APPENDIX 7: AUGUST 12, 2025 INFRINGEMENT CONTENTIONS APPLYING CLAIMS 1-5, 7, 8, 10, 12, AND 14 OF U.S. PATENT NO. 8,471,950 TO ACCUSED SAMSUNG '950 PRODUCTS

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
[1.pre] A signal processor comprising:	To the extent the preamble is construed as a limitation, each of the Accused Samsung '950 Products[1] incorporates a signal processr. For example, the Samsung Galaxy S25 is an apparatus that functions as the claimed signal processor. It is configured to process signals, such as images and/or video captured by its front and back cameras, and comprises one or more processors (e.g., a CPU, ISP, and/or DSP) to perform this processing:

MAIN CAMERA	Triple	50 MP, f/1.8, 24mm (wide), 1/1.56", 1.0µm, dual pixel PDAF, OIS
		10 MP, f/2.4, 67mm (telephoto), 1/3.94", 1.0µm, PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 13mm, 120˚ (ultrawide), 1/2.55" 1.4µm, Super Steady video
	Features	Best Face, LED flash, auto-HDR, panorama
	Video	8K@24/30fps, 4K@30/60fps, 1080p@30/60/120/240fps, 10-bit HDR, HDR10+, stereo sound rec., gyro-EIS
SELFIE CAMERA	Single	12 MP, f/2.2, 26mm (wide), 1/3.2", 1.12µm, dual pixel PDAF
	Features	HDR, HDR10+
	Video	4K@30/60fps, 1080p@30fps

[1] The Accused Samsung '950 Products include the Galaxy A Quantum, Galaxy A03s, Galaxy A04s, Galaxy A10s, Galaxy A11, Galaxy A12, Galaxy A12s (aka Nacho), Galaxy A13, Galaxy A13 5G, Galaxy A14, Galaxy A14 5G, Galaxy A20, Galaxy A20e, Galaxy A20s, Galaxy A21, Galaxy A21s, Galaxy A22, Galaxy A22s 5G, Galaxy A23, Galaxy A23 5G, Galaxy A24 4G, Galaxy A30, Galaxy A30s, Galaxy A32, Galaxy A32 5G, Galaxy A33 5G, Galaxy A34, Galaxy A36 5G, Galaxy A40, Galaxy A42 5G, Galaxy A50, Galaxy A50s, Galaxy A51, Galaxy A51 5G, Galaxy A51 5G UW, Galaxy A52, Galaxy A52 5G, Galaxy A53 5G, Galaxy A54 5G, Galaxy A60, Galaxy A70, Galaxy A70s, Galaxy A71, Galaxy A71 5G, Galaxy A71 5G UW, Galaxy A72, Galaxy A73 5G, Galaxy A8, Galaxy A8+, Galaxy A80, Galaxy A90 5G, Galaxy Fold, Galaxy Fold 5G, Galaxy Note10, Galaxy Note10 5G, Galaxy Note10 Lite, Galaxy Note10+, Galaxy Note10+ 5G, Galaxy Note20, Galaxy Note20 5G, Galaxy Note20 Ultra, Galaxy Note20 Ultra 5G, Galaxy Note9, Galaxy S10, Galaxy S10 5G, Galaxy S10 Lite, Galaxy S10+, Galaxy S10e, Galaxy S20, Galaxy S20 5G, Galaxy S205G UW, Galaxy S20 FE, Galaxy S20 FE 5G, Galaxy S20 Ultra, Galaxy S20 Ultra 5G, Galaxy S20+, Galaxy S20+ 5G, Galaxy S21 5G, Galaxy S21 FE 5G, Galaxy S21 Ultra 5G, Galaxy S21+ 5G, Galaxy S22 5G, Galaxy S22 Ultra 5G, Galaxy S22+ 5G, Galaxy S23, Galaxy S23 FE, Galaxy S23 Ultra, Galaxy S23+, Galaxy S24, Galaxy S24+, Galaxy S24 Ultra, Galaxy S25, Galaxy S25+, Galaxy S25 Ultra, Galaxy S9, Galaxy S9+, Galaxy Xcover FieldPro, Galaxy Xcover Pro, Galaxy Xcover6 Pro, Galaxy Z Flip, Galaxy Z Flip 5G, Galaxy Z Flip3 5G, Galaxy Z Flip4, Galaxy Z Flip5, Galaxy Z Flip6, Galaxy Z Fold2 5G, Galaxy Z Fold3 5G, Galaxy Z Fold4, Galaxy Z Fold5, Galaxy Z Fold6, Galaxy A15 5G, Galaxy A25 5G, Galaxy A35 5G, Galaxy Z Fold7, Galaxy Z Flip7, Galaxy Z Flip7 FE;; Galaxy Tab Active Pro, Galaxy Tab Active3, Galaxy Tab Active4 Pro, Galaxy Tab S5e, Galaxy Tab S6, Galaxy Tab S6 5G, Galaxy Tab S7, Galaxy Tab S7+, Galaxy Tab S8, Galaxy Tab S8 Ultra, Galaxy Tab S8+, Galaxy Tab S9, Galaxy Tab S9 FE, Galaxy Tab S9 FE+, Galaxy Tab S9 Ultra, Galaxy Tab S9+, Galaxy Tab A9+ 5G, Galaxy Tab Active5 5G, Galaxy Tab S10 Ultra, Galaxy Tab S10+, Galaxy Tab S10 FE+, Galaxy Tab S10 FE.. Each of these products infringe for the reasons and theories as set forth herein as they operate the same way by including the Camera application, CMOS image sensors, and/or ISPs that function in the same way as it pertains to the infringement theories shown herein. *See* Appendix 11.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	https://www.gsmarena.com/samsung_galaxy_s25-13610.php DISPLAY — Type: Dynamic LTPO AMOLED 2X, 120Hz, HDR10+, 2600 nits (peak) Size: 6.2 inches, 94.4 cm^2 (~91.1% screen-to-body ratio) Resolution: 1080 x 2340 pixels, 19.5:9 ratio (~416 ppi density) Protection: Corning Gorilla Glass Victus 2 Always-on display PLATFORM — OS: Android 15, up to 7 major Android upgrades, One UI 7 Chipset: Qualcomm SM8750-AB Snapdragon 8 Elite (3 nm) CPU: Octa-core (2x4.47 GHz Oryon V2 Phoenix L + 6x3.53 GHz Oryon V2 Phoenix M) GPU: Adreno 830 *Id.*

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

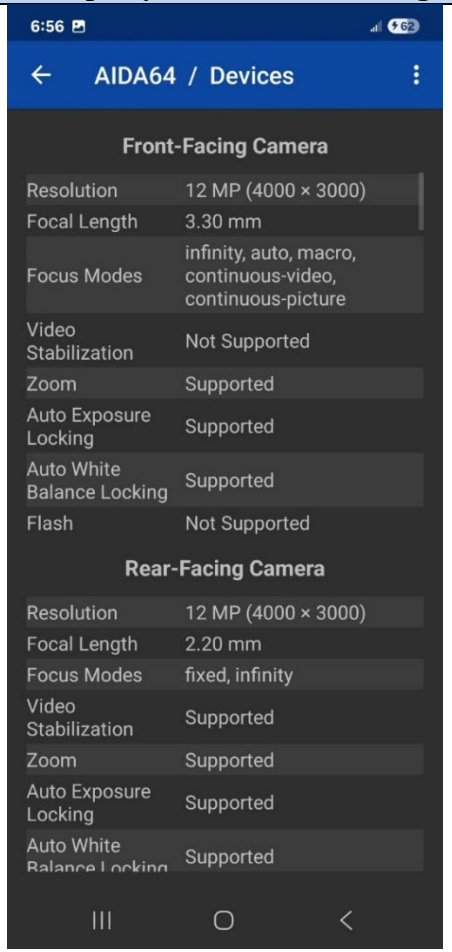
Specifications

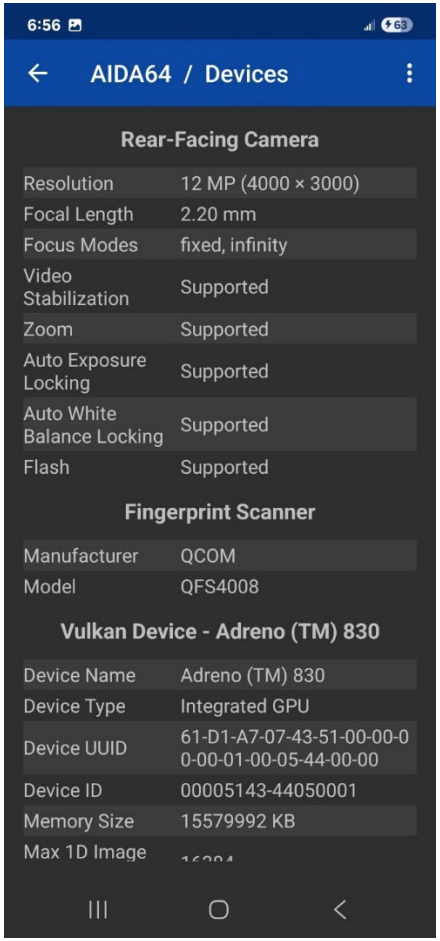
Qualcomm® Artificial Intelligence (AI) Engine	**GPU Name:** Qualcomm® Adreno™ **CPU Name:** Qualcomm® Oryon™ **Qualcomm® Hexagon™ Processor Features:** Qualcomm® Hexagon™ Scalar Accelerator, Qualcomm® Hexagon™ Tensor Accelerator, Qualcomm® Hexagon™ Vector eXtensions (HVX), Dedicated power delivery system, Micro Tile Inferencing, Hexagon Direct Link, Fused AI Accelerator architecture **Qualcomm® Sensing Hub Features:** Dual-core AI processor, Dual always-sensing cameras
CPU	**Name:** Qualcomm® Oryon™ **Architecture:** 64-bit **Clock Speed:** 4.47 GHz[1]
GPU	**Name:** Qualcomm® Adreno™ **APIs:** OpenGL® ES 3.2, Vulkan® 1.3, OpenCL™ 3.0 FP
Cellular Modem-RF	**Modem Name:** Snapdragon® X80 5G Modem-RF System **Peak Download Speed:** 10 Gbps **Peak Upload Speed:** 3.5 Gbps **Cellular Modem-RF Specs:** 8 carriers (mmWave), 2x2 MIMO (mmWave), 4x6 MIMO (Sub-6) **Performance Enhancement Technologies:** Qualcomm® Wideband Envelope Tracking, Qualcomm® 5G Ultra-Low Latency Suite, Qualcomm® 5G AI Processor Gen 2 with dedicated tensor accelerator, Qualcomm® Power RF Efficiency Suite, Qualcomm® 5G AI Suite Gen 3, Qualcomm® RF Uplink Optimization, Qualcomm® Smart Transmit™ Gen 5 technology, Qualcomm® 5G PowerSave Gen 5 **Cellular Technology:** 5G NR, Dynamic Spectrum Sharing (DSS), LTE, WCDMA, LAA, GSM/EDGE, EN-DC, CBRS, NR DC **Multi SIM:** Global 5G Multi-SIM, Dual SIM support Qualcomm® DSDA Gen 2 (Dual Data)

- https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform

- In addition, the AIDA64 Reports show that each of the Accused Samsung '950 Products contains a front-facing and rear-facing camera for recording video, and associated software, which in conjunction with one or more processors (e.g., CPU, ISP, or DSP) processes video.

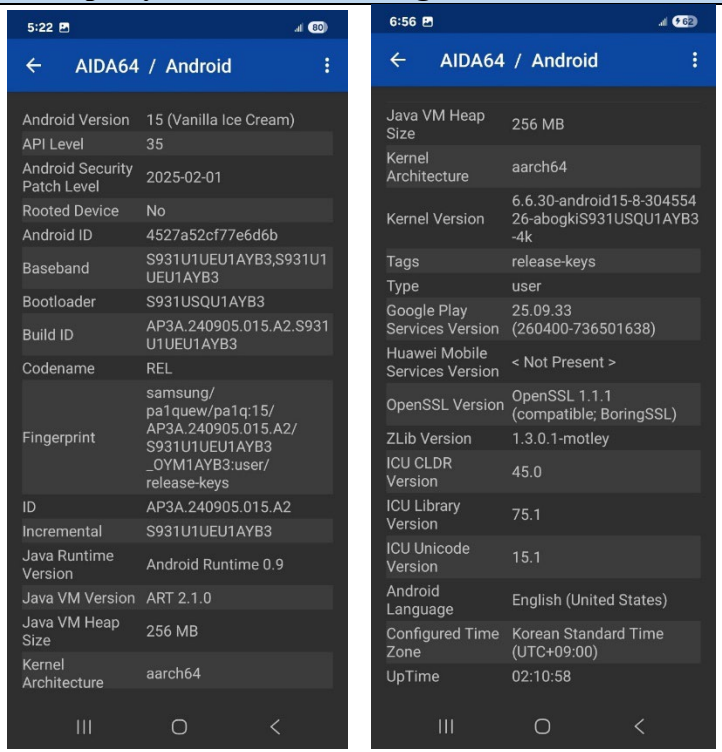
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement





(Screenshot of AIDA 64 Report – Camera)

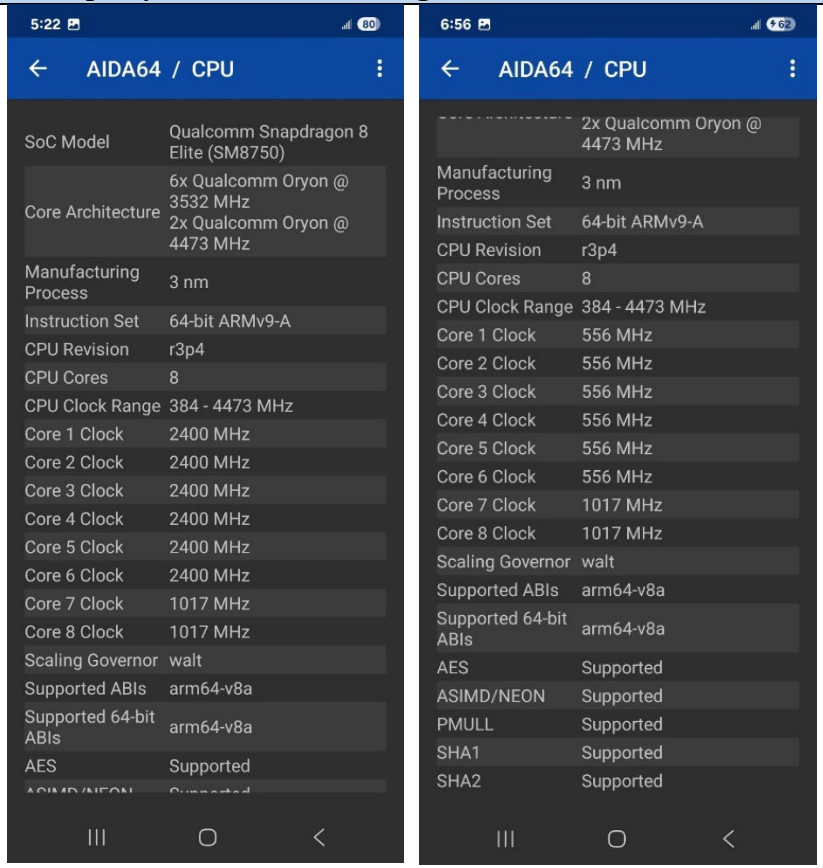
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



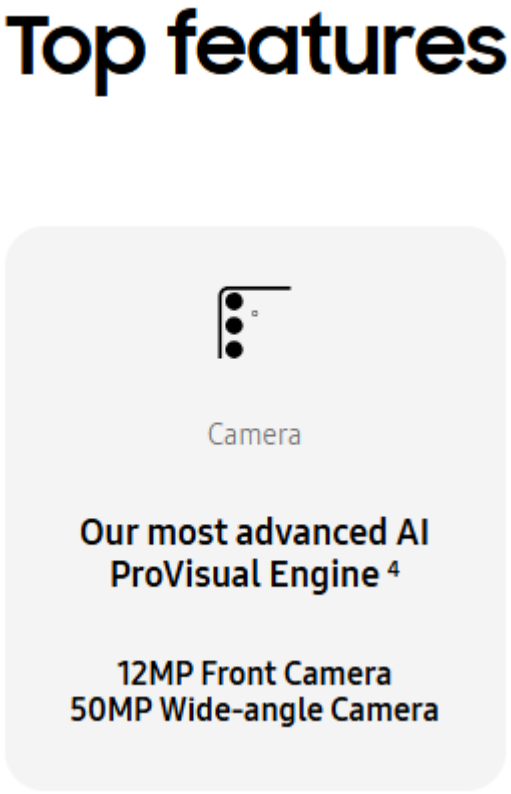
(Screenshot of AIDA 64 Report – Android)

The AIDA64 Reports and tech specs show that the Accused Samsung '950 Products contain one or more processors.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



(Screenshot of AIDA 64 Report – Processor)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 ProVisual Engine is now boosted by our powerful processor. Experience our advanced creative system for video and photo capturing, viewing and editing that you have to see to believe.[20] Shoot in improved 10-bit HDR for a stunning videography experience. Our advanced processor also delivers more precise noise removal meaning you won't have to worry about grainy night footage again.[3,4]

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Further, as an example, the Qualcomm Snapdragon 8 Elite Mobile Platform in the Samsung Galaxy S25 includes a processor for processing image signals:

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Introducing our most powerful processor, customized for Galaxy. With improved real-time ray tracing and Vulkan optimization, dive deep into the action with ultra-smooth gameplay thanks to Snapdragon® 8 Elite Mobile Platform for Galaxy.[21,22,23,24]

CPU	GPU	NPU
45 %	48 %	68 %
faster processing	improved graphics performance	faster AI performance

https://www.samsung.com/us/smartphones/galaxy-s25/

Powerhouse Qualcomm Oryon CPU defines a new mobile era

The first-in-mobile Qualcomm Oryon CPU delivers a 45% performance boost, 44% greater power efficiency, and the mobile industry's largest shared data cache. Our Qualcomm® Adreno GPU with newly sliced architecture achieves 40% enhanced performance and 40% improved efficiency. System-wide, experience an overall power savings of 27%.

Multimodal Gen AI at your fingertips

The Qualcomm® AI Engine boasts the fastest Qualcomm® Hexagon NPU, delivering a 45% AI performance improvement and 45% better performance per watt. Plus, multimodal Gen AI support and longer token inputs will help you become an expert on any topic.

AI-powered camera redefines photography

Our AI ISP is directly fused with the Qualcomm® Hexagon™ NPU to offer industry-leading camera features, like limitless Semantic Segmentation at 4K resolution. Plus, our on-device video object eraser, can remove unwanted elements from videos, while Insight AI provides real-time skin and sky adjustments to create more natural color and lighting in uncertain conditions.

Power and efficiency for revolutionary gaming

Mobile-first support for Unreal Engine 5's Nanite solution enables astonishing film-quality 3D environments in smartphone gaming—while maximizing efficiency. Plus, support for Unreal's Chaos Physics Engine delivers lifelike object interactions and simulations, even in complex scenes.

Studio-quality audio

Our Snapdragon Sound™ Technology Suite with Qualcomm® aptX™ Lossless Technology delivers up to 24-bit 48kHz bluetooth music streaming and up to 24-bit 96kHz Wi-Fi music streaming. Qualcomm® Expanded Personal Area Network (XPAN) technology enables whole-building untethered audio coverage -- aided by ultra-low power Wi-Fi 7.

Fully integrated, AI-enhanced connectivity

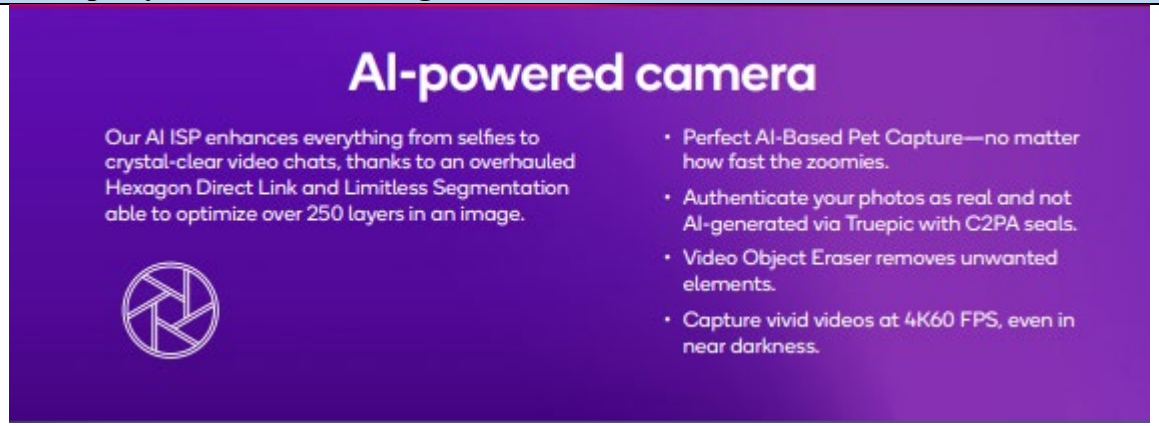
The Snapdragon X80 5G Modem-RF System with a dedicated AI tensor accelerator achieves multi-gigabit 5G speeds in more places with the first 4x6 MIMO solution, and 30% more accurate location positioning. And, our 40% more efficient Qualcomm® FastConnect™ 7900 Mobile Connectivity System is the first to integrate Wi-Fi ranging, Bluetooth® wireless technology, and UWB proximity technologies for object tracking, building access control, and more.

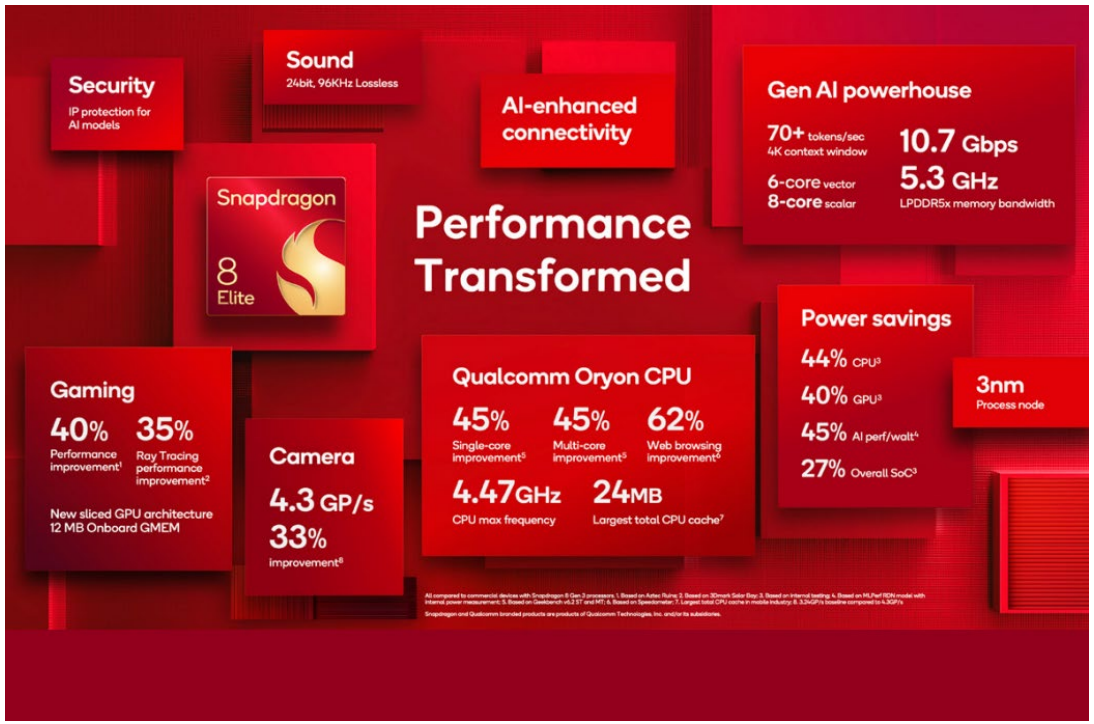
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

	• Our Qualcomm Spectra™ AI ISP features:
	  • Limitless Real-time Semantic Segmentation for photo/video frame
	  • Insight AI provides real-time skin and sky adjustments to create more natural color and lighting in uncertain conditions.
	  • Ultra-low Light video capture
	  • Video Object Eraser can remove unwanted elements from videos
	  • Real-time AI Relighting make you appear professional wherever you are
	  • Truepic photo capture with C2PA standard support lets you snap a photo with Truepic's cryptographic seal to prove the photo is real and not Gen AI
	
	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

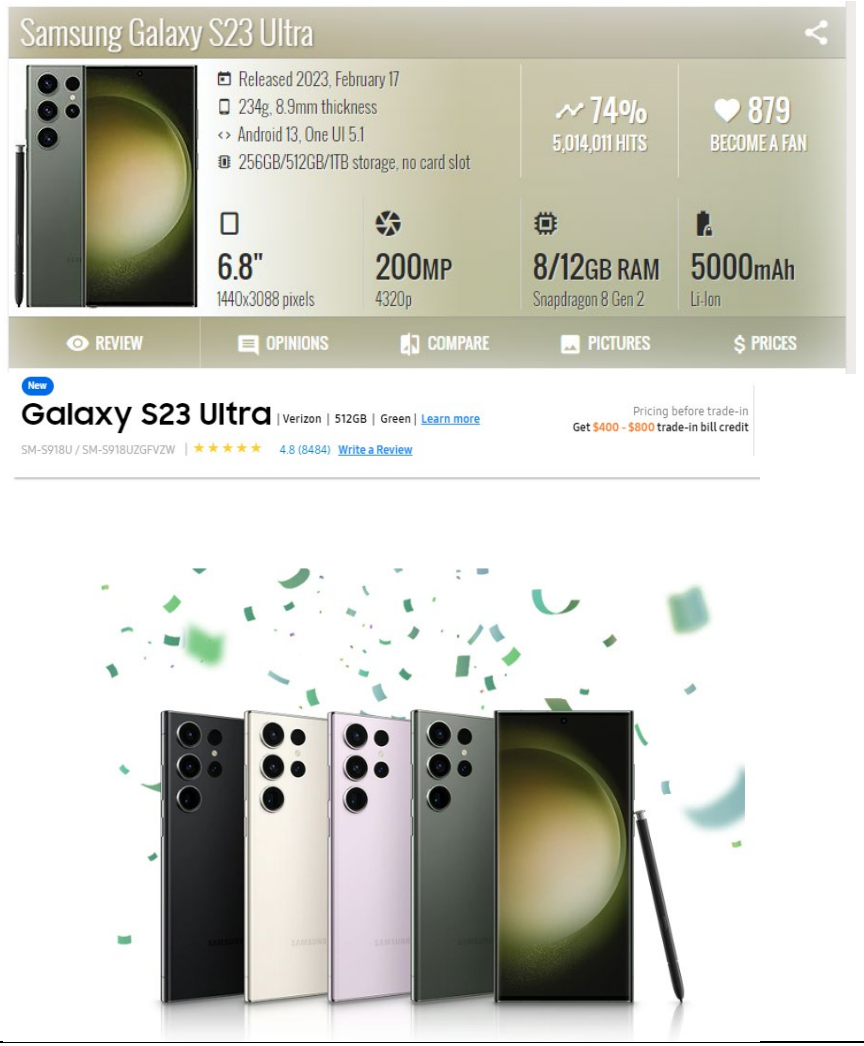
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



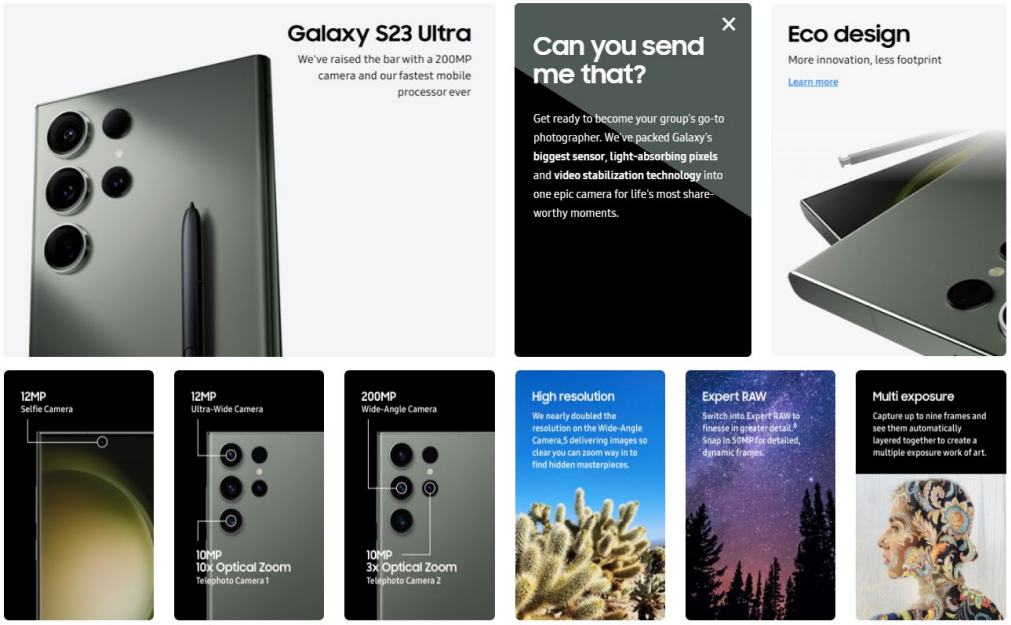


U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Camera Qualcomm Spectra™ Image Signal Processor • AI-ISP, Triple 18-bit ISPs Limitless real-time Semantic Segmentation photo and video processing Engine for Visual Analytics 4.0, including hardware acceleration for iToF depth sensors up to 4K 60 FPS Support for the latest HDR, DCG+VS, DCG, Staggered, QDOL, Less Blanking, and Multiframe HDR image sensors Support for triple video capture from HDR image sensors, with seamless switching between any HDR mode • Up to 48 MP triple camera @ 30 FPS with Zero Shutter Lag • Up to 108 MP single camera @ 30 FPS with Zero Shutter Lag • Up to 320-megapixel photo capture AI-based face detection, AI for 3A (auto-focus, autoexposure, and auto-white balance) Rec. 2020 color gamut photo and video capture Up to 10-bit color depth photo and video capture 10-bit HEIF: HEIC photo capture, HEVC video capture Google Ultra HDR photo capture Video capture HDR formats: HDR10+, HDR10, HLG, Dolby Vision 8K HDR video playback @ 60 FPS 4K video capture @ 120 FPS Slow-mo video capture at 1080p @ 480 FPS Hardware Bokeh Engine 2 for video capture (https://docs.qualcomm.com/bundle/publicresource/87-83196-1_REV_D_Snapdragon_8_Elite_Mobile_Platform_Product_Brief.pdf)

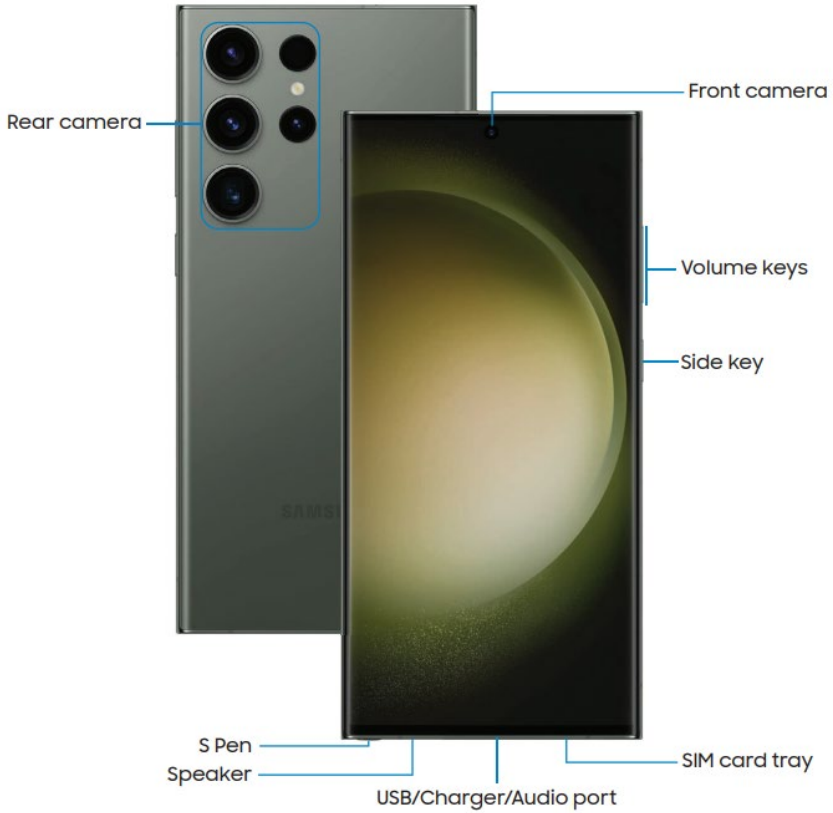
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Further, the Samsung Galaxy S25 includes a signal processor configured to execute an operating system: https://www.samsung.com/us/smartphones/galaxy-s25

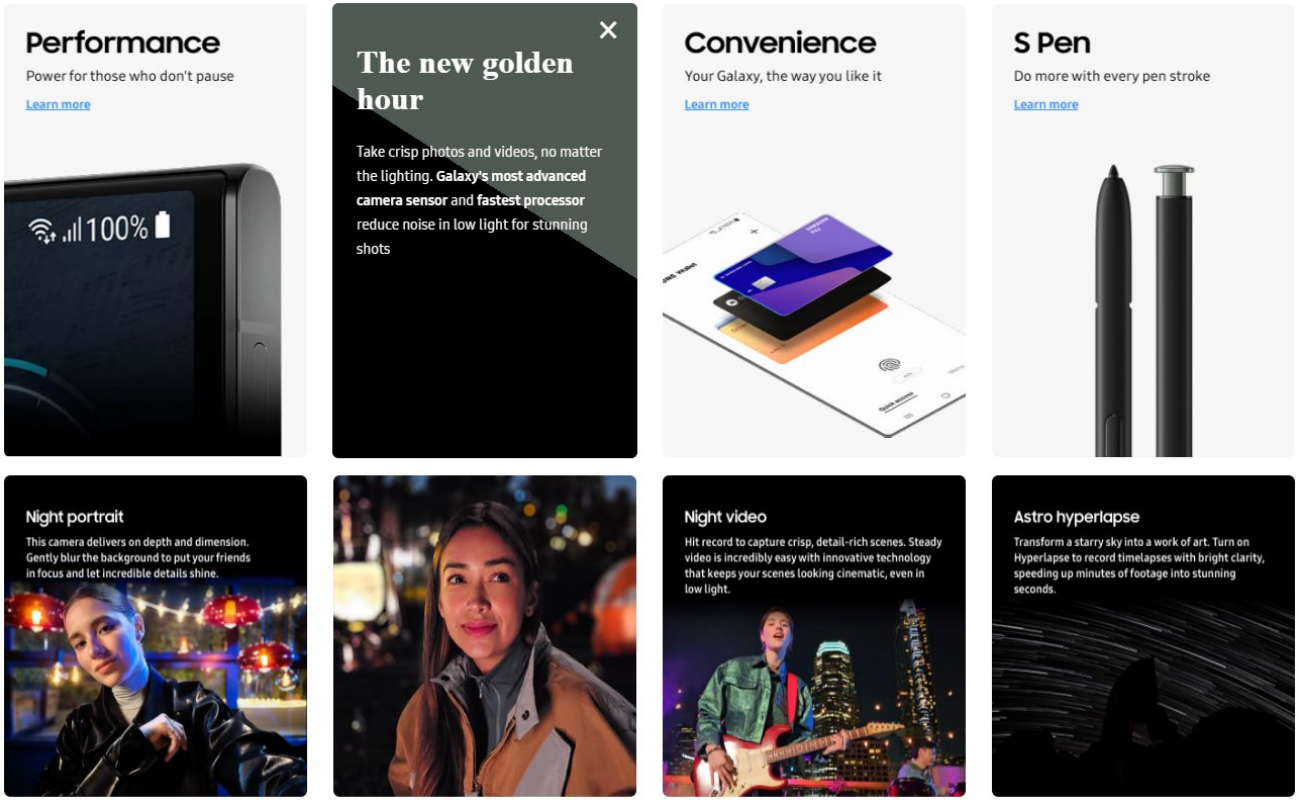
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Further, each of the Accused Samsung '950 Products includes a signal processer and cameras and is configured to run Camera2.java, which provides evidence of a signal processor: 

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU; https://www.gsmarena.com/samsung_galaxy_s23_ultra-12024.php.



MAIN CAMERA	Quad	200 MP, f/1.7, 24mm (wide), 1/1.3", 0.6µm, multi-directional PDAF, Laser AF, OIS
		10 MP, f/4.9, 230mm (periscope telephoto), 1/3.52", 1.12µm, Dual Pixel PDAF, OIS, 10x optical zoom
		10 MP, f/2.4, 70mm (telephoto), 1/3.52", 1.12µm, Dual Pixel PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 13mm, 120˚ (ultrawide), 1/2.55", 1.4µm, Dual Pixel PDAF, Super Steady video
	Features	LED flash, auto-HDR, panorama
	Video	8K@24/30fps, 4K@30/60fps, 1080p@30/60/240fps, 1080p@960fps, HDR10+, stereo sound rec., gyro-EIS
SELFIE CAMERA	Single	12 MP, f/2.2, 26mm (wide), Dual Pixel PDAF
	Features	Dual video call, Auto-HDR, HDR10+
	Video	4K@30/60fps, 1080p@30fps

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU; https://www.gsmarena.com/samsung_galaxy_s23_ultra-12024.php. Galaxy S23 Ultra 

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy S23 Ultra technical specifications; https://downloadcenter.samsung.com/content/UM/202302/20230228053129621/SAM_S911_S916_S918_EN_UM_OS13_020223_FINAL_AC_022023.pdf at 5.  Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU.

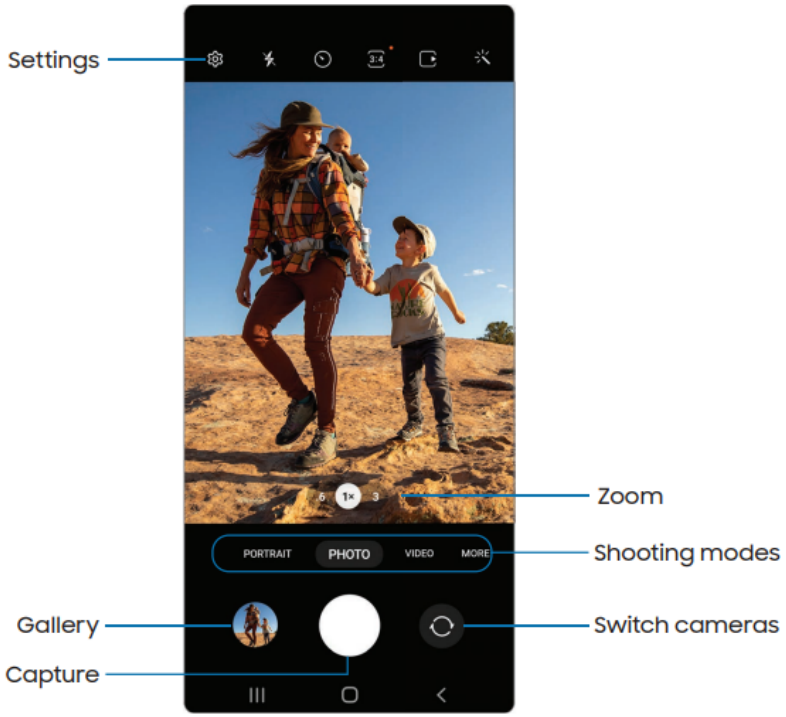
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Camera

Enjoy a full kit of pro lenses and pro-grade video modes and settings.

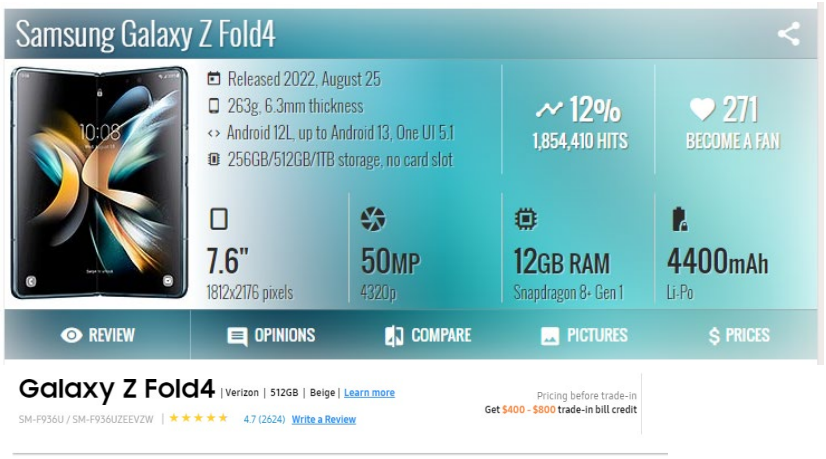
○ From Apps, tap Camera.

TIP Quickly press the **Side** key twice to open the Camera app.



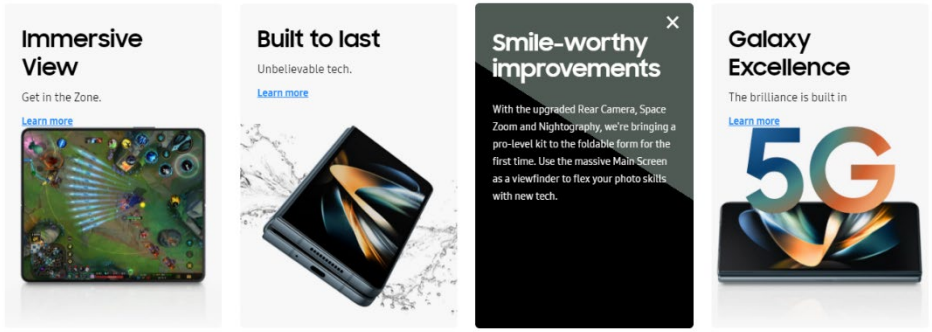
Galaxy S23 Ultra technical specification; https://downloadcenter.samsung.com/content/UM/202302/20230228053129621/SAM_S911_S916_S918_EN_UM_OS13_020223_FINAL_AC_022023.pdf at 58.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/; https://www.gsmarena.com/samsung_galaxy_z_fold4-11737.php.

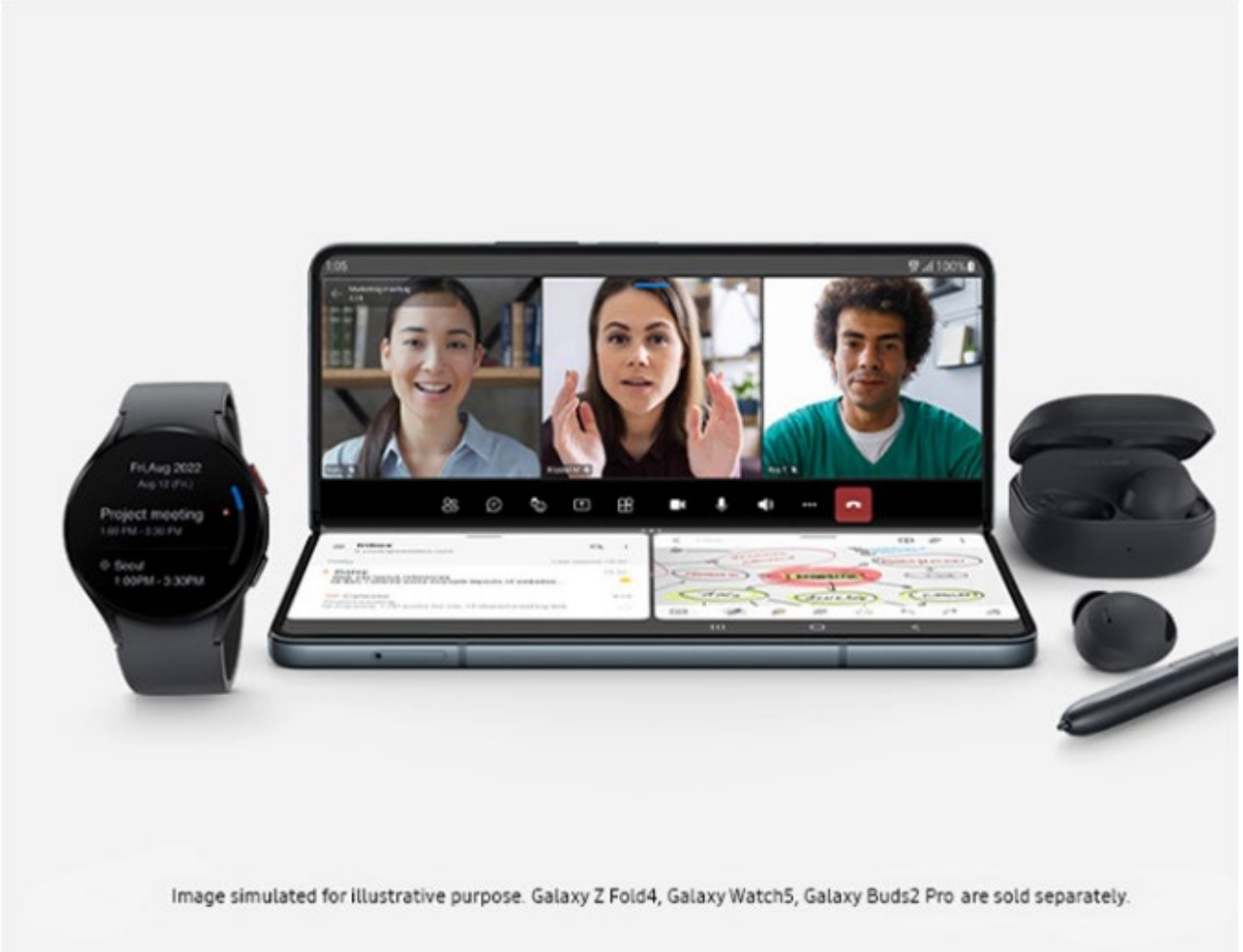
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

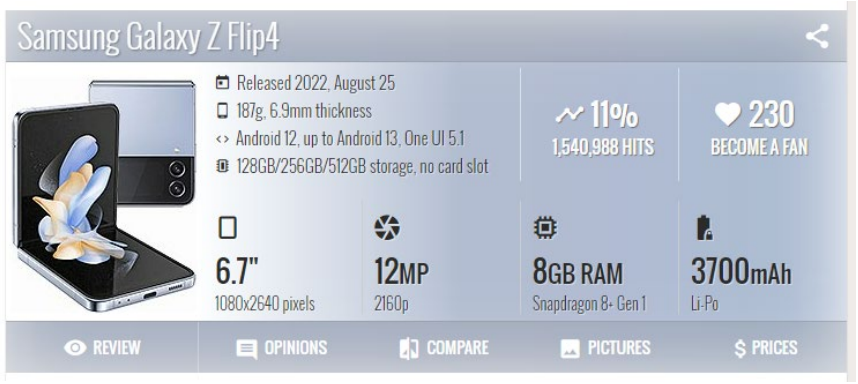
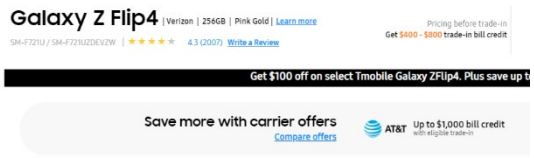


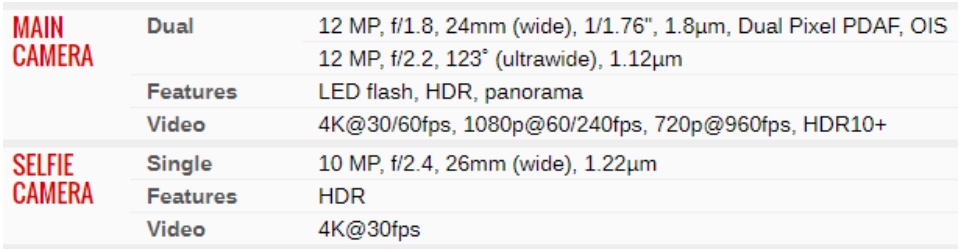
MAIN CAMERA	Triple	50 MP, f/1.8, 23mm (wide), 1.0µm, Dual Pixel PDAF, OIS
		10 MP, f/2.4, 66mm (telephoto), 1.0µm, PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 123°, 12mm (ultrawide), 1.12µm
	Features	LED flash, HDR, panorama
	Video	8K@24fps, 4K@60fps, 1080p@60/240fps (gyro-EIS), 720p@960fps (gyro-EIS), HDR10+
SELFIE CAMERA	Single	4 MP, f/1.8, 26mm (wide), 2.0µm, under display
		Cover camera:
		10 MP, f/2.2, 24mm (wide), 1/3", 1.22µm
	Features	HDR
	Video	4K@30/60fps, 1080p@30/60fps, gyro-EIS

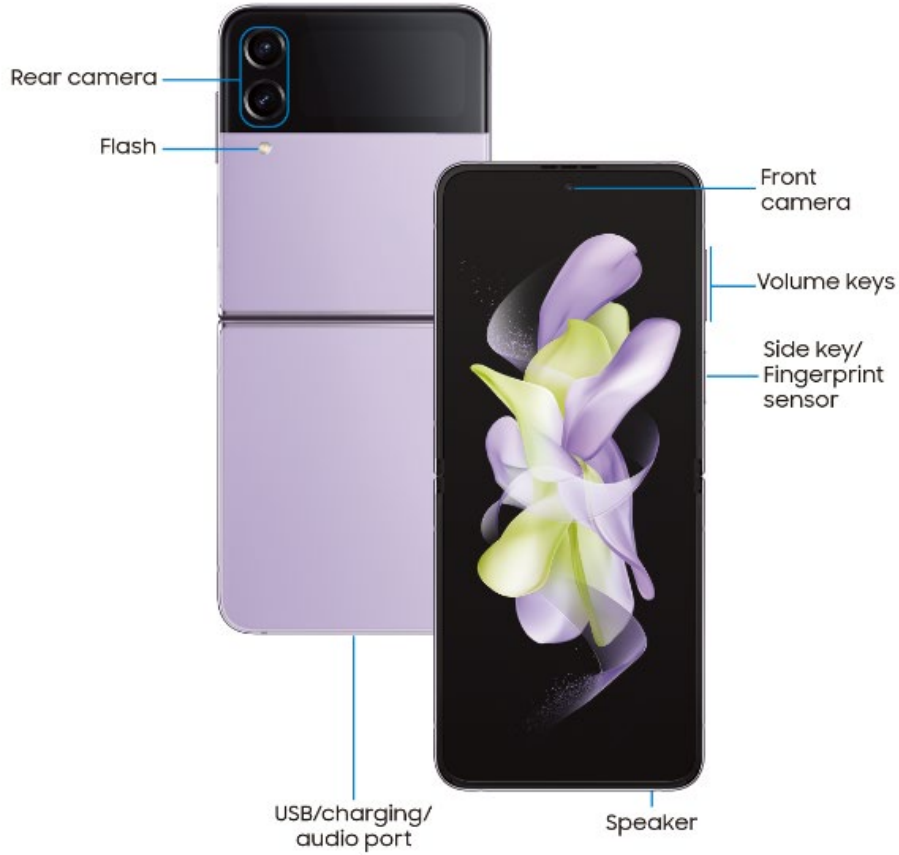
Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/; https://www.gsmarena.com/samsung_galaxy_z_fold4-11737.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Fold4 technical specification; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_fold4_d1e605.html.

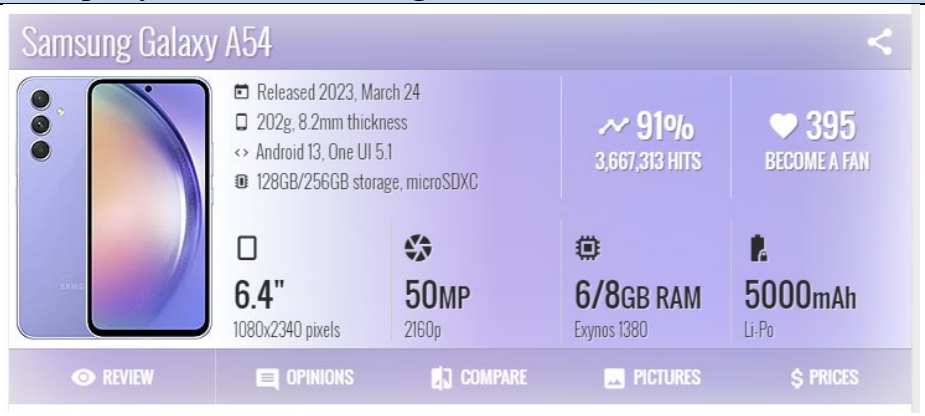
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/.

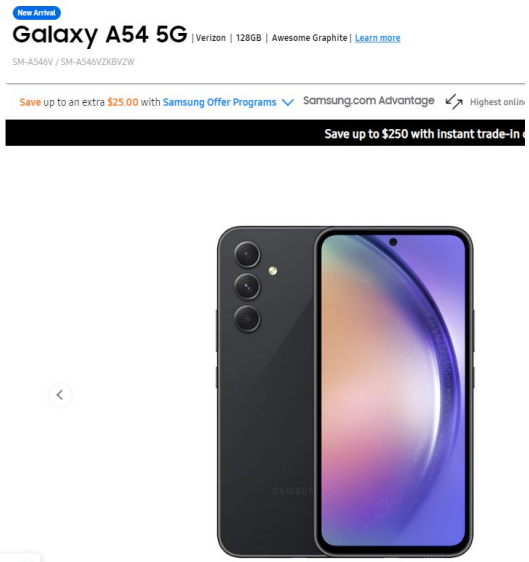
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy Z Fold4 technical specifications; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_fold4_camera_features_d1e3185.   Galaxy Z Flip4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-flip4/buy/galaxy-z-flip4-256gb-t-mobile-sm-f721uzdexau/; https://www.gsmarena.com/samsung_galaxy_z_flip4-11538.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Flip4 technical specifications; https://www.gsmarena.com/samsung_galaxy_z_flip4-11538.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy Z Flip4  Galaxy Z Flip4 technical specifications; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_flip4_d1e661.html.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement





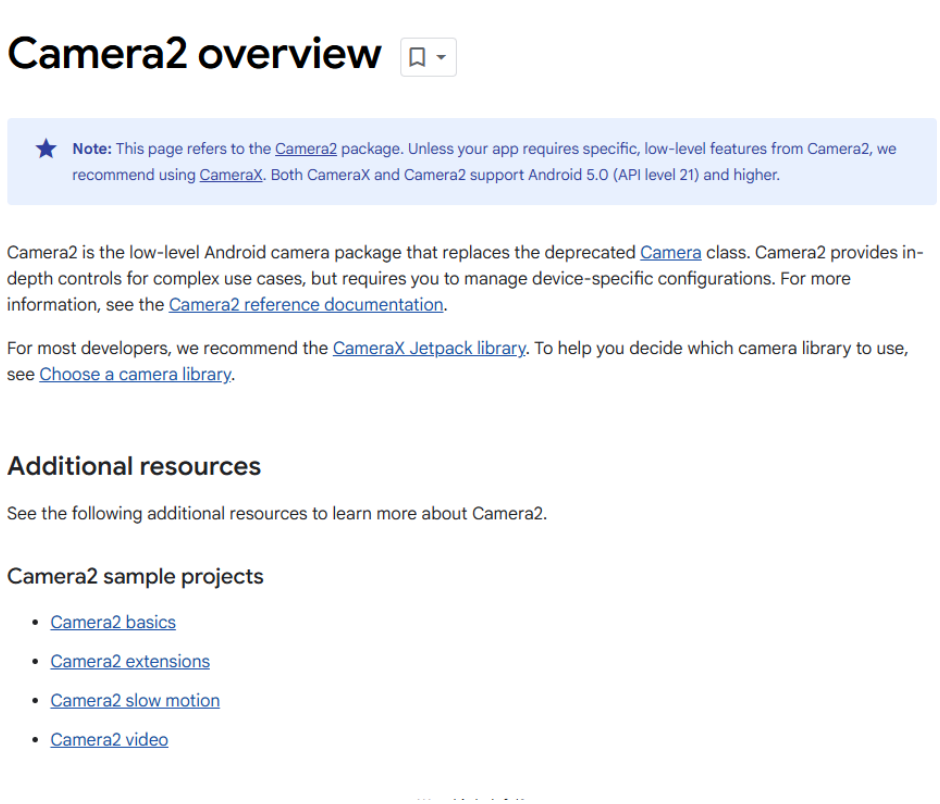
Galaxy A54 5G technical specifications; https://www.samsung.com/us/mobile/phones/galaxy-a54/buy/; https://www.gsmarena.com/samsung_galaxy_a54-12070.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

MAIN CAMERA	Triple	50 MP, f/1.8, (wide), 1/1.56", 1.0µm, PDAF, OIS
		12 MP, f/2.2, 123° (ultrawide), 1.12µm
		5 MP, f/2.4, (macro)
	Features	LED flash, panorama, HDR
	Video	4K@30fps, 1080p@30/60fps, 720p@480fps
SELFIE CAMERA	Single	32 MP, f/2.2, 26mm (wide), 1/2.8", 0.8µm
	Video	4K@30fps, 1080p@30/60fps

Samsung Galaxy A54 5G technical specifications; Galaxy A54 5G, 128GB (Unlocked) Phones - SM-A546UZKBXAA | Samsung US; https://www.gsmarena.com/samsung_galaxy_a54-12070.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy A54 5G Galaxy A54 5G technical specifications; https://downloadcenter.samsung.com/content/UM/202304/20230407022332214/SAM_A546_EN_UM_OS13_040523_FINAL.pdf at 5.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 (https://developer.android.com/media/camera/camera2)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Android Developers > Develop > API reference

Was this helpful?

android.hardware.camera2

Added in API level 21

Kotlin | **Java**

The android.hardware.camera2 package provides an interface to individual camera devices connected to an Android device. It replaces the deprecated `Camera` class.

This package models a camera device as a pipeline, which takes in input requests for capturing a single frame, captures the single image per the request, and then outputs one capture result metadata packet, plus a set of output image buffers for the request. The requests are processed in-order, and multiple requests can be in flight at once. Since the camera device is a pipeline with multiple stages, having multiple requests in flight is required to maintain full framerate on most Android devices.

To enumerate, query, and open available camera devices, obtain a `CameraManager` instance.

Individual `CameraDevices` provide a set of static property information that describes the hardware device and the available settings and output parameters for the device. This information is provided through the `CameraCharacteristics` object, and is available through `getCameraCharacteristics(String)`

To capture or stream images from a camera device, the application must first create a `camera capture session` with a set of output Surfaces for use with the camera device, with `createCaptureSession(SessionConfiguration)`. Each Surface has to be pre-configured with an `appropriate size and format` (if applicable) to match the sizes and formats available from the camera device. A target Surface can be obtained from a variety of classes, including `SurfaceView`, `SurfaceTexture` via `Surface(SurfaceTexture)`, `MediaCodec`, `MediaRecorder`, `Allocation`, and `ImageReader`.

Generally, camera preview images are sent to `SurfaceView` or `TextureView` (via its `SurfaceTexture`). Capture of JPEG images or RAW buffers for `DngCreator` can be done with `ImageReader` with the `JPEG` and `RAW_SENSOR` formats. Application-driven processing of camera data in OpenGL ES, or directly in managed or native code is best done through `SurfaceTexture`, or `ImageReader` with a `YUV_420_888` format, respectively.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	By default, YUV-format buffers provided by the camera are using the JFIF YUV<->RGB transform matrix (equivalent to Rec.601 full-range encoding), and after conversion to RGB with this matrix, the resulting RGB data is in the sRGB colorspace. Captured JPEG images may contain an ICC profile to specify their color space information; if not, they should be assumed to be in the sRGB space as well. On some devices, the output colorspace can be changed via `setColorSpace(Named)`. Note that although the YUV->RGB transform is the JFIF matrix (Rec.601 full-range), due to legacy and compatibility reasons, the output is in the sRGB colorspace, which uses the Rec.709 color primaries. Image processing code can safely treat the output RGB as being in the sRGB colorspace. The application then needs to construct a `CaptureRequest`, which defines all the capture parameters needed by a camera device to capture a single image. The request also lists which of the configured output Surfaces should be used as targets for this capture. The CameraDevice has a `factory method` for creating a `request builder` for a given use case, which is optimized for the Android device the application is running on. Once the request has been set up, it can be handed to the active capture session either for a one-shot `capture` or for an endlessly `repeating` use. Both methods also have a variant that accepts a list of requests to use as a burst capture / repeating burst. Repeating requests have a lower priority than captures, so a request submitted through `capture()` while there's a repeating request configured will be captured before any new instances of the currently repeating (burst) capture will begin capture. After processing a request, the camera device will produce a `TotalCaptureResult` object, which contains information about the state of the camera device at time of capture, and the final settings used. These may vary somewhat from the request, if rounding or resolving contradictory parameters was necessary. The camera device will also send a frame of image data into each of the output `Surfaces` included in the request. These are produced asynchronously relative to the output CaptureResult, sometimes substantially later.

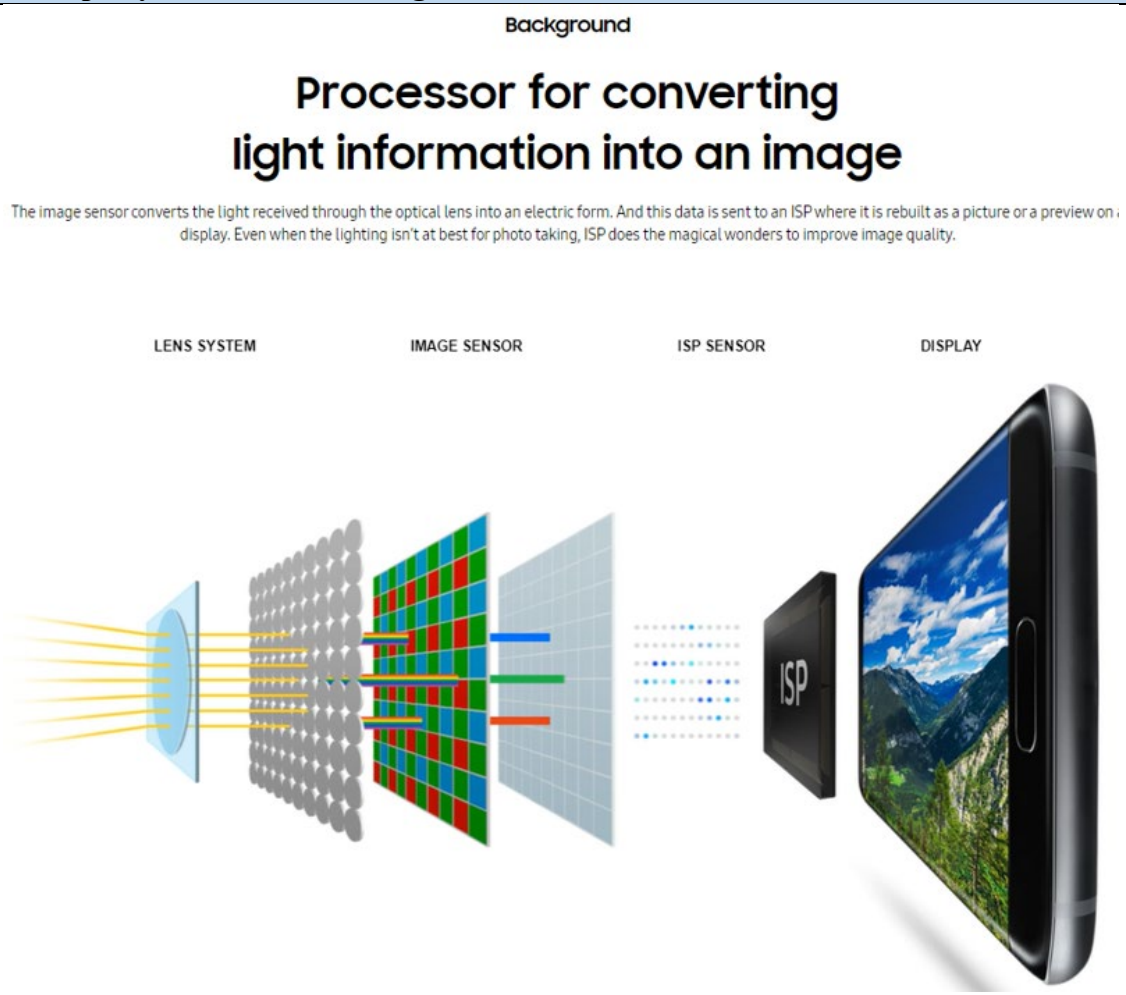
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

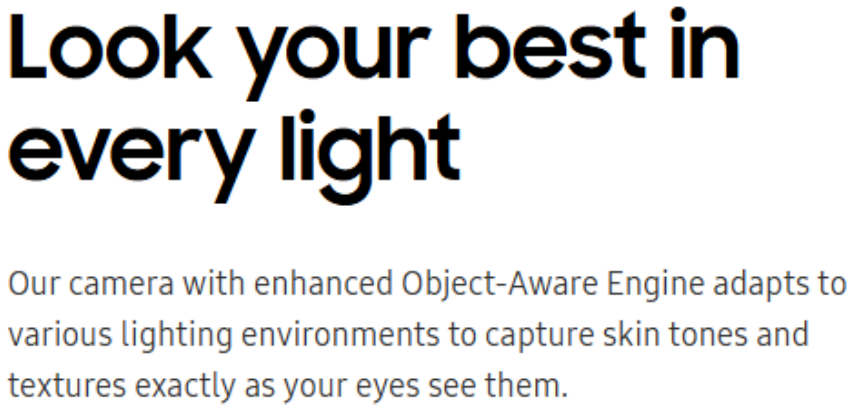
Classes

CameraCaptureSession	A configured capture session for a `CameraDevice`, used for capturing images from the camera or reprocessing images captured from the camera in the same session previously.
CameraCaptureSession.CaptureCallback	A callback object for tracking the progress of a `CaptureRequest` submitted to the camera device.
CameraCaptureSession.StateCallback	A callback object for receiving updates about the state of a camera capture session.
CameraCharacteristics	The properties describing a `CameraDevice`.
CameraCharacteristics.Key<T>	A `Key` is used to do camera characteristics field lookups with `CameraCharacteristics.get`.
CameraConstrainedHighSpeedCaptureSession	A constrained high speed capture session for a `CameraDevice`, used for capturing high speed images from the `CameraDevice` for high speed video recording use case.
CameraDevice	The CameraDevice class is a representation of a single camera connected to an Android device, allowing for fine-grain control of image capture and post-processing at high frame rates.
CameraDevice.CameraDeviceSetup	CameraDeviceSetup is a limited representation of `CameraDevice` that can be used to query device specific information which would otherwise need a CameraDevice instance.
CameraDevice.StateCallback	A callback objects for receiving updates about the state of a camera device.
CameraExtensionCharacteristics	Allows clients to query availability and supported resolutions of camera extensions.
CameraExtensionSession	A camera capture session that enables access to device-specific camera extensions, which often use multi-frame bursts and sophisticated post-process algorithms for image capture.
CameraExtensionSession.ExtensionCaptureCallback	A callback object for tracking the progress of a `CaptureRequest` submitted to the camera device.
CameraExtensionSession.StateCallback	A callback object for receiving updates about the state of a camera extension session.

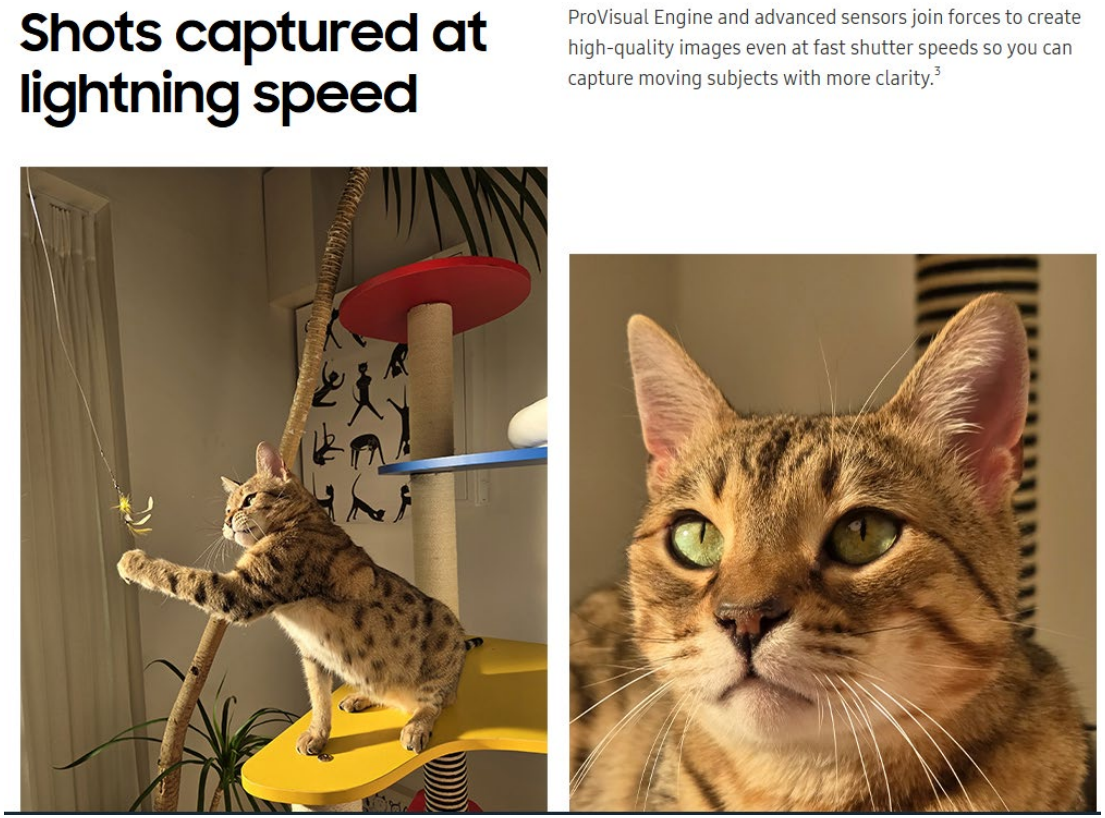
See https://developer.android.com/reference/android/hardware/camera2/package-summary

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
[1.a] a feature detection unit which detects a position where features of each pixel of an input picture signal have changed;	In each of the Accused Samsung '950 Products, the feature detection unit is comprised of one or more processors (e.g., a CPU, ISP, and/or DSP) , which are configured to detect a position where features of each pixel of an input picture signal have changed. As a nonlimiting example, each of the Accused Samsung '950 Products includes one or more image sensors associated with the plurality of cameras as front-facing and/or rear-facing cameras, which alone or in conjunction with other features and/or components discussed in this claim chart, allows each of the Accused Samsung '950 Products to convert light associated with an image into a digital signal representing the image as pixels. For example, each of the Accused Samsung '950 Products includes one or more image sensors that convert light received through optical lens into an electronic signal, which is sent to one or more image signal processors (ISP) where the electronic signal is rebuilt as a picture or a preview on a display. *See e.g.*, https://semiconductor.samsung.com/us/solutions/technology/image-processing/.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Accused Samsung '0 Products provide evidence of one or more image sensors converting light into a digital signal, https://semiconductor.samsung.com/us/solutions/technology/image-processing/.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	As an example of feature detection incorporated in or performed by the signal processor, the signal processor is configured to detect skin tones and textures in various lighting environments.  https://www.samsung.com/us/smartphones/galaxy-s25/ As another example of feature detection incorporated in or performed by the signal processor, the signal processor, in combination with one or more sensors, is configured to detect moving objects or subjects.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



https://www.samsung.com/us/smartphones/galaxy-s25/

As another example of feature detection incorporated in or performed by the signal processor, the signal processor is configured to detect different regions in an image by performing segmentation of a photo or video frame. For example, the signal processor performs segmentation to detect one or more features including faces, natural skin, hair, clothing, objects, and backgrounds.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

	• Our Qualcomm Spectra™ AI ISP features:
	  • Limitless Real-time Semantic Segmentation for photo/video frame
	  • Insight AI provides real-time skin and sky adjustments to create more natural color and lighting in uncertain conditions.
	  • Ultra-low Light video capture
	  • Video Object Eraser can remove unwanted elements from videos
	  • Real-time AI Relighting make you appear professional wherever you are
	  • Truepic photo capture with C2PA standard support lets you snap a photo with Truepic's cryptographic seal to prove the photo is real and not Gen AI
	
	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

AI-powered camera redefines photography

Infuse brilliance into mobile capture with our AI ISP, enhancing everything from selfies to crystal-clear video chats thanks to an overhauled Hexagon Direct Link. The first AI-powered Limitless Segmentation recognizes and enhances virtually anything in the frame, including faces, hair, clothing, objects, backgrounds, and beyond. Even furry friends appear crisp and cute—no matter how fast the zoomies—thanks to AI-Based Pet Capture.

- Our powerful AI ISP is deeply integrated with the Hexagon NPU for enhanced, intuitive capture.
- Limitless Segmentation can segment an image in over 250 layers, each optimized to perfection.
- Real-time Insight AI captures and enhances natural skin and sky tones even in the most challenging conditions.
- Truepic with C2PA adds cryptographic seals so you can authenticate your photos as real and not AI-generated—now including videos and audio recordings.
- Video Object Eraser can remove unwanted elements from video footage—on-device.
- Capture vivid videos at 4K60 FPS, even in near darkness.

(https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Snapdragon-8-Elite-Platform-Product-Brief.pdf)

Let's dive deeper into why Snapdragon 8 Elite is a game-changer:

- **Incredible power:** Experience a 45% boost in performance with the Qualcomm Oryon CPU, giving you lightning-fast apps and incredible multitasking.[1]
- **AI at your fingertips:** The Qualcomm® Hexagon™ NPU increases AI performance by 45%, handling everything from voice commands to image prompts. Your device is ready to adapt to your every move.
- **Photography, reimagined:** With features like 4K Semantic Segmentation, Video Object Eraser, and real-time AI lighting adjustments, the Snapdragon 8 Elite camera tech turns your mobile photos into pro-level masterpieces.

https://www.qualcomm.com/snapdragon/news/snapdragon-8-elite--the-power-behind-the-name

As additional examples of feature detection, the Accused Samsung '950 Products include AI camera detection/AI Optimizer for detecting features such as text, foliage, fireworks, faces, food, moon etc

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	to optimize the photograph and/or to "fill in the photo's missing part." If you're unsure how to edit a photo or video in the Gallery app, let AI Edit Suggestion help you out. This feature lets you move and delete unwanted objects in order to create an entirely new image. You can also use additional options such as remastering, colorizing, removing reflections, and adding portrait effects to transform and elevate your photos and videos. You can learn more about **AI Edit suggestions** using our guide. Generative edit is an AI editing tool that lets you customize your images. Just find your desired image in the Gallery app, tap the **Photo Assist** icon (the three stars), and then tap or draw around an object in the photo you'd like to adjust. You can move the object around to another part of the photo. When you tap **Generate**, AI will fill in the photo's missing parts. **Note:** Generative edit requires an internet connection and will resize photos to 12MP. Drawing Assist lets you bring your drawings to life. You can create AI sketches using Air command, Samsung Notes, Gallery, and the AI Select feature in the Edge panel. Portrait Studio on the Z Fold6 and Z Flip6 lets you add extra flair to your selfies. Select your desired selfie in the Gallery app, then tap the **Photo Assist** icon (the stars), and then tap **Generative portrait** on the image. You can select from the available styles at the bottom of the screen, and then tap **Generate** to create a new image. Live Effects will bring your photos to life with animations on the Z Fold6 and Z Flip6. Select a photo in the Gallery app, then swipe up to view more details, and then tap **3D photo**. AI will generate the photo's effects. You may see a zooming motion, a panning motion, or a swivel motion. https://www.samsung.com/us/support/answer/ANS10000753/ **Use AI editing tools in Gallery on your Galaxy phone or tablet** The new editing features on select **Galaxy phones and tablets** will transform your favorite photos into masterpieces! Thanks to Galaxy AI, you can use features like Generative edit and Edit suggestions to move objects within your photos and automatically receive enhancement recommendations. You can also use the Galaxy Enhance-X app to take things further with more editing options that include blur removal and brightness adjustment.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	https://www.samsung.com/us/support/answer/ANS10000753/ Further, the Accused Samsung '950 Products include a detector to detect pattern portions to perform "Generative edit," provide "Edit suggestions," implement Portrait Studio, and/or generate photo effects. **Use Generative edit** **Note** Generative edit is available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, Tab S10, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8. Generative edit allows you to move or delete objects from your pictures in order to create an entirely new image. Galaxy AI will then fill in the background and any missing portions.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Generative edit allows you to move or delete objects from your pictures in order to create an entirely new image. Galaxy AI will then fill in the background and any missing portions. 1 Navigate to and open the **Gallery** app, and then select a picture you'd like to edit. 2 Tap the **Edit** icon (the pencil), and then tap the **Generative edit** icon (the blue circle with three stars). **Note**: You may be required to tap **OK** on the prompt. 3 Using your finger, outline your desired object. Tap **Deselect** to start over if needed. 4 Next, touch and hold the outlined object, and then drag it into a different part of the image. Tap **Return** (the back arrow) to move the object back to its original position, or tap **Remove** (the eraser icon) to erase the object. Repeat this process to move or remove additional objects. 5 If needed, adjust the **slider** at the bottom of the screen to straighten the picture. 6 When you're finished, tap **Generate**. Galaxy AI will fill in the image's background and adjust the objects that have been moved. 7 Touch and hold **View original** to compare the original image with the newly generated image. 8 When you're finished, tap **Done**, and then tap **Save as copy** to save the image. https://www.samsung.com/us/support/answer/ANS10000934/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Use Edit suggestions

Note

Edit suggestions are available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, A16 5G, A26 5G, A35 5G, A36 5G, A54 5G, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8.

Galaxy AI will analyze your pictures and provide editing suggestions to enhance them! The individual suggestion will vary depending on the image, or there may not be any suggestions at all.

1 Navigate to and open the **Gallery** app, and then select a picture you'd like to edit.

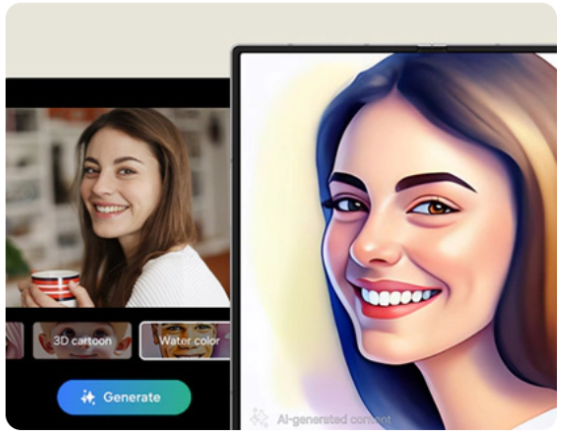
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	- **Pro**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while taking pictures. - **Pro video**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while recording videos. Samsung Galaxy S25 User Manual at 43. (https://downloadcenter.samsung.com/content/UM/202502/20250222040501249/SAM_S931_S936_S938_EN_UG_OS15_012425_FINAL_AC_02072025.pdf)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Use Portrait Studio

Note

Portrait Studio is available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, Tab S10, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8.



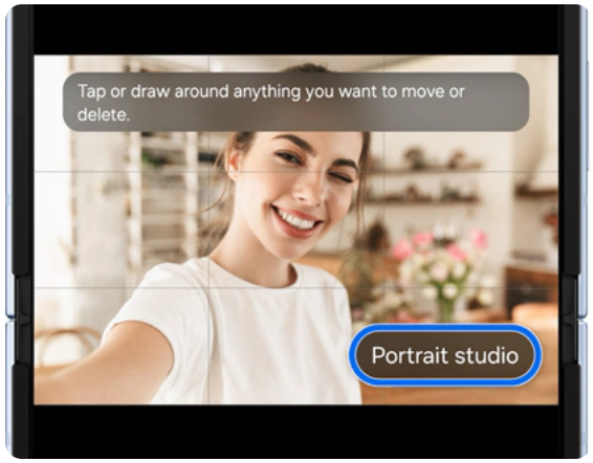
After you've taken a selfie, you can add some extra flair to it with Portrait Studio.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

After you've taken a selfie, you can add some extra flair to it with Portrait Studio.

1 Open the **Gallery** app, and then find and select your desired selfie.

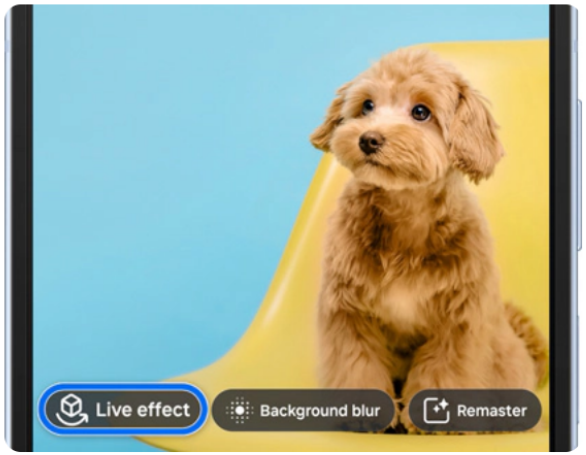
2 Tap the **Photo Assist** icon (the stars), and then tap **Generative portrait** on the image.



3 Select from the available styles at the bottom of the screen, such as Comic, 3D cartoon, or Watercolor.

4 Then, tap **Generate**.

https://www.samsung.com/us/support/answer/ANS10000934/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Live Effect will bring your photos to life with animations. The effect may differ depending on the photo. 1 Open the **Gallery** app, and then find and select a photo. 2 Swipe up to view more details, and then tap **3D photo** on the image.  3 AI will generate the photo's effects. You may see a zooming motion, a panning motion, or a swivel motion. 4 You can share the generated photo by tapping **Share** at the bottom of the screen. https://www.samsung.com/us/support/answer/ANS10000753/ Further, the Accused Samsung '950 Products include a Scene Optimizer to perform feature detection and corrections.

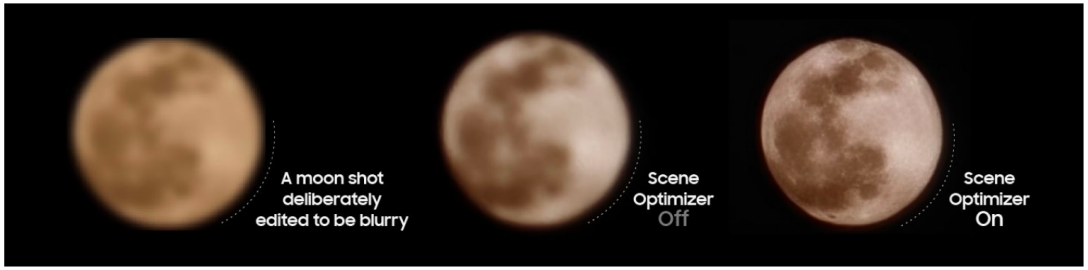
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	How Samsung Galaxy Cameras Combine Super Resolution Technologies With AI Technology to Produce High-Quality Images of the Moon Samsung is committed to delivering best-in-class camera experiences in all conditions. Since the introduction of the Galaxy S10, the Samsung Galaxy series has harnessed artificial intelligence (AI) technologies in its cameras to help users capture every epic moment anytime, anywhere. As part of this, Samsung developed the Scene Optimizer feature, a camera functionality which uses advanced AI to recognize objects and thus deliver the best results to users. Since the introduction of the Galaxy S21 series, Scene Optimizer has been able to recognize the moon as a specific object during the photo-taking process, and applies the feature's detail enhancement engine to the shot. When you're taking a photo of the moon, your Galaxy device's[1] camera system will harness this deep learning-based AI technology, as well as multi-frame processing in order to further enhance details. Read on to learn more about the multiple steps, processes and technologies that go in to delivering high-quality images of the moon.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Understanding Super Resolution and Scene Optimizer

In order to take a clear photo of the moon, Galaxy cameras harness Super Resolution to synthesize more than 10 images taken at 25x zoom or higher. The image taken at 25x zoom or above needs to eliminate noise and enhance clarity and other details.

Super Resolution technology helps produce images through multi-frame composition. When Scene Optimizer is turned on and the moon has been recognized as an object, the camera will deliver users a bright and clear image through the detail enhancement engine of Scene Optimizer on top of the Super Resolution technology.

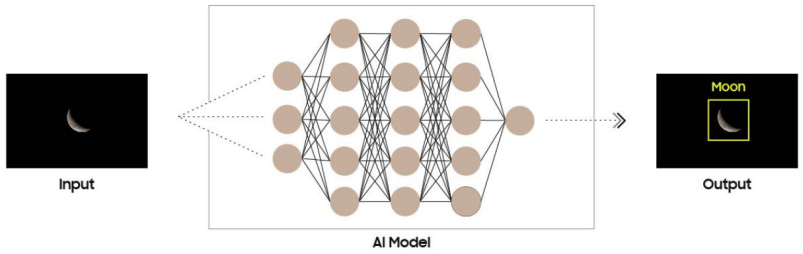


AI Deep Learning for Moon Object Recognition

The engine for recognizing the moon was built based on a variety of moon shapes and details, from full through to crescent moons, and is based on images taken from our view from the Earth.

It uses an AI deep learning model to detect the presence of the moon and identify the area it occupies – as denoted by the square box - in the relevant image. Once the AI model has completed its learning, it can detect the area occupied by the moon even in images that were not used in training.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



However, the moon will not be properly recognized by the camera and Scene Optimizer technology if it is obscured by clouds, or if the moon object itself is the side that is not visible from the Earth.

https://www.samsungmobilepress.com/feature-stories/how-samsung-galaxy-cameras-combine-super-resolution-technologies-with-ai-technology-to-produce-high-quality-images-of-the-moon/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

The Brightness Control Process

Once the device has recognized the moon after zooming in, it will control the brightness of the display in order to present the moon more clearly while maintaining optimal brightness.

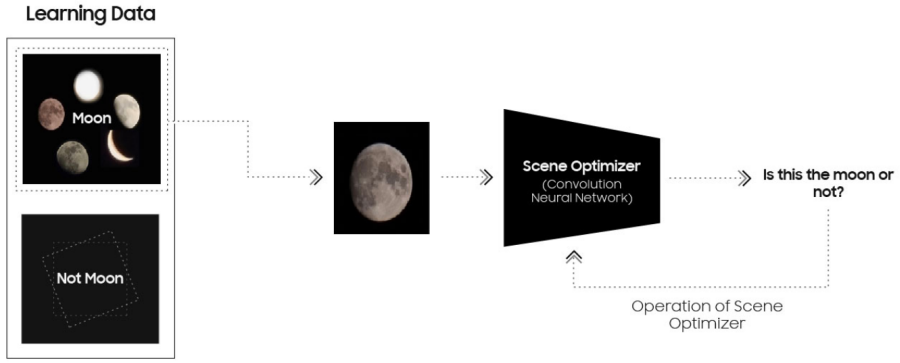
Accordingly, when users take photos of the moon at early evening time, the sky around the moon will appear darker than the actual sky color because the device will darken the object background brightness in order to help make the moon appear more clearly. Once your device recognizes the moon, it will continuously adjust focus to stay directly on the moon.

Capturing the Most Stable Images Possible

Samsung introduced the Zoom Lock feature, which automatically reduces the effects of a shaking device without the need for a tripod. Combining OIS and VDIS technologies, Zoom Lock is able to minimize the image blur that can be caused by shaking hands and helps users take truly epic moon shots.

While zooming in and touching the display or maintaining a focus on the moon for longer than 1.5 seconds, the Zoom Lock feature will be automatically activated. The border line of the zoom map on the upper right side of the screen will change from white to yellow, and the moon will be fixed on the display.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Next, the camera takes multiple pictures and then synthesizes them into a single, bright image with reduced noise.

After Multi-frame Processing has taken place, Galaxy camera further harnesses Scene Optimizer's deep-learning-based AI detail enhancement engine to effectively eliminate remaining noise and enhance the image details even further.

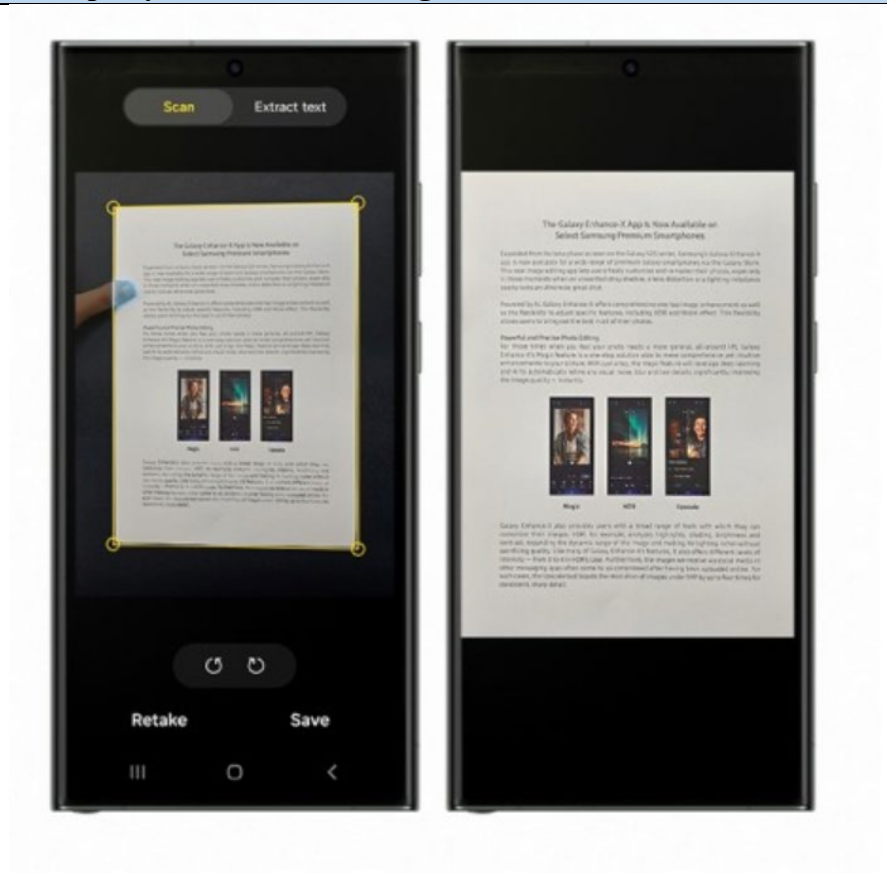
https://www.samsungmobilepress.com/feature-stories/how-samsung-galaxy-cameras-combine-super-resolution-technologies-with-ai-technology-to-produce-high-quality-images-of-the-moon/

For example, as an example the Accused Samsung '950 Products include AI Stereo Depth Mapping, that distinguishes various features (e.g., hair, clothing, or face).

Become the ultimate photographer with Samsung AI

Tap into the tools that help take perfect pictures, capture nighttime photos and make shareable content

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Samsung's Galaxy S23 Ultra series uses AI Stereo Depth Mapping, a software-based feature that relies on AI algorithms to improve image output when you click a photo. This algorithm essentially creates a depth map that automatically measures the distance between objects in an image, so it doesn't miss out on the smaller elements. For example, imagine a picture of a person on the Galaxy S23 ultra whose face is in focus, but their hair or clothing, which normal cameras may treat as background elements, might not be. AI Stereo Depth Mapping fixes this common problem, making sure all these elements are clear and in focus. https://www.samsung.com/us/explore/photography/become-the-ultimate-photographer-with-samsung-AI/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 https://news.samsung.com/global/one-ui-6-update-7-tips-for-making-the-most-of-ai-camera-on-your-galaxy **Doctrine of Equivalents**

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	To the extent Samsung argues that the above-identified structure do not literally infringe this claim element, this limitation is infringed under the doctrine of equivalents because the Accused Samsung '645 Products contain one or more components and/or software, or combination thereof, that perform substantially the same function in substantially the same way to obtain the same result. By way of example, to the extent that Samsung argues that the Accused Samsung '950 Products do not have a feature detection unit, each of these products include software, hardware, or a combination of the two that perform the equivalent function of detecting a position where features of each pixel are for object detection. Using this software, hardware, or combination, these products perform substantially the same function in substantially the same way. The performance of this function achieves substantially the same result, for example, the detection of a position where features of each pixel have changed. For example, the Accused Samsung '950 Products include image sensors, ISP, DSP, GPU, and/or CPU that execute source code to perform image processing and detect features. That this functionality may be divided across several components does not preclude these components from collectively functioning as a feature detection unit.
[1.b] a region creation unit which creates a region by removing pixels with the features from an evaluated value extraction region;	In each of the Accused Samsung '950 Products, the region creation unit is comprised of one or more processors (e.g., a CPU, ISP, and/or DSP), which are configured to create a region by removing pixels with the features from an evaluated value extraction region. As an example of region creation incorporated in or performed by the signal processor, the signal processor is configured to perform "segmentation" that, upon information and belief, creates one or more regions by removing pixels with the features from the extracted region to perform detection and corrections based on detected features such as skin tones and textures and other region or regions that do not include skin tones and textures (*e.g.*, text, foliage, fireworks, food, moon etc).

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Capture the Stars Like a Pro

on October 26, 2022 Audio Share

Earlier this year, the Galaxy S22 series introduced the pro-grade smartphone camera with advanced Nightography features. Now, that camera just got even better. With an updated version of the Expert RAW app and a brand new app called Camera Assistant,[1] you'll be able to capture professional-looking shots.

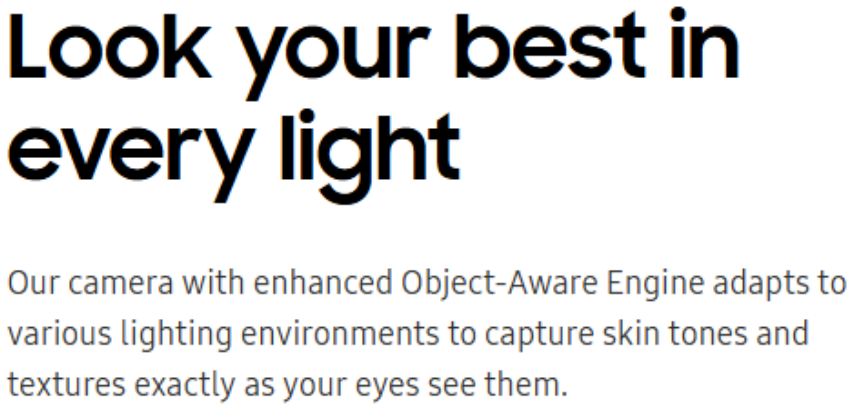
Capture the Galaxy With Astrophoto in Expert RAW

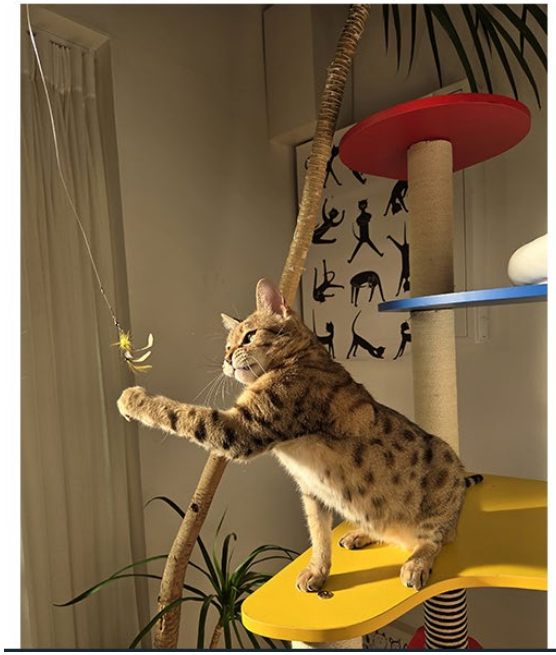
The Expert RAW elevates the S22's already robust night photography capabilities with a powerful Astrophoto feature. This brand-new feature lets star gazers and outdoor enthusiasts take clear and beautiful photos of constellations and dark sky activity.

Simply turn on the Sky guide to pinpoint the location of constellations, groups of stars, nebula and other celestial objects in our solar system. Your camera will use advanced AI segmentation technology and multi-frame processing based on the movements of a celestial body to snap photos over a set time period. As a result, you'll capture stunning shots of stars that look like they were taken with top-grade professional equipment.

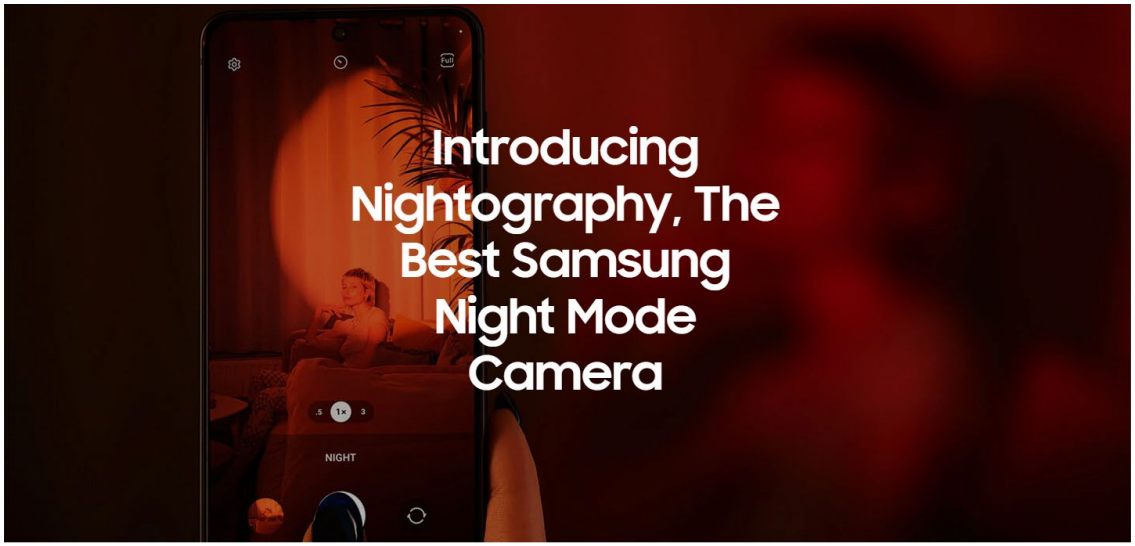
https://news.samsung.com/global/new-galaxy-s22-camera-updates-let-you-capture-the-stars-like-a-pro

As an example of region creation incorporated in or performed by the signal processor, the signal processor is configured to create a region that includes skin tones and textures and other region or regions that do not include skin tones and textures (*e.g.*, text, foliage, fireworks, food, moon etc).

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 https://www.samsung.com/us/smartphones/galaxy-s25/ As another example of region creation incorporated in or performed by the signal processor, the signal processor is configured to create a region that contain a detected moving object or subject and other region or regions that do not contain the detected moving object or subject.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Shots captured at lightning speed ProVisual Engine and advanced sensors join forces to create high-quality images even at fast shutter speeds so you can capture moving subjects with more clarity.[3]  https://www.samsung.com/us/smartphones/galaxy-s25/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Don't let the fact that it's dark ruin your chance to capture unforgettable moments. Samsung Galaxy devices have an incredible range of camera modes - perfect for every occasion and when it comes to taking epic shots at night you have everything you need in Night Mode. Here we explore Nightography in all its illuminating glory and explain why Night mode is the best camera setting to choose for exceptional low light images.

What does Night Mode do?

Night Mode is a smartphone feature that enables you to take vivid, highly optimised photos, even in the dark. Meaning you can avoid taking washed out, blurry night images. Pictures look sharp due to the innovative AI multi-frame processing which combines 30 images into just one epic shot, optimising colour and detail in every pixel.

https://www.samsung.com/uk/mobile-phone-buying-guide/samsung-night-mode-camera/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

What is low light photography?

Low light photography is all about capturing stunning images in conditions where natural or artificial light is minimal. Imagine photographing a beautiful sunset, a cityscape at night, or a candlelit dinner. The challenge lies in capturing the right details without the picture becoming too dark or grainy[1].

Enter the Galaxy S25 Ultra; designed to make low light photography an absolute joy. With its innovative Night Mode and Nightography features, this smartphone transforms night-time scenes into vivid and detailed photos. Night Mode intelligently combines multiple exposures, balancing the light and ensuring every part of the image is well-lit and clear.

Nightography takes it a step further by leveraging advanced AI[2] and sensor technology to enhance low-light performance. This ensures that even in the darkest environments, your photos are bright, sharp, and full of detail. Whether you're capturing a starry night sky, a bustling cityscape, or a cosy, dimly lit moment, the Galaxy S25 Ultra makes low light photography effortless and exciting.

1. Results may vary depending on shooting conditions including multiple subjects, being out of focus or moving subjects.
2. Samsung account login is required for certain AI features.

What is astrophotography?

Astrophotography is the art of capturing the beauty of the night sky, and with the Galaxy S25 Ultra, it's never been easier. This advanced camera feature, is designed to capture the breath-taking beauty of the stars and planets by using long-exposure lenses, advanced AI[1] technology, and cutting-edge camera software. It even guides you through the process with on-screen prompts, making it simple to snap stunning photos at night[2].

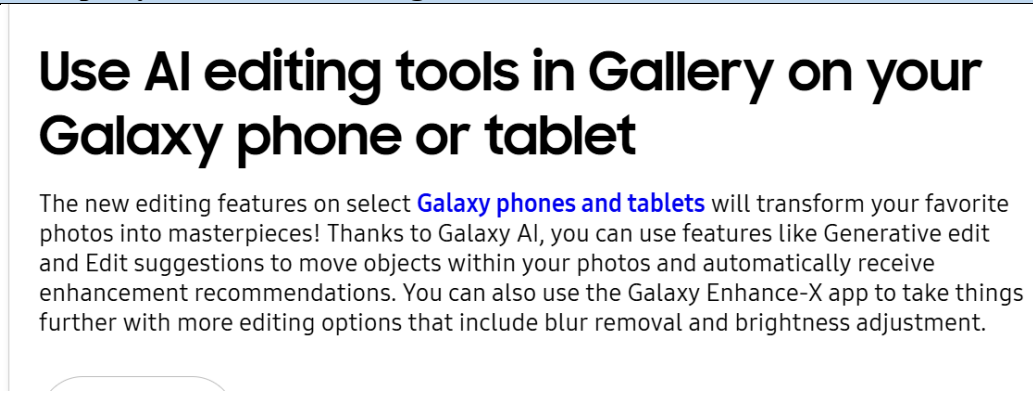
The sophisticated Camera AI enhances night-time images by optimising colours and restoring the intricate details of the evening sky. With the Galaxy S25 Ultra's advanced camera capabilities, larger sensors, and improved low-light performance, you can capture the wonders of the stars and planets without needing specialist equipment. So, point your Galaxy S25 Ultra towards the sky, and let it show you the way!

1. Samsung account login is required for certain AI features.
2. Results may vary depending on shooting conditions including multiple subjects, being out of focus or moving subjects.

https://www.samsung.com/uk/mobile-phone-buying-guide/samsung-galaxy-s25-camera-specs-explained/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	As another example, the signal processor performs segmentation to create a region that contains detected face and other region or regions that do not contain the detected face. The signal processor is configured to perform segmentation by removing pixels evaluated to be part of a face according to a face evaluation value. As another example of region creation incorporated in or performed by the signal processor, the signal processor is configured to create different regions in an image by performing segmentation of a photo or video frame. For example, the signal processor performs segmentation to create a region that contains detected natural skin and other region or regions that do not contain the detected natural skin. The signal processor is configured to perform segmentation by removing pixels evaluated to be part of natural skin region according to a natural skin evaluation value. For example, the signal processor performs segmentation to create a region that contains detected hair and other region or regions that do not contain the detected hair. The signal processor is configured to perform segmentation by removing pixels evaluated to be part of hair region according to a hair evaluation value. For example, the signal processor performs segmentation to create a region that contains detected clothing and other region or regions that do not contain the detected clothing. The signal processor is configured to perform segmentation by removing pixels evaluated to be part of clothing region according to a clothing evaluation value. For example, the signal processor performs segmentation to create a region that contains a detected object and other region or regions that do not contain the detected object. The signal processor is configured to perform segmentation by removing pixels evaluated to be part of a moving object region according to a moving object evaluation value.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	For example, the signal processor performs segmentation to create a region that contains a detected object and other region or regions that do not contain the detected object. The signal processor is configured to perform segmentation by removing pixels evaluated to be part of an object such as food, moon, fireworks, text, and/or other features according to an object evaluation value. For example, the signal processor performs segmentation to create a region that contains a detected object in a foreground and other region or regions that are part of a background. The signal processor is configured to perform segmentation by removing pixels evaluated to be part of a background region according to a foreground evaluation value. If you're unsure how to edit a photo or video in the Gallery app, let AI Edit Suggestion help you out. This feature lets you move and delete unwanted objects in order to create an entirely new image. You can also use additional options such as remastering, colorizing, removing reflections, and adding portrait effects to transform and elevate your photos and videos. You can learn more about **AI Edit suggestions** using our guide. Generative edit is an AI editing tool that lets you customize your images. Just find your desired image in the Gallery app, tap the **Photo Assist** icon (the three stars), and then tap or draw around an object in the photo you'd like to adjust. You can move the object around to another part of the photo. When you tap **Generate**, AI will fill in the photo's missing parts. **Note:** Generative edit requires an internet connection and will resize photos to 12MP. Drawing Assist lets you bring your drawings to life. You can create AI sketches using Air command, Samsung Notes, Gallery, and the AI Select feature in the Edge panel. Portrait Studio on the Z Fold6 and Z Flip6 lets you add extra flair to your selfies. Select your desired selfie in the Gallery app, then tap the **Photo Assist** icon (the stars), and then tap **Generative portrait** on the image. You can select from the available styles at the bottom of the screen, and then tap **Generate** to create a new image. Live Effects will bring your photos to life with animations on the Z Fold6 and Z Flip6. Select a photo in the Gallery app, then swipe up to view more details, and then tap **3D photo**. AI will generate the photo's effects. You may see a zooming motion, a panning motion, or a swivel motion. https://www.samsung.com/us/support/answer/ANS10000753/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 https://www.samsung.com/us/support/answer/ANS10000753/ Further, the Accused Samsung '950 Products include a detector to detect pattern portions to perform "Generative edit," provide "Edit suggestions," implement Portrait Studio, and/or generate photo effects.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Use Generative edit

Note

Generative edit is available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, Tab S10, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8.

Generative edit allows you to move or delete objects from your pictures in order to create an entirely new image. Galaxy AI will then fill in the background and any missing portions.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Generative edit allows you to move or delete objects from your pictures in order to create an entirely new image. Galaxy AI will then fill in the background and any missing portions. 1 Navigate to and open the **Gallery** app, and then select a picture you'd like to edit. 2 Tap the **Edit** icon (the pencil), and then tap the **Generative edit** icon (the blue circle with three stars). **Note**: You may be required to tap **OK** on the prompt. 3 Using your finger, outline your desired object. Tap **Deselect** to start over if needed. 4 Next, touch and hold the outlined object, and then drag it into a different part of the image. Tap **Return** (the back arrow) to move the object back to its original position, or tap **Remove** (the eraser icon) to erase the object. Repeat this process to move or remove additional objects. 5 If needed, adjust the **slider** at the bottom of the screen to straighten the picture. 6 When you're finished, tap **Generate**. Galaxy AI will fill in the image's background and adjust the objects that have been moved. 7 Touch and hold **View original** to compare the original image with the newly generated image. 8 When you're finished, tap **Done**, and then tap **Save as copy** to save the image. https://www.samsung.com/us/support/answer/ANS10000934/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Use Edit suggestions

Note

Edit suggestions are available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, A16 5G, A26 5G, A35 5G, A36 5G, A54 5G, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8.

Galaxy AI will analyze your pictures and provide editing suggestions to enhance them! The individual suggestion will vary depending on the image, or there may not be any suggestions at all.

1 Navigate to and open the **Gallery** app, and then select a picture you'd like to edit.

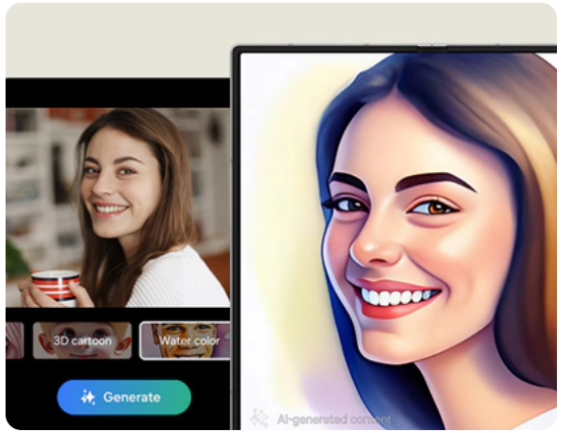
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	- **Pro**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while taking pictures. - **Pro video**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while recording videos. Samsung Galaxy S25 User Manual at 43. (https://downloadcenter.samsung.com/content/UM/202502/20250222040501249/SAM_S931_S936_S938_EN_UG_OS15_012425_FINAL_AC_02072025.pdf)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

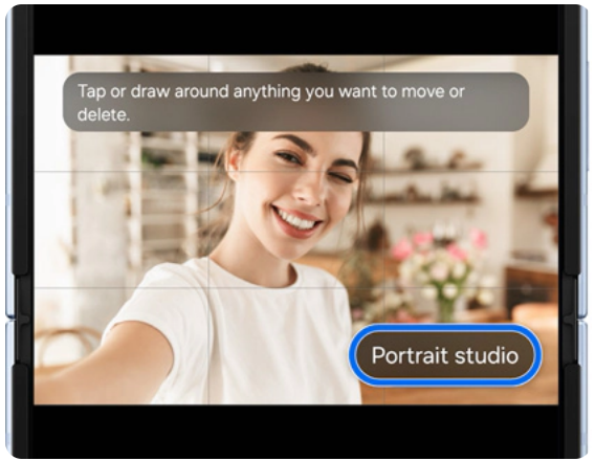
Use Portrait Studio

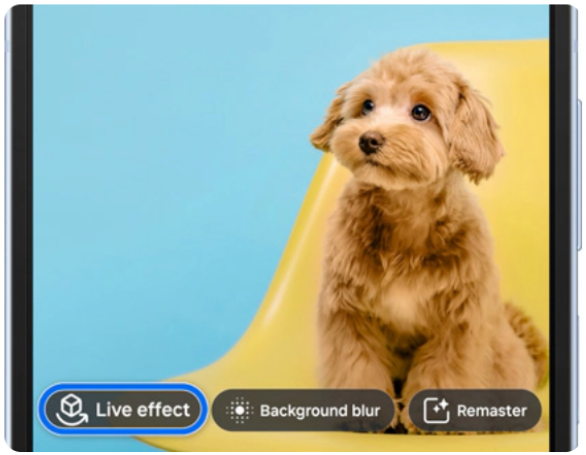
Note

Portrait Studio is available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, Tab S10, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8.



After you've taken a selfie, you can add some extra flair to it with Portrait Studio.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	After you've taken a selfie, you can add some extra flair to it with Portrait Studio. 1 Open the **Gallery** app, and then find and select your desired selfie. 2 Tap the **Photo Assist** icon (the stars), and then tap **Generative portrait** on the image.  3 Select from the available styles at the bottom of the screen, such as Comic, 3D cartoon, or Watercolor. 4 Then, tap **Generate**. https://www.samsung.com/us/support/answer/ANS10000934/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Live Effect will bring your photos to life with animations. The effect may differ depending on the photo. 1 Open the **Gallery** app, and then find and select a photo. 2 Swipe up to view more details, and then tap **3D photo** on the image.  3 AI will generate the photo's effects. You may see a zooming motion, a panning motion, or a swivel motion. 4 You can share the generated photo by tapping **Share** at the bottom of the screen. https://www.samsung.com/us/support/answer/ANS10000753/ Further, the Accused Samsung '950 Products include a Scene Optimizer to perform feature detection and corrections.

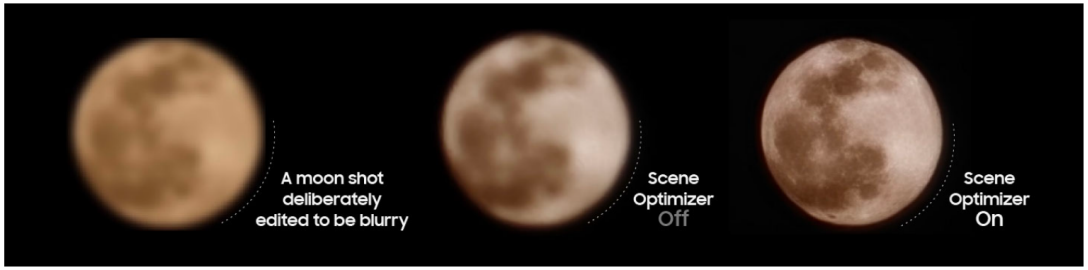
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	How Samsung Galaxy Cameras Combine Super Resolution Technologies With AI Technology to Produce High-Quality Images of the Moon Samsung is committed to delivering best-in-class camera experiences in all conditions. Since the introduction of the Galaxy S10, the Samsung Galaxy series has harnessed artificial intelligence (AI) technologies in its cameras to help users capture every epic moment anytime, anywhere. As part of this, Samsung developed the Scene Optimizer feature, a camera functionality which uses advanced AI to recognize objects and thus deliver the best results to users. Since the introduction of the Galaxy S21 series, Scene Optimizer has been able to recognize the moon as a specific object during the photo-taking process, and applies the feature's detail enhancement engine to the shot. When you're taking a photo of the moon, your Galaxy device's[1] camera system will harness this deep learning-based AI technology, as well as multi-frame processing in order to further enhance details. Read on to learn more about the multiple steps, processes and technologies that go in to delivering high-quality images of the moon.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Understanding Super Resolution and Scene Optimizer

In order to take a clear photo of the moon, Galaxy cameras harness Super Resolution to synthesize more than 10 images taken at 25x zoom or higher. The image taken at 25x zoom or above needs to eliminate noise and enhance clarity and other details.

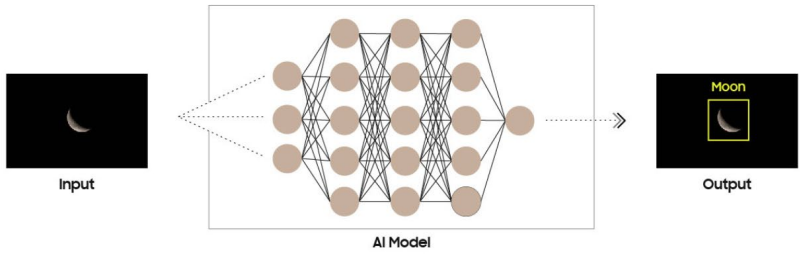
Super Resolution technology helps produce images through multi-frame composition. When Scene Optimizer is turned on and the moon has been recognized as an object, the camera will deliver users a bright and clear image through the detail enhancement engine of Scene Optimizer on top of the Super Resolution technology.



AI Deep Learning for Moon Object Recognition

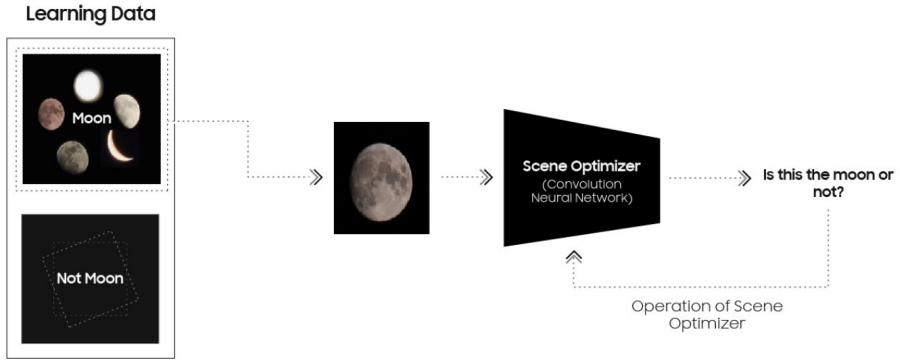
The engine for recognizing the moon was built based on a variety of moon shapes and details, from full through to crescent moons, and is based on images taken from our view from the Earth.

It uses an AI deep learning model to detect the presence of the moon and identify the area it occupies – as denoted by the square box - in the relevant image. Once the AI model has completed its learning, it can detect the area occupied by the moon even in images that were not used in training.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 However, the moon will not be properly recognized by the camera and Scene Optimizer technology if it is obscured by clouds, or if the moon object itself is the side that is not visible from the Earth. https://www.samsungmobilepress.com/feature-stories/how-samsung-galaxy-cameras-combine-super-resolution-technologies-with-ai-technology-to-produce-high-quality-images-of-the-moon/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	The Brightness Control Process Once the device has recognized the moon after zooming in, it will control the brightness of the display in order to present the moon more clearly while maintaining optimal brightness. Accordingly, when users take photos of the moon at early evening time, the sky around the moon will appear darker than the actual sky color because the device will darken the object background brightness in order to help make the moon appear more clearly. Once your device recognizes the moon, it will continuously adjust focus to stay directly on the moon. **Capturing the Most Stable Images Possible** Samsung introduced the Zoom Lock feature, which automatically reduces the effects of a shaking device without the need for a tripod. Combining OIS and VDIS technologies, Zoom Lock is able to minimize the image blur that can be caused by shaking hands and helps users take truly epic moon shots. While zooming in and touching the display or maintaining a focus on the moon for longer than 1.5 seconds, the Zoom Lock feature will be automatically activated. The border line of the zoom map on the upper right side of the screen will change from white to yellow, and the moon will be fixed on the display.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Next, the camera takes multiple pictures and then synthesizes them into a single, bright image with reduced noise.

After Multi-frame Processing has taken place, Galaxy camera further harnesses Scene Optimizer's deep-learning-based AI detail enhancement engine to effectively eliminate remaining noise and enhance the image details even further.

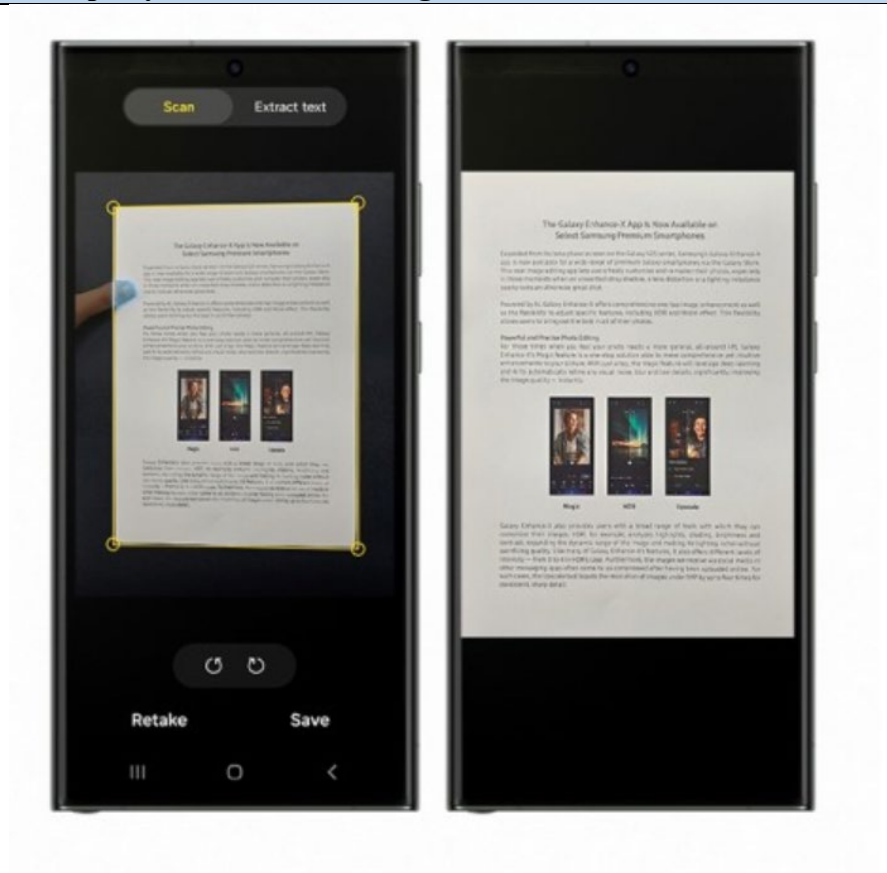
https://www.samsungmobilepress.com/feature-stories/how-samsung-galaxy-cameras-combine-super-resolution-technologies-with-ai-technology-to-produce-high-quality-images-of-the-moon/

For example, as an example the Accused Samsung '950 Products include AI Stereo Depth Mapping, that distinguishes various features (e.g., hair, clothing, or face).

Become the ultimate photographer with Samsung AI

Tap into the tools that help take perfect pictures, capture nighttime photos and make shareable content

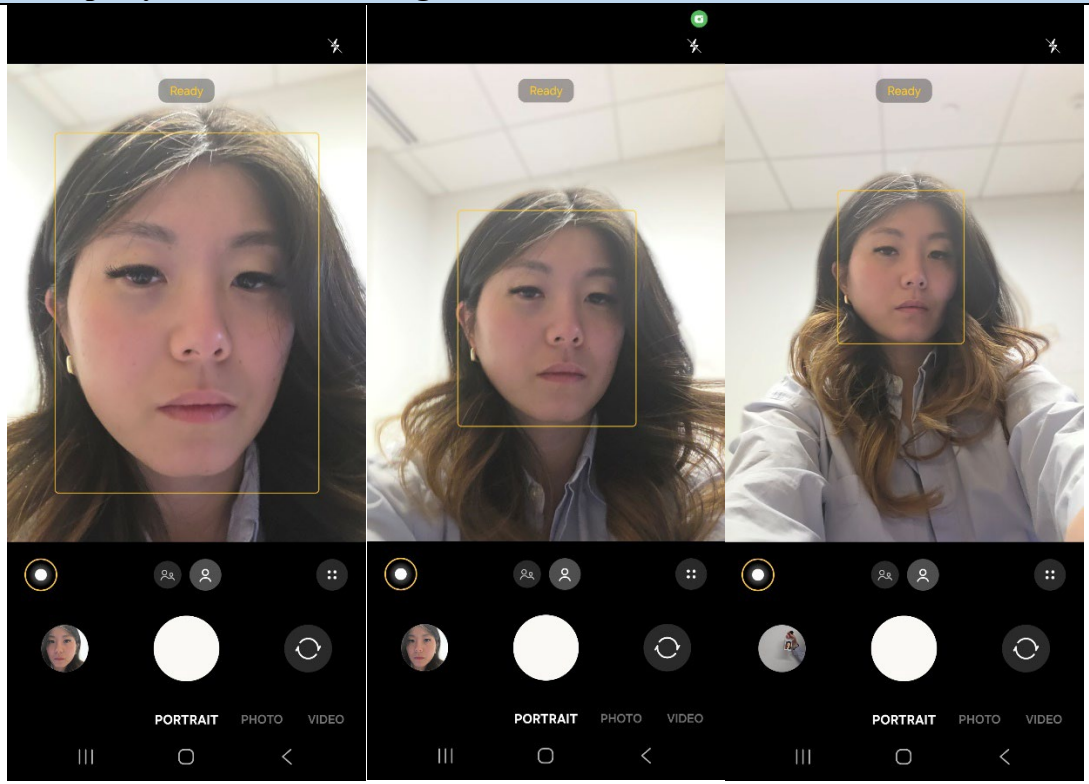
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Samsung's Galaxy S23 Ultra series uses AI Stereo Depth Mapping, a software-based feature that relies on AI algorithms to improve image output when you click a photo. This algorithm essentially creates a depth map that automatically measures the distance between objects in an image, so it doesn't miss out on the smaller elements. For example, imagine a picture of a person on the Galaxy S23 ultra whose face is in focus, but their hair or clothing, which normal cameras may treat as background elements, might not be. AI Stereo Depth Mapping fixes this common problem, making sure all these elements are clear and in focus. https://www.samsung.com/us/explore/photography/become-the-ultimate-photographer-with-samsung-AI/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 https://news.samsung.com/global/one-ui-6-update-7-tips-for-making-the-most-of-ai-camera-on-your-galaxy

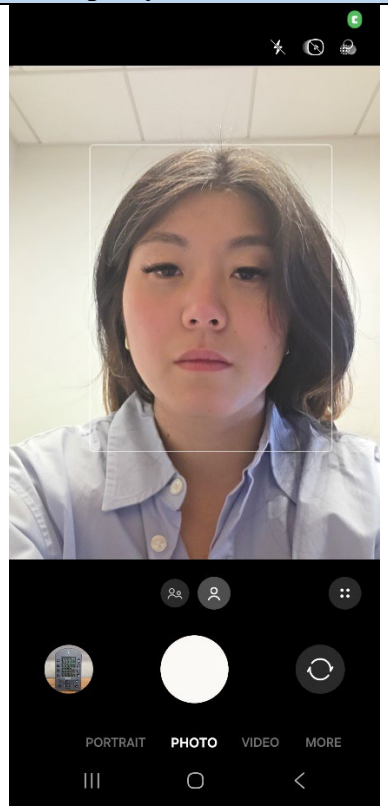
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

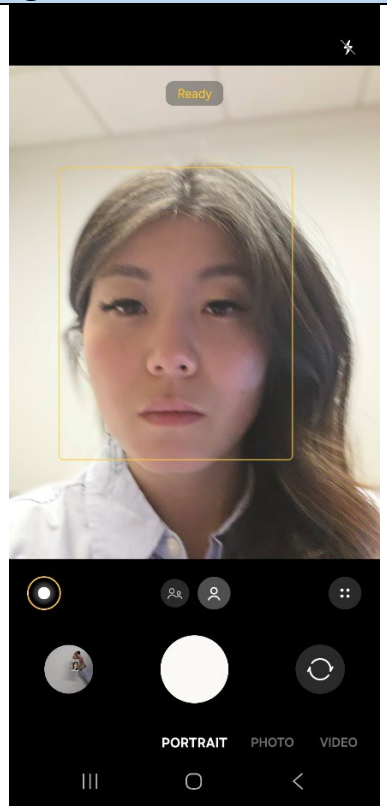
	• Our Qualcomm Spectra™ AI ISP features:
	  • Limitless Real-time Semantic Segmentation for photo/video frame
	  • Insight AI provides real-time skin and sky adjustments to create more natural color and lighting in uncertain conditions.
	  • Ultra-low Light video capture
	  • Video Object Eraser can remove unwanted elements from videos
	  • Real-time AI Relighting make you appear professional wherever you are
	  • Truepic photo capture with C2PA standard support lets you snap a photo with Truepic's cryptographic seal to prove the photo is real and not Gen AI
	
	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	AI-powered camera redefines photography Infuse brilliance into mobile capture with our AI ISP, enhancing everything from selfies to crystal-clear video chats thanks to an overhauled Hexagon Direct Link. The first AI-powered Limitless Segmentation recognizes and enhances virtually anything in the frame, including faces, hair, clothing, objects, backgrounds, and beyond. Even furry friends appear crisp and cute—no matter how fast the zoomies—thanks to AI-Based Pet Capture. • Our powerful AI ISP is deeply integrated with the Hexagon NPU for enhanced, intuitive capture. • Limitless Segmentation can segment an image in over 250 layers, each optimized to perfection. • Real-time Insight AI captures and enhances natural skin and sky tones even in the most challenging conditions. • Truepic with C2PA adds cryptographic seals so you can authenticate your photos as real and not AI-generated—now including videos and audio recordings. • Video Object Eraser can remove unwanted elements from video footage—on-device. • Capture vivid videos at 4K60 FPS, even in near darkness. (https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Snapdragon-8-Elite-Platform-Product-Brief.pdf) Let's dive deeper into why Snapdragon 8 Elite is a game-changer: • **Incredible power:** Experience a 45% boost in performance with the Qualcomm Oryon CPU, giving you lightning-fast apps and incredible multitasking.[1] • **AI at your fingertips:** The Qualcomm® Hexagon™ NPU increases AI performance by 45%, handling everything from voice commands to image prompts. Your device is ready to adapt to your every move. • **Photography, reimagined:** With features like 4K Semantic Segmentation, Video Object Eraser, and real-time AI lighting adjustments, the Snapdragon 8 Elite camera tech turns your mobile photos into pro-level masterpieces. https://www.qualcomm.com/snapdragon/news/snapdragon-8-elite--the-power-behind-the-name

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Demonstration of face detection, with the bounding box shown identifying the face at three different sizes which requires region creation and removing pixels to perform detections.

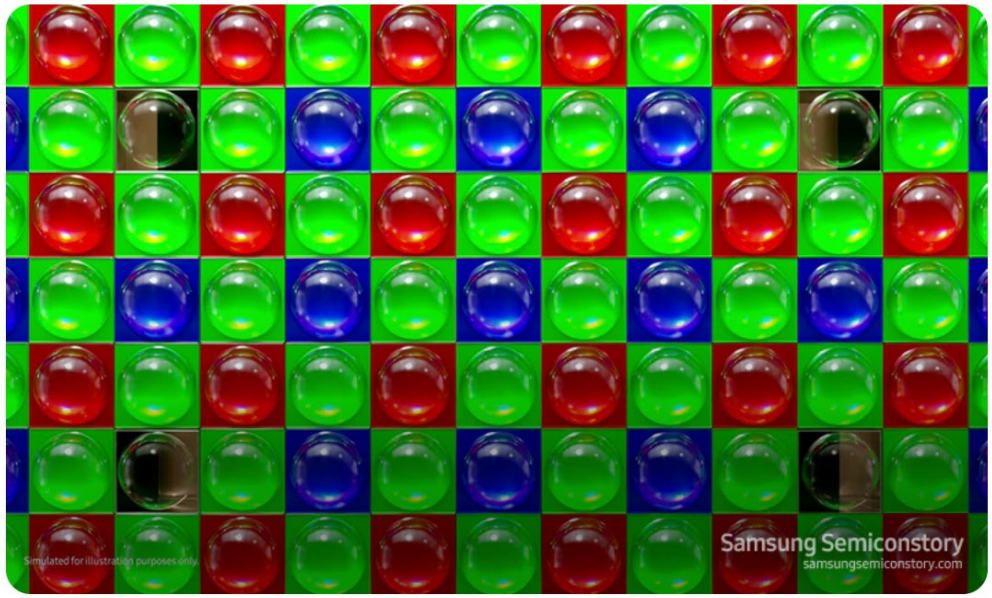
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

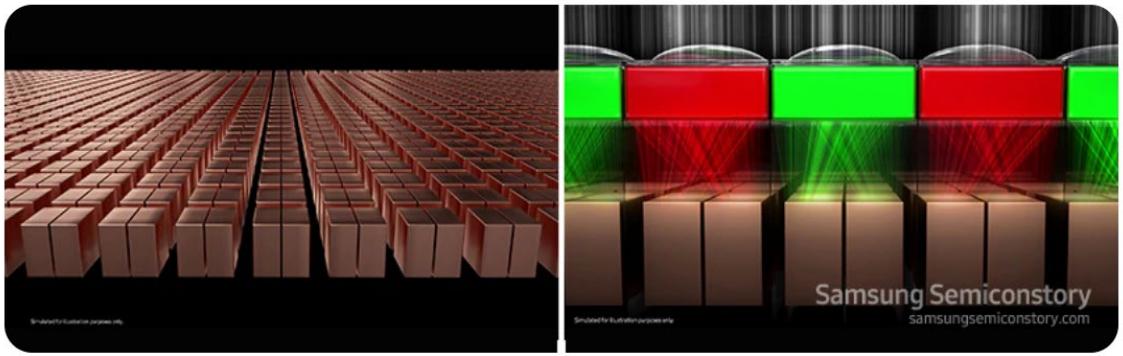




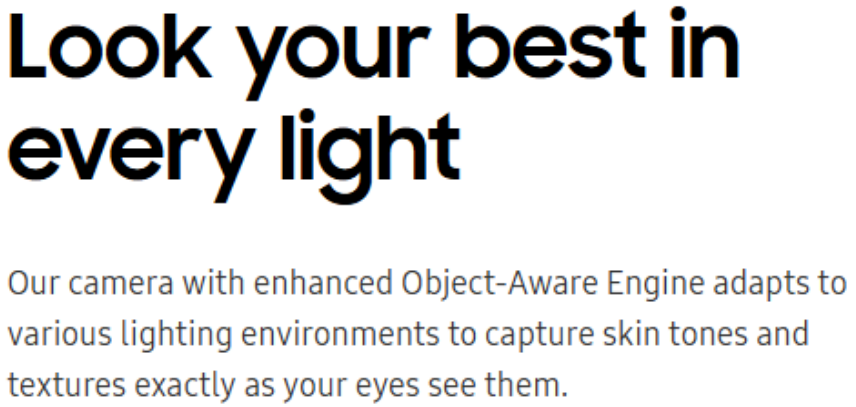
Demonstrating difference between the "Photo" mode and the "Portrait" mode which requires region creation and removing pixels to perform detections.

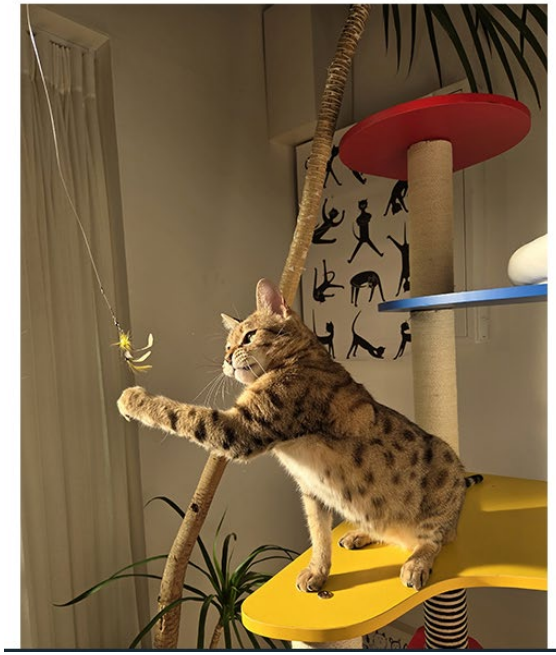
Further, the Accused Samsung '950 Products creates a region by removing pixels with the features from an evaluated value extraction region to perform PDAF:

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Special Autofocus Pixels Used in PDAF Technology To understand how Dual Pixel Pro works, it is important to first understand its foundational technology, Phase Detection Autofocus (PDAF). Just like how humans use their two eyes to focus, PDAF compares the phase difference perceived from two different locations and moves the lens such that the two phases align to adjust the focus. 

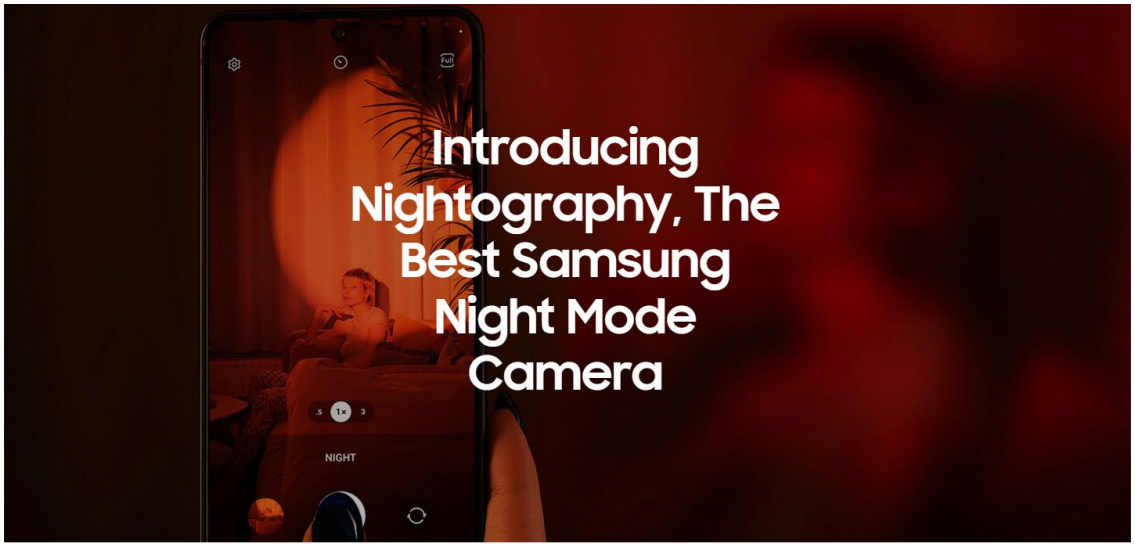
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Dual Pixel with Improved Autofocus  Each pixel on a Dual Pixel sensor contains two photodiodes, one left-looking, one right-looking. When capturing a scene, the phases from each pair of photodiodes are compared to achieve autofocus. Since every pixel in the sensor is being used for both autofocus and color values, the sensor can achieve quick autofocus without losing image quality. In the previous Dual Pixel technology, each pixel is divided vertically into left and right. Dual Pixe features green pixels that are divided diagonally. There are clear benefits in dividing pixels diagonally. These pixels can compare the phase differer between the top and bottom of the pixel in addition to phase differences in the left and right side a result, even in a situation where autofocusing is challenging to achieve based on the use of only and right phase differences, Dual Pixel Pro can use top and bottom phase differences, therefore delivering faster and more accurate autofocusing capabilities.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	https://semiconductor.samsung.com/news-events/tech-blog/the-evolution-from-image-sensor-to-human-eye-samsungs-innovative-dual-pixel-pro-technology/ **Doctrine of Equivalents** To the extent Samsung argues that the above-identified structure does not literally infringe this claim element, this limitation is infringed under the doctrine of equivalents because the Accused Samsung '950 Products contain one or more components and/or software, or a combination thereof, that perform substantially the same function in substantially the same way to obtain the same result. By way of example, to the extent that Samsung argues that the Accused Samsung '950 Products do not have a region creation unit, each of these products include software, hardware, or a combination of the two that perform the equivalent function of creating a region where pixels are removed. Using this combination, these products perform substantially the same function (for example, region creation) in substantially the same way. The performance of this function achieves substantially the same result, for example, the creation of a region corresponding to object detection. That this functionality may be divided across several components does not preclude these components from collectively functioning as a region creation unit.
[1.c] an evaluated value extraction unit which extracts an evaluated value in accordance with the evaluated value extraction region;	In each of the Accused Samsung '950 Products, the evaluated value extraction unit is comprised of one or more processors (e.g., a CPU, ISP, and/or DSP), which are configured to extract an evaluated value in accordance with the evaluated value extraction region. As an example of evaluated value extraction incorporated in or performed by the signal processor, the signal processor is configured to calculate or extract a value indicative of skin tones and textures in a region.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 https://www.samsung.com/us/smartphones/galaxy-s25/ As another example of evaluated value extraction incorporated in or performed by the signal processor, the signal processor is configured to calculate or extract a value indicative of a moving object or subject in a region.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Shots captured at lightning speed ProVisual Engine and advanced sensors join forces to create high-quality images even at fast shutter speeds so you can capture moving subjects with more clarity.[3]  https://www.samsung.com/us/smartphones/galaxy-s25/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Don't let the fact that it's dark ruin your chance to capture unforgettable moments. Samsung Galaxy devices have an incredible range of camera modes - perfect for every occasion and when it comes to taking epic shots at night you have everything you need in Night Mode. Here we explore Nightography in all its illuminating glory and explain why Night mode is the best camera setting to choose for exceptional low light images.

What does Night Mode do?

Night Mode is a smartphone feature that enables you to take vivid, highly optimised photos, even in the dark. Meaning you can avoid taking washed out, blurry night images. Pictures look sharp due to the innovative AI multi-frame processing which combines 30 images into just one epic shot, optimising colour and detail in every pixel.

https://www.samsung.com/uk/mobile-phone-buying-guide/samsung-night-mode-camera/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

What is low light photography?

Low light photography is all about capturing stunning images in conditions where natural or artificial light is minimal. Imagine photographing a beautiful sunset, a cityscape at night, or a candlelit dinner. The challenge lies in capturing the right details without the picture becoming too dark or grainy[1].

Enter the Galaxy S25 Ultra; designed to make low light photography an absolute joy. With its innovative Night Mode and Nightography features, this smartphone transforms night-time scenes into vivid and detailed photos. Night Mode intelligently combines multiple exposures, balancing the light and ensuring every part of the image is well-lit and clear.

Nightography takes it a step further by leveraging advanced AI[2] and sensor technology to enhance low-light performance. This ensures that even in the darkest environments, your photos are bright, sharp, and full of detail. Whether you're capturing a starry night sky, a bustling cityscape, or a cosy, dimly lit moment, the Galaxy S25 Ultra makes low light photography effortless and exciting.

1. Results may vary depending on shooting conditions including multiple subjects, being out of focus or moving subjects.
2. Samsung account login is required for certain AI features.

What is astrophotography?

Astrophotography is the art of capturing the beauty of the night sky, and with the Galaxy S25 Ultra, it's never been easier. This advanced camera feature, is designed to capture the breath-taking beauty of the stars and planets by using long-exposure lenses, advanced AI[1] technology, and cutting-edge camera software. It even guides you through the process with on-screen prompts, making it simple to snap stunning photos at night[2].

The sophisticated Camera AI enhances night-time images by optimising colours and restoring the intricate details of the evening sky. With the Galaxy S25 Ultra's advanced camera capabilities, larger sensors, and improved low-light performance, you can capture the wonders of the stars and planets without needing specialist equipment. So, point your Galaxy S25 Ultra towards the sky, and let it show you the way!

1. Samsung account login is required for certain AI features.
2. Results may vary depending on shooting conditions including multiple subjects, being out of focus or moving subjects.

https://www.samsung.com/uk/mobile-phone-buying-guide/samsung-galaxy-s25-camera-specs-explained/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	As another example of evaluated value extraction incorporated in or performed by the signal processor, the signal processor is configured to calculate or extract a value indicative of a face in a region. As another example of evaluated value extraction incorporated in or performed by the signal processor, the signal processor is configured to calculate or extract a value indicative of natural skin in a region. As another example of evaluated value extraction incorporated in or performed by the signal processor, the signal processor is configured to calculate or extract a value indicative of hair in a region. As another example of evaluated value extraction incorporated in or performed by the signal processor, the signal processor is configured to calculate or extract a value indicative of clothing in a region. As another example of evaluated value extraction incorporated in or performed by the signal processor, the signal processor is configured to calculate or extract a value indicative of a moving object in a region. As another example of evaluated value extraction incorporated in or performed by the signal processor, the signal processor is configured to calculate or extract a value indicative of a background region. As another example of evaluated value extraction incorporated in or performed by the signal processor, the signal processor is configured to calculate or extract a value indicative of food, text, fireworks, moon, auto-focus pixels for PDAF and other AI powered detections.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

	• Our Qualcomm Spectra™ AI ISP features:
	  • Limitless Real-time Semantic Segmentation for photo/video frame
	  • Insight AI provides real-time skin and sky adjustments to create more natural color and lighting in uncertain conditions.
	  • Ultra-low Light video capture
	  • Video Object Eraser can remove unwanted elements from videos
	  • Real-time AI Relighting make you appear professional wherever you are
	  • Truepic photo capture with C2PA standard support lets you snap a photo with Truepic's cryptographic seal to prove the photo is real and not Gen AI
	
	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Camera Qualcomm Spectra™ Image Signal Processor • AI-ISP, Triple 18-bit ISPs Limitless real-time Semantic Segmentation photo and video processing Engine for Visual Analytics 4.0, including hardware acceleration for iToF depth sensors up to 4K 60 FPS Support for the latest HDR, DCG+VS, DCG, Staggered, QDOL, Less Blanking, and Multiframe HDR image sensors Support for triple video capture from HDR image sensors, with seamless switching between any HDR mode • Up to 48 MP triple camera @ 30 FPS with Zero Shutter Lag • Up to 108 MP single camera @ 30 FPS with Zero Shutter Lag • Up to 320-megapixel photo capture AI-based face detection, AI for 3A (auto-focus, autoexposure, and auto-white balance) Rec. 2020 color gamut photo and video capture Up to 10-bit color depth photo and video capture 10-bit HEIF: HEIC photo capture, HEVC video capture Google Ultra HDR photo capture Video capture HDR formats: HDR10+, HDR10, HLG, Dolby Vision 8K HDR video playback @ 60 FPS 4K video capture @ 120 FPS Slow-mo video capture at 1080p @ 480 FPS Hardware Bokeh Engine 2 for video capture (https://docs.qualcomm.com/bundle/publicresource/87-83196-1_REV_D_Snapdragon_8_Elite_Mobile_Platform_Product_Brief.pdf)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	AI-powered camera redefines photography Infuse brilliance into mobile capture with our AI ISP, enhancing everything from selfies to crystal-clear video chats thanks to an overhauled Hexagon Direct Link. The first AI-powered Limitless Segmentation recognizes and enhances virtually anything in the frame, including faces, hair, clothing, objects, backgrounds, and beyond. Even furry friends appear crisp and cute—no matter how fast the zoomies—thanks to AI-Based Pet Capture. • Our powerful AI ISP is deeply integrated with the Hexagon NPU for enhanced, intuitive capture. • Limitless Segmentation can segment an image in over 250 layers, each optimized to perfection. • Real-time Insight AI captures and enhances natural skin and sky tones even in the most challenging conditions. • Truepic with C2PA adds cryptographic seals so you can authenticate your photos as real and not AI-generated—now including videos and audio recordings. • Video Object Eraser can remove unwanted elements from video footage—on-device. • Capture vivid videos at 4K60 FPS, even in near darkness. (https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Snapdragon-8-Elite-Platform-Product-Brief.pdf) Let's dive deeper into why Snapdragon 8 Elite is a game-changer: • **Incredible power:** Experience a 45% boost in performance with the Qualcomm Oryon CPU, giving you lightning-fast apps and incredible multitasking.[1] • **AI at your fingertips:** The Qualcomm® Hexagon™ NPU increases AI performance by 45%, handling everything from voice commands to image prompts. Your device is ready to adapt to your every move. • **Photography, reimagined:** With features like 4K Semantic Segmentation, Video Object Eraser, and real-time AI lighting adjustments, the Snapdragon 8 Elite camera tech turns your mobile photos into pro-level masterpieces. https://www.qualcomm.com/snapdragon/news/snapdragon-8-elite--the-power-behind-the-name

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

If you're unsure how to edit a photo or video in the Gallery app, let AI Edit Suggestion help you out. This feature lets you move and delete unwanted objects in order to create an entirely new image. You can also use additional options such as remastering, colorizing, removing reflections, and adding portrait effects to transform and elevate your photos and videos. You can learn more about **AI Edit suggestions** using our guide.

Generative edit is an AI editing tool that lets you customize your images. Just find your desired image in the Gallery app, tap the **Photo Assist** icon (the three stars), and then tap or draw around an object in the photo you'd like to adjust. You can move the object around to another part of the photo. When you tap **Generate**, AI will fill in the photo's missing parts.

Note: Generative edit requires an internet connection and will resize photos to 12MP.

Drawing Assist lets you bring your drawings to life. You can create AI sketches using Air command, Samsung Notes, Gallery, and the AI Select feature in the Edge panel.

Portrait Studio on the Z Fold6 and Z Flip6 lets you add extra flair to your selfies. Select your desired selfie in the Gallery app, then tap the **Photo Assist** icon (the stars), and then tap **Generative portrait** on the image. You can select from the available styles at the bottom of the screen, and then tap **Generate** to create a new image.

Live Effects will bring your photos to life with animations on the Z Fold6 and Z Flip6. Select a photo in the Gallery app, then swipe up to view more details, and then tap **3D photo**. AI will generate the photo's effects. You may see a zooming motion, a panning motion, or a swivel motion.

https://www.samsung.com/us/support/answer/ANS10000753/

Use AI editing tools in Gallery on your Galaxy phone or tablet

The new editing features on select **Galaxy phones and tablets** will transform your favorite photos into masterpieces! Thanks to Galaxy AI, you can use features like Generative edit and Edit suggestions to move objects within your photos and automatically receive enhancement recommendations. You can also use the Galaxy Enhance-X app to take things further with more editing options that include blur removal and brightness adjustment.

https://www.samsung.com/us/support/answer/ANS10000753/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Use Generative edit **Note** Generative edit is available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, Tab S10, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8. Generative edit allows you to move or delete objects from your pictures in order to create an entirely new image. Galaxy AI will then fill in the background and any missing portions.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Generative edit allows you to move or delete objects from your pictures in order to create an entirely new image. Galaxy AI will then fill in the background and any missing portions. 1 Navigate to and open the **Gallery** app, and then select a picture you'd like to edit. 2 Tap the **Edit** icon (the pencil), and then tap the **Generative edit** icon (the blue circle with three stars). **Note**: You may be required to tap **OK** on the prompt. 3 Using your finger, outline your desired object. Tap **Deselect** to start over if needed. 4 Next, touch and hold the outlined object, and then drag it into a different part of the image. Tap **Return** (the back arrow) to move the object back to its original position, or tap **Remove** (the eraser icon) to erase the object. Repeat this process to move or remove additional objects. 5 If needed, adjust the **slider** at the bottom of the screen to straighten the picture. 6 When you're finished, tap **Generate**. Galaxy AI will fill in the image's background and adjust the objects that have been moved. 7 Touch and hold **View original** to compare the original image with the newly generated image. 8 When you're finished, tap **Done**, and then tap **Save as copy** to save the image. https://www.samsung.com/us/support/answer/ANS10000934/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Use Edit suggestions

Note

Edit suggestions are available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, A16 5G, A26 5G, A35 5G, A36 5G, A54 5G, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8.

Galaxy AI will analyze your pictures and provide editing suggestions to enhance them! The individual suggestion will vary depending on the image, or there may not be any suggestions at all.

1 Navigate to and open the **Gallery** app, and then select a picture you'd like to edit.

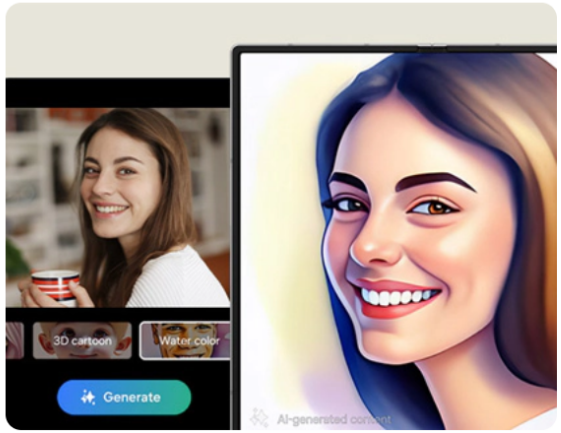
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	- **Pro**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while taking pictures. - **Pro video**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while recording videos. Samsung Galaxy S25 User Manual at 43. (https://downloadcenter.samsung.com/content/UM/202502/20250222040501249/SAM_S931_S936_S938_EN_UG_OS15_012425_FINAL_AC_02072025.pdf)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

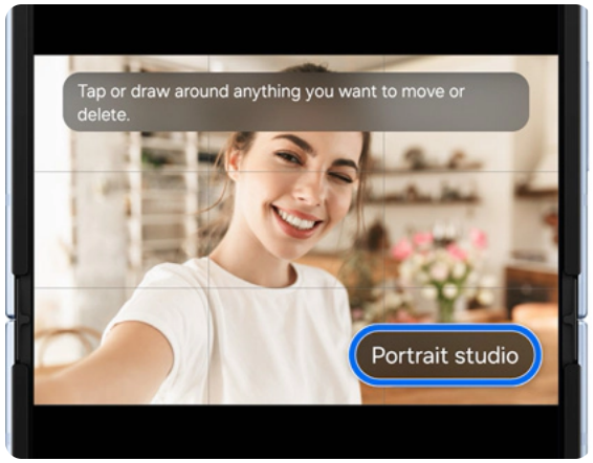
Use Portrait Studio

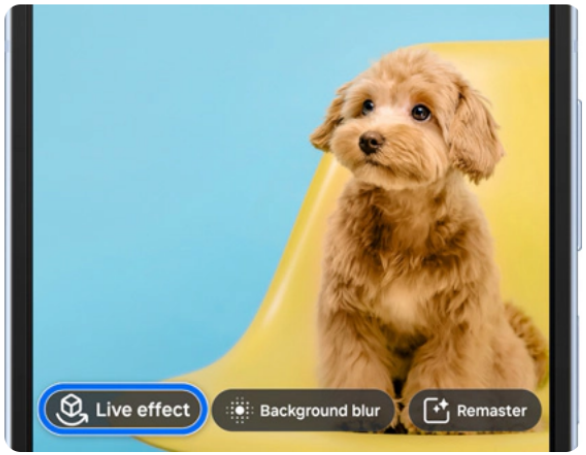
Note

Portrait Studio is available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, Tab S10, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8.



After you've taken a selfie, you can add some extra flair to it with Portrait Studio.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	After you've taken a selfie, you can add some extra flair to it with Portrait Studio. 1 Open the **Gallery** app, and then find and select your desired selfie. 2 Tap the **Photo Assist** icon (the stars), and then tap **Generative portrait** on the image.  3 Select from the available styles at the bottom of the screen, such as Comic, 3D cartoon, or Watercolor. 4 Then, tap **Generate**. https://www.samsung.com/us/support/answer/ANS10000934/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Live Effect will bring your photos to life with animations. The effect may differ depending on the photo. 1 Open the **Gallery** app, and then find and select a photo. 2 Swipe up to view more details, and then tap **3D photo** on the image.  3 AI will generate the photo's effects. You may see a zooming motion, a panning motion, or a swivel motion. 4 You can share the generated photo by tapping **Share** at the bottom of the screen. https://www.samsung.com/us/support/answer/ANS10000753/ Further, the Accused Samsung '950 Products include a Scene Optimizer to perform feature detection and corrections.

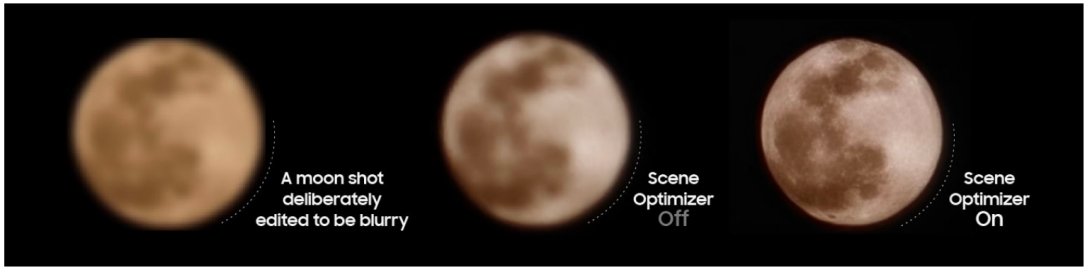
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	How Samsung Galaxy Cameras Combine Super Resolution Technologies With AI Technology to Produce High-Quality Images of the Moon Samsung is committed to delivering best-in-class camera experiences in all conditions. Since the introduction of the Galaxy S10, the Samsung Galaxy series has harnessed artificial intelligence (AI) technologies in its cameras to help users capture every epic moment anytime, anywhere. As part of this, Samsung developed the Scene Optimizer feature, a camera functionality which uses advanced AI to recognize objects and thus deliver the best results to users. Since the introduction of the Galaxy S21 series, Scene Optimizer has been able to recognize the moon as a specific object during the photo-taking process, and applies the feature's detail enhancement engine to the shot. When you're taking a photo of the moon, your Galaxy device's[1] camera system will harness this deep learning-based AI technology, as well as multi-frame processing in order to further enhance details. Read on to learn more about the multiple steps, processes and technologies that go in to delivering high-quality images of the moon.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Understanding Super Resolution and Scene Optimizer

In order to take a clear photo of the moon, Galaxy cameras harness Super Resolution to synthesize more than 10 images taken at 25x zoom or higher. The image taken at 25x zoom or above needs to eliminate noise and enhance clarity and other details.

Super Resolution technology helps produce images through multi-frame composition. When Scene Optimizer is turned on and the moon has been recognized as an object, the camera will deliver users a bright and clear image through the detail enhancement engine of Scene Optimizer on top of the Super Resolution technology.

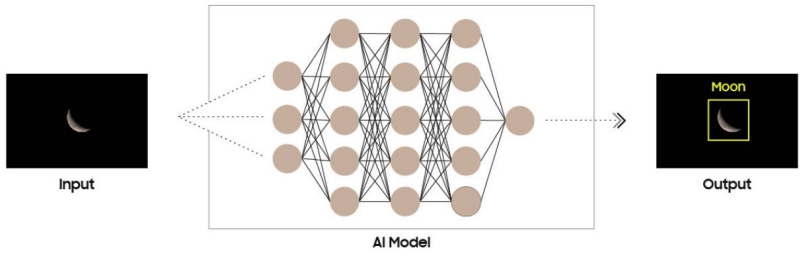


AI Deep Learning for Moon Object Recognition

The engine for recognizing the moon was built based on a variety of moon shapes and details, from full through to crescent moons, and is based on images taken from our view from the Earth.

It uses an AI deep learning model to detect the presence of the moon and identify the area it occupies – as denoted by the square box - in the relevant image. Once the AI model has completed its learning, it can detect the area occupied by the moon even in images that were not used in training.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

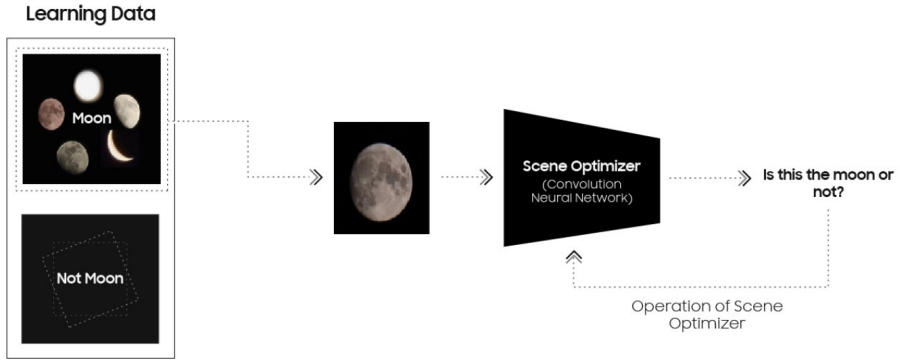


However, the moon will not be properly recognized by the camera and Scene Optimizer technology if it is obscured by clouds, or if the moon object itself is the side that is not visible from the Earth.

https://www.samsungmobilepress.com/feature-stories/how-samsung-galaxy-cameras-combine-super-resolution-technologies-with-ai-technology-to-produce-high-quality-images-of-the-moon/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	The Brightness Control Process Once the device has recognized the moon after zooming in, it will control the brightness of the display in order to present the moon more clearly while maintaining optimal brightness. Accordingly, when users take photos of the moon at early evening time, the sky around the moon will appear darker than the actual sky color because the device will darken the object background brightness in order to help make the moon appear more clearly. Once your device recognizes the moon, it will continuously adjust focus to stay directly on the moon. **Capturing the Most Stable Images Possible** Samsung introduced the Zoom Lock feature, which automatically reduces the effects of a shaking device without the need for a tripod. Combining OIS and VDIS technologies, Zoom Lock is able to minimize the image blur that can be caused by shaking hands and helps users take truly epic moon shots. While zooming in and touching the display or maintaining a focus on the moon for longer than 1.5 seconds, the Zoom Lock feature will be automatically activated. The border line of the zoom map on the upper right side of the screen will change from white to yellow, and the moon will be fixed on the display.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Next, the camera takes multiple pictures and then synthesizes them into a single, bright image with reduced noise.

After Multi-frame Processing has taken place, Galaxy camera further harnesses Scene Optimizer's deep-learning-based AI detail enhancement engine to effectively eliminate remaining noise and enhance the image details even further.

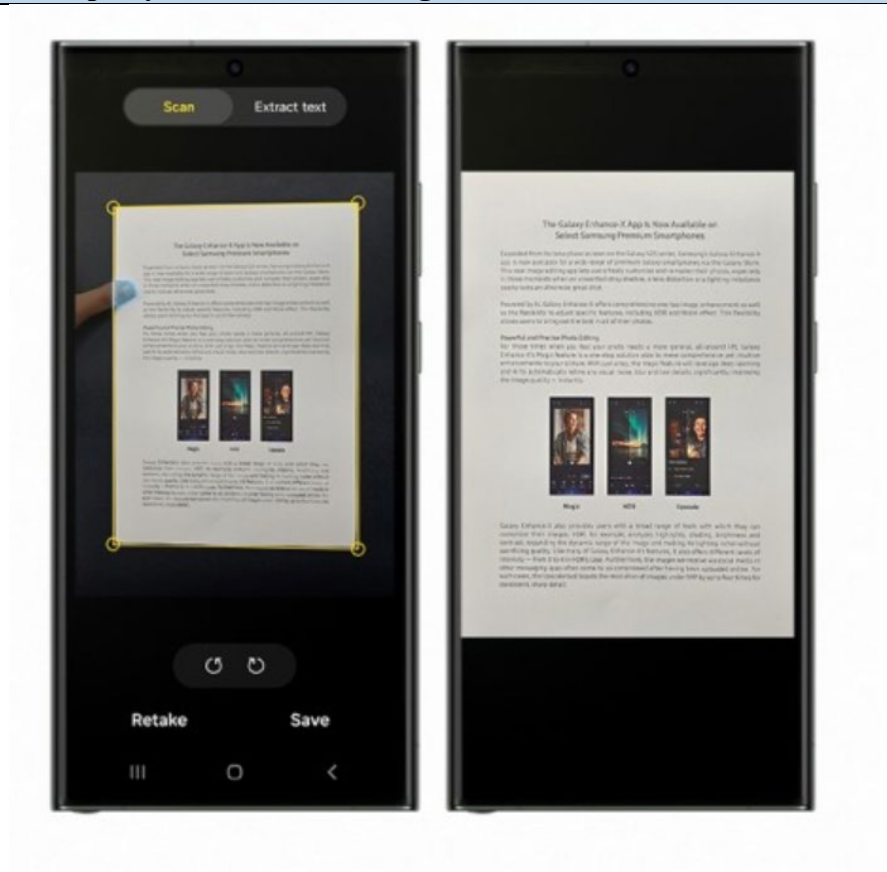
https://www.samsungmobilepress.com/feature-stories/how-samsung-galaxy-cameras-combine-super-resolution-technologies-with-ai-technology-to-produce-high-quality-images-of-the-moon/

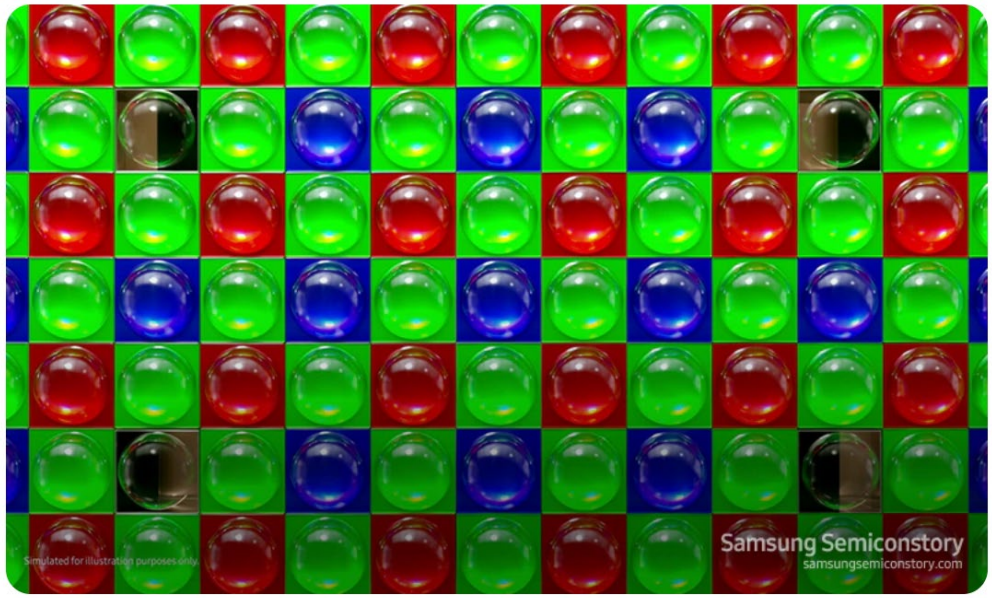
For example, as an example the Accused Samsung '950 Products include AI Stereo Depth Mapping, that distinguishes various features (e.g., hair, clothing, or face).

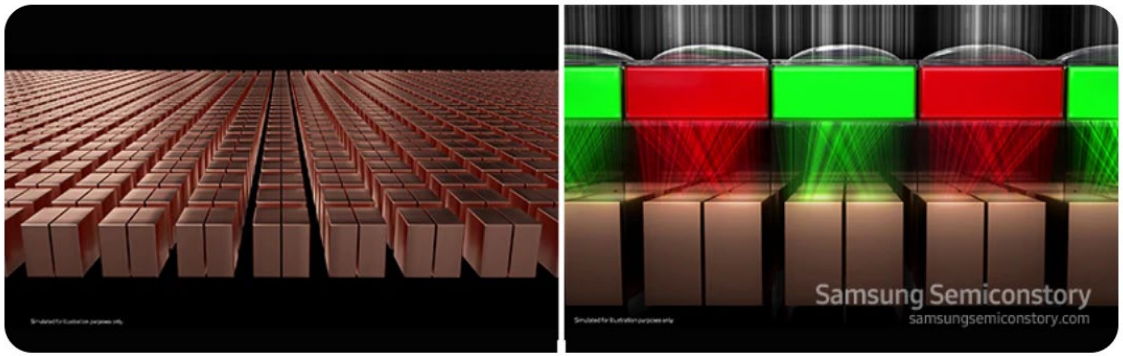
Become the ultimate photographer with Samsung AI

Tap into the tools that help take perfect pictures, capture nighttime photos and make shareable content

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Samsung's Galaxy S23 Ultra series uses AI Stereo Depth Mapping, a software-based feature that relies on AI algorithms to improve image output when you click a photo. This algorithm essentially creates a depth map that automatically measures the distance between objects in an image, so it doesn't miss out on the smaller elements. For example, imagine a picture of a person on the Galaxy S23 ultra whose face is in focus, but their hair or clothing, which normal cameras may treat as background elements, might not be. AI Stereo Depth Mapping fixes this common problem, making sure all these elements are clear and in focus. https://www.samsung.com/us/explore/photography/become-the-ultimate-photographer-with-samsung-AI/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 https://news.samsung.com/global/one-ui-6-update-7-tips-for-making-the-most-of-ai-camera-on-your-galaxy Further, the Accused Samsung '950 Products creates a region by removing pixels with the features from an evaluated value extraction region to perform PDAF:

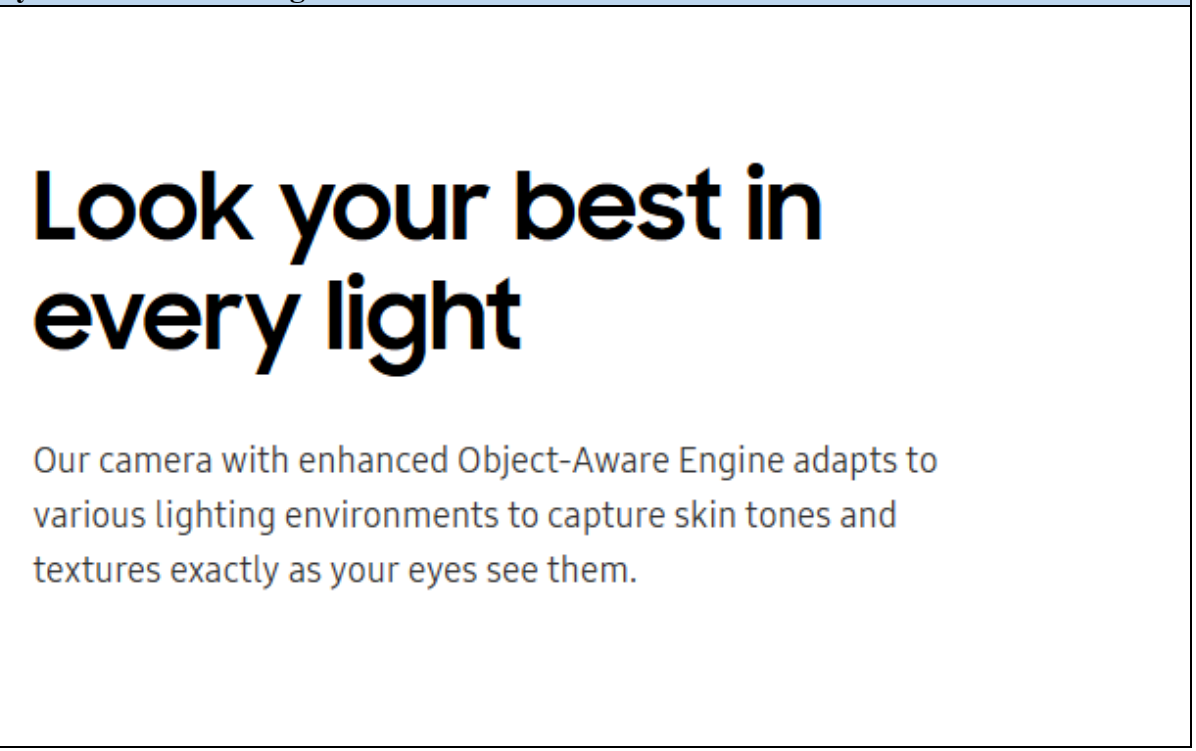
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Special Autofocus Pixels Used in PDAF Technology To understand how Dual Pixel Pro works, it is important to first understand its foundational technology, Phase Detection Autofocus (PDAF). Just like how humans use their two eyes to focus, PDAF compares the phase difference perceived from two different locations and moves the lens such that the two phases align to adjust the focus. 

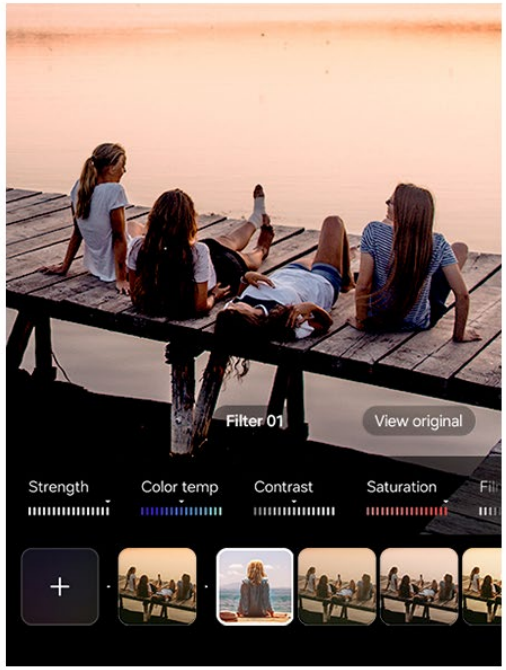
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Dual Pixel with Improved Autofocus  Each pixel on a Dual Pixel sensor contains two photodiodes, one left-looking, one right-looking. When capturing a scene, the phases from each pair of photodiodes are compared to achieve autofocus. Since every pixel in the sensor is being used for both autofocus and color values, the sensor can achieve quick autofocus without losing image quality. In the previous Dual Pixel technology, each pixel is divided vertically into left and right. Dual Pixe features green pixels that are divided diagonally. There are clear benefits in dividing pixels diagonally. These pixels can compare the phase differer between the top and bottom of the pixel in addition to phase differences in the left and right side a result, even in a situation where autofocusing is challenging to achieve based on the use of only and right phase differences, Dual Pixel Pro can use top and bottom phase differences, therefore delivering faster and more accurate autofocusing capabilities.

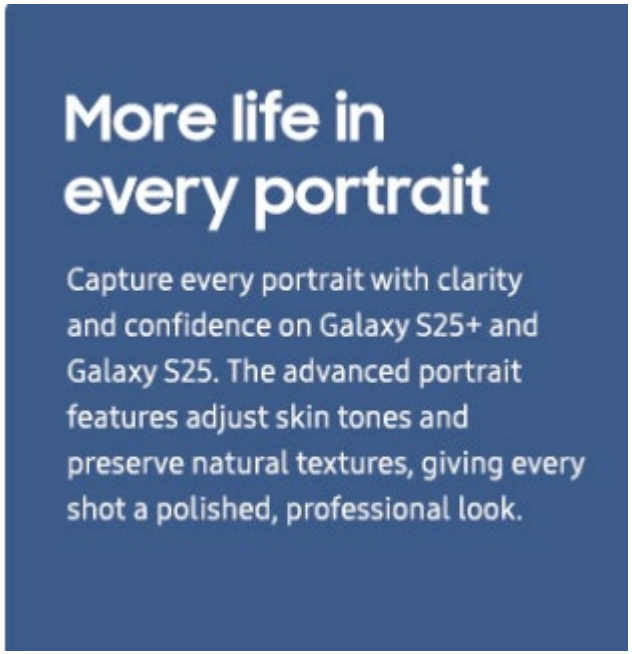
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	https://semiconductor.samsung.com/news-events/tech-blog/the-evolution-from-image-sensor-to-human-eye-samsungs-innovative-dual-pixel-pro-technology/ **Doctrine of Equivalents** To the extent Samsung argues that the above-identified structure does not literally infringe this claim element, this limitation is infringed under the doctrine of equivalents because the Accused Samsung '950 Products contain one or more components and/or software, or a combination thereof, that perform substantially the same function in substantially the same way to obtain the same result. By way of example, to the extent that Samsung argues that the Accused Samsung '950 Products do not have an evaluated value extraction unit, each of these products include software, hardware, or a combination of the two that perform the equivalent function of extracting an evaluated value for a region. Using this combination, these products perform substantially the same function (for example, value extraction) in substantially the same way. The performance of this function achieves substantially the same result, for example, the extraction of a value of a region corresponding to an object. That this functionality may be divided across several components does not preclude them from collectively functioning as an evaluated value extraction unit.
[1.d] a processing unit which applies predetermined processing to the picture signal; and	In each of the Accused Samsung '950 Products, the processing unit is comprised of one or more processors (e.g., a CPU, ISP, and/or DSP), which are configured to apply predetermined processing to the picture signal. This processing unit performs various image and video processing tasks on captured images, including adjusting the background for portrait photos, determining ideal camera settings like exposure, and performing white balance adjustments. As an example, the signal processor is configured to adjust skin tones and textures in accordance with lighting environment.

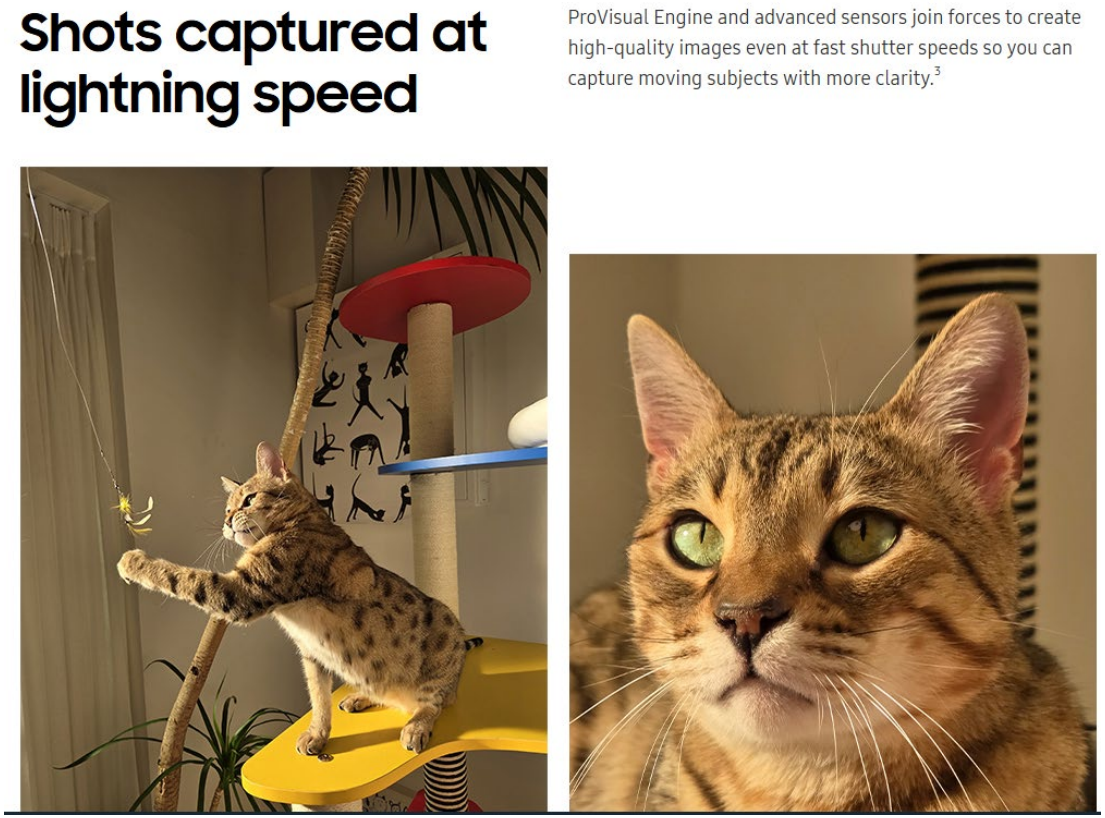
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Configure shooting mode Allow the camera to determine the ideal mode for your pictures or choose from several shooting modes. ○ From **Camera**, swipe the screen right and left to change shooting modes. • **Portrait**: Adjust the background of your shots for portrait photos. • **Photo**: Allow the camera to determine the ideal settings for pictures. • **Video**: Allow the camera to determine the ideal settings for videos. • **More**: Choose other available shooting modes. Tap **Edit** to drag modes into or out of the shooting modes tray at the bottom of the Camera screen. - **Bixby Vision**: When available, icons are displayed in the Camera viewfinder for translation, QR code detection, landmark recognition, or shopping. - **Pro**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while taking pictures. - **Pro video**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while recording videos. - **Night**: Use this to take photos in low-light conditions, without using the flash. - **Food**: Take pictures that emphasize the vivid colors of food.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	- **Panorama**: Create a linear image by taking pictures in either a horizontal or vertical direction. - **Slow motion**: Record videos at a high frame rate for viewing in slow motion. - **Hyperlapse**: Create a time lapse video by recording at various frame rates. The frame rate is adjusted depending on the scene being recorded and the movement of the device. - **Portrait video**: Adjust the background of your shots for portrait videos. - **Dual rec**: Access advanced features such as lock onto a subject, change between different rear camera lenses, and more. - **Single take**: Capture multiple pictures and video clips from different angles. Samsung Galaxy S25 User Guide at 43-44. (https://downloadcenter.samsung.com/content/UM/202502/20250222040501249/SAM_S931_S936_S938_EN_UG_OS15_012425_FINAL_AC_02072025.pdf)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 **Filters just for you** Bring pics to life with personalized filters. Galaxy AI analyzes your photo and creates a filter to match. Use it instantly or customize further with tweaks to the saturation, brightness and more. How to use Filters https://www.samsung.com/us/smartphones/galaxy-s25/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 https://www.samsung.com/us/smartphones/galaxy-s25 As another example, the signal processor is configured to adjust shutter speed and/or exposure in accordance with a motion of a moving object or subject in a region.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 https://www.samsung.com/us/smartphones/galaxy-s25/ As another example, the signal processor is configured to perform image enhancement or color correction such as lighting adjustment or white balance on a detected face. In particular, upon information and belief, the Accused Samsung '950 Products are configured to perform face detect 3A, which is predetermined processing based on detection of a face. As another example, the signal processor is configured to perform image enhancement or color correction such as lighting adjustment or white balance on a detected natural skin.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	As another example, the signal processor is configured to perform image enhancement or color correction such as lighting adjustment or white balance in a hair region. As another example, the signal processor is configured to perform image enhancement or color correction such as lighting adjustment or white balance in a clothing region. As another example, the signal processor is configured to perform image enhancement or object deletion in a moving object region. As another example, the signal processor is configured to perform image enhancement, lighting adjustment, or noise reduction in a background region. As additional examples, the signal processor is configured to perform image enhancement, lighting adjustment, and/or other predetermined processes or AI-based corrections based on detection of various objects such as food, text, fireworks, moon, auto-focus pixels for PDAF. Such predetermined processing includes performing "Generative edit," provide "Edit suggestions," implement Portrait Studio, and/or generate photo effects.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

If you're unsure how to edit a photo or video in the Gallery app, let AI Edit Suggestion help you out. This feature lets you move and delete unwanted objects in order to create an entirely new image. You can also use additional options such as remastering, colorizing, removing reflections, and adding portrait effects to transform and elevate your photos and videos. You can learn more about **AI Edit suggestions** using our guide.

Generative edit is an AI editing tool that lets you customize your images. Just find your desired image in the Gallery app, tap the **Photo Assist** icon (the three stars), and then tap or draw around an object in the photo you'd like to adjust. You can move the object around to another part of the photo. When you tap **Generate**, AI will fill in the photo's missing parts.

Note: Generative edit requires an internet connection and will resize photos to 12MP.

Drawing Assist lets you bring your drawings to life. You can create AI sketches using Air command, Samsung Notes, Gallery, and the AI Select feature in the Edge panel.

Portrait Studio on the Z Fold6 and Z Flip6 lets you add extra flair to your selfies. Select your desired selfie in the Gallery app, then tap the **Photo Assist** icon (the stars), and then tap **Generative portrait** on the image. You can select from the available styles at the bottom of the screen, and then tap **Generate** to create a new image.

Live Effects will bring your photos to life with animations on the Z Fold6 and Z Flip6. Select a photo in the Gallery app, then swipe up to view more details, and then tap **3D photo**. AI will generate the photo's effects. You may see a zooming motion, a panning motion, or a swivel motion.

https://www.samsung.com/us/support/answer/ANS10000753/

Use AI editing tools in Gallery on your Galaxy phone or tablet

The new editing features on select **Galaxy phones and tablets** will transform your favorite photos into masterpieces! Thanks to Galaxy AI, you can use features like Generative edit and Edit suggestions to move objects within your photos and automatically receive enhancement recommendations. You can also use the Galaxy Enhance-X app to take things further with more editing options that include blur removal and brightness adjustment.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	https://www.samsung.com/us/support/answer/ANS10000753/ **Use Generative edit** **Note** Generative edit is available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, Tab S10, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8. Generative edit allows you to move or delete objects from your pictures in order to create an entirely new image. Galaxy AI will then fill in the background and any missing portions.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Generative edit allows you to move or delete objects from your pictures in order to create an entirely new image. Galaxy AI will then fill in the background and any missing portions. 1 Navigate to and open the **Gallery** app, and then select a picture you'd like to edit. 2 Tap the **Edit** icon (the pencil), and then tap the **Generative edit** icon (the blue circle with three stars). **Note**: You may be required to tap **OK** on the prompt. 3 Using your finger, outline your desired object. Tap **Deselect** to start over if needed. 4 Next, touch and hold the outlined object, and then drag it into a different part of the image. Tap **Return** (the back arrow) to move the object back to its original position, or tap **Remove** (the eraser icon) to erase the object. Repeat this process to move or remove additional objects. 5 If needed, adjust the **slider** at the bottom of the screen to straighten the picture. 6 When you're finished, tap **Generate**. Galaxy AI will fill in the image's background and adjust the objects that have been moved. 7 Touch and hold **View original** to compare the original image with the newly generated image. 8 When you're finished, tap **Done**, and then tap **Save as copy** to save the image. https://www.samsung.com/us/support/answer/ANS10000934/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Use Edit suggestions

Note

Edit suggestions are available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, A16 5G, A26 5G, A35 5G, A36 5G, A54 5G, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8.

Galaxy AI will analyze your pictures and provide editing suggestions to enhance them! The individual suggestion will vary depending on the image, or there may not be any suggestions at all.

1 Navigate to and open the **Gallery** app, and then select a picture you'd like to edit.

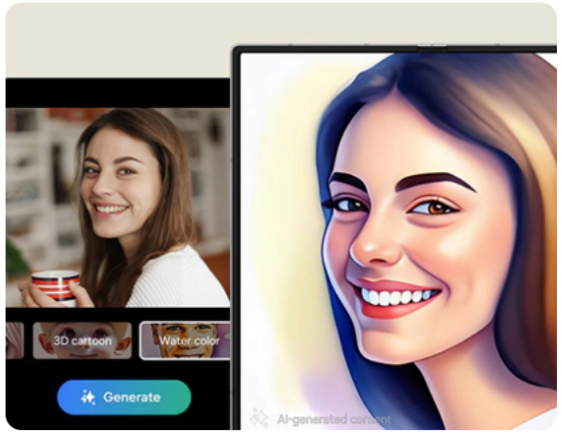
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	- **Pro**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while taking pictures. - **Pro video**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while recording videos. Samsung Galaxy S25 User Manual at 43. (https://downloadcenter.samsung.com/content/UM/202502/20250222040501249/SAM_S931_S936_S938_EN_UG_OS15_012425_FINAL_AC_02072025.pdf)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Use Portrait Studio

Note

Portrait Studio is available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, Tab S10, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8.



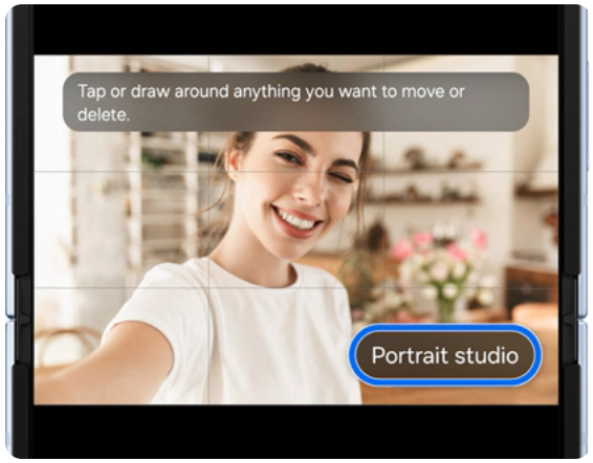
After you've taken a selfie, you can add some extra flair to it with Portrait Studio.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

After you've taken a selfie, you can add some extra flair to it with Portrait Studio.

1 Open the **Gallery** app, and then find and select your desired selfie.

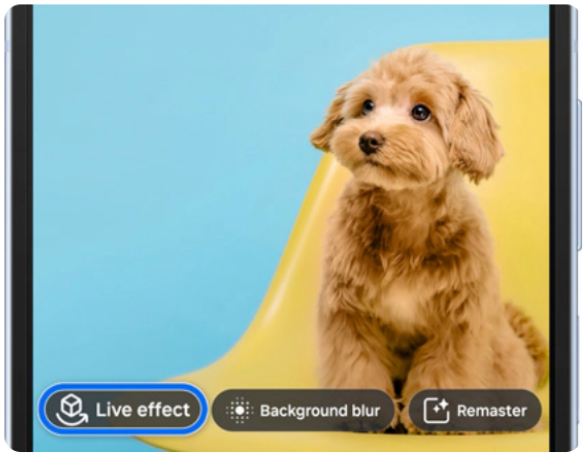
2 Tap the **Photo Assist** icon (the stars), and then tap **Generative portrait** on the image.



3 Select from the available styles at the bottom of the screen, such as Comic, 3D cartoon, or Watercolor.

4 Then, tap **Generate**.

https://www.samsung.com/us/support/answer/ANS10000934/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Live Effect will bring your photos to life with animations. The effect may differ depending on the photo. 1 Open the **Gallery** app, and then find and select a photo. 2 Swipe up to view more details, and then tap **3D photo** on the image.  3 AI will generate the photo's effects. You may see a zooming motion, a panning motion, or a swivel motion. 4 You can share the generated photo by tapping **Share** at the bottom of the screen. https://www.samsung.com/us/support/answer/ANS10000753/ Further, the Accused Samsung '950 Products include a Scene Optimizer to perform feature detection and corrections.

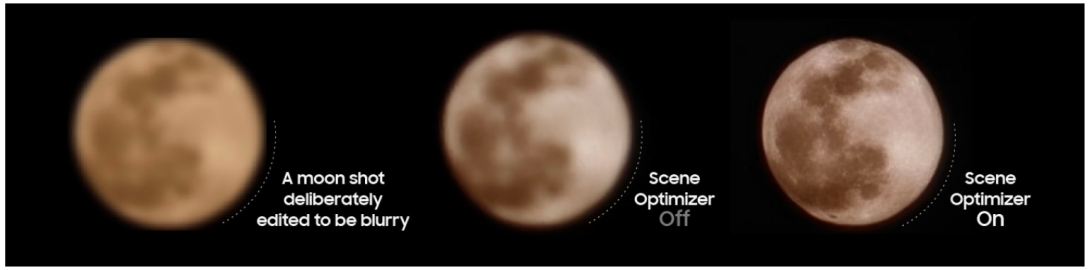
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	How Samsung Galaxy Cameras Combine Super Resolution Technologies With AI Technology to Produce High-Quality Images of the Moon Samsung is committed to delivering best-in-class camera experiences in all conditions. Since the introduction of the Galaxy S10, the Samsung Galaxy series has harnessed artificial intelligence (AI) technologies in its cameras to help users capture every epic moment anytime, anywhere. As part of this, Samsung developed the Scene Optimizer feature, a camera functionality which uses advanced AI to recognize objects and thus deliver the best results to users. Since the introduction of the Galaxy S21 series, Scene Optimizer has been able to recognize the moon as a specific object during the photo-taking process, and applies the feature's detail enhancement engine to the shot. When you're taking a photo of the moon, your Galaxy device's[1] camera system will harness this deep learning-based AI technology, as well as multi-frame processing in order to further enhance details. Read on to learn more about the multiple steps, processes and technologies that go in to delivering high-quality images of the moon.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Understanding Super Resolution and Scene Optimizer

In order to take a clear photo of the moon, Galaxy cameras harness Super Resolution to synthesize more than 10 images taken at 25x zoom or higher. The image taken at 25x zoom or above needs to eliminate noise and enhance clarity and other details.

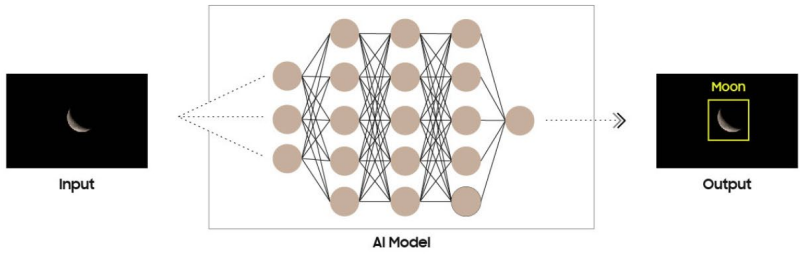
Super Resolution technology helps produce images through multi-frame composition. When Scene Optimizer is turned on and the moon has been recognized as an object, the camera will deliver users a bright and clear image through the detail enhancement engine of Scene Optimizer on top of the Super Resolution technology.



AI Deep Learning for Moon Object Recognition

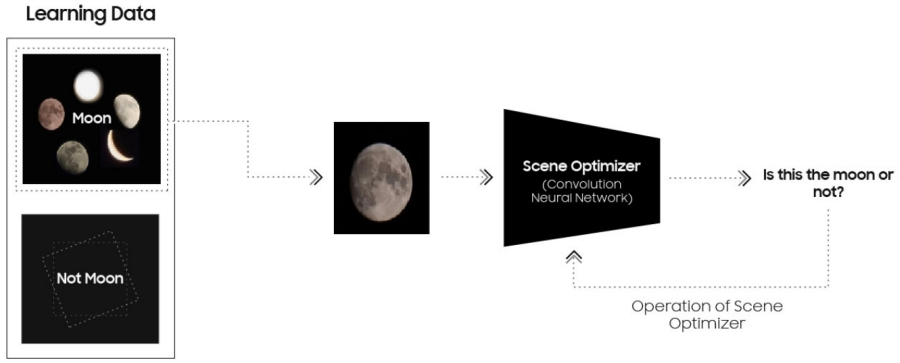
The engine for recognizing the moon was built based on a variety of moon shapes and details, from full through to crescent moons, and is based on images taken from our view from the Earth.

It uses an AI deep learning model to detect the presence of the moon and identify the area it occupies – as denoted by the square box - in the relevant image. Once the AI model has completed its learning, it can detect the area occupied by the moon even in images that were not used in training.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 However, the moon will not be properly recognized by the camera and Scene Optimizer technology if it is obscured by clouds, or if the moon object itself is the side that is not visible from the Earth. https://www.samsungmobilepress.com/feature-stories/how-samsung-galaxy-cameras-combine-super-resolution-technologies-with-ai-technology-to-produce-high-quality-images-of-the-moon/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	The Brightness Control Process Once the device has recognized the moon after zooming in, it will control the brightness of the display in order to present the moon more clearly while maintaining optimal brightness. Accordingly, when users take photos of the moon at early evening time, the sky around the moon will appear darker than the actual sky color because the device will darken the object background brightness in order to help make the moon appear more clearly. Once your device recognizes the moon, it will continuously adjust focus to stay directly on the moon. **Capturing the Most Stable Images Possible** Samsung introduced the Zoom Lock feature, which automatically reduces the effects of a shaking device without the need for a tripod. Combining OIS and VDIS technologies, Zoom Lock is able to minimize the image blur that can be caused by shaking hands and helps users take truly epic moon shots. While zooming in and touching the display or maintaining a focus on the moon for longer than 1.5 seconds, the Zoom Lock feature will be automatically activated. The border line of the zoom map on the upper right side of the screen will change from white to yellow, and the moon will be fixed on the display.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Next, the camera takes multiple pictures and then synthesizes them into a single, bright image with reduced noise.

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Become the ultimate photographer with Samsung AI

Tap into the tools that help take perfect pictures, capture nighttime photos and make shareable content

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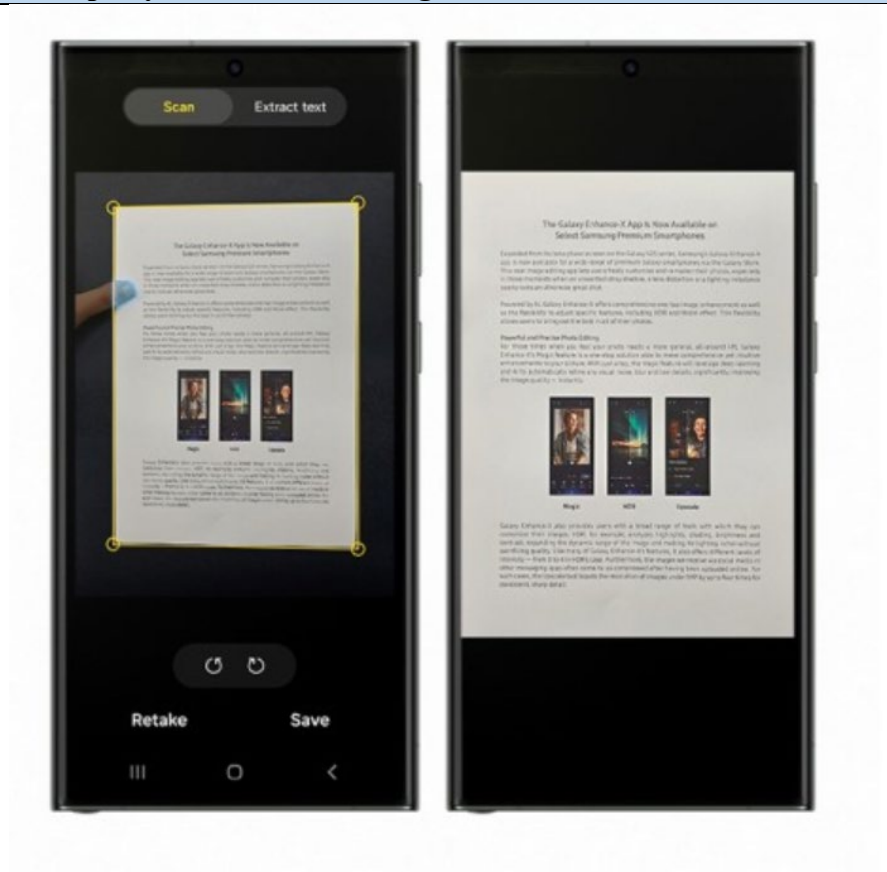
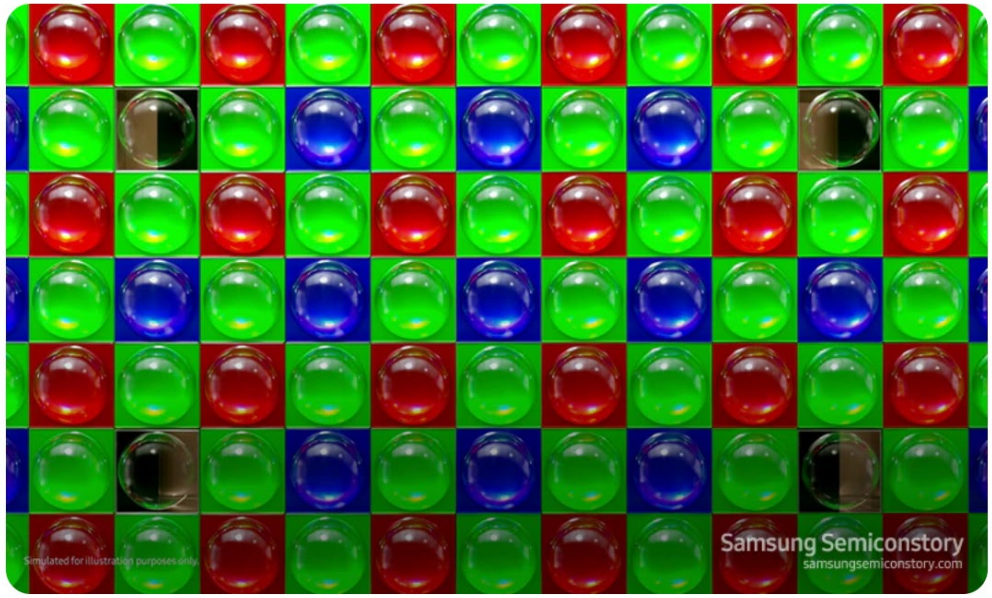
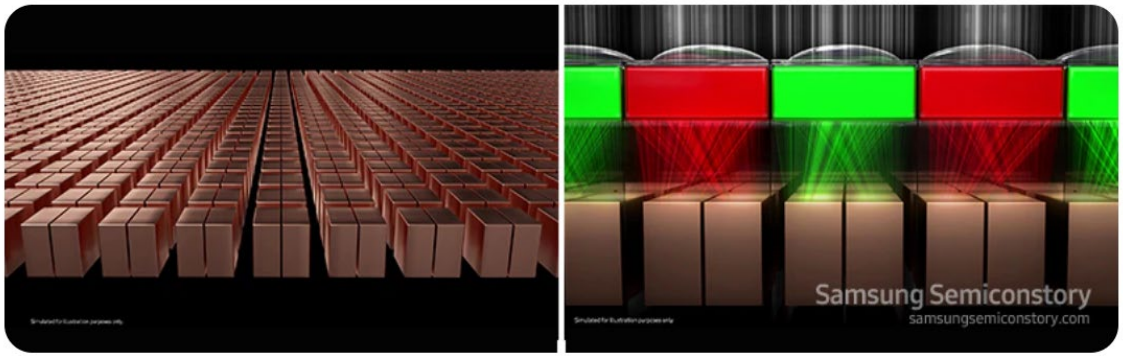
	Samsung's Galaxy S23 Ultra series uses AI Stereo Depth Mapping, a software-based feature that relies on AI algorithms to improve image output when you click a photo. This algorithm essentially creates a depth map that automatically measures the distance between objects in an image, so it doesn't miss out on the smaller elements. For example, imagine a picture of a person on the Galaxy S23 ultra whose face is in focus, but their hair or clothing, which normal cameras may treat as background elements, might not be. AI Stereo Depth Mapping fixes this common problem, making sure all these elements are clear and in focus. https://www.samsung.com/us/explore/photography/become-the-ultimate-photographer-with-samsung-AI/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 https://news.samsung.com/global/one-ui-6-update-7-tips-for-making-the-most-of-ai-camera-on-your-galaxy

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Further, the Accused Samsung '950 Products creates a region by removing pixels with the features from an evaluated value extraction region to perform PDAF: Special Autofocus Pixels Used in PDAF Technology To understand how Dual Pixel Pro works, it is important to first understand its foundational technology, Phase Detection Autofocus (PDAF). Just like how humans use their two eyes to focus, PDAF compares the phase difference perceived from two different locations and moves the lens such that the two phases align to adjust the focus. 

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Dual Pixel with Improved Autofocus  Each pixel on a Dual Pixel sensor contains two photodiodes, one left-looking, one right-looking. When capturing a scene, the phases from each pair of photodiodes are compared to achieve autofocus. Since every pixel in the sensor is being used for both autofocus and color values, the sensor can achieve quick autofocus without losing image quality. In the previous Dual Pixel technology, each pixel is divided vertically into left and right. Dual Pixe features green pixels that are divided diagonally. There are clear benefits in dividing pixels diagonally. These pixels can compare the phase differer between the top and bottom of the pixel in addition to phase differences in the left and right side a result, even in a situation where autofocusing is challenging to achieve based on the use of only and right phase differences, Dual Pixel Pro can use top and bottom phase differences, therefore delivering faster and more accurate autofocusing capabilities.

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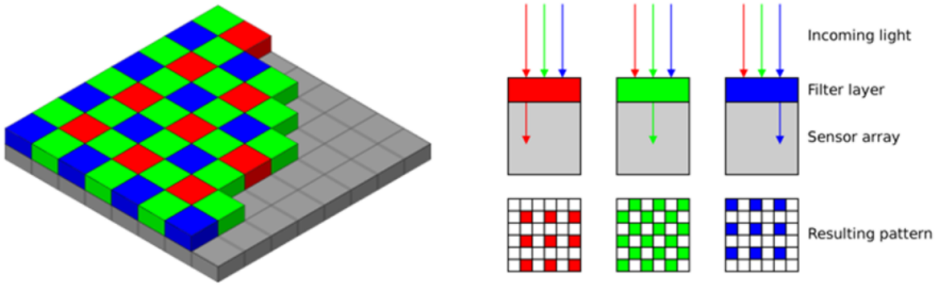
	https://semiconductor.samsung.com/news-events/tech-blog/the-evolution-from-image-sensor-to-human-eye-samsungs-innovative-dual-pixel-pro-technology/ **3. WB (White Balance)**[3] This block helps the camera adjust the color balance and render them accurately. It ensures that an image has a uniform WB Gain and that the RGB of the grey (achromatic) areas are adjusted to the same value (to depict the grey as grey). The sensor output fed to ISP has twice as many green channels as any other. This is the reason why the raw image before the application of WB Gain looks green overall. (Refer to 'De-mosaic' below) **4. De-mosaic (= Bayer Interpolation, Color Interpolation)** Most smartphone cameras use the Bayer type (or pattern) sensor. The Bayer sensor, as illustrated below [2] is 3 color filter combination sensor mounted on top of a photodiode array.  https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	FD (Face Detection) This block detects faces in an image/video and passes their coordinates to the next block. The face coordinates can be used in other algorithms or solutions to implement different features. **[Example of application] Using FD information in AWB (Auto White Balance) and AE (Auto Exposure) algorithm blocks** 1. When a face is detected, it compares and corrects the difference between the face brightness and the targeted brightness of the whole image. It utilizes the face coordinates received, to adjust the face brightness, etc. 2. When multiple sources are detected illuminating a face and the face is overly affected by these lights, this FD data can be used to correct the color on it. For example, if a face is detected in a low-color temperature light setup giving off a slightly reddish glow, the face coordinates are used to adjust the color of the face. https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145

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	• Our Qualcomm Spectra™ AI ISP features:
	  • Limitless Real-time Semantic Segmentation for photo/video frame
	  • Insight AI provides real-time skin and sky adjustments to create more natural color and lighting in uncertain conditions.
	  • Ultra-low Light video capture
	  • Video Object Eraser can remove unwanted elements from videos
	  • Real-time AI Relighting make you appear professional wherever you are
	  • Truepic photo capture with C2PA standard support lets you snap a photo with Truepic's cryptographic seal to prove the photo is real and not Gen AI
	
	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

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	Camera Qualcomm Spectra™ Image Signal Processor • AI-ISP, Triple 18-bit ISPs Limitless real-time Semantic Segmentation photo and video processing Engine for Visual Analytics 4.0, including hardware acceleration for iToF depth sensors up to 4K 60 FPS Support for the latest HDR, DCG+VS, DCG, Staggered, QDOL, Less Blanking, and Multiframe HDR image sensors Support for triple video capture from HDR image sensors, with seamless switching between any HDR mode • Up to 48 MP triple camera @ 30 FPS with Zero Shutter Lag • Up to 108 MP single camera @ 30 FPS with Zero Shutter Lag • Up to 320-megapixel photo capture AI-based face detection, AI for 3A (auto-focus, autoexposure, and auto-white balance) Rec. 2020 color gamut photo and video capture Up to 10-bit color depth photo and video capture 10-bit HEIF: HEIC photo capture, HEVC video capture Google Ultra HDR photo capture Video capture HDR formats: HDR10+, HDR10, HLG, Dolby Vision 8K HDR video playback @ 60 FPS 4K video capture @ 120 FPS Slow-mo video capture at 1080p @ 480 FPS Hardware Bokeh Engine 2 for video capture

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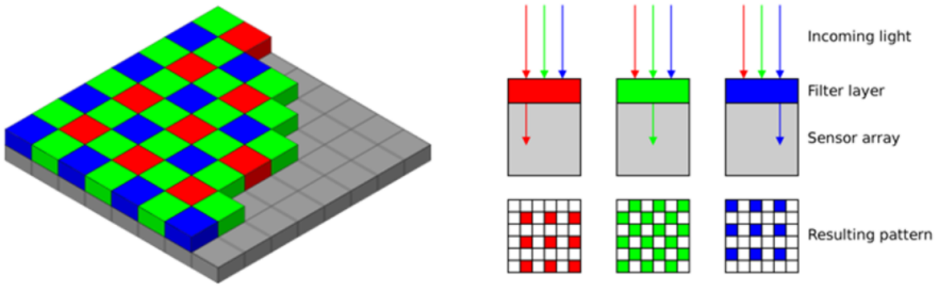
	(https://docs.qualcomm.com/bundle/publicresource/87-83196-1_REV_D_Snapdragon_8_Elite_Mobile_Platform_Product_Brief.pdf) **AI-powered camera redefines photography** Infuse brilliance into mobile capture with our AI ISP, enhancing everything from selfies to crystal-clear video chats thanks to an overhauled Hexagon Direct Link. The first AI-powered Limitless Segmentation recognizes and enhances virtually anything in the frame, including faces, hair, clothing, objects, backgrounds, and beyond. Even furry friends appear crisp and cute—no matter how fast the zoomies—thanks to AI-Based Pet Capture. • Our powerful AI ISP is deeply integrated with the Hexagon NPU for enhanced, intuitive capture. • Limitless Segmentation can segment an image in over 250 layers, each optimized to perfection. • Real-time Insight AI captures and enhances natural skin and sky tones even in the most challenging conditions. • Truepic with C2PA adds cryptographic seals so you can authenticate your photos as real and not AI-generated—now including videos and audio recordings. • Video Object Eraser can remove unwanted elements from video footage—on-device. • Capture vivid videos at 4K60 FPS, even in near darkness. (https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Snapdragon-8-Elite-Platform-Product-Brief.pdf) Let's dive deeper into why Snapdragon 8 Elite is a game-changer: • **Incredible power:** Experience a 45% boost in performance with the Qualcomm Oryon CPU, giving you lightning-fast apps and incredible multitasking.[1] • **AI at your fingertips:** The Qualcomm® Hexagon™ NPU increases AI performance by 45%, handling everything from voice commands to image prompts. Your device is ready to adapt to your every move. • **Photography, reimagined:** With features like 4K Semantic Segmentation, Video Object Eraser, and real-time AI lighting adjustments, the Snapdragon 8 Elite camera tech turns your mobile photos into pro-level masterpieces. https://www.qualcomm.com/snapdragon/news/snapdragon-8-elite--the-power-behind-the-name

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	3. WB (White Balance)[3] This block helps the camera adjust the color balance and render them accurately. It ensures that an image has a uniform WB Gain and that the RGB of the grey (achromatic) areas are adjusted to the same value (to depict the grey as grey). The sensor output fed to ISP has twice as many green channels as any other. This is the reason why the raw image before the application of WB Gain looks green overall. (Refer to 'De-mosaic' below) **4. De-mosaic (= Bayer Interpolation, Color Interpolation)** Most smartphone cameras use the Bayer type (or pattern) sensor. The Bayer sensor, as illustrated below [2] is 3 color filter combination sensor mounted on top of a photodiode array.  https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145

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U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

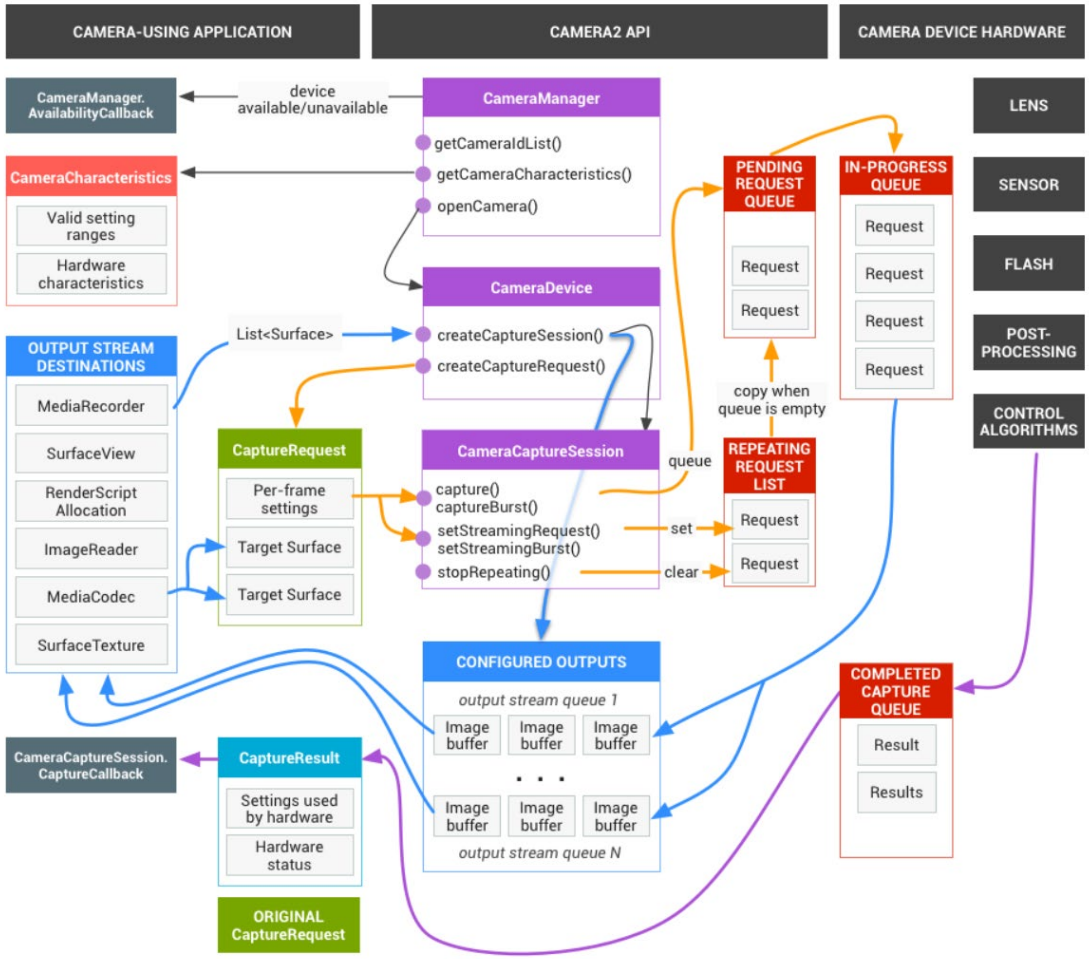

Figure 1. Camera model

https://source.android.com/docs/core/camera/camera3_requests_hal

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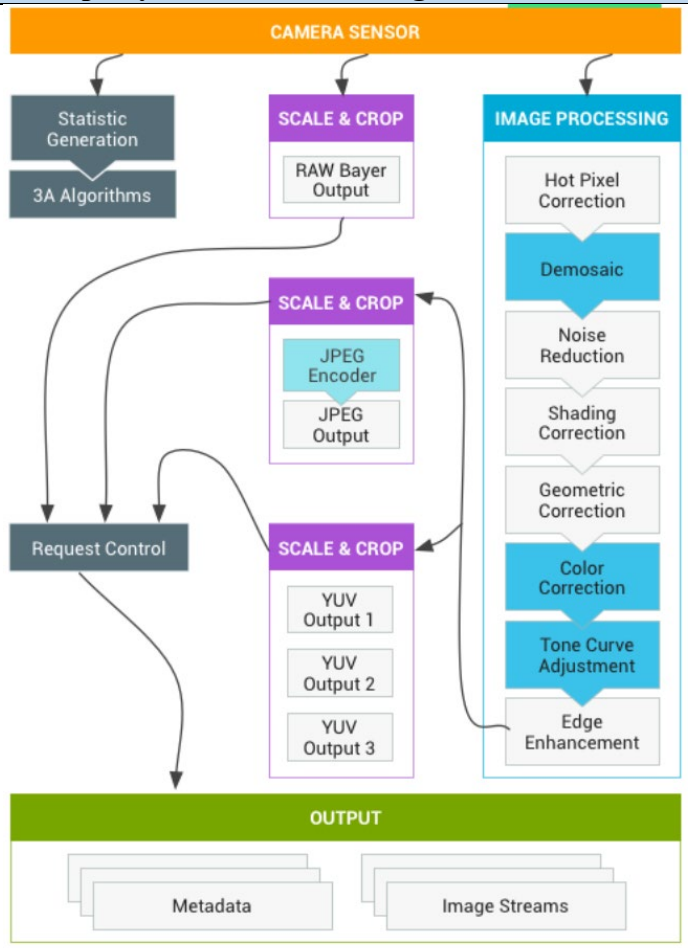

Figure 2. Camera pipeline

https://source.android.com/docs/core/camera/camera3_requests_hal

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```
/**
 * <p>Same as OFF mode, except that this capture will not be
 * used by camera device background auto-exposure, auto-white balance and
 * auto-focus algorithms (3A) to update their statistics.</p>
 * <p>Specifically, the 3A routines are locked to the last
 * values set from a request with AUTO, OFF, or
 * USE_SCENE_MODE, and any statistics or state updates
 * collected from manual captures with OFF_KEEP_STATE will be
 * discarded by the camera device.</p>
 * @see CaptureRequest#CONTROL_MODE
 */
public static final int CONTROL_MODE_OFF_KEEP_STATE = 3;


/**
 * <p>If face detection support exists, use face
 * detection data for auto-focus, auto-white balance, and
 * auto-exposure routines.</p>
 * <p>If face detection statistics are disabled
 * (i.e. {@link CaptureRequest#STATISTICS_FACE_DETECT_MODE android.statistics.faceDetectMode} is set to OFF),
 * this should still operate correctly (but will not return
 * face detection statistics to the framework).</p>
 * <p>Unlike the other scene modes, {@link CaptureRequest#CONTROL_AE_MODE android.control.aeMode},
 * {@link CaptureRequest#CONTROL_AWB_MODE android.control.awbMode}, and {@link CaptureRequest#CONTROL_AF_MODE android.control.afMode}
 * remain active when FACE_PRIORITY is set.</p>
 *
 * @see CaptureRequest#CONTROL_AE_MODE
 * @see CaptureRequest#CONTROL_AF_MODE
 * @see CaptureRequest#CONTROL_AWB_MODE
 * @see CaptureRequest#STATISTICS_FACE_DETECT_MODE
 * @see CaptureRequest#CONTROL_SCENE_MODE
 */
public static final int CONTROL_SCENE_MODE_FACE_PRIORITY = 1;
```

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```
/**
 * <p>List of the maximum number of regions that can be used for metering in
 * auto-exposure (AE), auto-white balance (AWB), and auto-focus (AF);
 * this corresponds to the maximum number of elements in
 * {@link CaptureRequest#CONTROL_AE_REGIONS android.control.aeRegions}, {@link CaptureRequest#CONTROL_AWB_REGIONS android.control.awbRegions},
 * and {@link CaptureRequest#CONTROL_AF_REGIONS android.control.afRegions}.</p>
 * <p><b>Range of valid values:</b><br></p>
 * <p>Value must be &gt;= 0 for each element. For full-capability devices
 * this value must be &gt;= 1 for AE and AF. The order of the elements is:
 * <code>(AE, AWB, AF)</code>.</p>
 * <p>This key is available on all devices.</p>
 *
 * @see CaptureRequest#CONTROL_AE_REGIONS
 * @see CaptureRequest#CONTROL_AF_REGIONS
 * @see CaptureRequest#CONTROL_AWB_REGIONS
 * @hide
 */
public static final Key<int[]> CONTROL_MAX_REGIONS =
        new Key<int[]>("android.control.maxRegions", int[].class);
```

```
    */
    @PublicKey
    @NonNull
    public static final Key<Integer> CONTROL_AWB_MODE =
            new Key<Integer>("android.control.awbMode", int.class);
```

See
https://android.googlesource.com/platform/frameworks/base/+/master/core/java/android/hardware/camera2/CameraMetadata.java;
https://android.googlesource.com/platform/frameworks/base/+/master/core/java/android/hardware/camera2/CameraCharacteristics.java;

https://android.googlesource.com/platform/frameworks/base/+/master/core/java/android/hardware/camera2/CaptureResult.java;

https://android.googlesource.com/platform/frameworks/base/+/master/core/java/android/hardware/camera2/CaptureRequest.java;

As an additional example, the Accused Samsung '950 Products detect white attributes (e.g., based on scene classification or skin) and applies color temperature corrections by adjusting hue and

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	saturation. For example, the "Camera" application includes a scene mode feature, which adjusts the camera settings based on detection of the type of scene including detecting white attributes in the scene.
	
	CONTROL_SCENE_MODE_FACE_PRIORITY Added in API level 21
	
	`public static final int CONTROL_SCENE_MODE_FACE_PRIORITY`
	
	If face detection support exists, use face detection data for auto-focus, auto-white balance, and auto-exposure routines.
	
	If face detection statistics are disabled (i.e. `android.statistics.faceDetectMode` is set to OFF), this should still operate correctly (but will not return face detection statistics to the framework).
	
	Unlike the other scene modes, `android.control.aeMode`, `android.control.awbMode`, and `android.control.afMode` remain active when FACE_PRIORITY is set.
	
	CONTROL_SCENE_MODE_FIREWORKS Added in API level 21
	
	`public static final int CONTROL_SCENE_MODE_FIREWORKS`
	
	Optimized for nighttime photos of fireworks.

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CONTROL_SCENE_MODE_HDR

Added in API level 22

```
public static final int CONTROL_SCENE_MODE_HDR
```

Turn on a device-specific high dynamic range (HDR) mode.

In this scene mode, the camera device captures images that keep a larger range of scene illumination levels visible in the final image. For example, when taking a picture of a object in front of a bright window, both the object and the scene through the window may be visible when using HDR mode, while in normal AUTO mode, one or the other may be poorly exposed. As a tradeoff, HDR mode generally takes much longer to capture a single image, has no user control, and may have other artifacts depending on the HDR method used.

Therefore, HDR captures operate at a much slower rate than regular captures.

CONTROL_SCENE_MODE_LANDSCAPE

Added in API level 21

```
public static final int CONTROL_SCENE_MODE_LANDSCAPE
```

Optimized for photos of distant macroscopic objects.

See also:

`CaptureRequest.CONTROL_SCENE_MODE`

Constant Value: 4 (0x00000004)

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	CONTROL_SCENE_MODE_NIGHT Added in API level 21
	
	`public static final int CONTROL_SCENE_MODE_NIGHT`
	
	Optimized for low-light settings.
	
	See also:
	
	`CaptureRequest.CONTROL_SCENE_MODE`
	
	Constant Value: 5 (0x00000005)
	
	CONTROL_SCENE_MODE_NIGHT_PORTRAIT Added in API level 21
	
	`public static final int CONTROL_SCENE_MODE_NIGHT_PORTRAIT`
	
	Optimized for still photos of people in low-light settings.
	
	See also:
	
	`CaptureRequest.CONTROL_SCENE_MODE`
	
	Constant Value: 6 (0x00000006)

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	CONTROL_SCENE_MODE_PARTY Added in API level 21
	
	`public static final int CONTROL_SCENE_MODE_PARTY`
	
	Optimized for dim, indoor settings with multiple moving people.
	
	See also:
	
	`CaptureRequest.CONTROL_SCENE_MODE`
	
	Constant Value: 14 (0x0000000e)
	
	CONTROL_SCENE_MODE_PORTRAIT Added in API level 21
	
	`public static final int CONTROL_SCENE_MODE_PORTRAIT`
	
	Optimized for still photos of people.
	
	See also:
	
	`CaptureRequest.CONTROL_SCENE_MODE`
	
	Constant Value: 3 (0x00000003)

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	CONTROL_SCENE_MODE_SNOW Added in API level 21
	
	`public static final int CONTROL_SCENE_MODE_SNOW`
	
	Optimized for bright, outdoor settings containing snow.
	
	See also:
	
	`CaptureRequest.CONTROL_SCENE_MODE`
	
	Constant Value: 9 (0x00000009)
	
	COLOR_CORRECTION_MODE Added in API level 21
	
	`public static final Key<Integer> COLOR_CORRECTION_MODE`
	
	The mode control selects how the image data is converted from the sensor's native color into linear sRGB color.
	
	When auto-white balance (AWB) is enabled with `CaptureRequest#CONTROL_AWB_MODE`, this control is overridden by the AWB routine. When AWB is disabled, the application controls how the color mapping is performed.
	
	See https://developer.android.com/reference/android/hardware/camera2/CameraMetadata#CONTROL_SCENE_MODE_FACE_PRIORITY

[1.e] a control unit which controls the processing unit in accordance with the evaluated value having been extracted by the evaluated value extraction unit;	In each of the Accused Samsung '950 Products, the control unit is comprised of one or more processors (e.g., a CPU, ISP, and/or DSP), which are configured to control the processing unit in accordance with the evaluated value having been extracted by the evaluated value extraction unitFor example, on information and belief, the Samsung Galaxy S25 includes a CPU executing the operating system and/or the camera application and the AI camera detection software, that either alone or in conjunction with component of the image signal processor control components and/or the an image signal processor (ISP) and/or digital signal processor (DSP) that adjusts an image or

<table>
<tr><th>U.S. Patent No. 8,471,950</th><th>Exemplary Evidence of Infringement</th></tr>
<tr><td></td><td>
performs predetermined processing including corrections and enhancements based on object detection. For example, by performing white balance correction, food enhancement, firework detection, enhancement for moon photographs, corrections for text detection etc.

As an additional example, white balance is adjusted in accordance with the detected lighting conditions, e.g. fluorescent lighting, incandescent lighting, sunny outdoor lighting, cloudy outdoor lighting. Upon information and belief, certain adjustments are applied when one or more features e.g. skin tone, hair, or face, are detected in a particular region (e.g., Face detect AWB, AW, or AF). Further, foliage or snow scene corrections are performed or not performed when such features are detected or not detected in a region but other image corrections are performed (e.g., face corrections and portrait mode corrections are applied). Further, text scanning corrections are not performed when text is not detected but additional image corrections are applied. Moreover, image corrections to the foreground (e.g., the face of a person or object being captured) are applied but corrections to the background are not applied if a white or black background is not detected. Further if the face is close to the camera such that a background is not detected, then the face corrections are applied but background corrections are not applied and background pattern portions are not contained.

Further, Portrait Mode corrections are applied (e.g., background blurring and face enhancements) based on detected faces.

The image signal processor in the Accused Samsung '950 Products is controled in accordance with the AI-detected objectes and peforms specific processing based on such detections.

<table>
<tr><th>Input</th><th>Features</th><th>Features Contained</th><th>Video with Contents</th><th>Correction</th></tr>
<tr><td> </td><td>Snow</td><td>No</td><td>Cloth</td><td>Corrections based on the selected camera's parameters</td></tr>
</table>
</td></tr>
</table>

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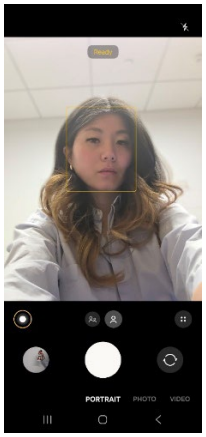
	Portrait Photo				
	 Person in front of a white wall	Snow	No	Face	Beauty face correction applied
	 Book Scan	Snow	No	Scanned image	Scan correction applied

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Face close up

Stair	No	Face	Beauty face correction applied

Input	Features	Features Contained	Video with Contents	Correction
Portrait Photo	Cloud	Yes	Cloth	No Correction. No Blur

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement					
	Person in front of a white wall	Wall	Yes	Face	No Correction. No Blur	
	Book Scan	Text	Yes	Scanned image	No Correction. No Blur	

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Face close up	Cloth	Yes	Face	No White balance correction.

As an example, the signal processor is configured to control adjust skin tones and textures in accordance with lighting environment.

Adaptive color tone

Adjust the colors and white balance based on ambient lighting conditions to make colors appear more natural in different environments.

- From Settings, tap **Display** > **Adaptive color tone** and tap to enable this feature.

Samsung Galaxy S25 User Manual at 116. (https://downloadcenter.samsung.com/content/UM/202502/20250222040501249/SAM_S931_S936_S938_EN_UG_OS15_012425_FINAL_AC_02072025.pdf)

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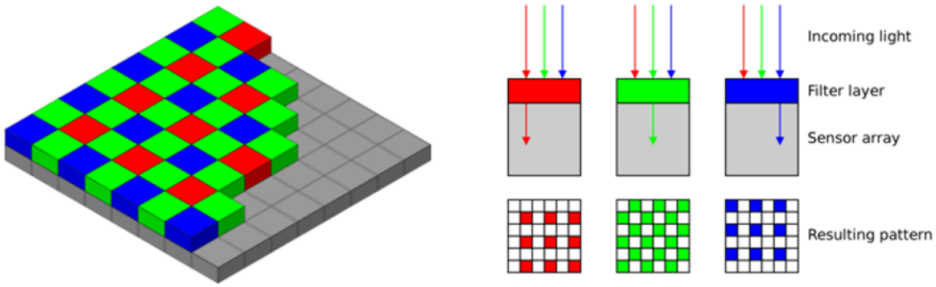
	3. WB (White Balance)[3] This block helps the camera adjust the color balance and render them accurately. It ensures that an image has a uniform WB Gain and that the RGB of the grey (achromatic) areas are adjusted to the same value (to depict the grey as grey). The sensor output fed to ISP has twice as many green channels as any other. This is the reason why the raw image before the application of WB Gain looks green overall. (Refer to 'De-mosaic' below) **4. De-mosaic (= Bayer Interpolation, Color Interpolation)** Most smartphone cameras use the Bayer type (or pattern) sensor. The Bayer sensor, as illustrated below [2] is 3 color filter combination sensor mounted on top of a photodiode array.  https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145

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	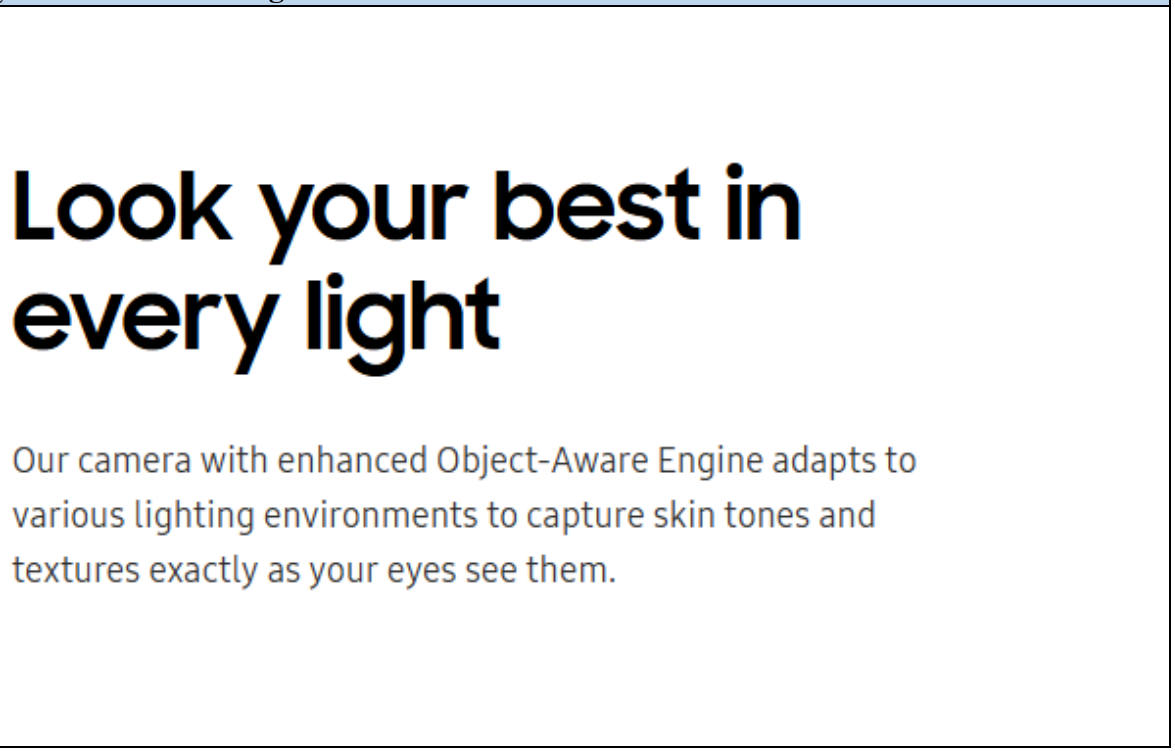

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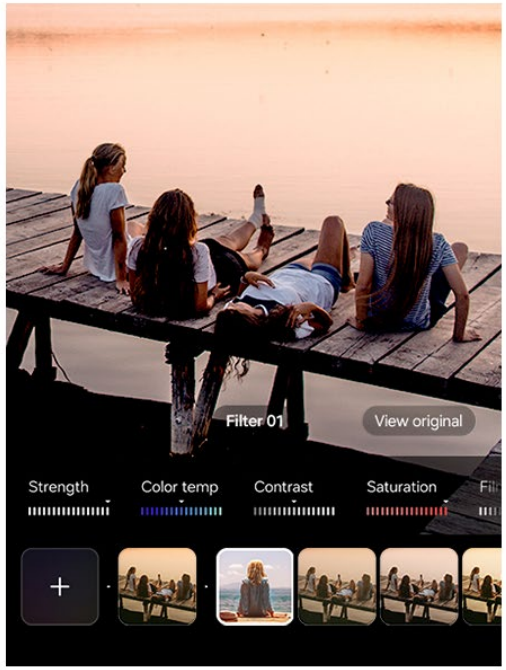
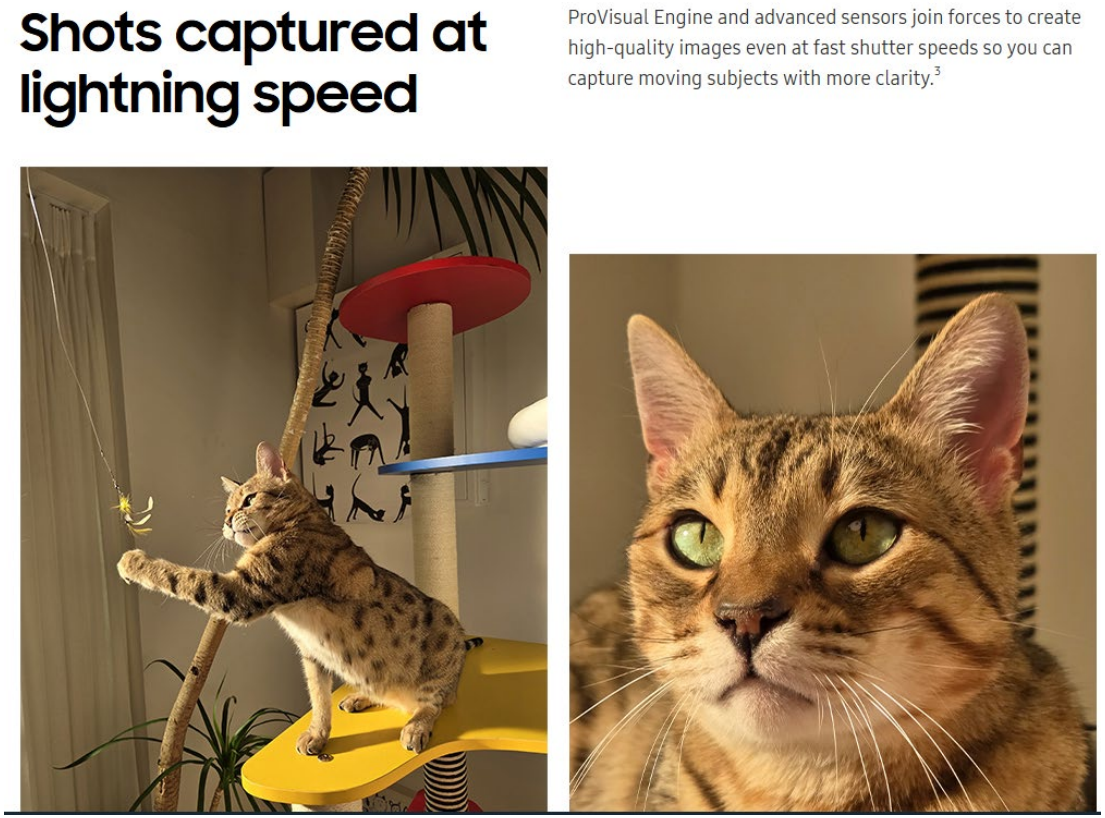
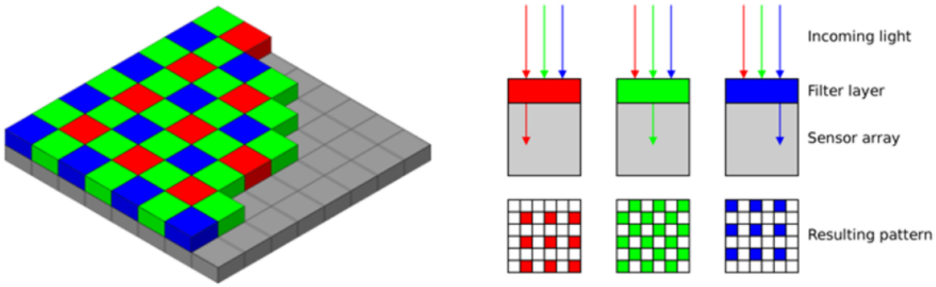
	 **Filters just for you** Bring pics to life with personalized filters. Galaxy AI analyzes your photo and creates a filter to match. Use it instantly or customize further with tweaks to the saturation, brightness and more. How to use Filters https://www.samsung.com/us/smartphones/galaxy-s25/ As another example, the signal processor is configured to control adjustment of shutter speed and/or exposure in accordance with a motion of a moving object or subject in a region.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 https://www.samsung.com/us/smartphones/galaxy-s25/ As another example, the signal processor is configured to control image enhancement or color correction such as lighting adjustment or white balance on a detected face. As another example, the signal processor is configured to control image enhancement or color correction such as lighting adjustment or white balance on a detected natural skin.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	As another example, the signal processor is configured to control image enhancement or color correction such as lighting adjustment or white balance in a hair region. As another example, the signal processor is configured to control image enhancement or color correction such as lighting adjustment or white balance in a clothing region.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	3. WB (White Balance)[3] This block helps the camera adjust the color balance and render them accurately. It ensures that an image has a uniform WB Gain and that the RGB of the grey (achromatic) areas are adjusted to the same value (to depict the grey as grey). The sensor output fed to ISP has twice as many green channels as any other. This is the reason why the raw image before the application of WB Gain looks green overall. (Refer to 'De-mosaic' below) **4. De-mosaic (= Bayer Interpolation, Color Interpolation)** Most smartphone cameras use the Bayer type (or pattern) sensor. The Bayer sensor, as illustrated below [2] is 3 color filter combination sensor mounted on top of a photodiode array.  https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	FD (Face Detection) This block detects faces in an image/video and passes their coordinates to the next block. The face coordinates can be used in other algorithms or solutions to implement different features. **[Example of application] Using FD information in AWB (Auto White Balance) and AE (Auto Exposure) algorithm blocks** 1. When a face is detected, it compares and corrects the difference between the face brightness and the targeted brightness of the whole image. It utilizes the face coordinates received, to adjust the face brightness, etc. 2. When multiple sources are detected illuminating a face and the face is overly affected by these lights, this FD data can be used to correct the color on it. For example, if a face is detected in a low-color temperature light setup giving off a slightly reddish glow, the face coordinates are used to adjust the color of the face. https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145 As another example, the signal processor is configured to control image enhancement or object deletion in a moving object region. As another example, the signal processor is configured to control image enhancement, lighting adjustment, or noise reduction in a background region. As additional examples, the signal processor is configured to perform image enhancement, lighting adjustment, and/or other predetermined processes or AI-based corrections based on detection of various objects such as food, text, fireworks, moon, auto-focus pixels for PDAF. Such predetermined processing includes performing "Generative edit," provide "Edit suggestions," implement Portrait Studio, and/or generate photo effects.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	If you're unsure how to edit a photo or video in the Gallery app, let AI Edit Suggestion help you out. This feature lets you move and delete unwanted objects in order to create an entirely new image. You can also use additional options such as remastering, colorizing, removing reflections, and adding portrait effects to transform and elevate your photos and videos. You can learn more about **AI Edit suggestions** using our guide. Generative edit is an AI editing tool that lets you customize your images. Just find your desired image in the Gallery app, tap the **Photo Assist** icon (the three stars), and then tap or draw around an object in the photo you'd like to adjust. You can move the object around to another part of the photo. When you tap **Generate**, AI will fill in the photo's missing parts. **Note:** Generative edit requires an internet connection and will resize photos to 12MP. Drawing Assist lets you bring your drawings to life. You can create AI sketches using Air command, Samsung Notes, Gallery, and the AI Select feature in the Edge panel. Portrait Studio on the Z Fold6 and Z Flip6 lets you add extra flair to your selfies. Select your desired selfie in the Gallery app, then tap the **Photo Assist** icon (the stars), and then tap **Generative portrait** on the image. You can select from the available styles at the bottom of the screen, and then tap **Generate** to create a new image. Live Effects will bring your photos to life with animations on the Z Fold6 and Z Flip6. Select a photo in the Gallery app, then swipe up to view more details, and then tap **3D photo**. AI will generate the photo's effects. You may see a zooming motion, a panning motion, or a swivel motion. https://www.samsung.com/us/support/answer/ANS10000753/ **Use AI editing tools in Gallery on your Galaxy phone or tablet** The new editing features on select **Galaxy phones and tablets** will transform your favorite photos into masterpieces! Thanks to Galaxy AI, you can use features like Generative edit and Edit suggestions to move objects within your photos and automatically receive enhancement recommendations. You can also use the Galaxy Enhance-X app to take things further with more editing options that include blur removal and brightness adjustment. https://www.samsung.com/us/support/answer/ANS10000753/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Use Generative edit Note Generative edit is available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, Tab S10, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8. Generative edit allows you to move or delete objects from your pictures in order to create an entirely new image. Galaxy AI will then fill in the background and any missing portions.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Generative edit allows you to move or delete objects from your pictures in order to create an entirely new image. Galaxy AI will then fill in the background and any missing portions. 1 Navigate to and open the **Gallery** app, and then select a picture you'd like to edit. 2 Tap the **Edit** icon (the pencil), and then tap the **Generative edit** icon (the blue circle with three stars). **Note**: You may be required to tap **OK** on the prompt. 3 Using your finger, outline your desired object. Tap **Deselect** to start over if needed. 4 Next, touch and hold the outlined object, and then drag it into a different part of the image. Tap **Return** (the back arrow) to move the object back to its original position, or tap **Remove** (the eraser icon) to erase the object. Repeat this process to move or remove additional objects. 5 If needed, adjust the **slider** at the bottom of the screen to straighten the picture. 6 When you're finished, tap **Generate**. Galaxy AI will fill in the image's background and adjust the objects that have been moved. 7 Touch and hold **View original** to compare the original image with the newly generated image. 8 When you're finished, tap **Done**, and then tap **Save as copy** to save the image. https://www.samsung.com/us/support/answer/ANS10000934/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Use Edit suggestions

Note

Edit suggestions are available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, A16 5G, A26 5G, A35 5G, A36 5G, A54 5G, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8.

Galaxy AI will analyze your pictures and provide editing suggestions to enhance them! The individual suggestion will vary depending on the image, or there may not be any suggestions at all.

1 Navigate to and open the **Gallery** app, and then select a picture you'd like to edit.

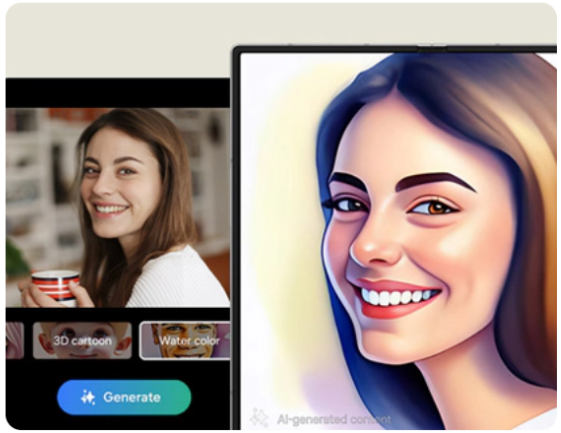
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	- **Pro**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while taking pictures. - **Pro video**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while recording videos. Samsung Galaxy S25 User Manual at 43. (https://downloadcenter.samsung.com/content/UM/202502/20250222040501249/SAM_S931_S936_S938_EN_UG_OS15_012425_FINAL_AC_02072025.pdf)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Use Portrait Studio

Note

Portrait Studio is available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, Tab S10, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8.



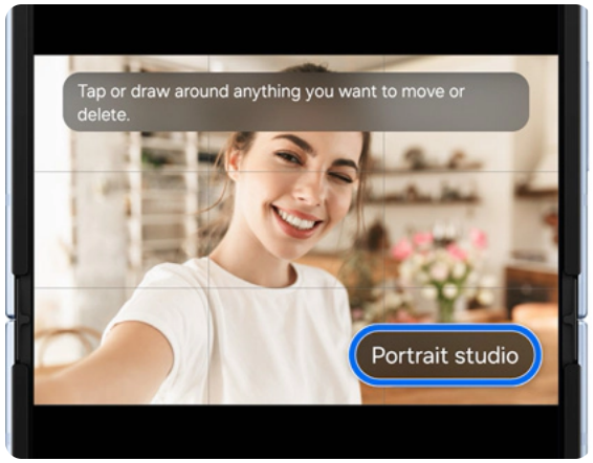
After you've taken a selfie, you can add some extra flair to it with Portrait Studio.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

After you've taken a selfie, you can add some extra flair to it with Portrait Studio.

1 Open the **Gallery** app, and then find and select your desired selfie.

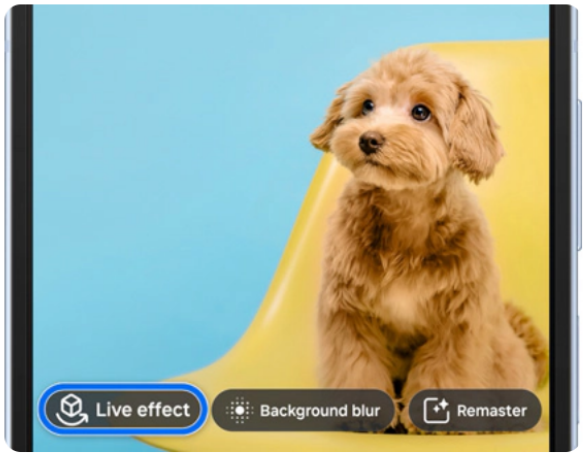
2 Tap the **Photo Assist** icon (the stars), and then tap **Generative portrait** on the image.



3 Select from the available styles at the bottom of the screen, such as Comic, 3D cartoon, or Watercolor.

4 Then, tap **Generate**.

https://www.samsung.com/us/support/answer/ANS10000934/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Live Effect will bring your photos to life with animations. The effect may differ depending on the photo. 1 Open the **Gallery** app, and then find and select a photo. 2 Swipe up to view more details, and then tap **3D photo** on the image.  3 AI will generate the photo's effects. You may see a zooming motion, a panning motion, or a swivel motion. 4 You can share the generated photo by tapping **Share** at the bottom of the screen. https://www.samsung.com/us/support/answer/ANS10000753/ Further, the Accused Samsung '950 Products include a Scene Optimizer to perform feature detection and corrections.

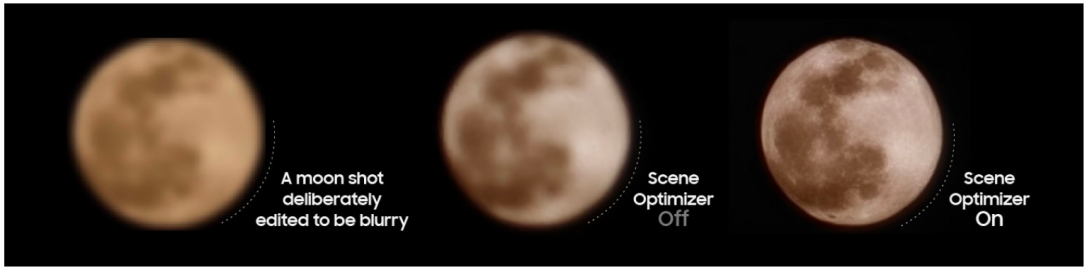
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	How Samsung Galaxy Cameras Combine Super Resolution Technologies With AI Technology to Produce High-Quality Images of the Moon Samsung is committed to delivering best-in-class camera experiences in all conditions. Since the introduction of the Galaxy S10, the Samsung Galaxy series has harnessed artificial intelligence (AI) technologies in its cameras to help users capture every epic moment anytime, anywhere. As part of this, Samsung developed the Scene Optimizer feature, a camera functionality which uses advanced AI to recognize objects and thus deliver the best results to users. Since the introduction of the Galaxy S21 series, Scene Optimizer has been able to recognize the moon as a specific object during the photo-taking process, and applies the feature's detail enhancement engine to the shot. When you're taking a photo of the moon, your Galaxy device's[1] camera system will harness this deep learning-based AI technology, as well as multi-frame processing in order to further enhance details. Read on to learn more about the multiple steps, processes and technologies that go in to delivering high-quality images of the moon.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Understanding Super Resolution and Scene Optimizer

In order to take a clear photo of the moon, Galaxy cameras harness Super Resolution to synthesize more than 10 images taken at 25x zoom or higher. The image taken at 25x zoom or above needs to eliminate noise and enhance clarity and other details.

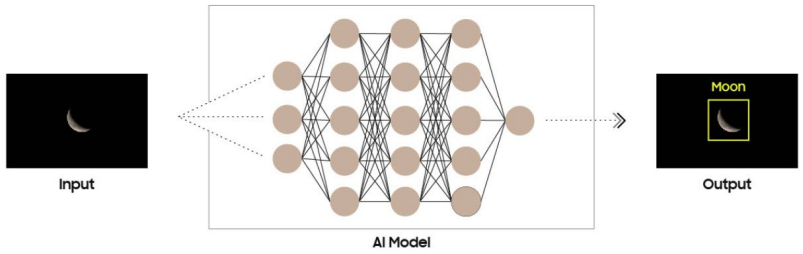
Super Resolution technology helps produce images through multi-frame composition. When Scene Optimizer is turned on and the moon has been recognized as an object, the camera will deliver users a bright and clear image through the detail enhancement engine of Scene Optimizer on top of the Super Resolution technology.



AI Deep Learning for Moon Object Recognition

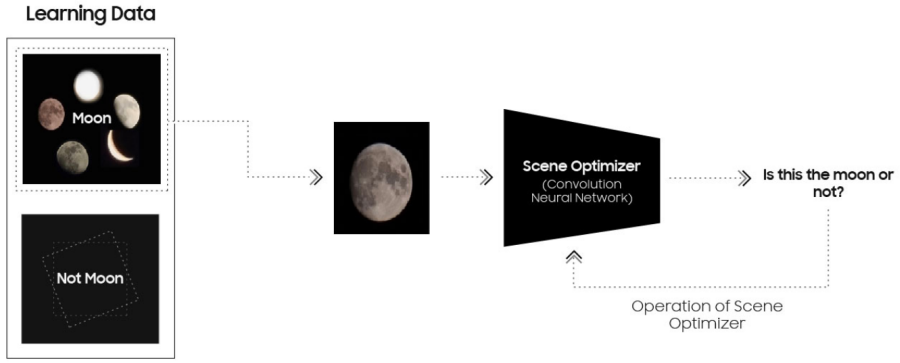
The engine for recognizing the moon was built based on a variety of moon shapes and details, from full through to crescent moons, and is based on images taken from our view from the Earth.

It uses an AI deep learning model to detect the presence of the moon and identify the area it occupies – as denoted by the square box - in the relevant image. Once the AI model has completed its learning, it can detect the area occupied by the moon even in images that were not used in training.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 However, the moon will not be properly recognized by the camera and Scene Optimizer technology if it is obscured by clouds, or if the moon object itself is the side that is not visible from the Earth. https://www.samsungmobilepress.com/feature-stories/how-samsung-galaxy-cameras-combine-super-resolution-technologies-with-ai-technology-to-produce-high-quality-images-of-the-moon/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	The Brightness Control Process Once the device has recognized the moon after zooming in, it will control the brightness of the display in order to present the moon more clearly while maintaining optimal brightness. Accordingly, when users take photos of the moon at early evening time, the sky around the moon will appear darker than the actual sky color because the device will darken the object background brightness in order to help make the moon appear more clearly. Once your device recognizes the moon, it will continuously adjust focus to stay directly on the moon. **Capturing the Most Stable Images Possible** Samsung introduced the Zoom Lock feature, which automatically reduces the effects of a shaking device without the need for a tripod. Combining OIS and VDIS technologies, Zoom Lock is able to minimize the image blur that can be caused by shaking hands and helps users take truly epic moon shots. While zooming in and touching the display or maintaining a focus on the moon for longer than 1.5 seconds, the Zoom Lock feature will be automatically activated. The border line of the zoom map on the upper right side of the screen will change from white to yellow, and the moon will be fixed on the display.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Next, the camera takes multiple pictures and then synthesizes them into a single, bright image with reduced noise.

After Multi-frame Processing has taken place, Galaxy camera further harnesses Scene Optimizer's deep-learning-based AI detail enhancement engine to effectively eliminate remaining noise and enhance the image details even further.

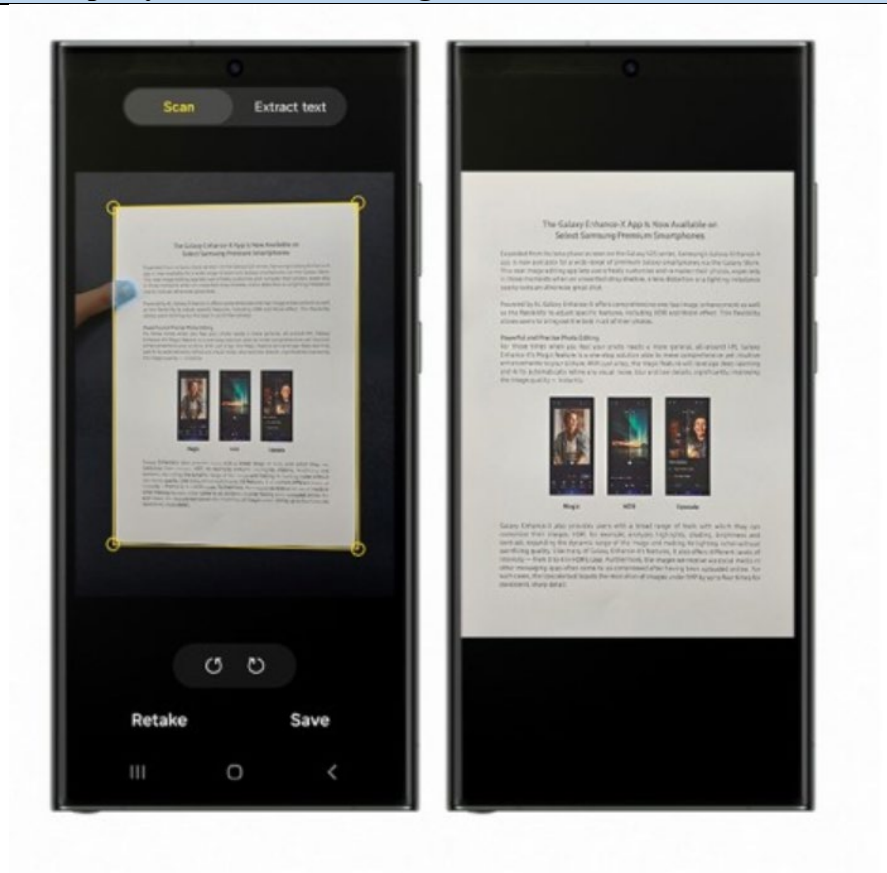
https://www.samsungmobilepress.com/feature-stories/how-samsung-galaxy-cameras-combine-super-resolution-technologies-with-ai-technology-to-produce-high-quality-images-of-the-moon/

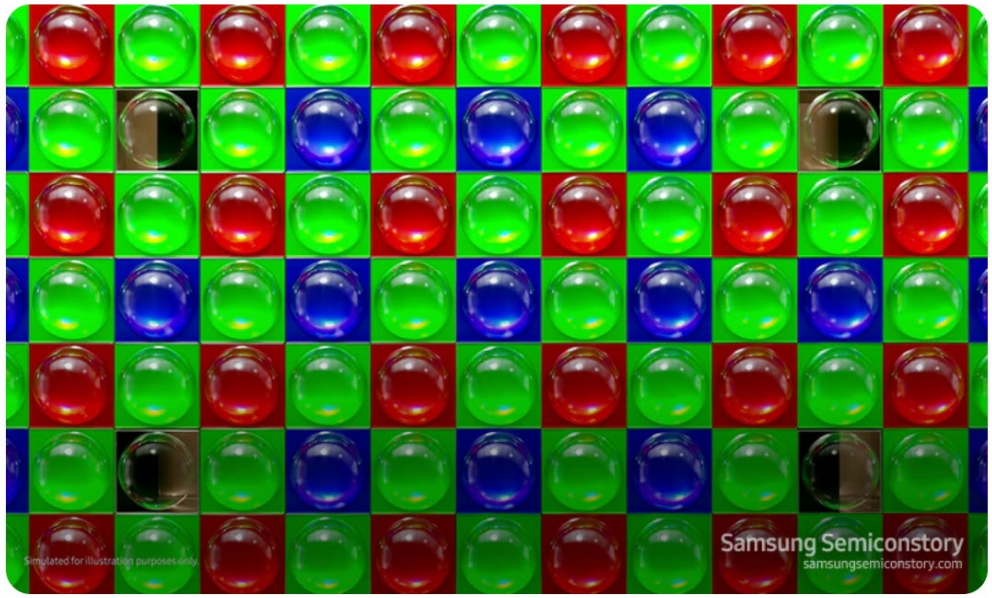
For example, as an example the Accused Samsung '950 Products include AI Stereo Depth Mapping, that distinguishes various features (e.g., hair, clothing, or face).

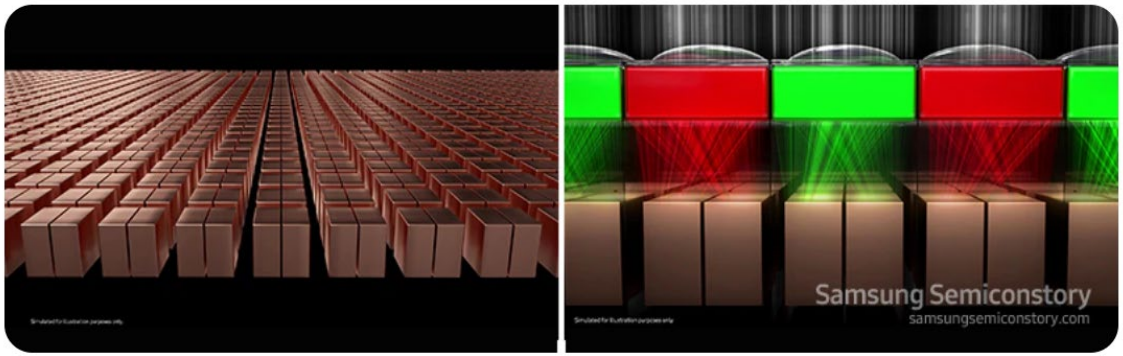
Become the ultimate photographer with Samsung AI

Tap into the tools that help take perfect pictures, capture nighttime photos and make shareable content

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Samsung's Galaxy S23 Ultra series uses AI Stereo Depth Mapping, a software-based feature that relies on AI algorithms to improve image output when you click a photo. This algorithm essentially creates a depth map that automatically measures the distance between objects in an image, so it doesn't miss out on the smaller elements. For example, imagine a picture of a person on the Galaxy S23 ultra whose face is in focus, but their hair or clothing, which normal cameras may treat as background elements, might not be. AI Stereo Depth Mapping fixes this common problem, making sure all these elements are clear and in focus. https://www.samsung.com/us/explore/photography/become-the-ultimate-photographer-with-samsung-AI/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 https://news.samsung.com/global/one-ui-6-update-7-tips-for-making-the-most-of-ai-camera-on-your-galaxy Further, the Accused Samsung '950 Products creates a region by removing pixels with the features from an evaluated value extraction region to perform PDAF:

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Special Autofocus Pixels Used in PDAF Technology To understand how Dual Pixel Pro works, it is important to first understand its foundational technology, Phase Detection Autofocus (PDAF). Just like how humans use their two eyes to focus, PDAF compares the phase difference perceived from two different locations and moves the lens such that the two phases align to adjust the focus. 

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Dual Pixel with Improved Autofocus  Each pixel on a Dual Pixel sensor contains two photodiodes, one left-looking, one right-looking. When capturing a scene, the phases from each pair of photodiodes are compared to achieve autofocus. Since every pixel in the sensor is being used for both autofocus and color values, the sensor can achieve quick autofocus without losing image quality. In the previous Dual Pixel technology, each pixel is divided vertically into left and right. Dual Pixe features green pixels that are divided diagonally. There are clear benefits in dividing pixels diagonally. These pixels can compare the phase differer between the top and bottom of the pixel in addition to phase differences in the left and right side a result, even in a situation where autofocusing is challenging to achieve based on the use of only and right phase differences, Dual Pixel Pro can use top and bottom phase differences, therefore delivering faster and more accurate autofocusing capabilities.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

	https://semiconductor.samsung.com/news-events/tech-blog/the-evolution-from-image-sensor-to-human-eye-samsungs-innovative-dual-pixel-pro-technology/
	
	• Our Qualcomm Spectra™ AI ISP features:
	  • Limitless Real-time Semantic Segmentation for photo/video frame
	  • Insight AI provides real-time skin and sky adjustments to create more natural color and lighting in uncertain conditions.
	  • Ultra-low Light video capture
	  • Video Object Eraser can remove unwanted elements from videos
	  • Real-time AI Relighting make you appear professional wherever you are
	  • Truepic photo capture with C2PA standard support lets you snap a photo with Truepic's cryptographic seal to prove the photo is real and not Gen AI
	
	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Camera Qualcomm Spectra™ Image Signal Processor • AI-ISP, Triple 18-bit ISPs Limitless real-time Semantic Segmentation photo and video processing Engine for Visual Analytics 4.0, including hardware acceleration for iToF depth sensors up to 4K 60 FPS Support for the latest HDR, DCG+VS, DCG, Staggered, QDOL, Less Blanking, and Multiframe HDR image sensors Support for triple video capture from HDR image sensors, with seamless switching between any HDR mode • Up to 48 MP triple camera @ 30 FPS with Zero Shutter Lag • Up to 108 MP single camera @ 30 FPS with Zero Shutter Lag • Up to 320-megapixel photo capture AI-based face detection, AI for 3A (auto-focus, autoexposure, and auto-white balance) Rec. 2020 color gamut photo and video capture Up to 10-bit color depth photo and video capture 10-bit HEIF: HEIC photo capture, HEVC video capture Google Ultra HDR photo capture Video capture HDR formats: HDR10+, HDR10, HLG, Dolby Vision 8K HDR video playback @ 60 FPS 4K video capture @ 120 FPS Slow-mo video capture at 1080p @ 480 FPS Hardware Bokeh Engine 2 for video capture (https://docs.qualcomm.com/bundle/publicresource/87-83196-1_REV_D_Snapdragon_8_Elite_Mobile_Platform_Product_Brief.pdf)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	AI-powered camera redefines photography Infuse brilliance into mobile capture with our AI ISP, enhancing everything from selfies to crystal-clear video chats thanks to an overhauled Hexagon Direct Link. The first AI-powered Limitless Segmentation recognizes and enhances virtually anything in the frame, including faces, hair, clothing, objects, backgrounds, and beyond. Even furry friends appear crisp and cute—no matter how fast the zoomies—thanks to AI-Based Pet Capture. • Our powerful AI ISP is deeply integrated with the Hexagon NPU for enhanced, intuitive capture. • Limitless Segmentation can segment an image in over 250 layers, each optimized to perfection. • Real-time Insight AI captures and enhances natural skin and sky tones even in the most challenging conditions. • Truepic with C2PA adds cryptographic seals so you can authenticate your photos as real and not AI-generated—now including videos and audio recordings. • Video Object Eraser can remove unwanted elements from video footage—on-device. • Capture vivid videos at 4K60 FPS, even in near darkness. (https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Snapdragon-8-Elite-Platform-Product-Brief.pdf) Let's dive deeper into why Snapdragon 8 Elite is a game-changer: • **Incredible power:** Experience a 45% boost in performance with the Qualcomm Oryon CPU, giving you lightning-fast apps and incredible multitasking.[1] • **AI at your fingertips:** The Qualcomm® Hexagon™ NPU increases AI performance by 45%, handling everything from voice commands to image prompts. Your device is ready to adapt to your every move. • **Photography, reimagined:** With features like 4K Semantic Segmentation, Video Object Eraser, and real-time AI lighting adjustments, the Snapdragon 8 Elite camera tech turns your mobile photos into pro-level masterpieces. https://www.qualcomm.com/snapdragon/news/snapdragon-8-elite--the-power-behind-the-name

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

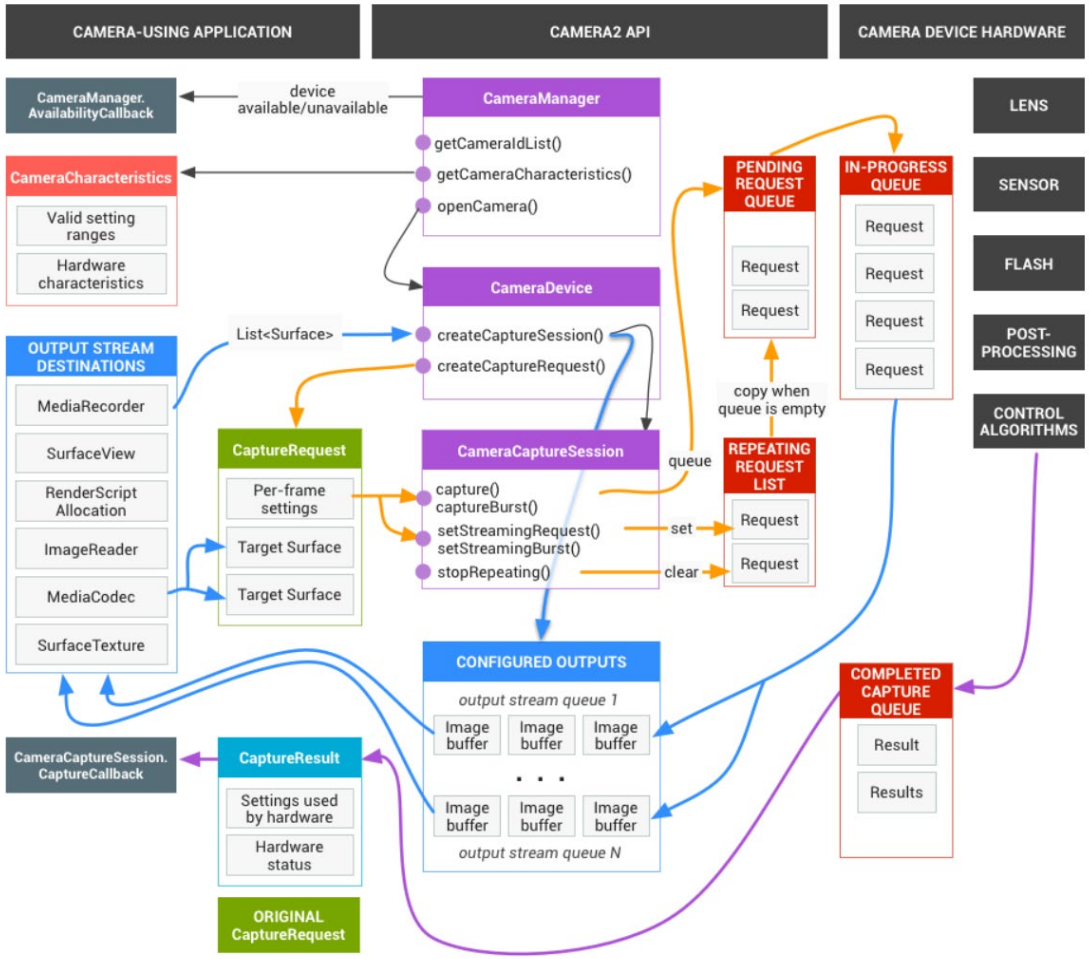


Figure 1. Camera model

https://source.android.com/docs/core/camera/camera3_requests_hal

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

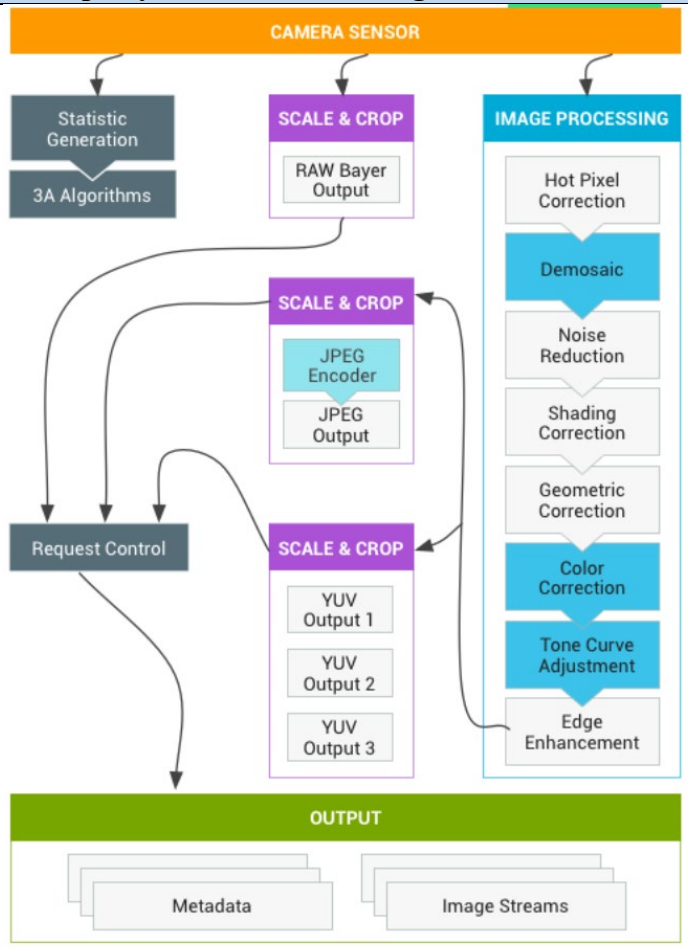


Figure 2. Camera pipeline

https://source.android.com/docs/core/camera/camera3_requests_hal

Doctrine of Equivalents

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	To the extent Samsung argues that the above-identified structure does not literally infringe this claim element, this limitation is infringed under the doctrine of equivalents because the Accused Samsung '950 Products contain one or more components and/or software, or a combination thereof, that perform substantially the same function in substantially the same way to obtain the same result. By way of example, to the extent that Samsung argues that the Accused Samsung '950 Products do not have a control unit, each of these products include software, hardware, or a combination of the two that perform the equivalent function of controlling the signal processing unit. Using this combination, these products perform substantially the same function (for example, controlling components within the signal processor) in substantially the same way. The performance of this function achieves substantially the same result, for example, the control of the processing unit based on an extracted value. That this functionality may be divided across several components does not preclude them from collectively functioning as a control unit.
[1.f] wherein the control unit controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed.	The signal processor in each of the Accused Samsung '950 Products incorporates or operates as a control unit which controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed. For example, on information and belief, the Samsung Galaxy S25 includes an image signal processor (ISP) and/or digital signal processor (DSP) that adjusts an image, for example, by performing white balance correction. For example, the white balance is adjusted in accordance with the detected lighting conditions, e.g. fluorescent lighting, incandescent lighting, sunny outdoor lighting, cloudy outdoor lighting. Upon information and belief, certain adjustments are applied when one or more features e.g. skin tone, hair, or face, are detected in a particular region (e.g., Face detect AWB, AW, or AF). Further, foliage or snow scene corrections are performed or not performed when such features are detected or not detected in a region but other image corrections are performed (e.g., face corrections and portrait mode corrections are applied). Further, text scanning corrections are not performed when text is not detected but additional image corrections are applied. Moreover, image corrections to the foreground (e.g., the face of a person or object being captured) are applied but corrections to the background are

<table>
<tr><th>U.S. Patent No. 8,471,950</th><th>Exemplary Evidence of Infringement</th></tr>
<tr><td></td><td>not applied if a white or black background is not detected. Further if the face is close to the camera such that a background is not detected, then the face corrections are applied but background corrections are not applied and background pattern portions are not contained.

Further, Portrait Mode corrections are applied (e.g., background blurring and face enhancements) based on detected faces.

The image signal processor in the Accused Samsung '950 Products is controled in accordance with the AI-detected objectes and peforms specific processing based on such detections.

<table>
<tr><th>Input</th><th>Features</th><th>Features Contained</th><th>Video with Contents</th><th>Correction</th></tr>
<tr><td>
Portrait Photo</td><td>Snow</td><td>No</td><td>Cloth</td><td>Corrections based on the selected camera's parameters</td></tr>
</table>
</td></tr>
</table>

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement					
	Person in front of a white wall	Snow	No	Face	Beauty face correction applied	
	Book Scan	Snow	No	Scanned image	Scan correction applied	

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Face close up

Stair	No	Face	Beauty face correction applied

Input	Features	Features Contained	Video with Contents	Correction
Portrait Photo	Cloud	Yes	Cloth	No Correction. No Blur

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement					
	Person in front of a white wall	Wall	Yes	Face	No Correction. No Blur	
	Book Scan	Text	Yes	Scanned image	No Correction. No Blur	

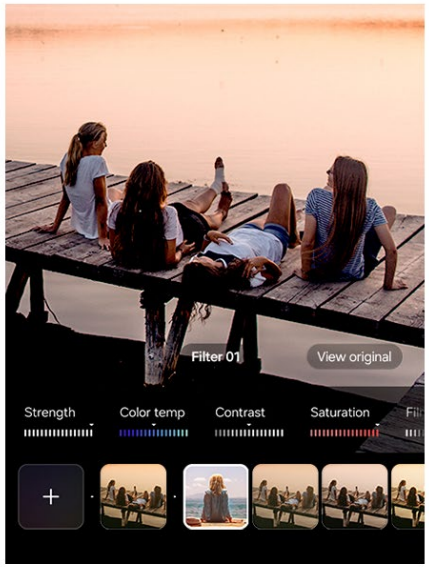
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

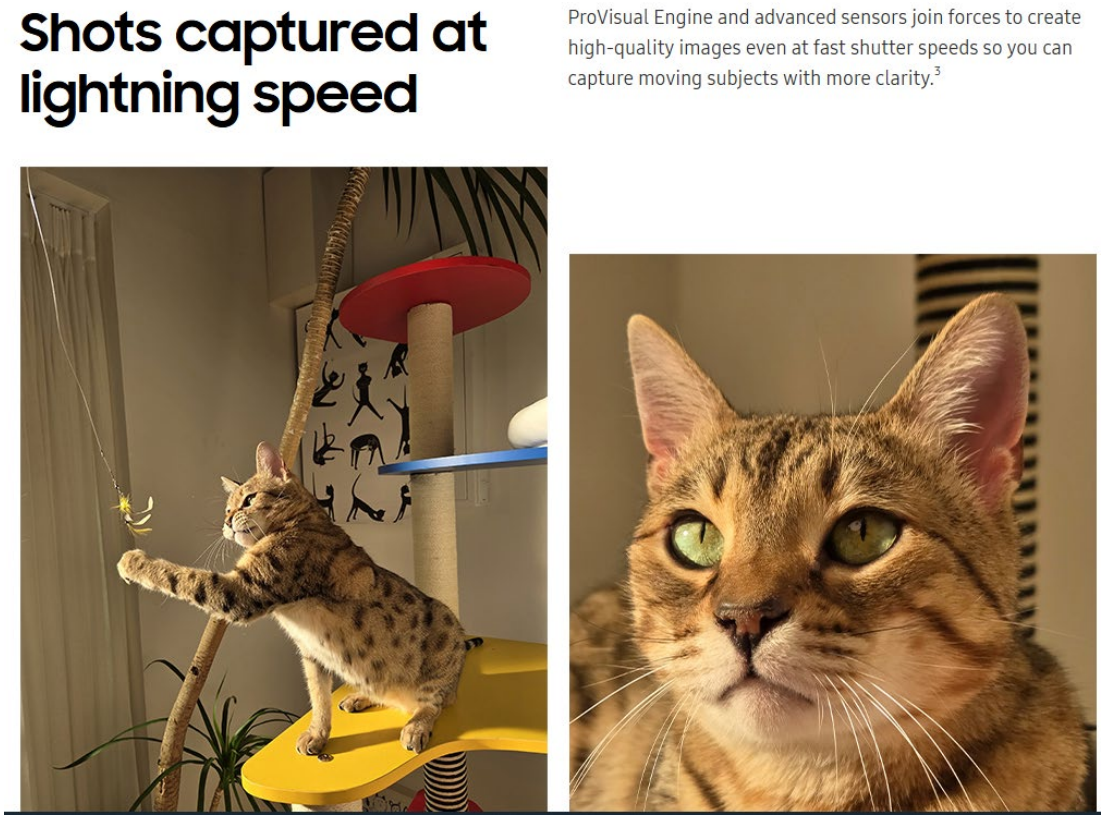
Face close up	Cloth	Yes	Face	No White balance correction.

As an example, the signal processor is configured to control skin tones and textures adjustment while performing different processing for other region or regions that do not include the detected skin tones and textures.

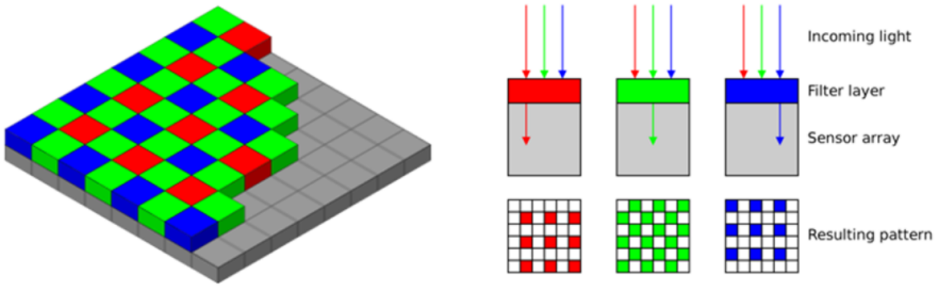
Look your best in every light

Our camera with enhanced Object-Aware Engine adapts to various lighting environments to capture skin tones and textures exactly as your eyes see them.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 **Filters just for you** Bring pics to life with personalized filters. Galaxy AI analyzes your photo and creates a filter to match. Use it instantly or customize further with tweaks to the saturation, brightness and more. How to use Filters https://www.samsung.com/us/smartphones/galaxy-s25/ As another example, the signal processor is configured to control adjustment of shutter speed and/or exposure in accordance with a motion of a moving object or subject in a region while performing different exposure adjustment for other region or regions that do not include the moving object .

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 https://www.samsung.com/us/smartphones/galaxy-s25/ As another example, the signal processor is configured to control image enhancement or color correction such as lighting adjustment or white balance on a detected face while performing different image enhancement, or color correction such as white balance for other region or regions that do not include the detected face.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	As another example, the signal processor is configured to control image enhancement or color correction such as lighting adjustment or white balance on a detected natural skin while performing different image enhancement, or color correction such as white balance for other region or regions that do not include the detected natural skin. As another example, the signal processor is configured to control image enhancement or color correction such as lighting adjustment or white balance in a hair region while performing different image enhancement, or color correction such as white balance for other region or regions that do not include the detected hair. As another example, the signal processor is configured to control image enhancement or color correction such as lighting adjustment or white balance in a clothing region while performing different image enhancement, or color correction such as white balance for other region or regions that do not include the detected clothing. As another example, the signal processor is configured to control image enhancement or object deletion in a moving object region while performing different image enhancement, or color correction such as white balance for other region or regions that do not include the detected moving object.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	3. WB (White Balance)[3] This block helps the camera adjust the color balance and render them accurately. It ensures that an image has a uniform WB Gain and that the RGB of the grey (achromatic) areas are adjusted to the same value (to depict the grey as grey). The sensor output fed to ISP has twice as many green channels as any other. This is the reason why the raw image before the application of WB Gain looks green overall. (Refer to 'De-mosaic' below) **4. De-mosaic (= Bayer Interpolation, Color Interpolation)** Most smartphone cameras use the Bayer type (or pattern) sensor. The Bayer sensor, as illustrated below [2] is 3 color filter combination sensor mounted on top of a photodiode array.  https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	FD (Face Detection) This block detects faces in an image/video and passes their coordinates to the next block. The face coordinates can be used in other algorithms or solutions to implement different features. **[Example of application] Using FD information in AWB (Auto White Balance) and AE (Auto Exposure) algorithm blocks** 1. When a face is detected, it compares and corrects the difference between the face brightness and the targeted brightness of the whole image. It utilizes the face coordinates received, to adjust the face brightness, etc. 2. When multiple sources are detected illuminating a face and the face is overly affected by these lights, this FD data can be used to correct the color on it. For example, if a face is detected in a low-color temperature light setup giving off a slightly reddish glow, the face coordinates are used to adjust the color of the face. https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145 As another example, the signal processor is configured to control image enhancement, lighting adjustment, or noise reduction in a background region excluding other regions such as face region, hair region, clothing region, moving object region, or natural skin region. As additional examples, the signal processor is configured to perform image enhancement, lighting adjustment, and/or other predetermined processes or AI-based corrections based on detection of various objects such as food, text, fireworks, moon, auto-focus pixels for PDAF. Such predetermined processing includes performing "Generative edit," provide "Edit suggestions," implement Portrait Studio, and/or generate photo effects.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

If you're unsure how to edit a photo or video in the Gallery app, let AI Edit Suggestion help you out. This feature lets you move and delete unwanted objects in order to create an entirely new image. You can also use additional options such as remastering, colorizing, removing reflections, and adding portrait effects to transform and elevate your photos and videos. You can learn more about **AI Edit suggestions** using our guide.

Generative edit is an AI editing tool that lets you customize your images. Just find your desired image in the Gallery app, tap the **Photo Assist** icon (the three stars), and then tap or draw around an object in the photo you'd like to adjust. You can move the object around to another part of the photo. When you tap **Generate**, AI will fill in the photo's missing parts.

Note: Generative edit requires an internet connection and will resize photos to 12MP.

Drawing Assist lets you bring your drawings to life. You can create AI sketches using Air command, Samsung Notes, Gallery, and the AI Select feature in the Edge panel.

Portrait Studio on the Z Fold6 and Z Flip6 lets you add extra flair to your selfies. Select your desired selfie in the Gallery app, then tap the **Photo Assist** icon (the stars), and then tap **Generative portrait** on the image. You can select from the available styles at the bottom of the screen, and then tap **Generate** to create a new image.

Live Effects will bring your photos to life with animations on the Z Fold6 and Z Flip6. Select a photo in the Gallery app, then swipe up to view more details, and then tap **3D photo**. AI will generate the photo's effects. You may see a zooming motion, a panning motion, or a swivel motion.

https://www.samsung.com/us/support/answer/ANS10000753/

Use AI editing tools in Gallery on your Galaxy phone or tablet

The new editing features on select **Galaxy phones and tablets** will transform your favorite photos into masterpieces! Thanks to Galaxy AI, you can use features like Generative edit and Edit suggestions to move objects within your photos and automatically receive enhancement recommendations. You can also use the Galaxy Enhance-X app to take things further with more editing options that include blur removal and brightness adjustment.

https://www.samsung.com/us/support/answer/ANS10000753/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Use Generative edit Note Generative edit is available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, Tab S10, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8. Generative edit allows you to move or delete objects from your pictures in order to create an entirely new image. Galaxy AI will then fill in the background and any missing portions.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Generative edit allows you to move or delete objects from your pictures in order to create an entirely new image. Galaxy AI will then fill in the background and any missing portions. 1 Navigate to and open the **Gallery** app, and then select a picture you'd like to edit. 2 Tap the **Edit** icon (the pencil), and then tap the **Generative edit** icon (the blue circle with three stars). **Note**: You may be required to tap **OK** on the prompt. 3 Using your finger, outline your desired object. Tap **Deselect** to start over if needed. 4 Next, touch and hold the outlined object, and then drag it into a different part of the image. Tap **Return** (the back arrow) to move the object back to its original position, or tap **Remove** (the eraser icon) to erase the object. Repeat this process to move or remove additional objects. 5 If needed, adjust the **slider** at the bottom of the screen to straighten the picture. 6 When you're finished, tap **Generate**. Galaxy AI will fill in the image's background and adjust the objects that have been moved. 7 Touch and hold **View original** to compare the original image with the newly generated image. 8 When you're finished, tap **Done**, and then tap **Save as copy** to save the image. https://www.samsung.com/us/support/answer/ANS10000934/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Use Edit suggestions

Note

Edit suggestions are available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, A16 5G, A26 5G, A35 5G, A36 5G, A54 5G, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8.

Galaxy AI will analyze your pictures and provide editing suggestions to enhance them! The individual suggestion will vary depending on the image, or there may not be any suggestions at all.

1 Navigate to and open the **Gallery** app, and then select a picture you'd like to edit.

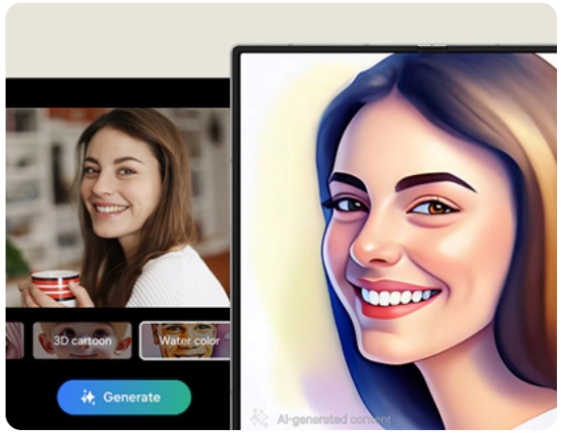
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	- **Pro**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while taking pictures. - **Pro video**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while recording videos. Samsung Galaxy S25 User Manual at 43. (https://downloadcenter.samsung.com/content/UM/202502/20250222040501249/SAM_S931_S936_S938_EN_UG_OS15_012425_FINAL_AC_02072025.pdf)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

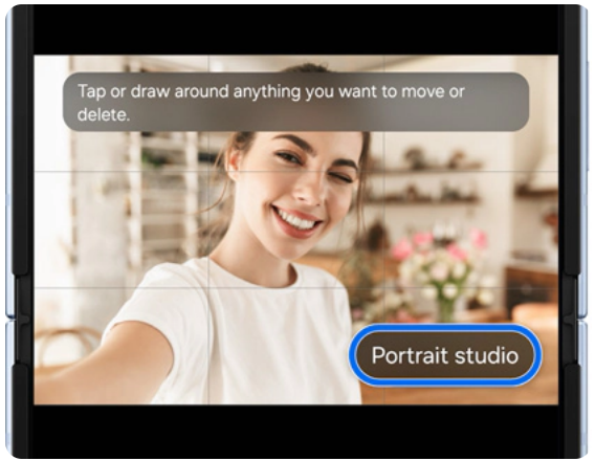
Use Portrait Studio

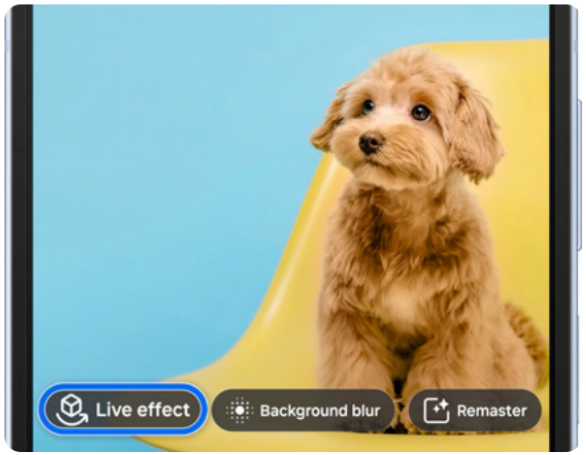
Note

Portrait Studio is available on the Galaxy S25 Ultra, S25 Edge, S25+, S25, S24 Ultra, S24+, S24, S24 FE, S23 Ultra, S23+, S23, S23 FE, S22 Ultra, S22+, S22, Z Fold6, Z Fold5, Z Fold4, Z Flip6, Z Flip5, Z Flip4, Tab S10, Tab S9 Ultra, Tab S9+, Tab S9, Tab S8+, Tab S8, and Tab S8.



After you've taken a selfie, you can add some extra flair to it with Portrait Studio.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	After you've taken a selfie, you can add some extra flair to it with Portrait Studio. 1 Open the **Gallery** app, and then find and select your desired selfie. 2 Tap the **Photo Assist** icon (the stars), and then tap **Generative portrait** on the image.  3 Select from the available styles at the bottom of the screen, such as Comic, 3D cartoon, or Watercolor. 4 Then, tap **Generate**. https://www.samsung.com/us/support/answer/ANS10000934/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Live Effect will bring your photos to life with animations. The effect may differ depending on the photo. 1 Open the **Gallery** app, and then find and select a photo. 2 Swipe up to view more details, and then tap **3D photo** on the image.  3 AI will generate the photo's effects. You may see a zooming motion, a panning motion, or a swivel motion. 4 You can share the generated photo by tapping **Share** at the bottom of the screen. https://www.samsung.com/us/support/answer/ANS10000753/ Further, the Accused Samsung '950 Products include a Scene Optimizer to perform feature detection and corrections.

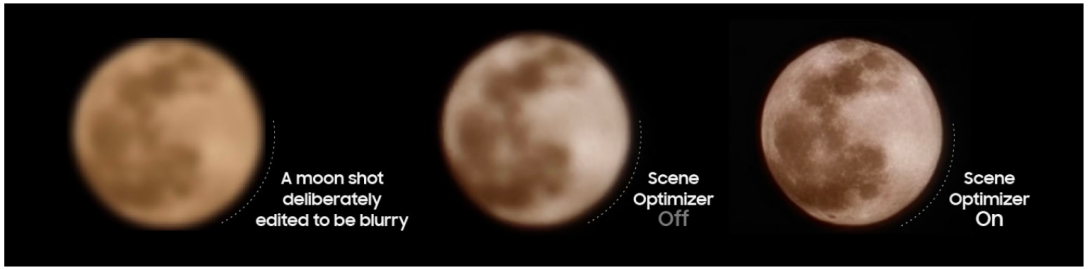
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	How Samsung Galaxy Cameras Combine Super Resolution Technologies With AI Technology to Produce High-Quality Images of the Moon Samsung is committed to delivering best-in-class camera experiences in all conditions. Since the introduction of the Galaxy S10, the Samsung Galaxy series has harnessed artificial intelligence (AI) technologies in its cameras to help users capture every epic moment anytime, anywhere. As part of this, Samsung developed the Scene Optimizer feature, a camera functionality which uses advanced AI to recognize objects and thus deliver the best results to users. Since the introduction of the Galaxy S21 series, Scene Optimizer has been able to recognize the moon as a specific object during the photo-taking process, and applies the feature's detail enhancement engine to the shot. When you're taking a photo of the moon, your Galaxy device's[1] camera system will harness this deep learning-based AI technology, as well as multi-frame processing in order to further enhance details. Read on to learn more about the multiple steps, processes and technologies that go in to delivering high-quality images of the moon.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Understanding Super Resolution and Scene Optimizer

In order to take a clear photo of the moon, Galaxy cameras harness Super Resolution to synthesize more than 10 images taken at 25x zoom or higher. The image taken at 25x zoom or above needs to eliminate noise and enhance clarity and other details.

Super Resolution technology helps produce images through multi-frame composition. When Scene Optimizer is turned on and the moon has been recognized as an object, the camera will deliver users a bright and clear image through the detail enhancement engine of Scene Optimizer on top of the Super Resolution technology.

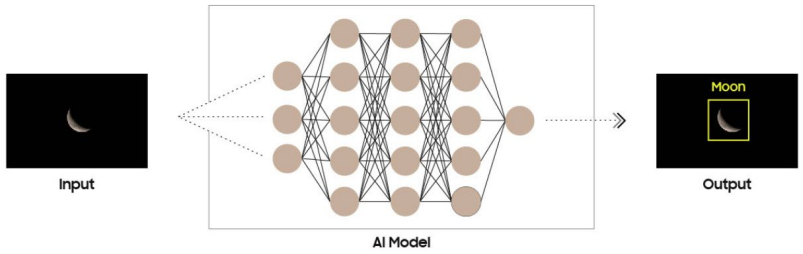


AI Deep Learning for Moon Object Recognition

The engine for recognizing the moon was built based on a variety of moon shapes and details, from full through to crescent moons, and is based on images taken from our view from the Earth.

It uses an AI deep learning model to detect the presence of the moon and identify the area it occupies – as denoted by the square box - in the relevant image. Once the AI model has completed its learning, it can detect the area occupied by the moon even in images that were not used in training.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

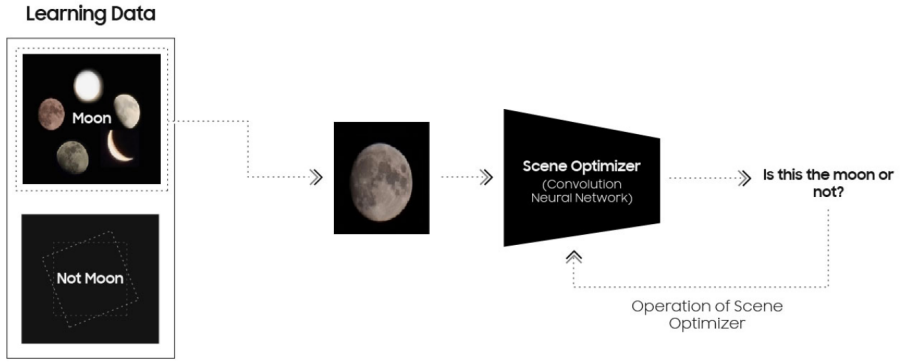


However, the moon will not be properly recognized by the camera and Scene Optimizer technology if it is obscured by clouds, or if the moon object itself is the side that is not visible from the Earth.

https://www.samsungmobilepress.com/feature-stories/how-samsung-galaxy-cameras-combine-super-resolution-technologies-with-ai-technology-to-produce-high-quality-images-of-the-moon/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	The Brightness Control Process Once the device has recognized the moon after zooming in, it will control the brightness of the display in order to present the moon more clearly while maintaining optimal brightness. Accordingly, when users take photos of the moon at early evening time, the sky around the moon will appear darker than the actual sky color because the device will darken the object background brightness in order to help make the moon appear more clearly. Once your device recognizes the moon, it will continuously adjust focus to stay directly on the moon. **Capturing the Most Stable Images Possible** Samsung introduced the Zoom Lock feature, which automatically reduces the effects of a shaking device without the need for a tripod. Combining OIS and VDIS technologies, Zoom Lock is able to minimize the image blur that can be caused by shaking hands and helps users take truly epic moon shots. While zooming in and touching the display or maintaining a focus on the moon for longer than 1.5 seconds, the Zoom Lock feature will be automatically activated. The border line of the zoom map on the upper right side of the screen will change from white to yellow, and the moon will be fixed on the display.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Next, the camera takes multiple pictures and then synthesizes them into a single, bright image with reduced noise.

After Multi-frame Processing has taken place, Galaxy camera further harnesses Scene Optimizer's deep-learning-based AI detail enhancement engine to effectively eliminate remaining noise and enhance the image details even further.

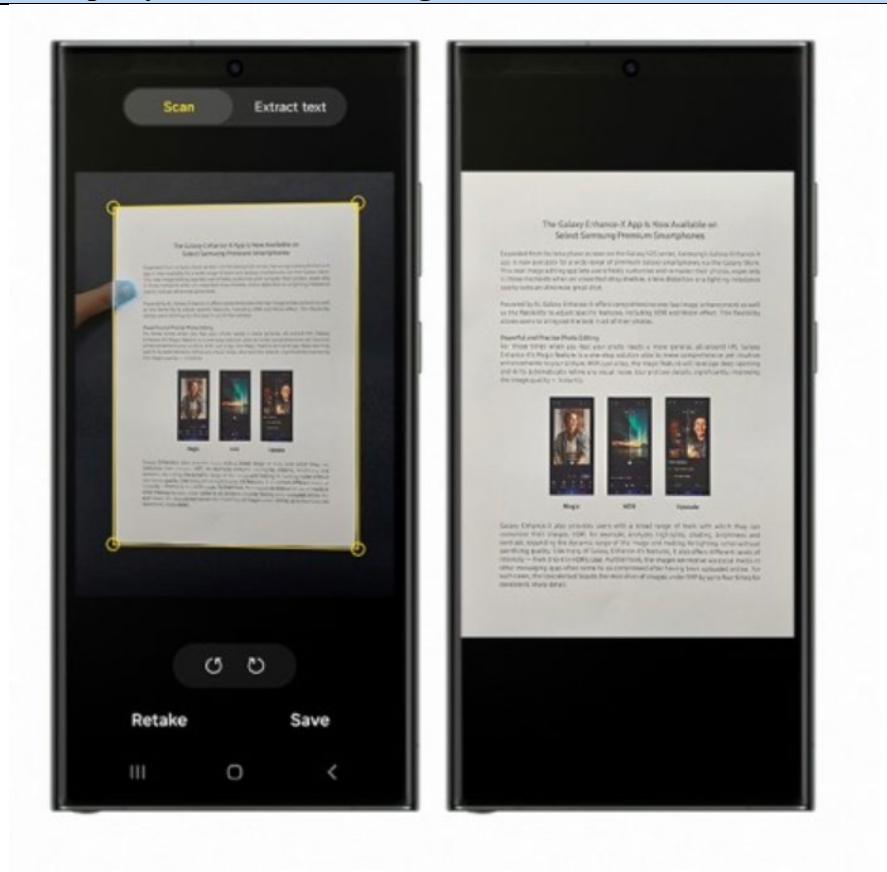
https://www.samsungmobilepress.com/feature-stories/how-samsung-galaxy-cameras-combine-super-resolution-technologies-with-ai-technology-to-produce-high-quality-images-of-the-moon/

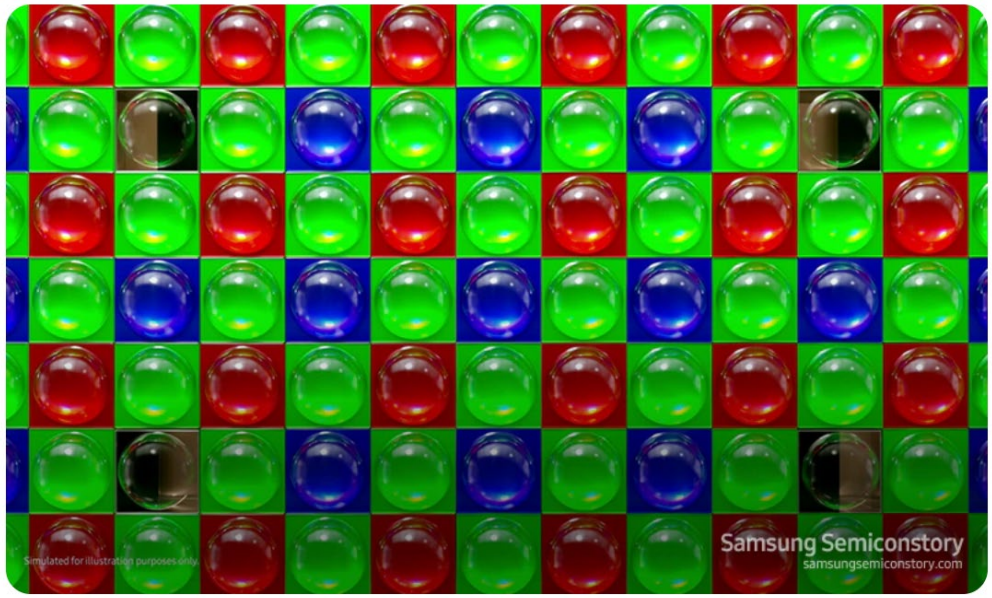
For example, as an example the Accused Samsung '950 Products include AI Stereo Depth Mapping, that distinguishes various features (e.g., hair, clothing, or face).

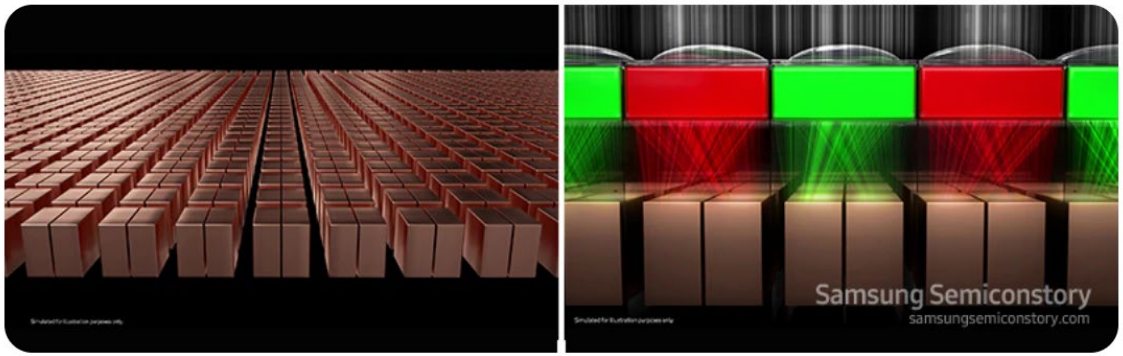
Become the ultimate photographer with Samsung AI

Tap into the tools that help take perfect pictures, capture nighttime photos and make shareable content

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Samsung's Galaxy S23 Ultra series uses AI Stereo Depth Mapping, a software-based feature that relies on AI algorithms to improve image output when you click a photo. This algorithm essentially creates a depth map that automatically measures the distance between objects in an image, so it doesn't miss out on the smaller elements. For example, imagine a picture of a person on the Galaxy S23 ultra whose face is in focus, but their hair or clothing, which normal cameras may treat as background elements, might not be. AI Stereo Depth Mapping fixes this common problem, making sure all these elements are clear and in focus. https://www.samsung.com/us/explore/photography/become-the-ultimate-photographer-with-samsung-AI/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 https://news.samsung.com/global/one-ui-6-update-7-tips-for-making-the-most-of-ai-camera-on-your-galaxy Further, the Accused Samsung '950 Products creates a region by removing pixels with the features from an evaluated value extraction region to perform PDAF:

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Special Autofocus Pixels Used in PDAF Technology To understand how Dual Pixel Pro works, it is important to first understand its foundational technology, Phase Detection Autofocus (PDAF). Just like how humans use their two eyes to focus, PDAF compares the phase difference perceived from two different locations and moves the lens such that the two phases align to adjust the focus. 

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Dual Pixel with Improved Autofocus  Each pixel on a Dual Pixel sensor contains two photodiodes, one left-looking, one right-looking. When capturing a scene, the phases from each pair of photodiodes are compared to achieve autofocus. Since every pixel in the sensor is being used for both autofocus and color values, the sensor can achieve quick autofocus without losing image quality. In the previous Dual Pixel technology, each pixel is divided vertically into left and right. Dual Pixe features green pixels that are divided diagonally. There are clear benefits in dividing pixels diagonally. These pixels can compare the phase differer between the top and bottom of the pixel in addition to phase differences in the left and right side a result, even in a situation where autofocusing is challenging to achieve based on the use of only and right phase differences, Dual Pixel Pro can use top and bottom phase differences, therefore delivering faster and more accurate autofocusing capabilities.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

	https://semiconductor.samsung.com/news-events/tech-blog/the-evolution-from-image-sensor-to-human-eye-samsungs-innovative-dual-pixel-pro-technology/
	
	• Our Qualcomm Spectra™ AI ISP features:
	  • Limitless Real-time Semantic Segmentation for photo/video frame
	  • Insight AI provides real-time skin and sky adjustments to create more natural color and lighting in uncertain conditions.
	  • Ultra-low Light video capture
	  • Video Object Eraser can remove unwanted elements from videos
	  • Real-time AI Relighting make you appear professional wherever you are
	  • Truepic photo capture with C2PA standard support lets you snap a photo with Truepic's cryptographic seal to prove the photo is real and not Gen AI
	
	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Camera Qualcomm Spectra™ Image Signal Processor • AI-ISP, Triple 18-bit ISPs Limitless real-time Semantic Segmentation photo and video processing Engine for Visual Analytics 4.0, including hardware acceleration for iToF depth sensors up to 4K 60 FPS Support for the latest HDR, DCG+VS, DCG, Staggered, QDOL, Less Blanking, and Multiframe HDR image sensors Support for triple video capture from HDR image sensors, with seamless switching between any HDR mode • Up to 48 MP triple camera @ 30 FPS with Zero Shutter Lag • Up to 108 MP single camera @ 30 FPS with Zero Shutter Lag • Up to 320-megapixel photo capture AI-based face detection, AI for 3A (auto-focus, autoexposure, and auto-white balance) Rec. 2020 color gamut photo and video capture Up to 10-bit color depth photo and video capture 10-bit HEIF: HEIC photo capture, HEVC video capture Google Ultra HDR photo capture Video capture HDR formats: HDR10+, HDR10, HLG, Dolby Vision 8K HDR video playback @ 60 FPS 4K video capture @ 120 FPS Slow-mo video capture at 1080p @ 480 FPS Hardware Bokeh Engine 2 for video capture (https://docs.qualcomm.com/bundle/publicresource/87-83196-1_REV_D_Snapdragon_8_Elite_Mobile_Platform_Product_Brief.pdf)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	AI-powered camera redefines photography Infuse brilliance into mobile capture with our AI ISP, enhancing everything from selfies to crystal-clear video chats thanks to an overhauled Hexagon Direct Link. The first AI-powered Limitless Segmentation recognizes and enhances virtually anything in the frame, including faces, hair, clothing, objects, backgrounds, and beyond. Even furry friends appear crisp and cute—no matter how fast the zoomies—thanks to AI-Based Pet Capture. • Our powerful AI ISP is deeply integrated with the Hexagon NPU for enhanced, intuitive capture. • Limitless Segmentation can segment an image in over 250 layers, each optimized to perfection. • Real-time Insight AI captures and enhances natural skin and sky tones even in the most challenging conditions. • Truepic with C2PA adds cryptographic seals so you can authenticate your photos as real and not AI-generated—now including videos and audio recordings. • Video Object Eraser can remove unwanted elements from video footage—on-device. • Capture vivid videos at 4K60 FPS, even in near darkness. (https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Snapdragon-8-Elite-Platform-Product-Brief.pdf) Let's dive deeper into why Snapdragon 8 Elite is a game-changer: • **Incredible power:** Experience a 45% boost in performance with the Qualcomm Oryon CPU, giving you lightning-fast apps and incredible multitasking.[1] • **AI at your fingertips:** The Qualcomm® Hexagon™ NPU increases AI performance by 45%, handling everything from voice commands to image prompts. Your device is ready to adapt to your every move. • **Photography, reimagined:** With features like 4K Semantic Segmentation, Video Object Eraser, and real-time AI lighting adjustments, the Snapdragon 8 Elite camera tech turns your mobile photos into pro-level masterpieces. https://www.qualcomm.com/snapdragon/news/snapdragon-8-elite--the-power-behind-the-name

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

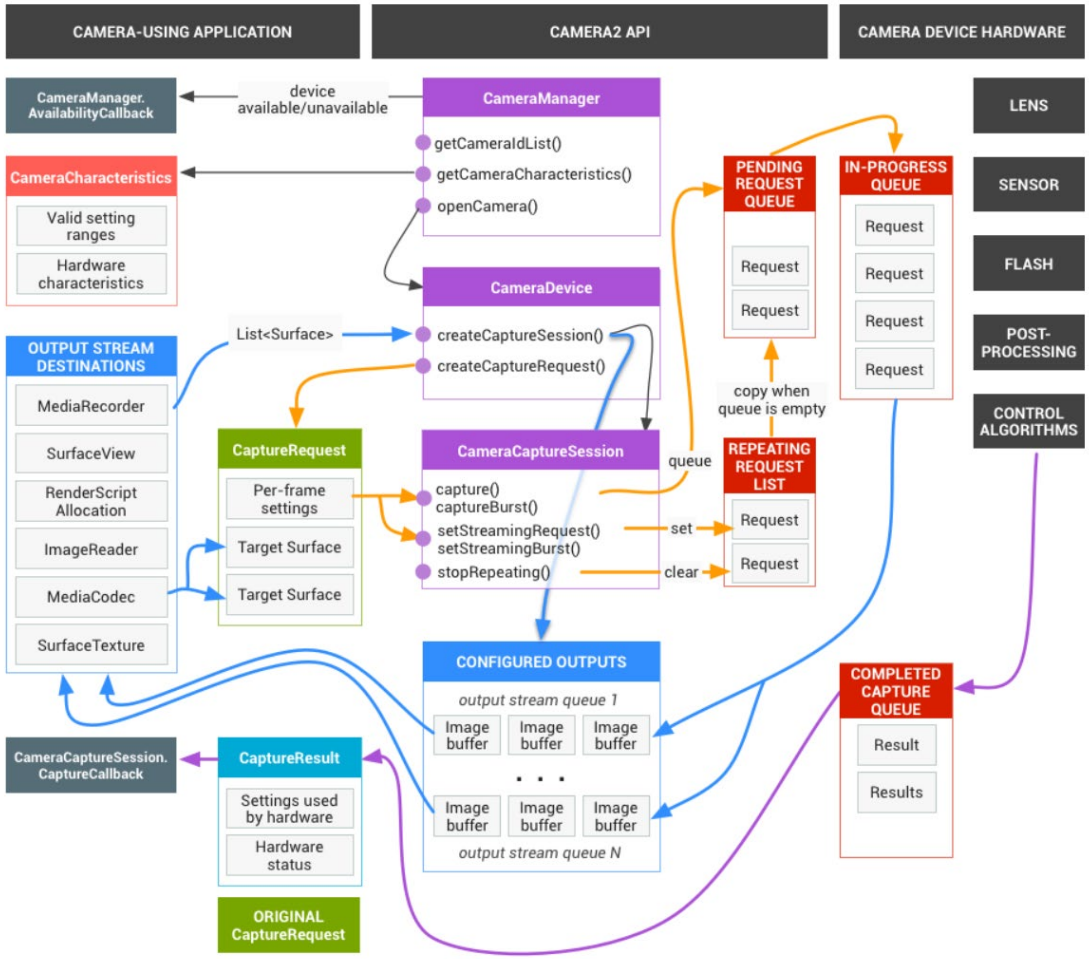


Figure 1. Camera model

https://source.android.com/docs/core/camera/camera3_requests_hal

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

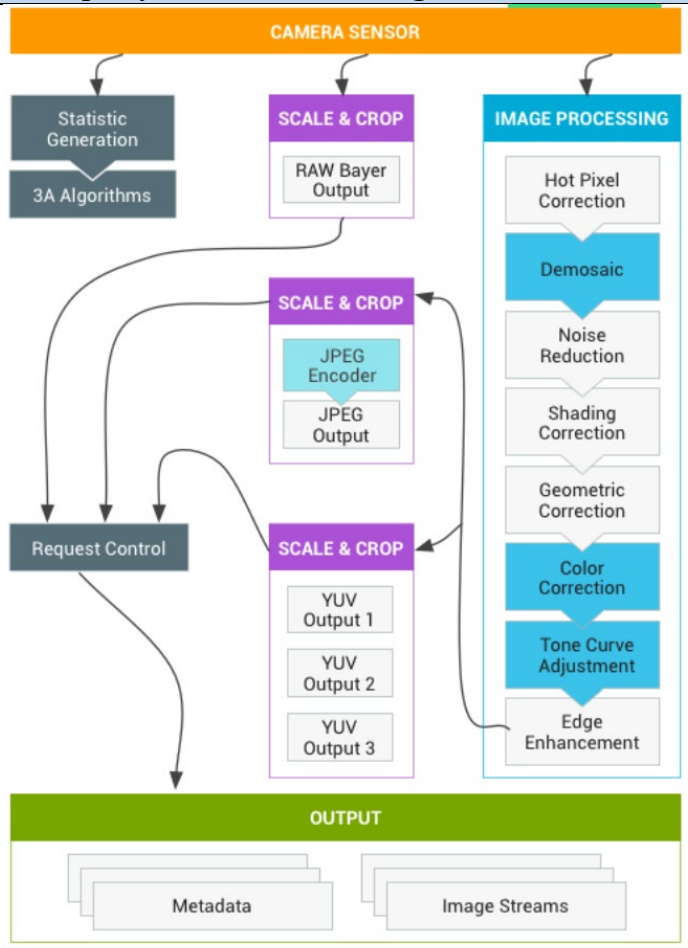


Figure 2. Camera pipeline

https://source.android.com/docs/core/camera/camera3_requests_hal

Doctrine of Equivalents

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	To the extent Samsung argues that the above-identified structure does not literally infringe this claim element, this limitation is infringed under the doctrine of equivalents because the Accused Samsung '950 Products contain one or more components and/or software, or a combination thereof, that perform substantially the same function in substantially the same way to obtain the same result. By way of example, to the extent that Samsung argues that the Accused Samsung '950 Products do not have a control unit that operates in this manner, each of these products include software, hardware, or a combination of the two that perform the equivalent function of controlling the signal processing unit. Using this combination, these products perform substantially the same function (for example, controlling components within the signal processor) in substantially the same way. The performance of this function achieves substantially the same result, for example, the control of the processing unit based on an extracted value from a region where other features were removed. That this functionality may be divided across several components does not preclude them from collectively functioning as a control unit.
[2.a] A signal processor according to claim 1, wherein the feature detection unit includes: a hold unit which holds position information of the detected pixels; and	For example, the Samsung S25 has one or more, buffer for temporary storing image data while ISP pipeline processes occur, a memory, and/or storage for holding information generated by software and applications including position information of the detected pixels e.g. pixels associated with detected features such as face, hair, clothing, moving objects, etc.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	  https://www.samsung.com/us/smartphones/galaxy-s25/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
[2.b] the region creation unit which creates a region by excluding the held positions from an evaluated value extraction region.	The signal processor in each of the Accused Samsung '950 Products incorporates or operates as a region creation unit which creates a region by removing pixels with the features from an evaluated value extraction region. As an example, the signal processor is configured to create a region that includes skin tones and textures and other region or regions that do not include skin tones and textures. To create other region or regions that do not contain the detected skin tones and textures, the signal processor excludes a skin tone region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contain a detected moving object or subject and other region or regions that do not contain the detected moving object or subject. To create other region or regions that do not contain the detected moving object, the signal processor excludes a moving object region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains a detected face and other region or regions that do not contain the detected face. To create other region or regions that do not contain the detected face, the signal processor excludes a face region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected natural skin and other region or regions that do not contain the detected natural skin. To create other region or regions that do not contain the detected natural skin, the signal processor excludes a natural skin region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected hair and other region or regions that do not contain the detected hair. To create other region or regions that do not contain the detected hair, the signal processor excludes a hair region that contains the pixels for which a position has been held in the hold unit or memory.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

	As another example, the signal processor is configured to create a region that contains detected clothing and other region or regions that do not contain the detected clothing. To create other region or regions that do not contain the detected clothing, the signal processor excludes a clothing region that contains the pixels for which a position has been held in the hold unit or memory.
	
	As another example, the signal processor is configured to create a region that contains a detected object in a foreground and other region or regions that are part of a background. To create other region or regions that do not contain the detected foreground, the signal processor excludes a foreground region that contains the pixels for which a position has been held in the hold unit or memory.
	
	• Our Qualcomm Spectra™ AI ISP features:
	
	  • Limitless Real-time Semantic Segmentation for photo/video frame
	  • Insight AI provides real-time skin and sky adjustments to create more natural color and lighting in uncertain conditions.
	  • Ultra-low Light video capture
	  • Video Object Eraser can remove unwanted elements from videos
	  • Real-time AI Relighting make you appear professional wherever you are
	  • Truepic photo capture with C2PA standard support lets you snap a photo with Truepic's cryptographic seal to prove the photo is real and not Gen AI

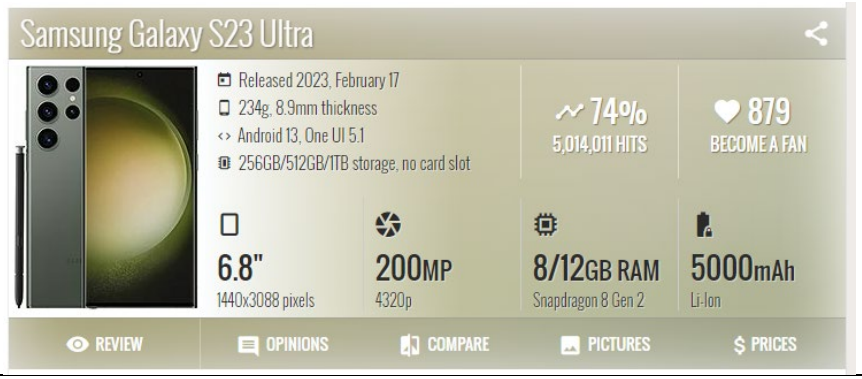
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform) **AI-powered camera redefines photography** Infuse brilliance into mobile capture with our AI ISP, enhancing everything from selfies to crystal-clear video chats thanks to an overhauled Hexagon Direct Link. The first AI-powered Limitless Segmentation recognizes and enhances virtually anything in the frame, including faces, hair, clothing, objects, backgrounds, and beyond. Even furry friends appear crisp and cute—no matter how fast the zoomies—thanks to AI-Based Pet Capture. • Our powerful AI ISP is deeply integrated with the Hexagon NPU for enhanced, intuitive capture. • Limitless Segmentation can segment an image in over 250 layers, each optimized to perfection. • Real-time Insight AI captures and enhances natural skin and sky tones even in the most challenging conditions. • Truepic with C2PA adds cryptographic seals so you can authenticate your photos as real and not AI-generated—now including videos and audio recordings. • Video Object Eraser can remove unwanted elements from video footage—on-device. • Capture vivid videos at 4K60 FPS, even in near darkness. (https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Snapdragon-8-Elite-Platform-Product-Brief.pdf)
[3.a] A signal processor according to claim 2, wherein: the processing unit includes a focus lens, and a drive unit for driving the focus lens;	For example, the Samsung S25 incorporates one or more lenses e.g. a telephoto lens with an optical zoom including a drive unit to drive the optical zoom lens.

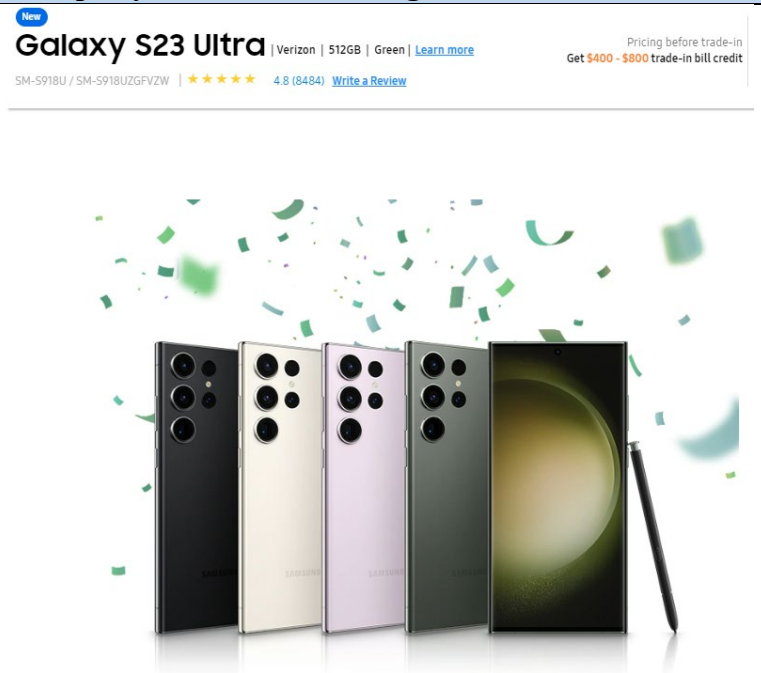
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

MAIN CAMERA	Triple	50 MP, f/1.8, 24mm (wide), 1/1.56", 1.0µm, dual pixel PDAF, OIS
		10 MP, f/2.4, 67mm (telephoto), 1/3.94", 1.0µm, PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 13mm, 120˚ (ultrawide), 1/2.55" 1.4µm, Super Steady video
	Features	Best Face, LED flash, auto-HDR, panorama
	Video	8K@24/30fps, 4K@30/60fps, 1080p@30/60/120/240fps, 10-bit HDR, HDR10+, stereo sound rec., gyro-EIS
SELFIE CAMERA	Single	12 MP, f/2.2, 26mm (wide), 1/3.2", 1.12µm, dual pixel PDAF
	Features	HDR, HDR10+
	Video	4K@30/60fps, 1080p@30fps

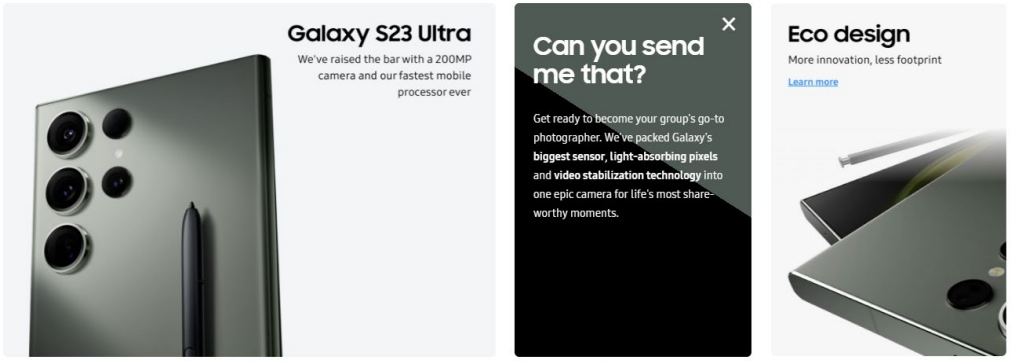
https://www.gsmarena.com/samsung_galaxy_s25-13610.php

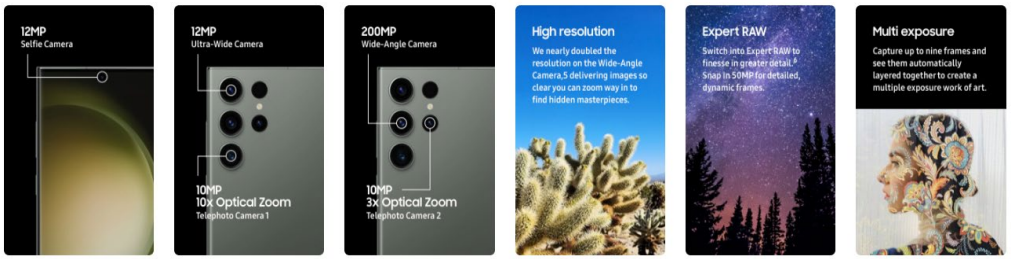
The remaining accused products also include focus lens and a drive unit to, for example, perform AF or PDAF:



U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU; https://www.gsmarena.com/samsung_galaxy_s23_ultra-12024.php.

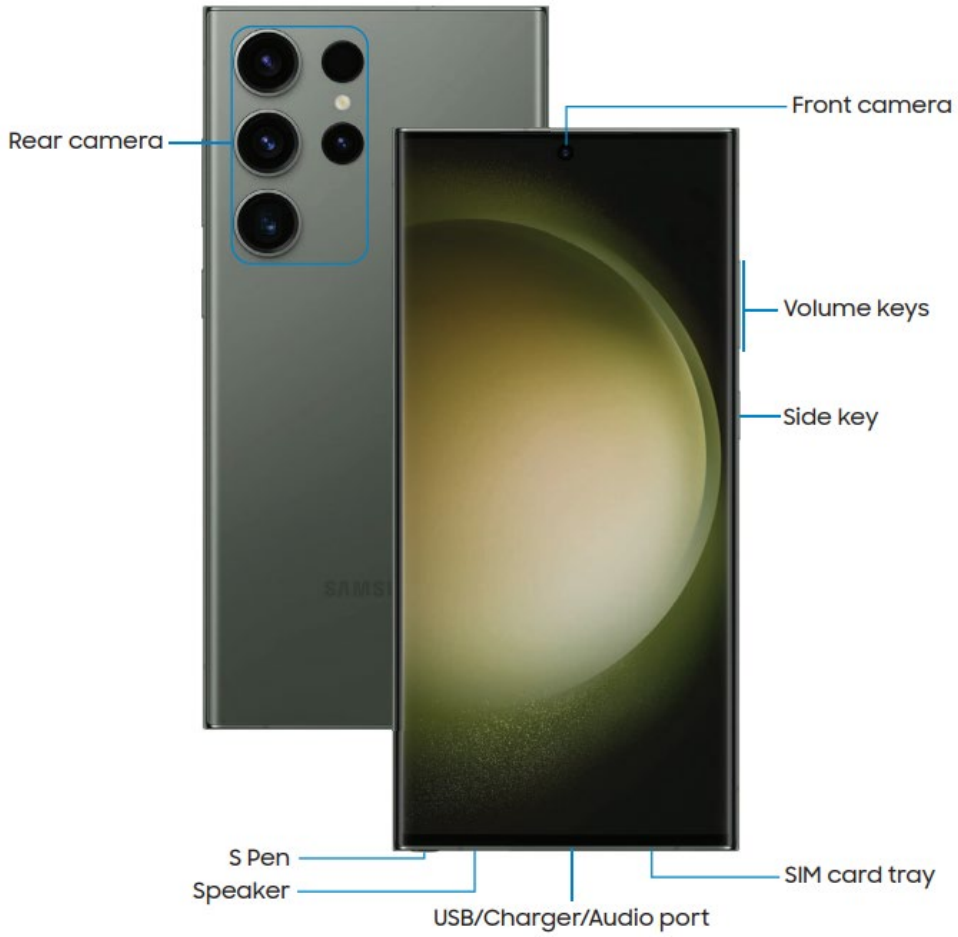
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

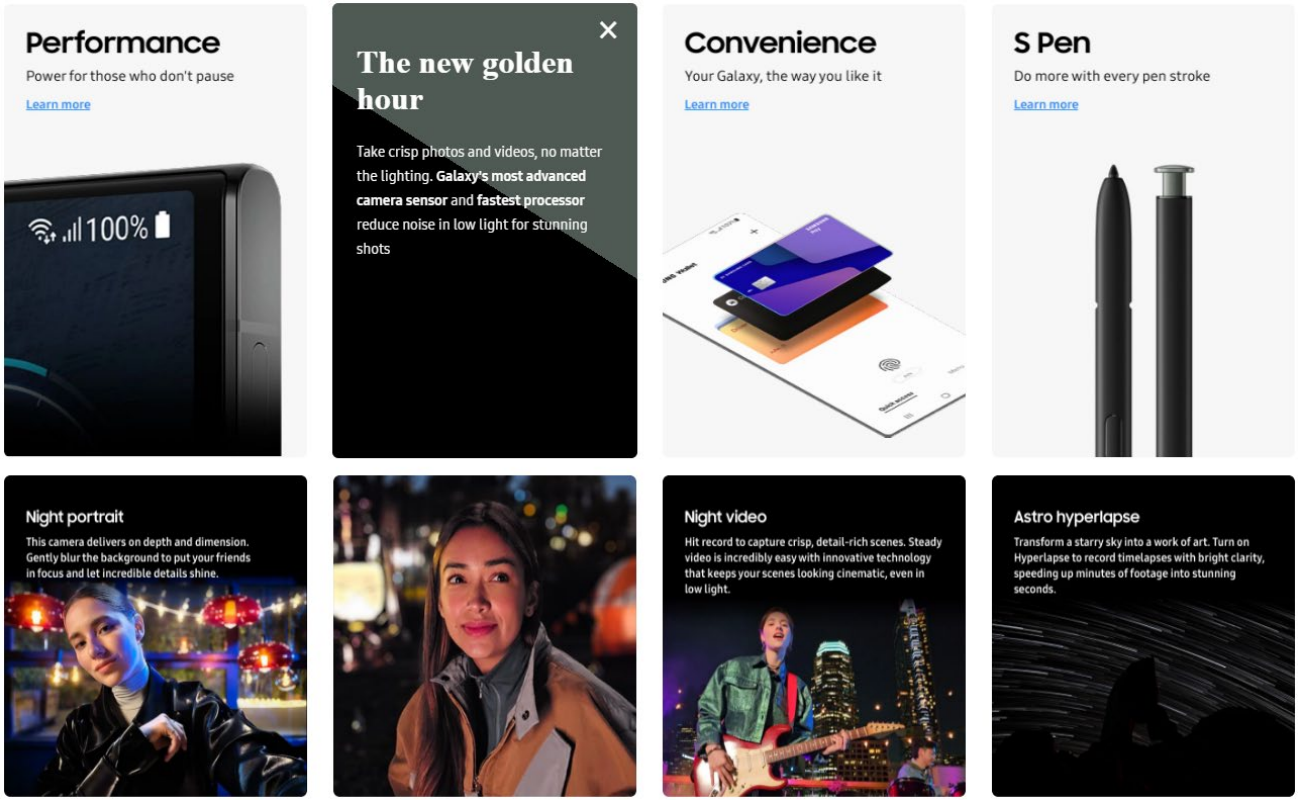




MAIN CAMERA	Quad	200 MP, f/1.7, 24mm (wide), 1/1.3", 0.6µm, multi-directional PDAF, Laser AF, OIS
		10 MP, f/4.9, 230mm (periscope telephoto), 1/3.52", 1.12µm, Dual Pixel PDAF, OIS, 10x optical zoom
		10 MP, f/2.4, 70mm (telephoto), 1/3.52", 1.12µm, Dual Pixel PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 13mm, 120˚ (ultrawide), 1/2.55", 1.4µm, Dual Pixel PDAF, Super Steady video
	Features	LED flash, auto-HDR, panorama
	Video	8K@24/30fps, 4K@30/60fps, 1080p@30/60/240fps, 1080p@960fps, HDR10+, stereo sound rec., gyro-EIS
SELFIE CAMERA	Single	12 MP, f/2.2, 26mm (wide), Dual Pixel PDAF
	Features	Dual video call, Auto-HDR, HDR10+
	Video	4K@30/60fps, 1080p@30fps

Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU; https://www.gsmarena.com/samsung_galaxy_s23_ultra-12024.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy S23 Ultra 

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy S23 Ultra technical specifications; https://downloadcenter.samsung.com/content/UM/202302/20230228053129621/SAM_S911_S916_S918_EN_UM_OS13_020223_FINAL_AC_022023.pdf at 5.  Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU.

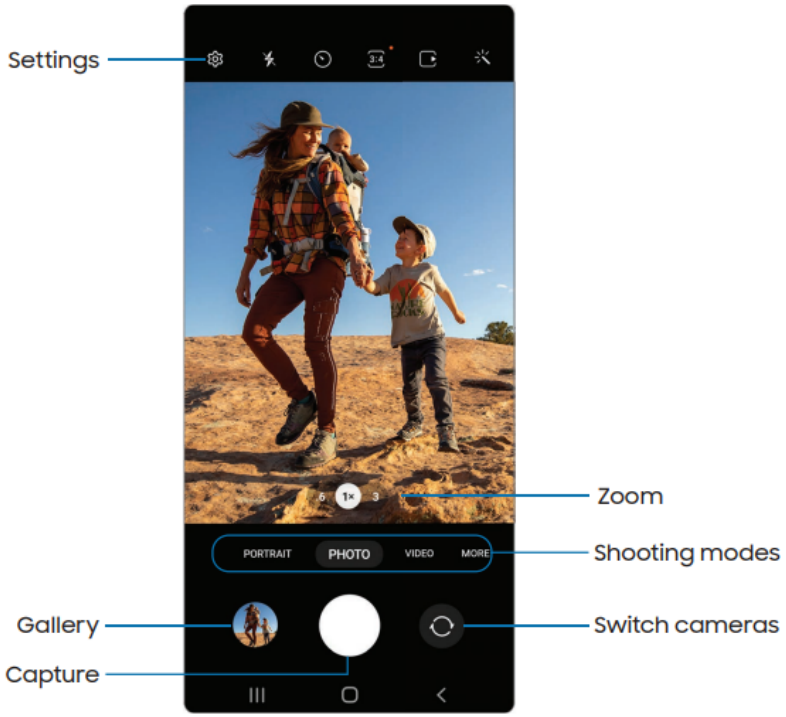
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Camera

Enjoy a full kit of pro lenses and pro-grade video modes and settings.

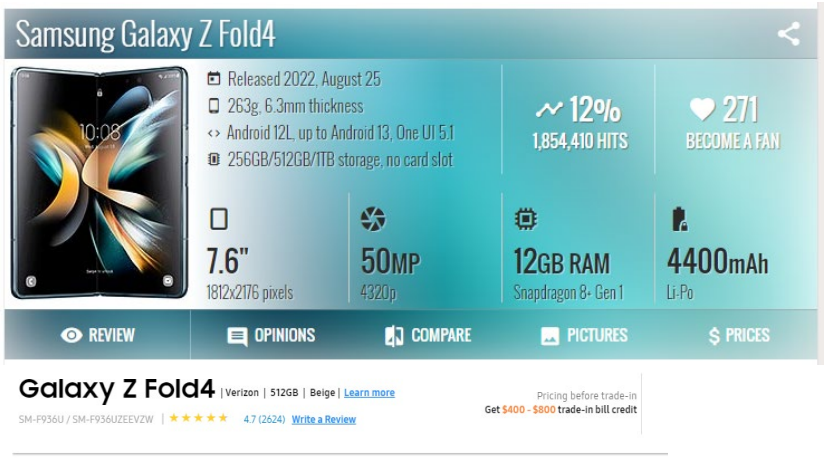
○ From Apps, tap Camera.

TIP Quickly press the **Side** key twice to open the Camera app.



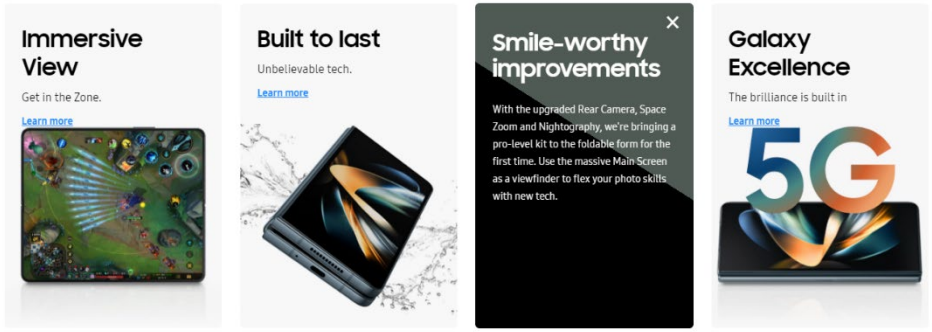
Galaxy S23 Ultra technical specification; https://downloadcenter.samsung.com/content/UM/202302/20230228053129621/SAM_S911_S916_S918_EN_UM_OS13_020223_FINAL_AC_022023.pdf at 58.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/; https://www.gsmarena.com/samsung_galaxy_z_fold4-11737.php.

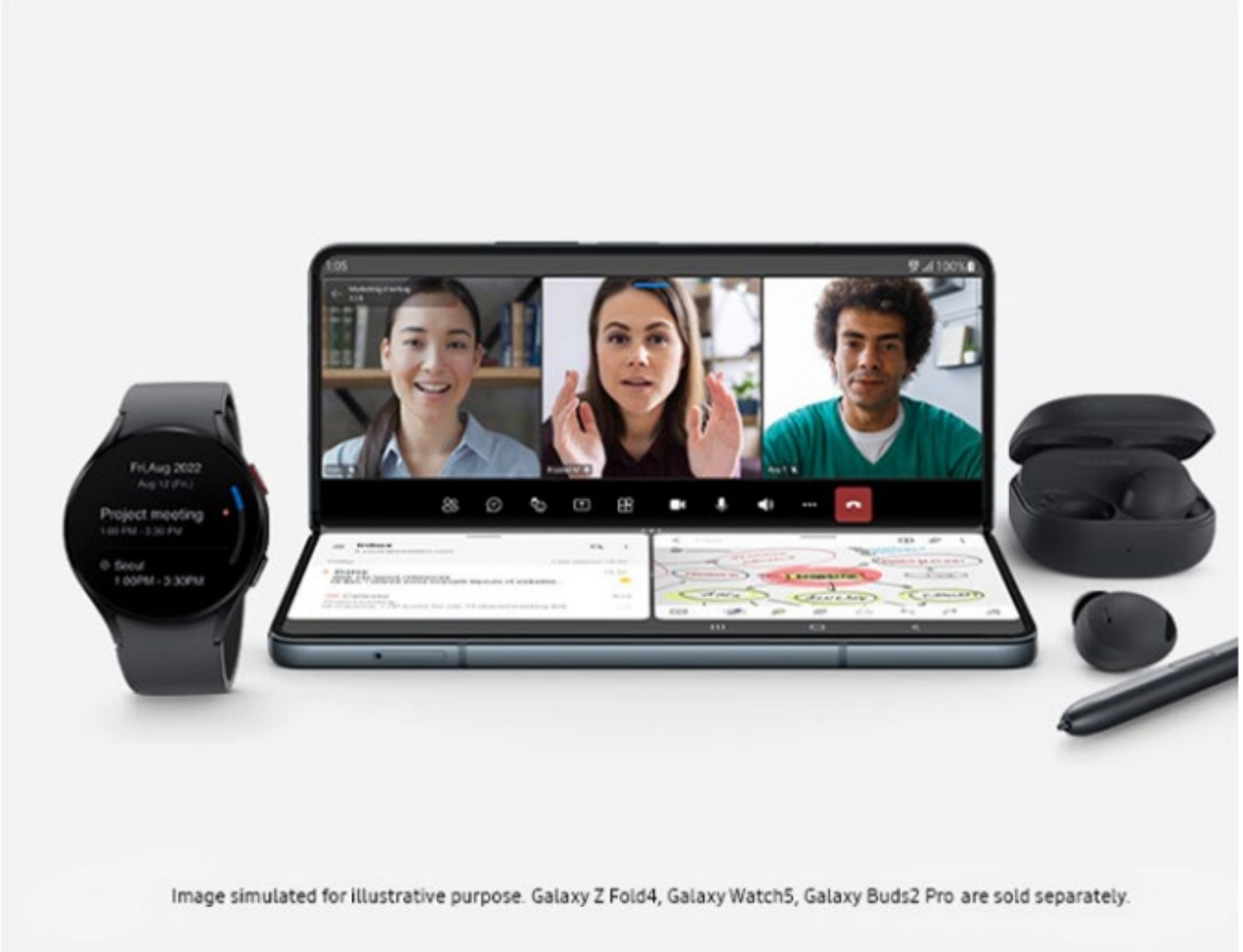
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

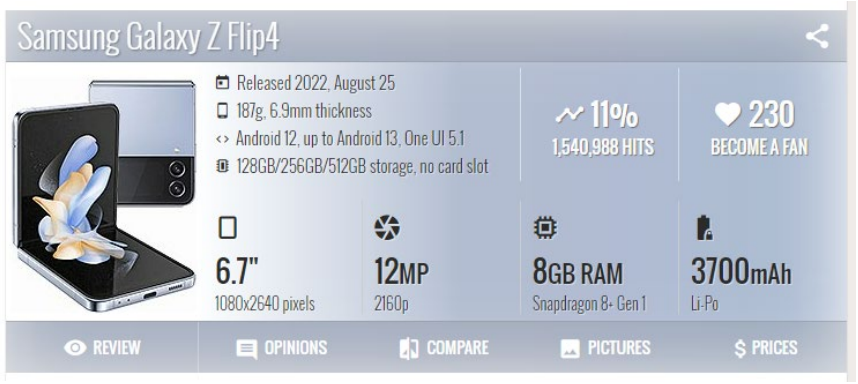
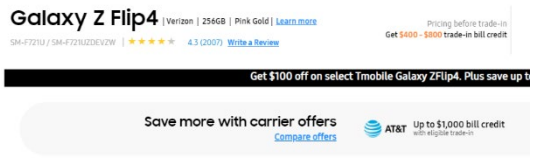


MAIN CAMERA	Triple	50 MP, f/1.8, 23mm (wide), 1.0µm, Dual Pixel PDAF, OIS
		10 MP, f/2.4, 66mm (telephoto), 1.0µm, PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 123°, 12mm (ultrawide), 1.12µm
	Features	LED flash, HDR, panorama
	Video	8K@24fps, 4K@60fps, 1080p@60/240fps (gyro-EIS), 720p@960fps (gyro-EIS), HDR10+
SELFIE CAMERA	Single	4 MP, f/1.8, 26mm (wide), 2.0µm, under display
		Cover camera:
		10 MP, f/2.2, 24mm (wide), 1/3", 1.22µm
	Features	HDR
	Video	4K@30/60fps, 1080p@30/60fps, gyro-EIS

Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/; https://www.gsmarena.com/samsung_galaxy_z_fold4-11737.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy Z Fold4 Galaxy Z Fold4 technical specification; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_fold4_d1e605.html.

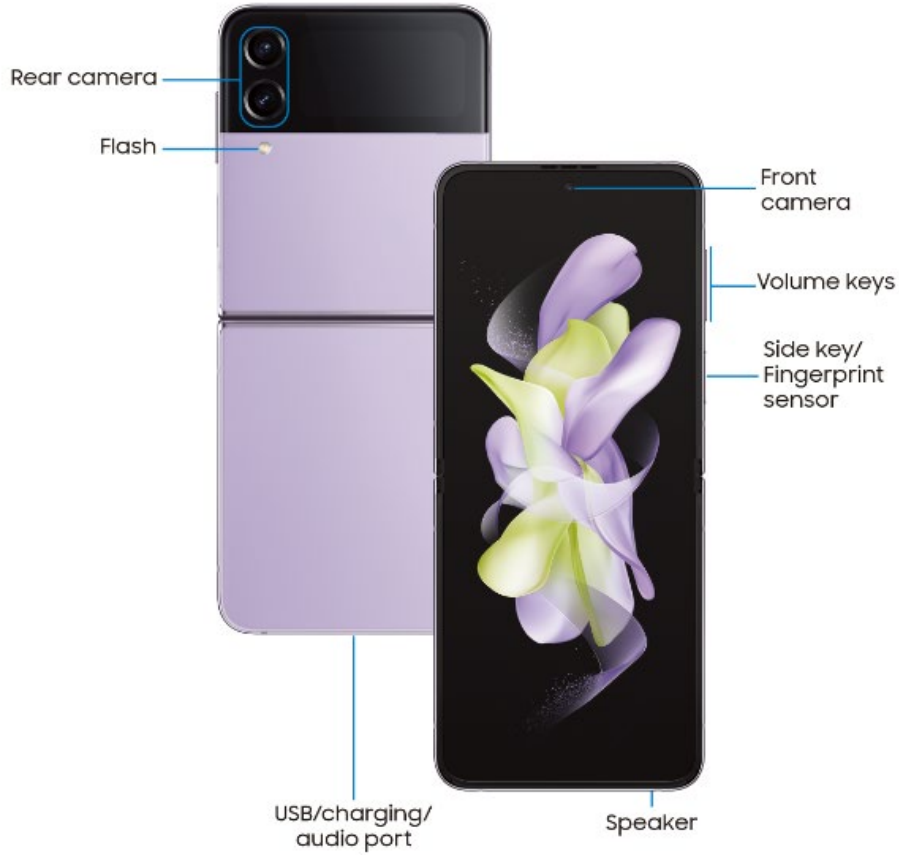
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy Z Fold4 technical specifications; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_fold4_camera_features_d1e3185.   Galaxy Z Flip4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-flip4/buy/galaxy-z-flip4-256gb-t-mobile-sm-f721uzdexau/; https://www.gsmarena.com/samsung_galaxy_z_flip4-11538.php.

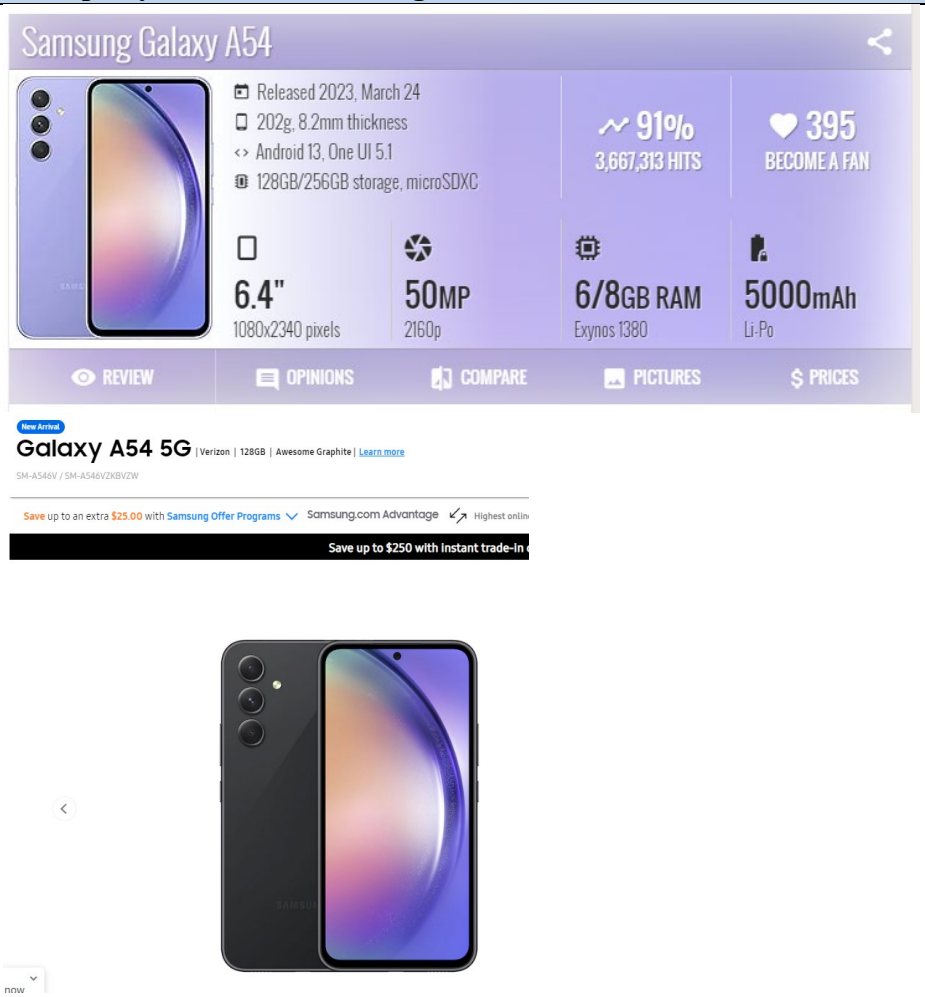
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

MAIN CAMERA	Dual	12 MP, f/1.8, 24mm (wide), 1/1.76", 1.8µm, Dual Pixel PDAF, OIS
		12 MP, f/2.2, 123˚ (ultrawide), 1.12µm
	Features	LED flash, HDR, panorama
	Video	4K@30/60fps, 1080p@60/240fps, 720p@960fps, HDR10+
SELFIE CAMERA	Single	10 MP, f/2.4, 26mm (wide), 1.22µm
	Features	HDR
	Video	4K@30fps

Galaxy Z Flip4 technical specifications; https://www.gsmarena.com/samsung_galaxy_z_flip4-11538.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy Z Flip4  Galaxy Z Flip4 technical specifications; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_flip4_d1e661.html.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Galaxy A54 5G technical specifications; https://www.samsung.com/us/mobile/phones/galaxy-a54/buy/; https://www.gsmarena.com/samsung_galaxy_a54-12070.php.

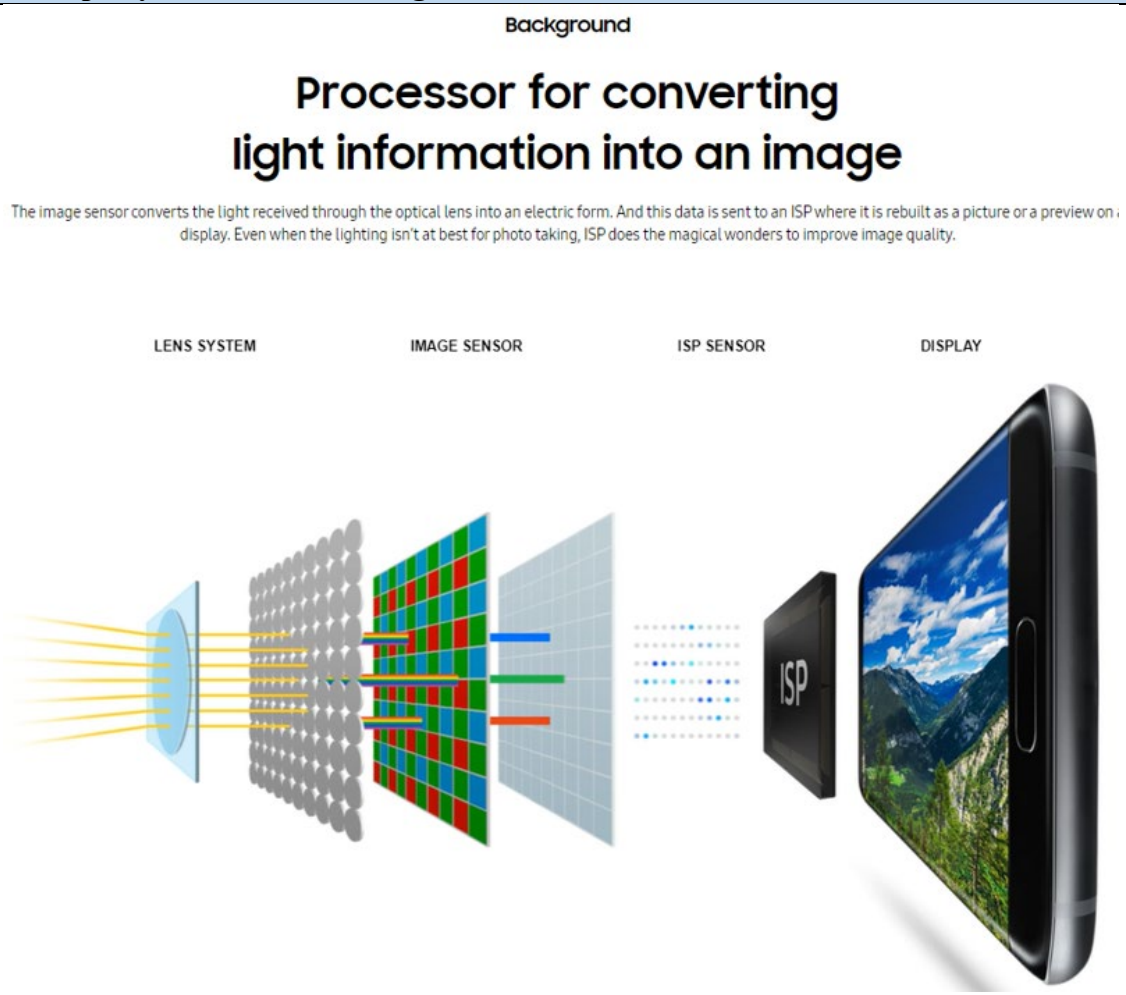
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

MAIN CAMERA	Triple	50 MP, f/1.8, (wide), 1/1.56", 1.0µm, PDAF, OIS
		12 MP, f/2.2, 123° (ultrawide), 1.12µm
		5 MP, f/2.4, (macro)
	Features	LED flash, panorama, HDR
	Video	4K@30fps, 1080p@30/60fps, 720p@480fps
SELFIE CAMERA	Single	32 MP, f/2.2, 26mm (wide), 1/2.8", 0.8µm
	Video	4K@30fps, 1080p@30/60fps

Samsung Galaxy A54 5G technical specifications; Galaxy A54 5G, 128GB (Unlocked) Phones - SM-A546UZKBXAA | Samsung US; https://www.gsmarena.com/samsung_galaxy_a54-12070.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy A54 5G Galaxy A54 5G technical specifications; https://downloadcenter.samsung.com/content/UM/202304/20230407022332214/SAM_A546_EN_UM_OS13_040523_FINAL.pdf at 5.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
[3.b] a photoelectric conversion unit for performing photoelectric conversion is disposed between the focus lens and the extraction unit; and	For example, the Samsung S25 incorporates an image sensor corresponding to each of the one or more lenses e.g. a 10MP image sensor for the telephoto lens. The image sensor incorporates a photoelectric conversion unit for performing photoelectric conversion disposed between the focus lens and the extraction unit. For example, the image sensor converts light to electricity representing pixel elements. As a nonlimiting example, each of the Accused Samsung '950 Products includes one or more image sensors associated with the plurality of cameras as front-facing and/or rear-facing cameras, which alone or in conjunction with other features and/or components discussed in this claim chart, allows each of the Accused Samsung '950 Products to convert light associated with an image into a digital signal representing the image as pixels. For example, each of the Accused Samsung '950 Products includes one or more image sensors that convert light received through optical lens into an electronic signal, which is sent to one or more image signal processors (ISP) where the electronic signal is rebuilt as a picture or a preview on a display. *See e.g.*, https://semiconductor.samsung.com/us/solutions/technology/image-processing/.

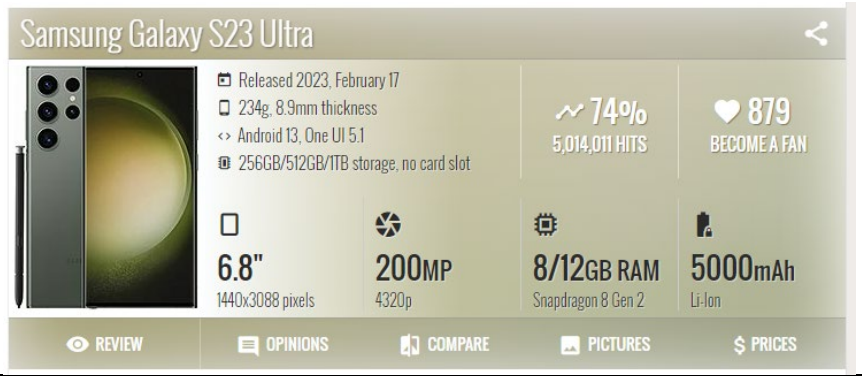
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Accused Samsung '0 Products provide evidence of one or more image sensors converting light into a digital signal, https://semiconductor.samsung.com/us/solutions/technology/image-processing/.

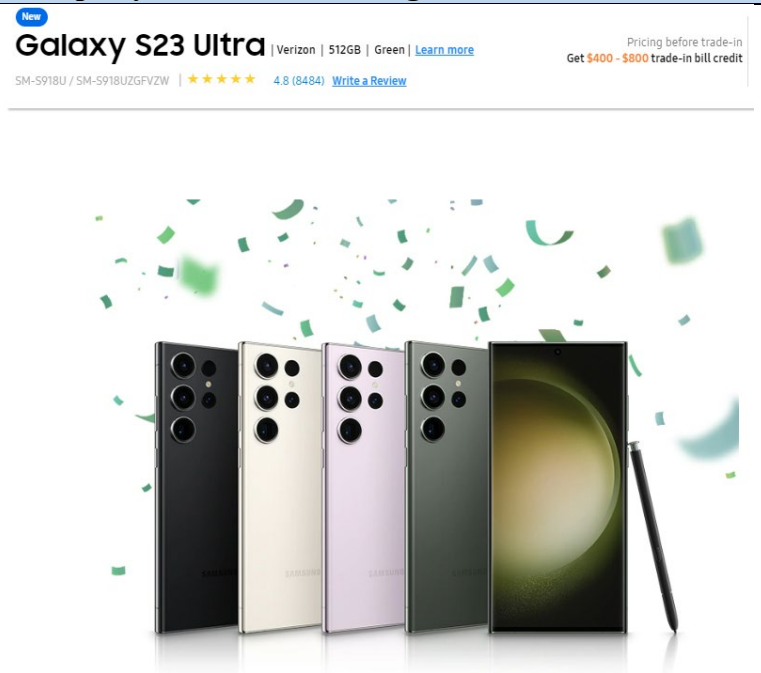
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

MAIN CAMERA	Triple	50 MP, f/1.8, 24mm (wide), 1/1.56", 1.0µm, dual pixel PDAF, OIS
		10 MP, f/2.4, 67mm (telephoto), 1/3.94", 1.0µm, PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 13mm, 120˚ (ultrawide), 1/2.55" 1.4µm, Super Steady video
	Features	Best Face, LED flash, auto-HDR, panorama
	Video	8K@24/30fps, 4K@30/60fps, 1080p@30/60/120/240fps, 10-bit HDR, HDR10+, stereo sound rec., gyro-EIS
SELFIE CAMERA	Single	12 MP, f/2.2, 26mm (wide), 1/3.2", 1.12µm, dual pixel PDAF
	Features	HDR, HDR10+
	Video	4K@30/60fps, 1080p@30fps

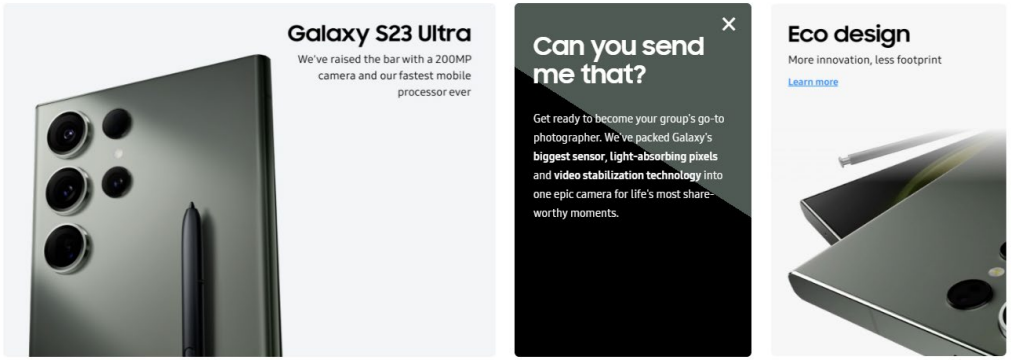
https://www.gsmarena.com/samsung_galaxy_s25-13610.php

Further, each of the Accused Samsung '950 Products includes a photoelectric conversion circuit for performing conversions by using CMOS image sensors to convert light into electricity:



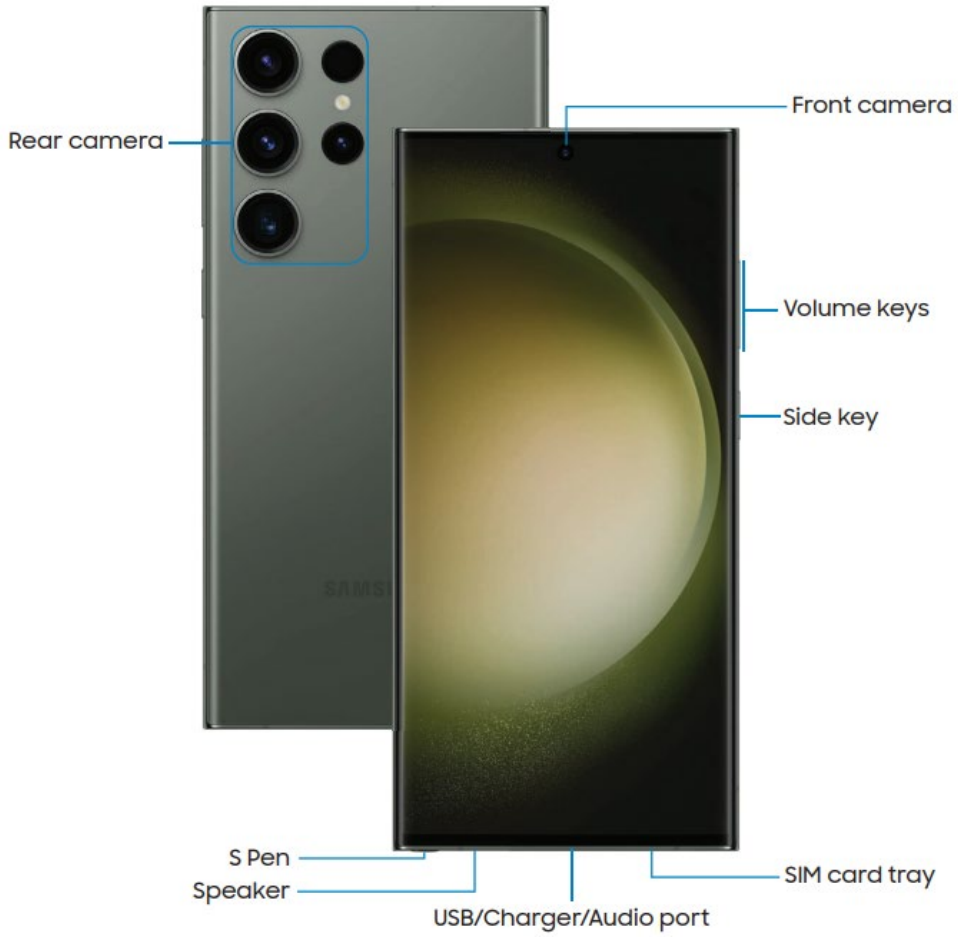
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU; https://www.gsmarena.com/samsung_galaxy_s23_ultra-12024.php.

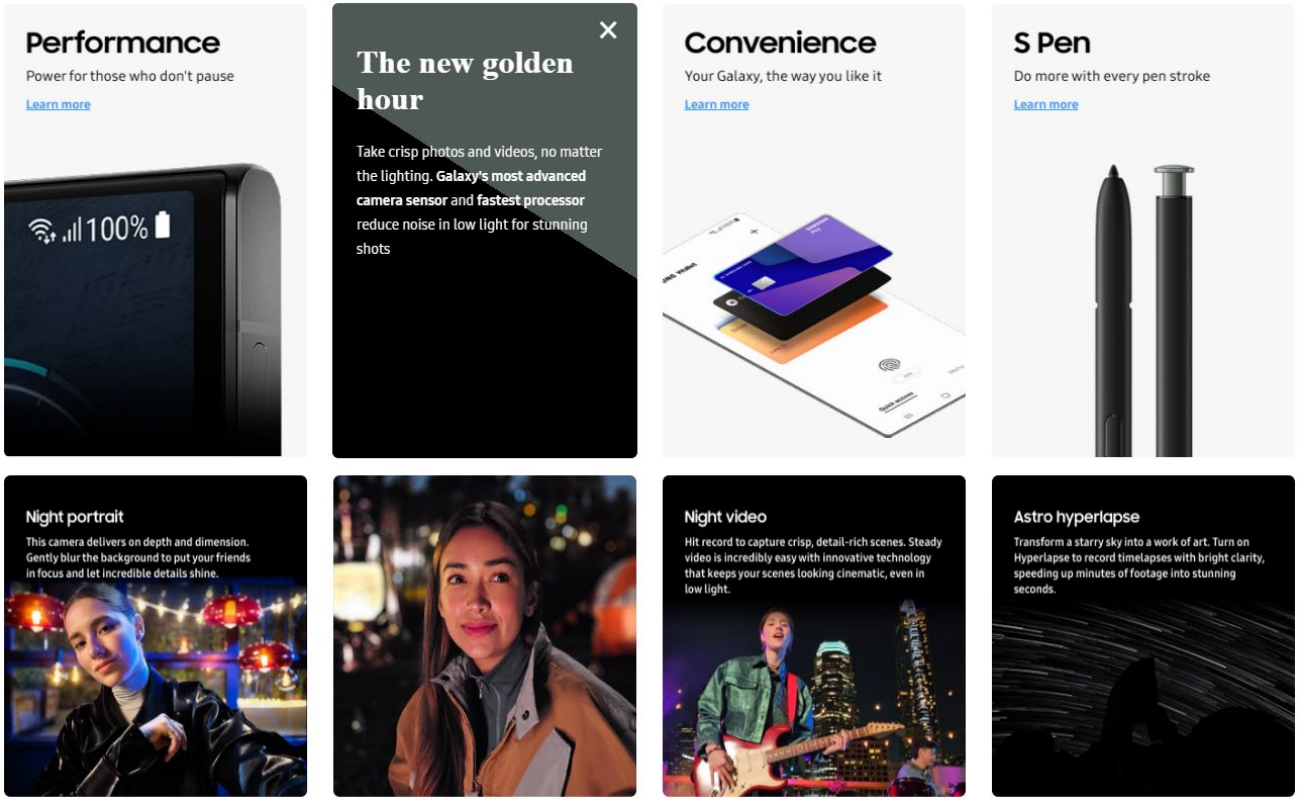
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



MAIN CAMERA	Quad	200 MP, f/1.7, 24mm (wide), 1/1.3", 0.6µm, multi-directional PDAF, Laser AF, OIS
		10 MP, f/4.9, 230mm (periscope telephoto), 1/3.52", 1.12µm, Dual Pixel PDAF, OIS, 10x optical zoom
		10 MP, f/2.4, 70mm (telephoto), 1/3.52", 1.12µm, Dual Pixel PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 13mm, 120˚ (ultrawide), 1/2.55", 1.4µm, Dual Pixel PDAF, Super Steady video
	Features	LED flash, auto-HDR, panorama
	Video	8K@24/30fps, 4K@30/60fps, 1080p@30/60/240fps, 1080p@960fps, HDR10+, stereo sound rec., gyro-EIS
SELFIE CAMERA	Single	12 MP, f/2.2, 26mm (wide), Dual Pixel PDAF
	Features	Dual video call, Auto-HDR, HDR10+
	Video	4K@30/60fps, 1080p@30fps

Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU; https://www.gsmarena.com/samsung_galaxy_s23_ultra-12024.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy S23 Ultra 

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy S23 Ultra technical specifications; https://downloadcenter.samsung.com/content/UM/202302/20230228053129621/SAM_S911_S916_S918_EN_UM_OS13_020223_FINAL_AC_022023.pdf at 5.  Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU.

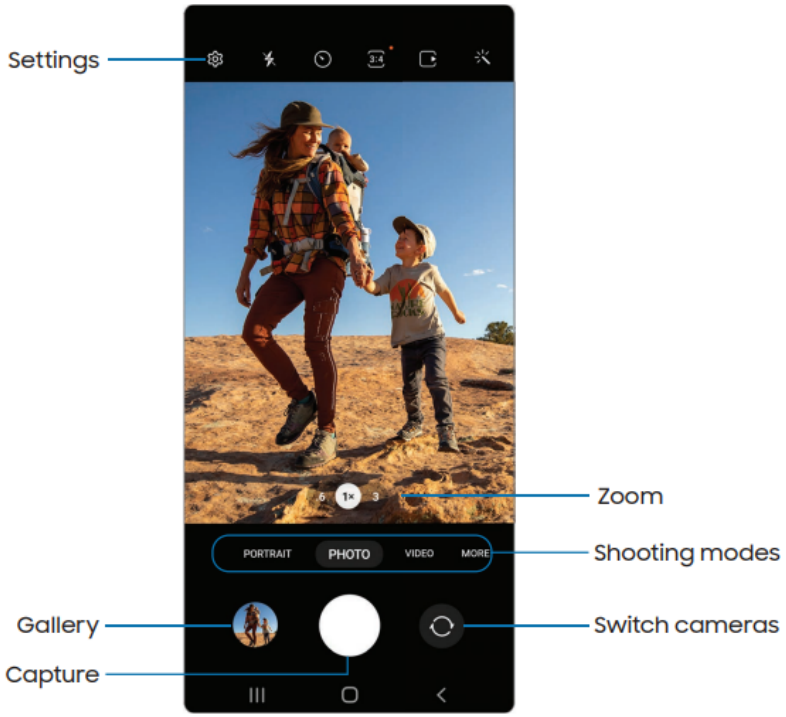
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Camera

Enjoy a full kit of pro lenses and pro-grade video modes and settings.

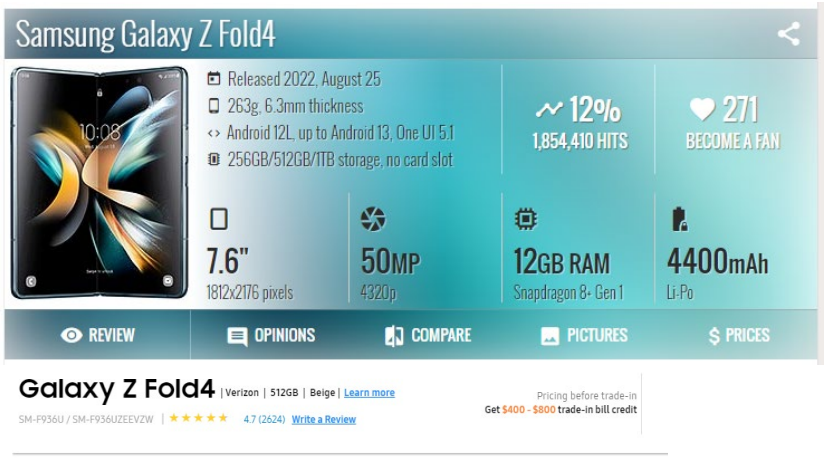
○ From Apps, tap Camera.

TIP Quickly press the **Side** key twice to open the Camera app.



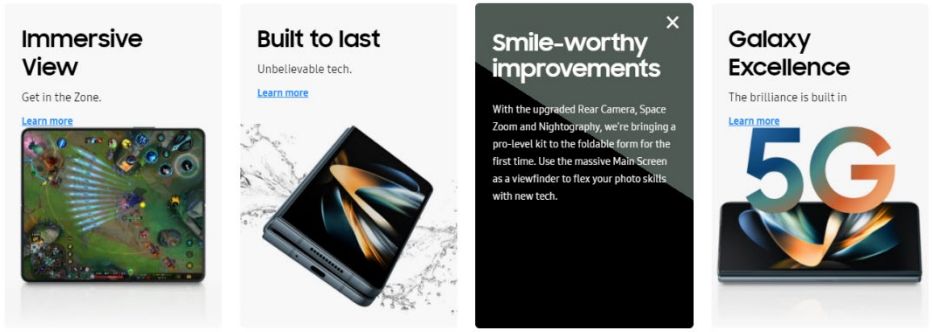
Galaxy S23 Ultra technical specification; https://downloadcenter.samsung.com/content/UM/202302/20230228053129621/SAM_S911_S916_S918_EN_UM_OS13_020223_FINAL_AC_022023.pdf at 58.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/; https://www.gsmarena.com/samsung_galaxy_z_fold4-11737.php.

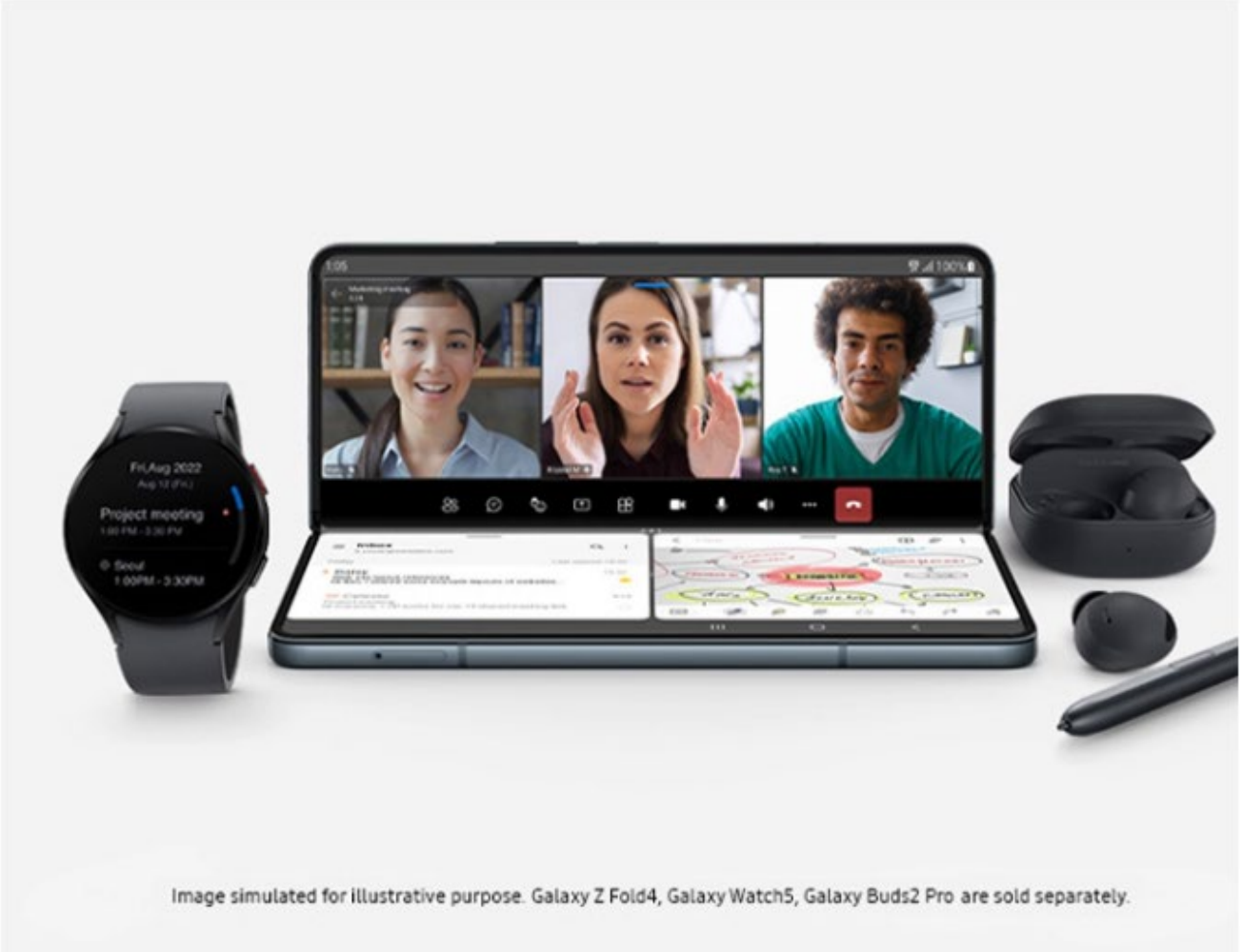
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

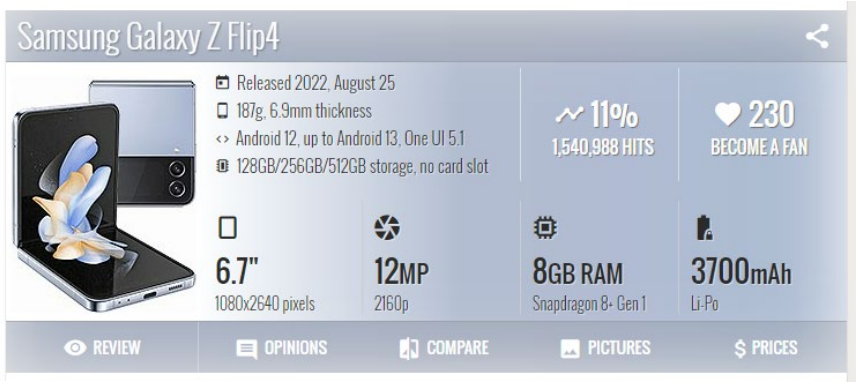
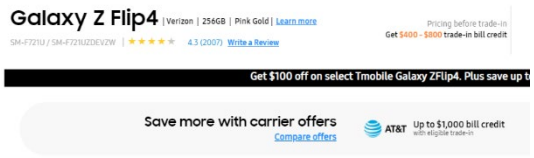


MAIN CAMERA	Triple	50 MP, f/1.8, 23mm (wide), 1.0µm, Dual Pixel PDAF, OIS
		10 MP, f/2.4, 66mm (telephoto), 1.0µm, PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 123°, 12mm (ultrawide), 1.12µm
	Features	LED flash, HDR, panorama
	Video	8K@24fps, 4K@60fps, 1080p@60/240fps (gyro-EIS), 720p@960fps (gyro-EIS), HDR10+
SELFIE CAMERA	Single	4 MP, f/1.8, 26mm (wide), 2.0µm, under display
		Cover camera:
		10 MP, f/2.2, 24mm (wide), 1/3", 1.22µm
	Features	HDR
	Video	4K@30/60fps, 1080p@30/60fps, gyro-EIS

Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/; https://www.gsmarena.com/samsung_galaxy_z_fold4-11737.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy Z Fold4 Galaxy Z Fold4 technical specification; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_fold4_d1e605.html.

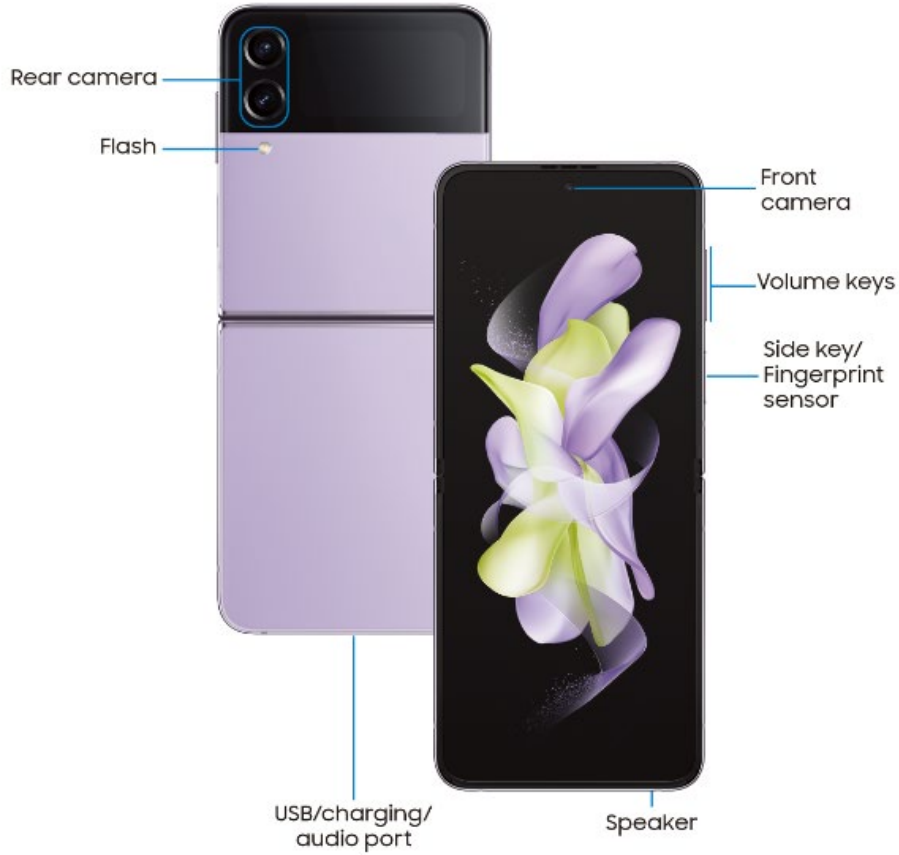
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy Z Fold4 technical specifications; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_fold4_camera_features_d1e3185.   Galaxy Z Flip4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-flip4/buy/galaxy-z-flip4-256gb-t-mobile-sm-f721uzdexau/; https://www.gsmarena.com/samsung_galaxy_z_flip4-11538.php.

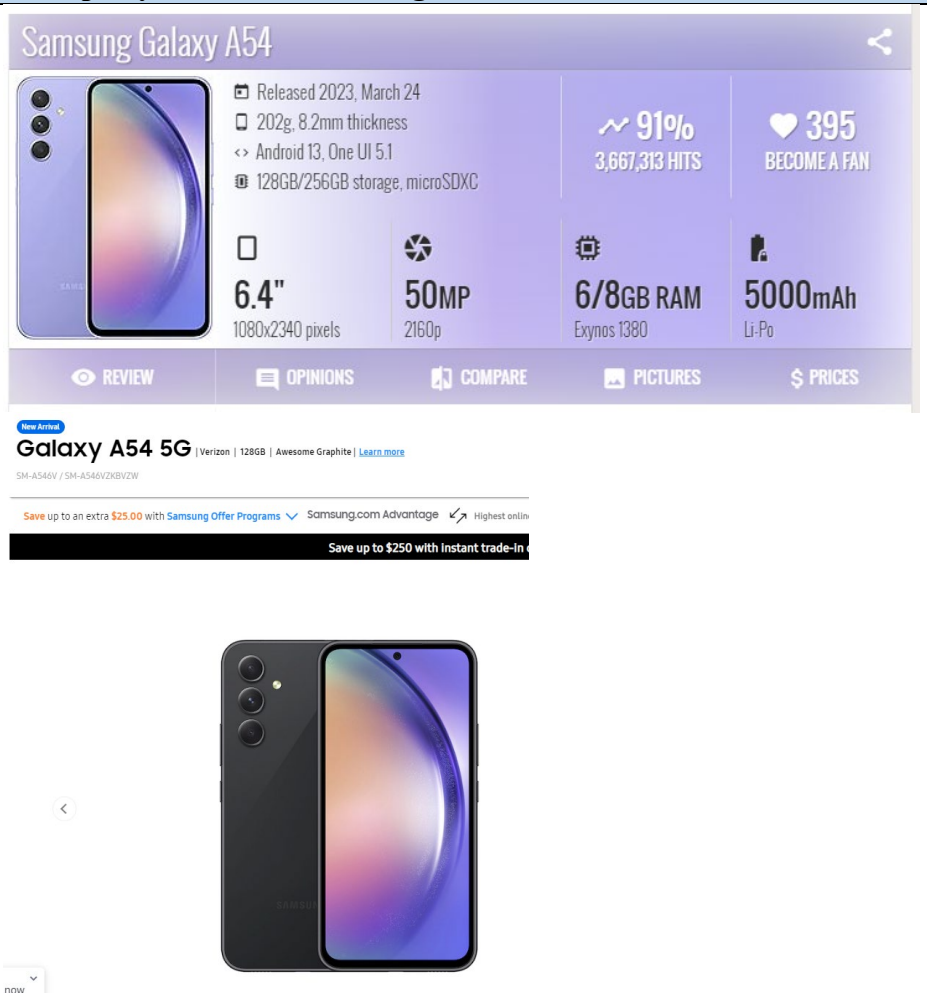
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

MAIN CAMERA	Dual	12 MP, f/1.8, 24mm (wide), 1/1.76", 1.8µm, Dual Pixel PDAF, OIS
		12 MP, f/2.2, 123˚ (ultrawide), 1.12µm
	Features	LED flash, HDR, panorama
	Video	4K@30/60fps, 1080p@60/240fps, 720p@960fps, HDR10+
SELFIE CAMERA	Single	10 MP, f/2.4, 26mm (wide), 1.22µm
	Features	HDR
	Video	4K@30fps

Galaxy Z Flip4 technical specifications; https://www.gsmarena.com/samsung_galaxy_z_flip4-11538.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy Z Flip4  Galaxy Z Flip4 technical specifications; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_flip4_d1e661.html.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Galaxy A54 5G technical specifications; https://www.samsung.com/us/mobile/phones/galaxy-a54/buy/; https://www.gsmarena.com/samsung_galaxy_a54-12070.php.

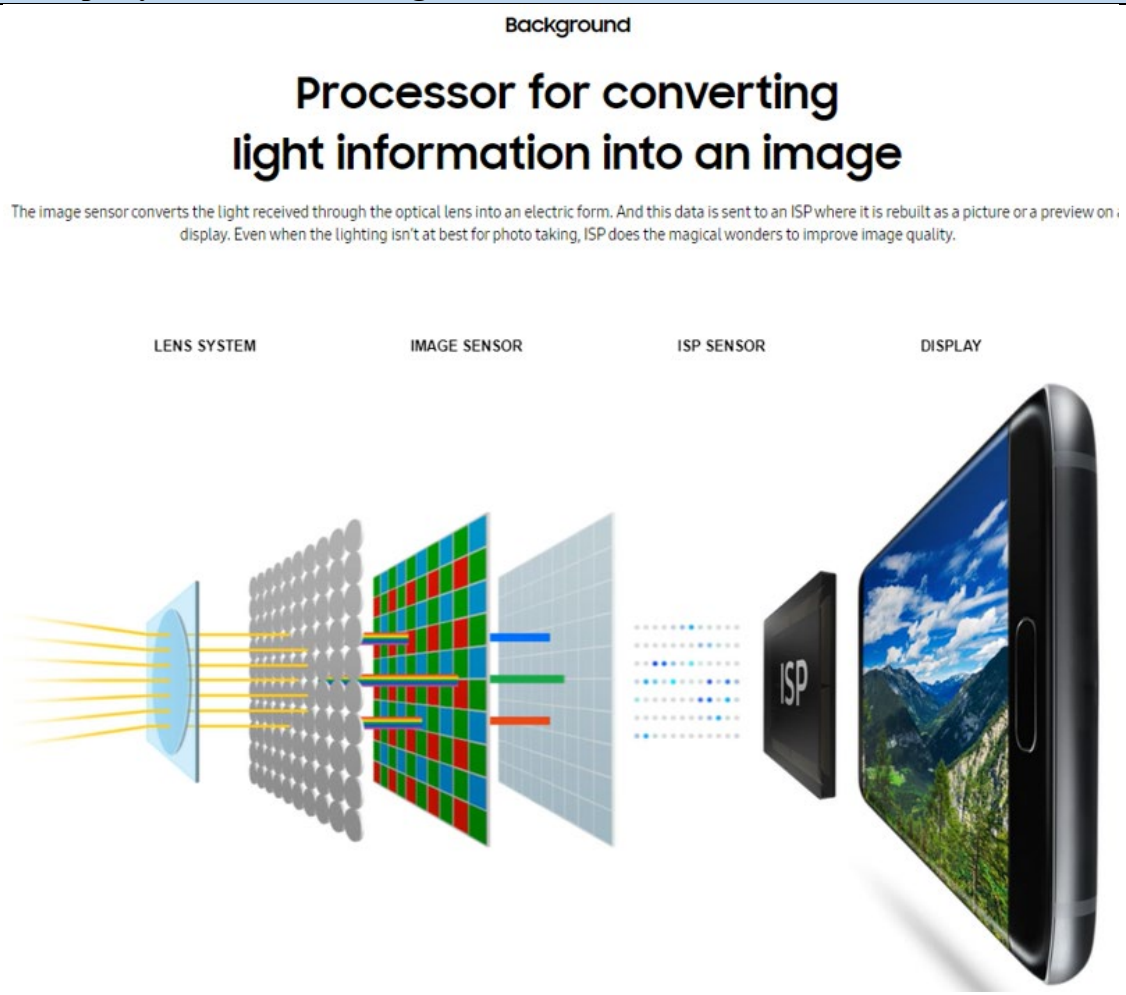
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

MAIN CAMERA	Triple	50 MP, f/1.8, (wide), 1/1.56", 1.0µm, PDAF, OIS
		12 MP, f/2.2, 123° (ultrawide), 1.12µm
		5 MP, f/2.4, (macro)
	Features	LED flash, panorama, HDR
	Video	4K@30fps, 1080p@30/60fps, 720p@480fps
SELFIE CAMERA	Single	32 MP, f/2.2, 26mm (wide), 1/2.8", 0.8µm
	Video	4K@30fps, 1080p@30/60fps

Samsung Galaxy A54 5G technical specifications; Galaxy A54 5G, 128GB (Unlocked) Phones - SM-A546UZKBXAA | Samsung US; https://www.gsmarena.com/samsung_galaxy_a54-12070.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy A54 5G technical specifications; https://downloadcenter.samsung.com/content/UM/202304/20230407022332214/SAM_A546_EN_UM_OS13_040523_FINAL.pdf at 5. As a nonlimiting example, each of the Accused Samsung '950 Products includes one or more image sensors associated with the plurality of cameras as front-facing

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	and/or rear-facing cameras, which alone or in conjunction with other features and/or components discussed in this claim chart, allows each of the Accused Samsung '950 Products to convert light associated with an image into a digital signal representing the image as pixels. For example, each of the Accused Samsung '950 Products includes one or more image sensors that convert light received through optical lens into an electronic signal, which is sent to one or more image signal processors (ISP) where the electronic signal is rebuilt as a picture or a preview on a display. *See e.g.*, https://semiconductor.samsung.com/us/solutions/technology/image-processing/.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Accused Samsung '0 Products provide evidence of one or more image sensors converting light into a digital signal, https://semiconductor.samsung.com/us/solutions/technology/image-processing/.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

MAIN CAMERA	Triple	50 MP, f/1.8, 24mm (wide), 1/1.56", 1.0µm, dual pixel PDAF, OIS
		10 MP, f/2.4, 67mm (telephoto), 1/3.94", 1.0µm, PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 13mm, 120˚ (ultrawide), 1/2.55" 1.4µm, Super Steady video
	Features	Best Face, LED flash, auto-HDR, panorama
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SELFIE CAMERA	Single	12 MP, f/2.2, 26mm (wide), 1/3.2", 1.12µm, dual pixel PDAF
	Features	HDR, HDR10+
	Video	4K@30/60fps, 1080p@30fps

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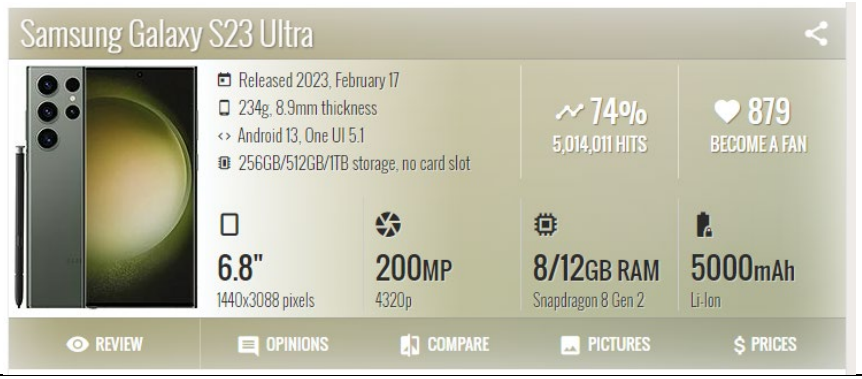
Further, each of the Accused Samsung '950 Products includes a photoelectric conversion circuit for performing conversions by using CMOS image sensors to convert light into electricity:



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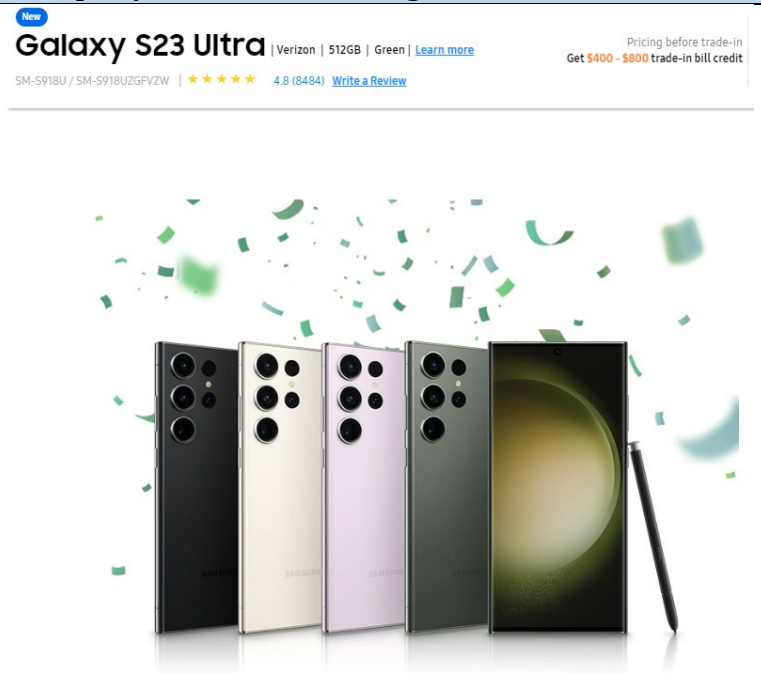
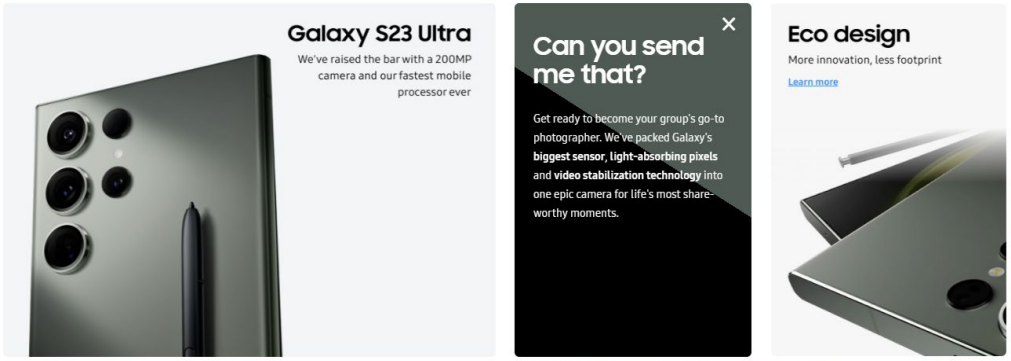
	 Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU; https://www.gsmarena.com/samsung_galaxy_s23_ultra-12024.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



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		10 MP, f/4.9, 230mm (periscope telephoto), 1/3.52", 1.12µm, Dual Pixel PDAF, OIS, 10x optical zoom
		10 MP, f/2.4, 70mm (telephoto), 1/3.52", 1.12µm, Dual Pixel PDAF, OIS, 3x optical zoom
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SELFIE CAMERA	Single	12 MP, f/2.2, 26mm (wide), Dual Pixel PDAF
	Features	Dual video call, Auto-HDR, HDR10+
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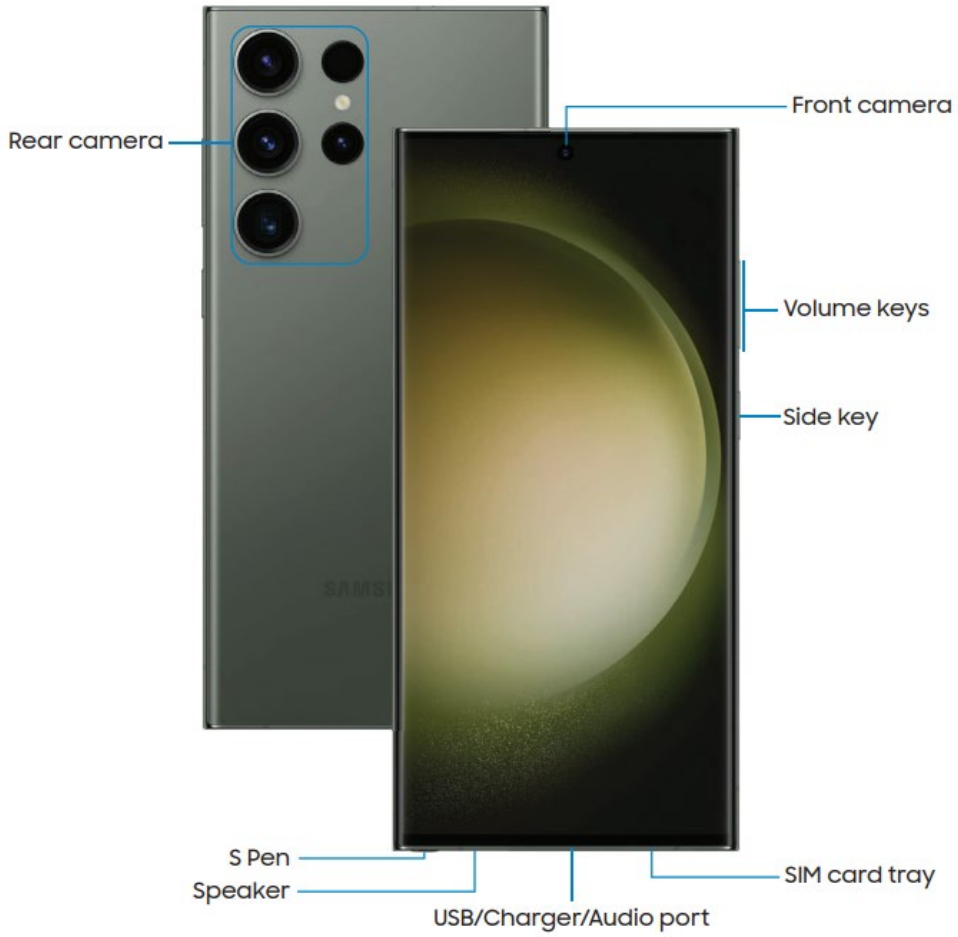
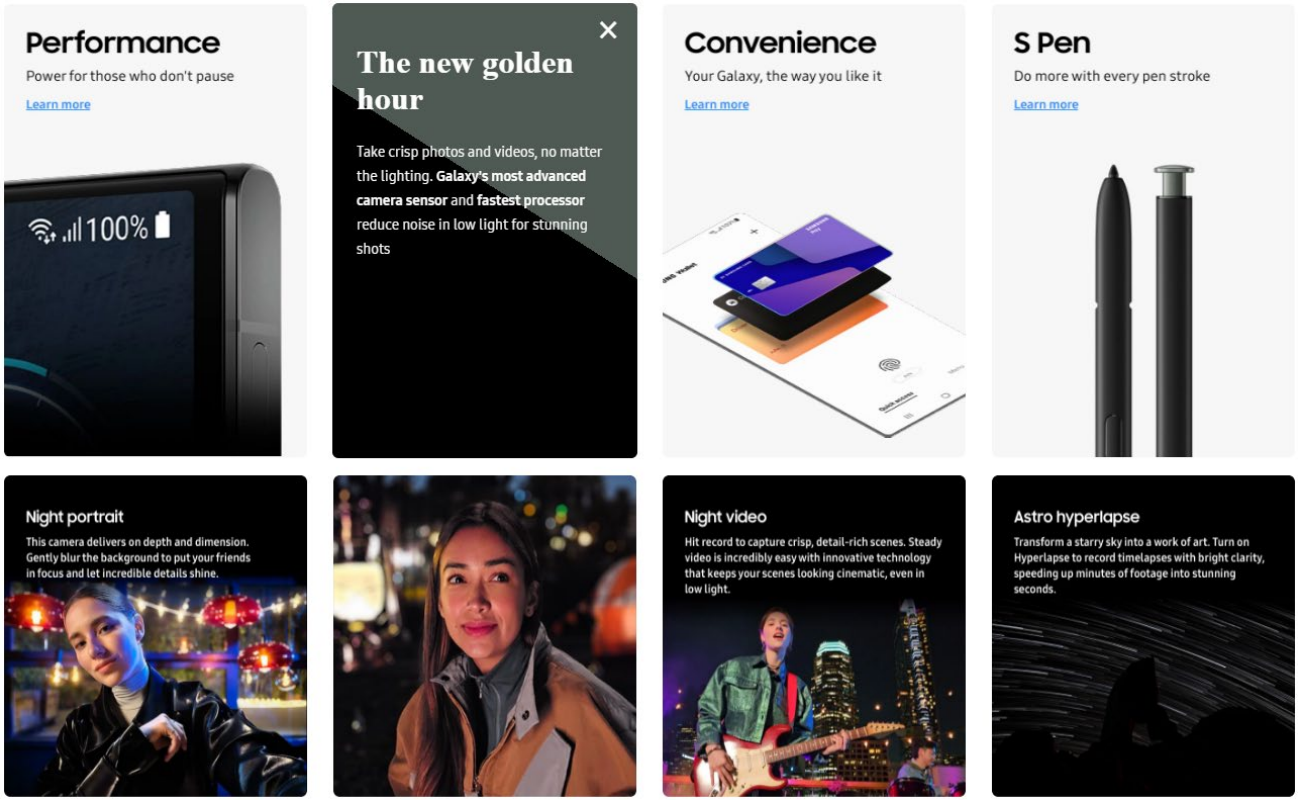
Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU; https://www.gsmarena.com/samsung_galaxy_s23_ultra-12024.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy S23 Ultra 

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy S23 Ultra technical specifications; https://downloadcenter.samsung.com/content/UM/202302/20230228053129621/SAM_S911_S916_S918_EN_UM_OS13_020223_FINAL_AC_022023.pdf at 5.  Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

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Enjoy a full kit of pro lenses and pro-grade video modes and settings.

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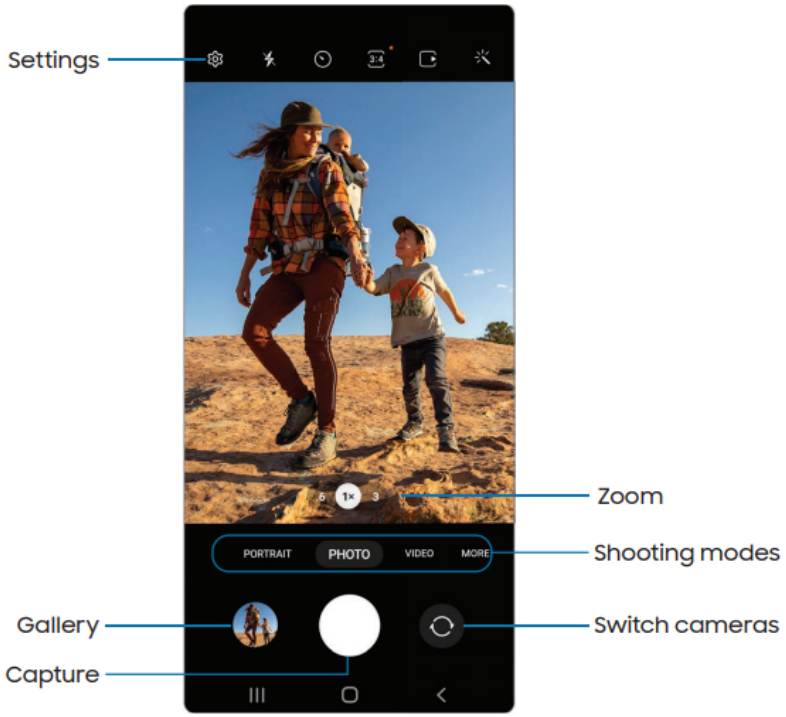
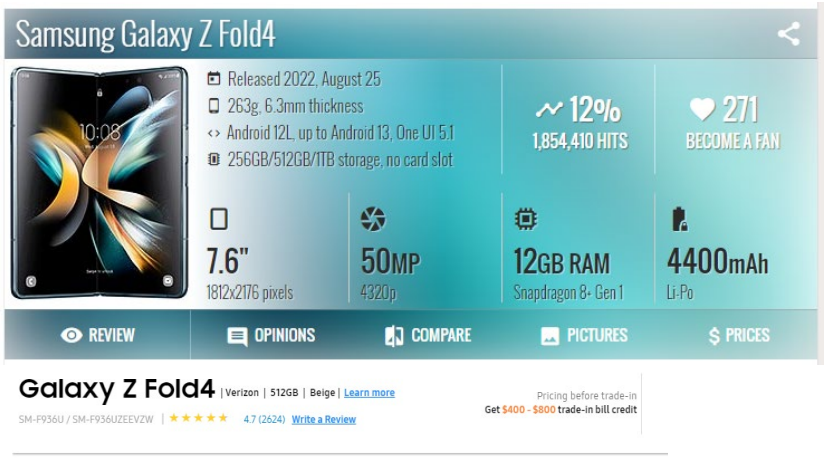


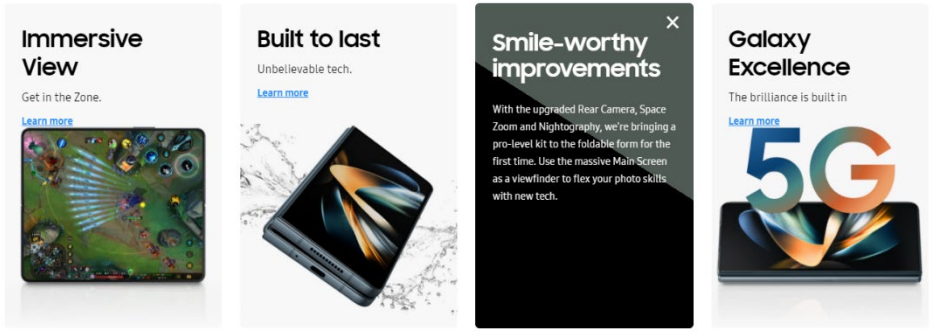
Galaxy S23 Ultra technical specification; https://downloadcenter.samsung.com/content/UM/202302/20230228053129621/SAM_S911_S916_S918_EN_UM_OS13_020223_FINAL_AC_022023.pdf at 58.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/; https://www.gsmarena.com/samsung_galaxy_z_fold4-11737.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



MAIN CAMERA	Triple	50 MP, f/1.8, 23mm (wide), 1.0µm, Dual Pixel PDAF, OIS
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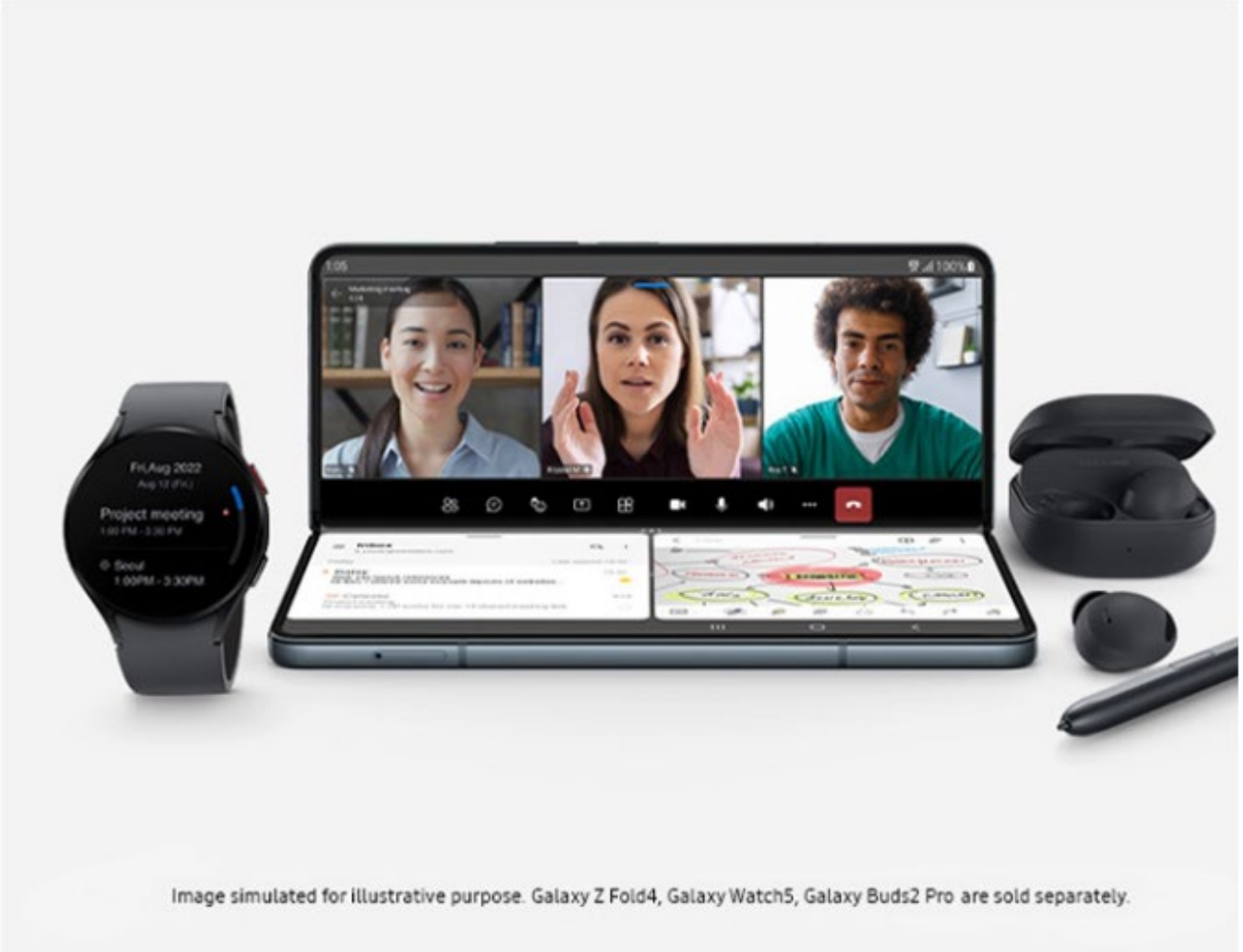
		12 MP, f/2.2, 123°, 12mm (ultrawide), 1.12µm
	Features	LED flash, HDR, panorama
	Video	8K@24fps, 4K@60fps, 1080p@60/240fps (gyro-EIS), 720p@960fps (gyro-EIS), HDR10+
SELFIE CAMERA	Single	4 MP, f/1.8, 26mm (wide), 2.0µm, under display
		Cover camera:
		10 MP, f/2.2, 24mm (wide), 1/3", 1.22µm
	Features	HDR
	Video	4K@30/60fps, 1080p@30/60fps, gyro-EIS

Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/; https://www.gsmarena.com/samsung_galaxy_z_fold4-11737.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Fold4 technical specification; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_fold4_d1e605.html.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/.

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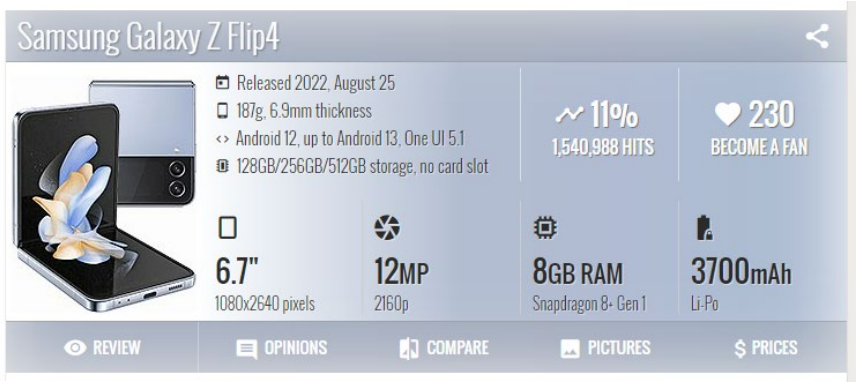
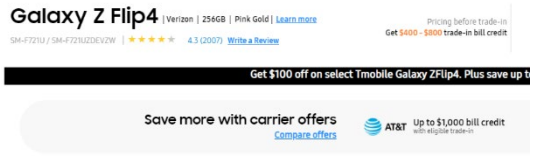
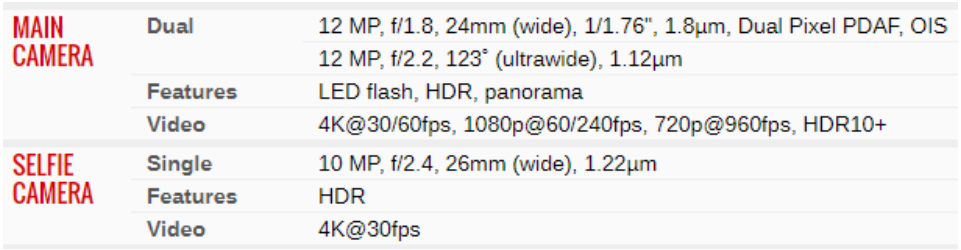
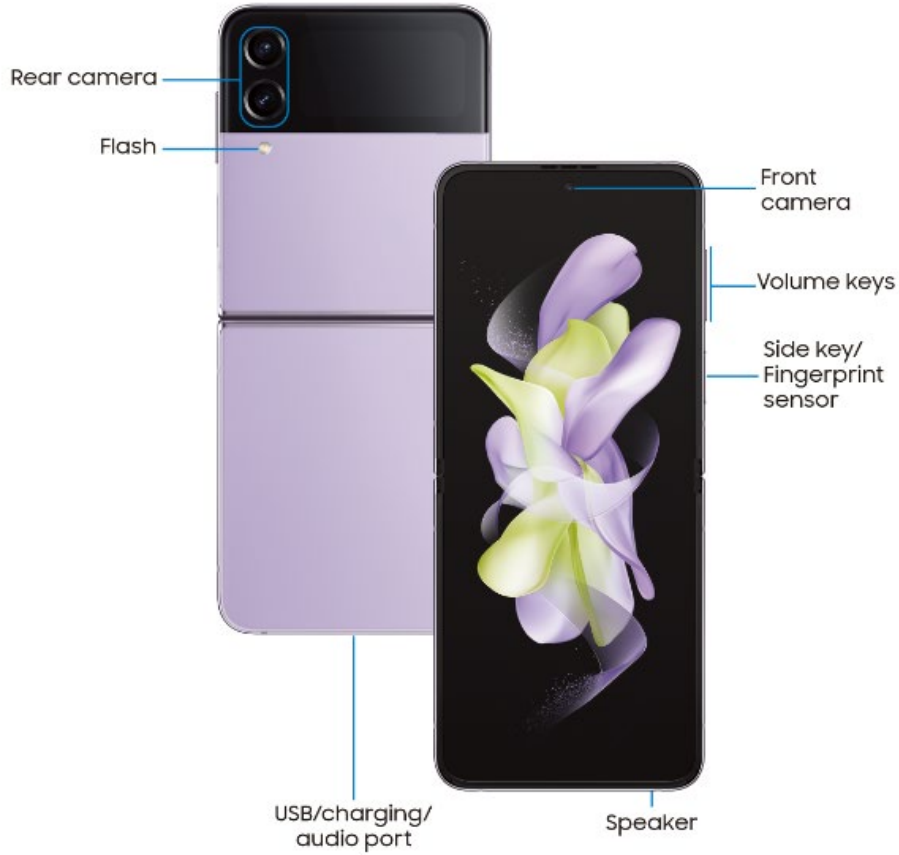
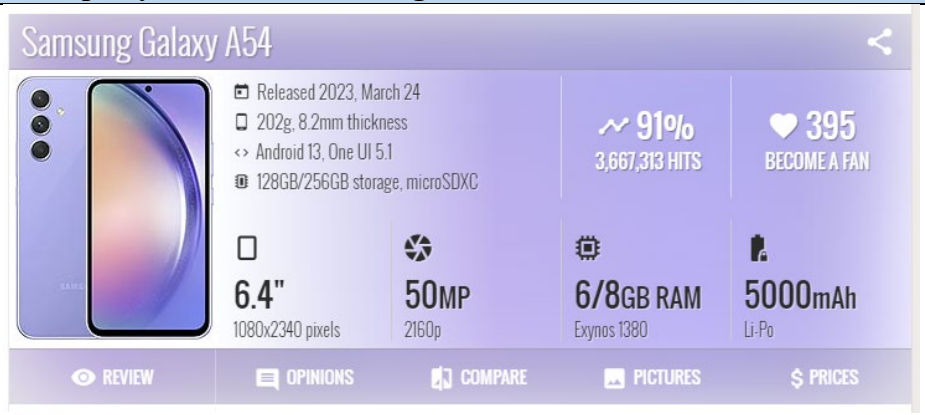
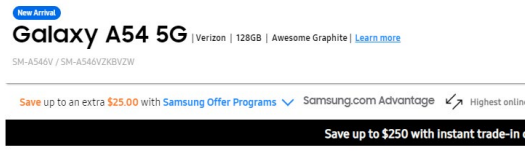
	Galaxy Z Fold4 technical specifications; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_fold4_camera_features_d1e3185.   Galaxy Z Flip4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-flip4/buy/galaxy-z-flip4-256gb-t-mobile-sm-f721uzdexau/; https://www.gsmarena.com/samsung_galaxy_z_flip4-11538.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Flip4 technical specifications; https://www.gsmarena.com/samsung_galaxy_z_flip4-11538.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy Z Flip4  Galaxy Z Flip4 technical specifications; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_flip4_d1e661.html.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement





Galaxy A54 5G technical specifications; https://www.samsung.com/us/mobile/phones/galaxy-a54/buy/; https://www.gsmarena.com/samsung_galaxy_a54-12070.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

MAIN CAMERA	Triple	50 MP, f/1.8, (wide), 1/1.56", 1.0µm, PDAF, OIS
		12 MP, f/2.2, 123° (ultrawide), 1.12µm
		5 MP, f/2.4, (macro)
	Features	LED flash, panorama, HDR
	Video	4K@30fps, 1080p@30/60fps, 720p@480fps
SELFIE CAMERA	Single	32 MP, f/2.2, 26mm (wide), 1/2.8", 0.8µm
	Video	4K@30fps, 1080p@30/60fps

Samsung Galaxy A54 5G technical specifications; Galaxy A54 5G, 128GB (Unlocked) Phones - SM-A546UZKBXAA | Samsung US; https://www.gsmarena.com/samsung_galaxy_a54-12070.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy A54 5G Galaxy A54 5G technical specifications; https://downloadcenter.samsung.com/content/UM/202304/20230407022332214/SAM_A546_EN_UM_OS13_040523_FINAL.pdf at 5.

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[3.c] the control unit controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed.	*See* claim [1.f] above. *See also*: The signal processor in each of the Accused Samsung '950 Products incorporates or operates as the control unit that controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed. As an example, the signal processor is configured to create a region that includes skin tones and textures and other region or regions that do not include skin tones and textures. To create other region or regions that do not contain the detected skin tones and textures, the signal processor excludes a skin tone region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contain a detected moving object or subject and other region or regions that do not contain the detected moving object or subject. To create other region or regions that do not contain the detected moving object, the signal processor excludes a moving object region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains a detected face and other region or regions that do not contain the detected face. To create other region or regions that do not contain the detected face, the signal processor excludes a face region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected natural skin and other region or regions that do not contain the detected natural skin. To create other region or regions that do not contain the detected natural skin, the signal processor excludes a natural skin region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected hair and other region or regions that do not contain the detected hair. To create other region or regions

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	that do not contain the detected hair, the signal processor excludes a hair region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected clothing and other region or regions that do not contain the detected clothing. To create other region or regions that do not contain the detected clothing, the signal processor excludes a clothing region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains a detected object in a foreground and other region or regions that are part of a background. To create other region or regions that do not contain the detected foreground, the signal processor excludes a foreground region that contains the pixels for which a position has been held in the hold unit or memory.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

	• Our Qualcomm Spectra™ AI ISP features:
	  • Limitless Real-time Semantic Segmentation for photo/video frame
	  • Insight AI provides real-time skin and sky adjustments to create more natural color and lighting in uncertain conditions.
	  • Ultra-low Light video capture
	  • Video Object Eraser can remove unwanted elements from videos
	  • Real-time AI Relighting make you appear professional wherever you are
	  • Truepic photo capture with C2PA standard support lets you snap a photo with Truepic's cryptographic seal to prove the photo is real and not Gen AI
	
	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	AI-powered camera redefines photography Infuse brilliance into mobile capture with our AI ISP, enhancing everything from selfies to crystal-clear video chats thanks to an overhauled Hexagon Direct Link. The first AI-powered Limitless Segmentation recognizes and enhances virtually anything in the frame, including faces, hair, clothing, objects, backgrounds, and beyond. Even furry friends appear crisp and cute—no matter how fast the zoomies—thanks to AI-Based Pet Capture. • Our powerful AI ISP is deeply integrated with the Hexagon NPU for enhanced, intuitive capture. • Limitless Segmentation can segment an image in over 250 layers, each optimized to perfection. • Real-time Insight AI captures and enhances natural skin and sky tones even in the most challenging conditions. • Truepic with C2PA adds cryptographic seals so you can authenticate your photos as real and not AI-generated—now including videos and audio recordings. • Video Object Eraser can remove unwanted elements from video footage—on-device. • Capture vivid videos at 4K60 FPS, even in near darkness. (https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Snapdragon-8-Elite-Platform-Product-Brief.pdf)
[4.a] A signal processor according to claim 2, wherein: the processing unit is a signal processing unit for adjusting white balance of an input picture signal; and	For example, all of the Accused Samsung '950 Products are equipped with white balance correction, which is activated when an object that appears white in person is detected in an image. The white balance correction adjusts for the color temperature of the light source so that an object that appears white in person also appears white in the image. As a result, the Accused Samsung '950 Products are necessarily configured to detect with a patterned portion (e.g. white object, white snow) formed of a single color of black or white is input, and contain one or more processors for doing same (e.g., CPU, ISP, and/or DSP). Further, the Accused Samsung '950 Products performs specific white balance processes when a face is detected.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

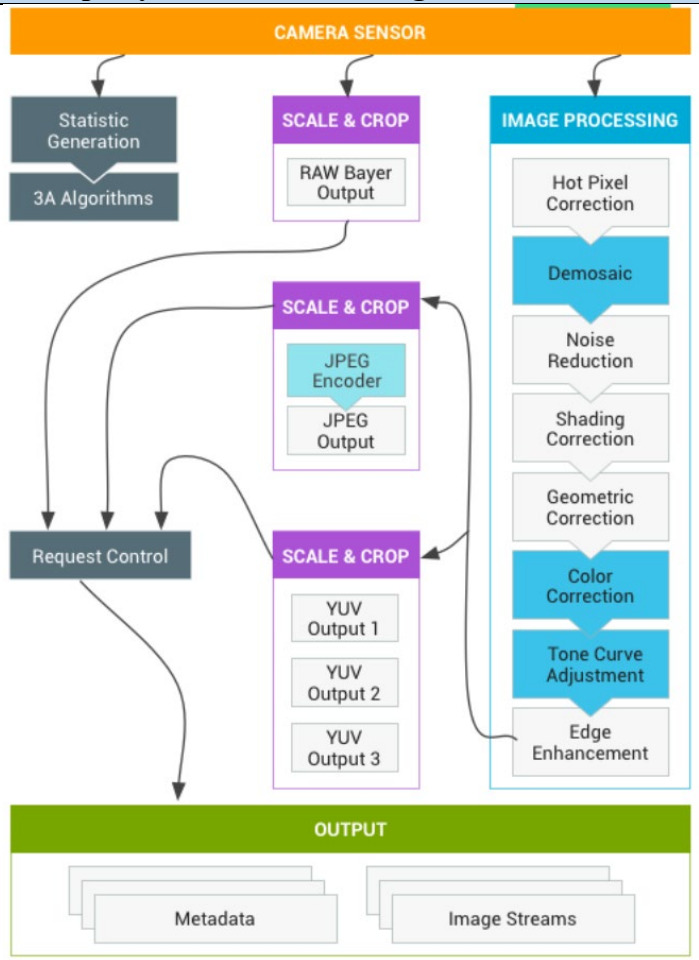


Figure 2. Camera pipeline

https://source.android.com/docs/core/camera/camera3_requests_hal (white balance is included in "3A")

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	- **Pro**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while taking pictures. - **Pro video**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while recording videos. Samsung Galaxy S25 User Manual at 43. (https://downloadcenter.samsung.com/content/UM/202502/20250222040501249/SAM_S931_S936_S938_EN_UG_OS15_012425_FINAL_AC_02072025.pdf) Adaptive color tone Adjust the colors and white balance based on ambient lighting conditions to make colors appear more natural in different environments. ○ From Settings, tap Display > Adaptive color tone and tap to enable this feature. *Id*. at 116.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Screen mode

Your device has several screen mode options which adjust the screen quality for different situations. You can select the mode according to your preference.

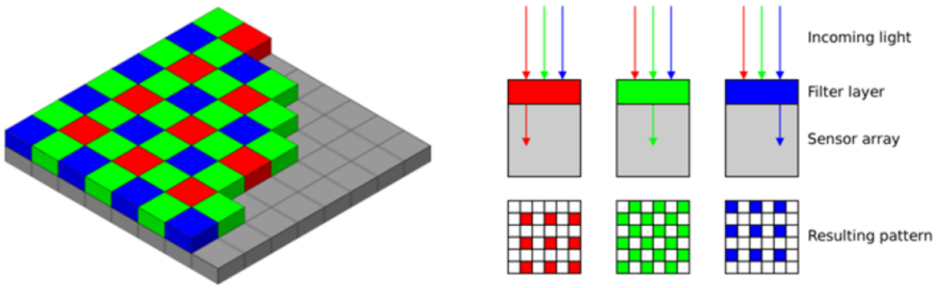
1. From Settings, tap **Display** > **Screen mode**.
2. Tap an option to set a different screen mode.
   - Drag the slider to adjust the white balance.
   - Tap **Advanced settings** to manually change the RGB values.

Id. at 117.

Intelligent features

- **Scan documents and text**: Automatically show a button when a document is detected to scan it. Tap the option to enable Auto scanning, which will scan a document without a tap. You'll also have the option to remove unwanted objects, in case your fingers are in the frame.
- **Scan QR codes**: Automatically detects QR codes when using the camera.
- **Shot suggestions**: Get on-screen guides to help you line up great shots.
- **Intelligent optimization**: Set the quality optimization options to prioritize quality or speed in Photo mode. You can also enable Scene optimizer to automatically adjust exposure, contrast, white balance, and more based on what is detected in the camera frame. The Scene optimizer is only available when using the rear camera.

https://www.samsung.com/us/support/answer/ANS10004601/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	As another example, the signal processor is configured to control image enhancement or color correction such as lighting adjustment or white balance on a detected face while performing different image enhancement, or color correction such as white balance for other region or regions that do not include the detected face. **3. WB (White Balance)**[3] This block helps the camera adjust the color balance and render them accurately. It ensures that an image has a uniform WB Gain and that the RGB of the grey (achromatic) areas are adjusted to the same value (to depict the grey as grey). The sensor output fed to ISP has twice as many green channels as any other. This is the reason why the raw image before the application of WB Gain looks green overall. (Refer to 'De-mosaic' below) **4. De-mosaic (= Bayer Interpolation, Color Interpolation)** Most smartphone cameras use the Bayer type (or pattern) sensor. The Bayer sensor, as illustrated below [2] is 3 color filter combination sensor mounted on top of a photodiode array.  https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	FD (Face Detection) This block detects faces in an image/video and passes their coordinates to the next block. The face coordinates can be used in other algorithms or solutions to implement different features. **[Example of application] Using FD information in AWB (Auto White Balance) and AE (Auto Exposure) algorithm blocks** 1. When a face is detected, it compares and corrects the difference between the face brightness and the targeted brightness of the whole image. It utilizes the face coordinates received, to adjust the face brightness, etc. 2. When multiple sources are detected illuminating a face and the face is overly affected by these lights, this FD data can be used to correct the color on it. For example, if a face is detected in a low-color temperature light setup giving off a slightly reddish glow, the face coordinates are used to adjust the color of the face. https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145 As another example, the signal processor is configured to control image enhancement or color correction such as lighting adjustment or white balance on a detected natural skin while performing different image enhancement, or color correction such as white balance for other region or regions that do not include the detected natural skin. As another example, the signal processor is configured to control image enhancement or color correction such as lighting adjustment or white balance in a hair region while performing different image enhancement, or color correction such as white balance for other region or regions that do not include the detected hair. As another example, the signal processor is configured to control image enhancement or color correction such as lighting adjustment or white balance in a clothing region while performing different image enhancement, or color correction such as white balance for other region or regions that do not include the detected clothing.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	As another example, the signal processor is configured to control image enhancement or object deletion in a moving object region while performing different image enhancement, or color correction such as white balance for other region or regions that do not include the detected moving object.
[4.b] the control unit controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed.	*See* claim [1.e] above. *See also*: The signal processor in each of the Accused Samsung '950 Products incorporates or operates as the control unit that controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed. As an example, the signal processor is configured to create a region that includes skin tones and textures and other region or regions that do not include skin tones and textures. To create other region or regions that do not contain the detected skin tones and textures, the signal processor excludes a skin tone region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contain a detected moving object or subject and other region or regions that do not contain the detected moving object or subject. To create other region or regions that do not contain the detected moving object, the signal processor excludes a moving object region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains a detected face and other region or regions that do not contain the detected face. To create other region or regions that do not contain the detected face, the signal processor excludes a face region that contains the pixels for which a position has been held in the hold unit or memory.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	As another example, the signal processor is configured to create a region that contains detected natural skin and other region or regions that do not contain the detected natural skin. To create other region or regions that do not contain the detected natural skin, the signal processor excludes a natural skin region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected hair and other region or regions that do not contain the detected hair. To create other region or regions that do not contain the detected hair, the signal processor excludes a hair region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected clothing and other region or regions that do not contain the detected clothing. To create other region or regions that do not contain the detected clothing, the signal processor excludes a clothing region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains a detected object in a foreground and other region or regions that are part of a background. To create other region or regions that do not contain the detected foreground, the signal processor excludes a foreground region that contains the pixels for which a position has been held in the hold unit or memory.

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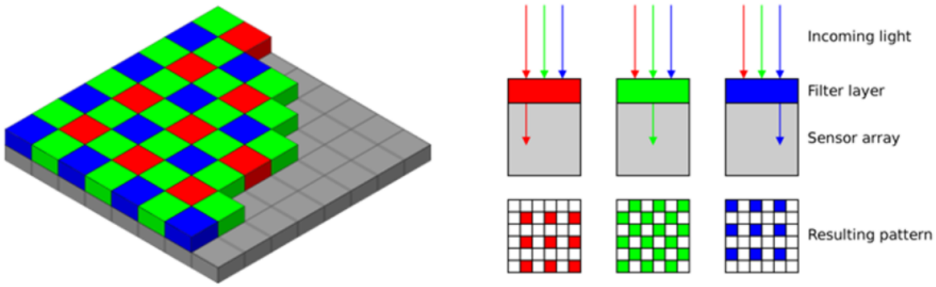
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	AI-powered camera redefines photography Infuse brilliance into mobile capture with our AI ISP, enhancing everything from selfies to crystal-clear video chats thanks to an overhauled Hexagon Direct Link. The first AI-powered Limitless Segmentation recognizes and enhances virtually anything in the frame, including faces, hair, clothing, objects, backgrounds, and beyond. Even furry friends appear crisp and cute—no matter how fast the zoomies—thanks to AI-Based Pet Capture. • Our powerful AI ISP is deeply integrated with the Hexagon NPU for enhanced, intuitive capture. • Limitless Segmentation can segment an image in over 250 layers, each optimized to perfection. • Real-time Insight AI captures and enhances natural skin and sky tones even in the most challenging conditions. • Truepic with C2PA adds cryptographic seals so you can authenticate your photos as real and not AI-generated—now including videos and audio recordings. • Video Object Eraser can remove unwanted elements from video footage—on-device. • Capture vivid videos at 4K60 FPS, even in near darkness. (https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Snapdragon-8-Elite-Platform-Product-Brief.pdf)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	3. WB (White Balance)[3] This block helps the camera adjust the color balance and render them accurately. It ensures that an image has a uniform WB Gain and that the RGB of the grey (achromatic) areas are adjusted to the same value (to depict the grey as grey). The sensor output fed to ISP has twice as many green channels as any other. This is the reason why the raw image before the application of WB Gain looks green overall. (Refer to 'De-mosaic' below) **4. De-mosaic (= Bayer Interpolation, Color Interpolation)** Most smartphone cameras use the Bayer type (or pattern) sensor. The Bayer sensor, as illustrated below [2] is 3 color filter combination sensor mounted on top of a photodiode array.  https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	FD (Face Detection) This block detects faces in an image/video and passes their coordinates to the next block. The face coordinates can be used in other algorithms or solutions to implement different features. **[Example of application] Using FD information in AWB (Auto White Balance) and AE (Auto Exposure) algorithm blocks** 1. When a face is detected, it compares and corrects the difference between the face brightness and the targeted brightness of the whole image. It utilizes the face coordinates received, to adjust the face brightness, etc. 2. When multiple sources are detected illuminating a face and the face is overly affected by these lights, this FD data can be used to correct the color on it. For example, if a face is detected in a low-color temperature light setup giving off a slightly reddish glow, the face coordinates are used to adjust the color of the face. https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145 For example, on information and belief, the Samsung Galaxy S25 includes an image signal processor (ISP) and/or digital signal processor (DSP) that adjusts an image, for example, by performing white balance correction. For example, the white balance is adjusted in accordance with the detected lighting conditions, e.g. fluorescent lighting, incandescent lighting, sunny outdoor lighting, cloudy outdoor lighting. Upon information and belief, certain adjustments are applied when one or more features e.g. skin tone, hair, or face, are detected in a particular region and certain adjustments are performed when the one or more such features are not contained in another region. For example, foliage or snow scene corrections are not performed when such features are not detected in a region but other image corrections are performed (e.g., face corrections and portrait mode corrections are applied). Similarly, certain white balance corrections are not performed when a white or black background is not contained but additional white balance corrections are applied to the content. Further, text scanning corrections are not performed when text is not detected but additional image corrections are applied. Moreover, image corrections to the foreground (e.g., the face of a person or object being captured) are applied but corrections to the background are not applied if a white or black background is not detected. Further if the face is close to the camera such

<table>
<tr><th>U.S. Patent No. 8,471,950</th><th>Exemplary Evidence of Infringement</th></tr>
<tr><td></td><td>that a background is not detected, then the face corrections are applied but background corrections are not applied and background pattern portions are not contained.
<table>
<tr><th>Input</th><th>Features</th><th>Features Contained</th><th>Video with Contents</th><th>Correction</th></tr>
<tr><td>
Portrait Photo</td><td>Snow</td><td>No</td><td>Cloth</td><td>Corrections based on the selected camera's parameters</td></tr>
<tr><td>
Person in front of a white wall</td><td>Snow</td><td>No</td><td>Face</td><td>Beauty face correction applied</td></tr>
</table></td></tr>
</table>

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Book Scan	Snow	No	Scanned image	Scan correction applied
Face close up	Stair	No	Face	Beauty face correction applied

Input	Features	Features Contained	Video with Contents	Correction
	Cloud	Yes	Cloth	No Correction.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement					
	Portrait Photo				No Blur	
	Person in front of a white wall	Wall	Yes	Face	No Correction. No Blur	
	Book Scan	Text	Yes	Scanned image	No Correction. No Blur	

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement					
	Face close up	Cloth	Yes	Face	No White balance correction.	
[5.a] A signal processor according to claim 2, wherein: the region creation unit includes a region segmentation unit for segmenting an effective region in advance, and an overlap detection unit which detects overlap of position information output from the hold unit with blocks segmented by the region segmentation unit; and	For example, the signal processor is configured to detect different regions in an image by performing segmentation of a photo or video frame. For example, the signal processor performs segmentation to detect one or more features including faces, natural skin, hair, clothing, objects, and backgrounds. On information and belief, the signal processor is configured to detect whether a region having a feature e.g. one of face, natural skin, hair, clothing, background overlaps another region having another one of the features face, natural skin, hair, clothing, background. For example, the signal processor can detect whether a region in which hair is detected overlaps with another region in which natural skin is detected. In another example, the signal processor can detect whether a region in which face is detected overlaps with another region in which natural skin is detected. In another example, the signal processor can detect whether a region in which face is detected overlaps with another region in which clothing is detected. In another example, the signal processor can detect whether a region in which face is detected overlaps with another region in which natural skin is detected.					

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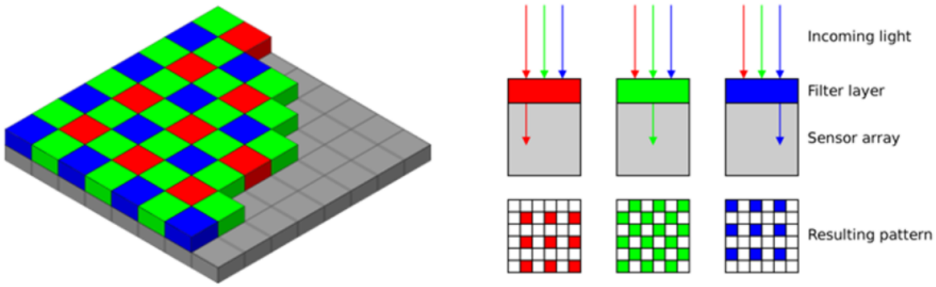
	3. WB (White Balance)[3] This block helps the camera adjust the color balance and render them accurately. It ensures that an image has a uniform WB Gain and that the RGB of the grey (achromatic) areas are adjusted to the same value (to depict the grey as grey). The sensor output fed to ISP has twice as many green channels as any other. This is the reason why the raw image before the application of WB Gain looks green overall. (Refer to 'De-mosaic' below) **4. De-mosaic (= Bayer Interpolation, Color Interpolation)** Most smartphone cameras use the Bayer type (or pattern) sensor. The Bayer sensor, as illustrated below [2] is 3 color filter combination sensor mounted on top of a photodiode array.  https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	FD (Face Detection) This block detects faces in an image/video and passes their coordinates to the next block. The face coordinates can be used in other algorithms or solutions to implement different features. **[Example of application] Using FD information in AWB (Auto White Balance) and AE (Auto Exposure) algorithm blocks** 1. When a face is detected, it compares and corrects the difference between the face brightness and the targeted brightness of the whole image. It utilizes the face coordinates received, to adjust the face brightness, etc. 2. When multiple sources are detected illuminating a face and the face is overly affected by these lights, this FD data can be used to correct the color on it. For example, if a face is detected in a low-color temperature light setup giving off a slightly reddish glow, the face coordinates are used to adjust the color of the face. https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

	• Our Qualcomm Spectra™ AI ISP features:
	  • Limitless Real-time Semantic Segmentation for photo/video frame
	  • Insight AI provides real-time skin and sky adjustments to create more natural color and lighting in uncertain conditions.
	  • Ultra-low Light video capture
	  • Video Object Eraser can remove unwanted elements from videos
	  • Real-time AI Relighting make you appear professional wherever you are
	  • Truepic photo capture with C2PA standard support lets you snap a photo with Truepic's cryptographic seal to prove the photo is real and not Gen AI
	
	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	AI-powered camera redefines photography Infuse brilliance into mobile capture with our AI ISP, enhancing everything from selfies to crystal-clear video chats thanks to an overhauled Hexagon Direct Link. The first AI-powered Limitless Segmentation recognizes and enhances virtually anything in the frame, including faces, hair, clothing, objects, backgrounds, and beyond. Even furry friends appear crisp and cute—no matter how fast the zoomies—thanks to AI-Based Pet Capture. • Our powerful AI ISP is deeply integrated with the Hexagon NPU for enhanced, intuitive capture. • Limitless Segmentation can segment an image in over 250 layers, each optimized to perfection. • Real-time Insight AI captures and enhances natural skin and sky tones even in the most challenging conditions. • Truepic with C2PA adds cryptographic seals so you can authenticate your photos as real and not AI-generated—now including videos and audio recordings. • Video Object Eraser can remove unwanted elements from video footage—on-device. • Capture vivid videos at 4K60 FPS, even in near darkness. (https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Snapdragon-8-Elite-Platform-Product-Brief.pdf) Let's dive deeper into why Snapdragon 8 Elite is a game-changer: • **Incredible power:** Experience a 45% boost in performance with the Qualcomm Oryon CPU, giving you lightning-fast apps and incredible multitasking.[1] • **AI at your fingertips:** The Qualcomm® Hexagon™ NPU increases AI performance by 45%, handling everything from voice commands to image prompts. Your device is ready to adapt to your every move. • **Photography, reimagined:** With features like 4K Semantic Segmentation, Video Object Eraser, and real-time AI lighting adjustments, the Snapdragon 8 Elite camera tech turns your mobile photos into pro-level masterpieces. https://www.qualcomm.com/snapdragon/news/snapdragon-8-elite--the-power-behind-the-name
[5.b] the control unit controls the processing unit by using an evaluated	*See* claim [1.f] above. *See also*:

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
value of a region from which pixels having an extracted predetermined feature are removed.	The signal processor in each of the Accused Samsung '950 Products incorporates or operates as the control unit that controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed. As an example, the signal processor is configured to create a region that includes skin tones and textures and other region or regions that do not include skin tones and textures. To create other region or regions that do not contain the detected skin tones and textures, the signal processor excludes a skin tone region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contain a detected moving object or subject and other region or regions that do not contain the detected moving object or subject. To create other region or regions that do not contain the detected moving object, the signal processor excludes a moving object region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains a detected face and other region or regions that do not contain the detected face. To create other region or regions that do not contain the detected face, the signal processor excludes a face region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected natural skin and other region or regions that do not contain the detected natural skin. To create other region or regions that do not contain the detected natural skin, the signal processor excludes a natural skin region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected hair and other region or regions that do not contain the detected hair. To create other region or regions that do not contain the detected hair, the signal processor excludes a hair region that contains the pixels for which a position has been held in the hold unit or memory.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	As another example, the signal processor is configured to create a region that contains detected clothing and other region or regions that do not contain the detected clothing. To create other region or regions that do not contain the detected clothing, the signal processor excludes a clothing region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains a detected object in a foreground and other region or regions that are part of a background. To create other region or regions that do not contain the detected foreground, the signal processor excludes a foreground region that contains the pixels for which a position has been held in the hold unit or memory.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

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	  • Video Object Eraser can remove unwanted elements from videos
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	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

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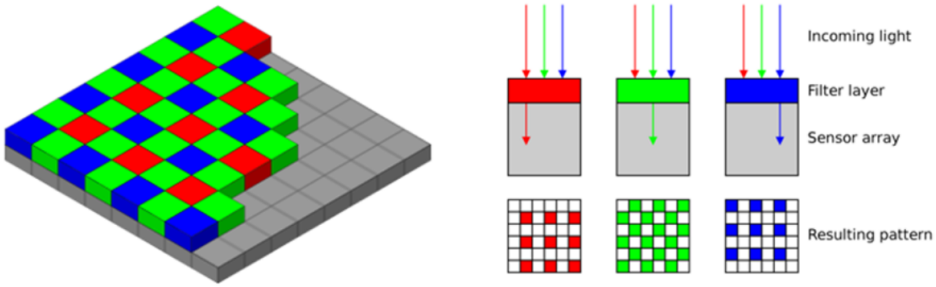
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	that a background is not detected, then the face corrections are applied but background corrections are not applied and background pattern portions are not contained. **3. WB (White Balance)**[3] This block helps the camera adjust the color balance and render them accurately. It ensures that an image has a uniform WB Gain and that the RGB of the grey (achromatic) areas are adjusted to the same value (to depict the grey as grey). The sensor output fed to ISP has twice as many green channels as any other. This is the reason why the raw image before the application of WB Gain looks green overall. (Refer to 'De-mosaic' below) **4. De-mosaic (= Bayer Interpolation, Color Interpolation)** Most smartphone cameras use the Bayer type (or pattern) sensor. The Bayer sensor, as illustrated below [2] is 3 color filter combination sensor mounted on top of a photodiode array.  https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

FD (Face Detection)

This block detects faces in an image/video and passes their coordinates to the next block. The face coordinates can be used in other algorithms or solutions to implement different features.

[Example of application] Using FD information in AWB (Auto White Balance) and AE (Auto Exposure) algorithm blocks

1. When a face is detected, it compares and corrects the difference between the face brightness and the targeted brightness of the whole image. It utilizes the face coordinates received, to adjust the face brightness, etc.
2. When multiple sources are detected illuminating a face and the face is overly affected by these lights, this FD data can be used to correct the color on it. For example, if a face is detected in a low-color temperature light setup giving off a slightly reddish glow, the face coordinates are used to adjust the color of the face.

https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145

Input	Features	Features Contained	Video with Contents	Correction
Portrait Photo	Snow	No	Cloth	Corrections based on the selected camera's parameters

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement					
	Person in front of a white wall	Snow	No	Face	Beauty face correction applied	
	Book Scan	Snow	No	Scanned image	Scan correction applied	

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Face close up

Stair	No	Face	Beauty face correction applied

Input	Features	Features Contained	Video with Contents	Correction
Portrait Photo	Cloud	Yes	Cloth	No Correction. No Blur

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement					
	Person in front of a white wall	Wall	Yes	Face	No Correction. No Blur	
	Book Scan	Text	Yes	Scanned image	No Correction. No Blur	

U.S. Patent No. 8,471,950	**Exemplary Evidence of Infringement**					
	 Face close up	Cloth	Yes	Face	No White balance correction.	
[7.a] A signal according to claim 2, wherein: the processing unit is a light intensity adjustment unit for controlling exposure;	As another example, the signal processor is configured to perform lighting adjustment for example by adjusting shutter and/or exposure. This includes performing AE.					

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

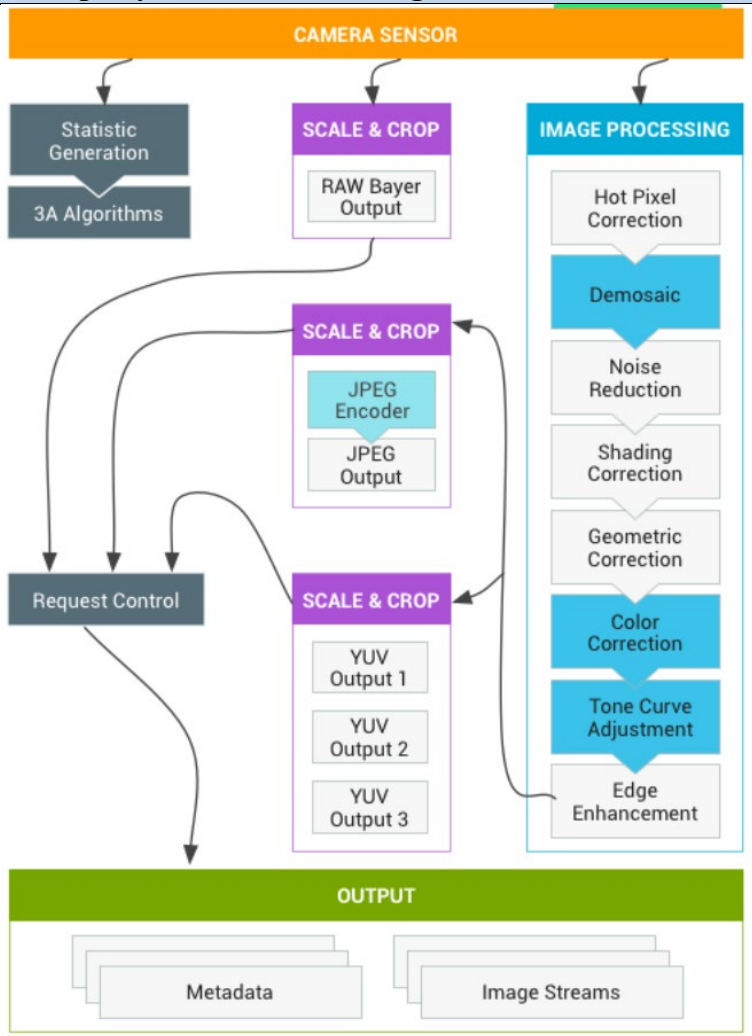
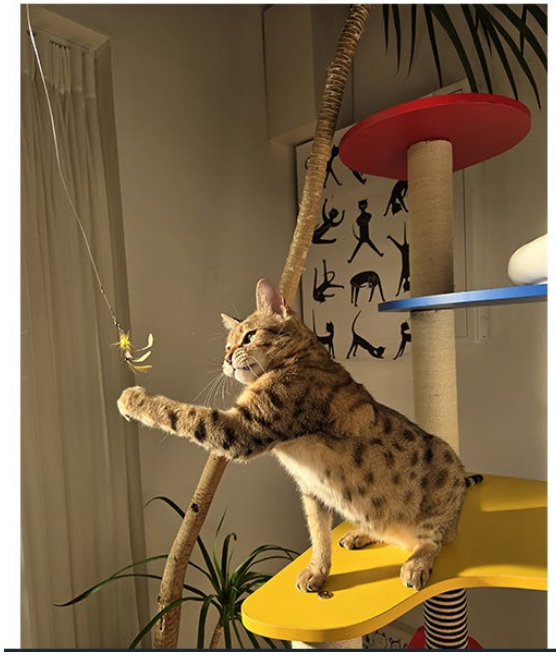


Figure 2. Camera pipeline

https://source.android.com/docs/core/camera/camera3_requests_hal

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Shots captured at lightning speed ProVisual Engine and advanced sensors join forces to create high-quality images even at fast shutter speeds so you can capture moving subjects with more clarity.[3]  https://www.samsung.com/us/smartphones/galaxy-s25/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

	• Our Qualcomm Spectra™ AI ISP features:
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	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

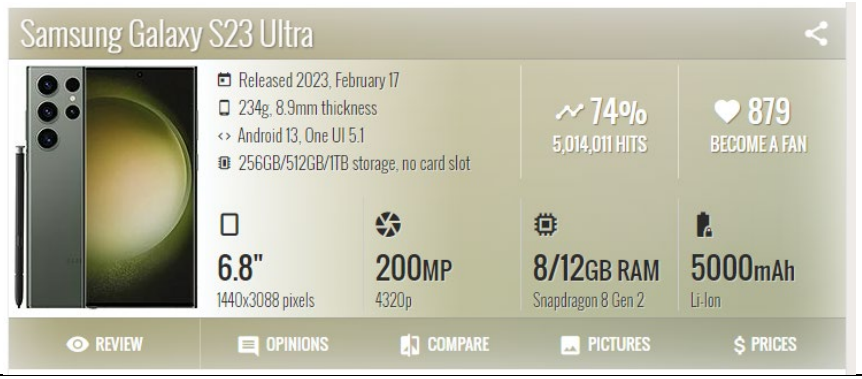
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Camera Qualcomm Spectra™ Image Signal Processor • AI-ISP, Triple 18-bit ISPs Limitless real-time Semantic Segmentation photo and video processing Engine for Visual Analytics 4.0, including hardware acceleration for iToF depth sensors up to 4K 60 FPS Support for the latest HDR, DCG+VS, DCG, Staggered, QDOL, Less Blanking, and Multiframe HDR image sensors Support for triple video capture from HDR image sensors, with seamless switching between any HDR mode • Up to 48 MP triple camera @ 30 FPS with Zero Shutter Lag • Up to 108 MP single camera @ 30 FPS with Zero Shutter Lag • Up to 320-megapixel photo capture AI-based face detection, AI for 3A (auto-focus, autoexposure, and auto-white balance) Rec. 2020 color gamut photo and video capture Up to 10-bit color depth photo and video capture 10-bit HEIF: HEIC photo capture, HEVC video capture Google Ultra HDR photo capture Video capture HDR formats: HDR10+, HDR10, HLG, Dolby Vision 8K HDR video playback @ 60 FPS 4K video capture @ 120 FPS Slow-mo video capture at 1080p @ 480 FPS Hardware Bokeh Engine 2 for video capture (https://docs.qualcomm.com/bundle/publicresource/87-83196-1_REV_D_Snapdragon_8_Elite_Mobile_Platform_Product_Brief.pdf)

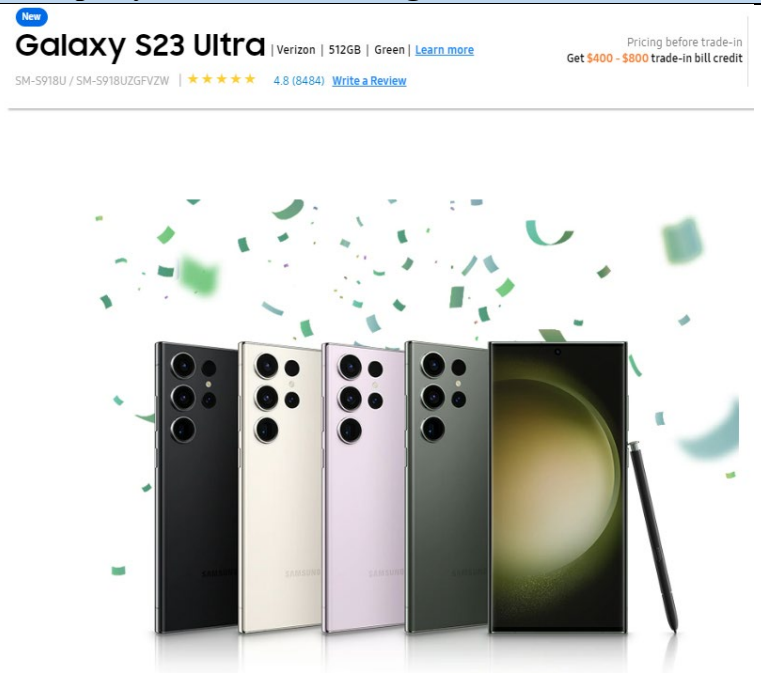
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	AI-powered camera redefines photography Infuse brilliance into mobile capture with our AI ISP, enhancing everything from selfies to crystal-clear video chats thanks to an overhauled Hexagon Direct Link. The first AI-powered Limitless Segmentation recognizes and enhances virtually anything in the frame, including faces, hair, clothing, objects, backgrounds, and beyond. Even furry friends appear crisp and cute—no matter how fast the zoomies—thanks to AI-Based Pet Capture. • Our powerful AI ISP is deeply integrated with the Hexagon NPU for enhanced, intuitive capture. • Limitless Segmentation can segment an image in over 250 layers, each optimized to perfection. • Real-time Insight AI captures and enhances natural skin and sky tones even in the most challenging conditions. • Truepic with C2PA adds cryptographic seals so you can authenticate your photos as real and not AI-generated—now including videos and audio recordings. • Video Object Eraser can remove unwanted elements from video footage—on-device. • Capture vivid videos at 4K60 FPS, even in near darkness. (https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Snapdragon-8-Elite-Platform-Product-Brief.pdf) Let's dive deeper into why Snapdragon 8 Elite is a game-changer: • **Incredible power:** Experience a 45% boost in performance with the Qualcomm Oryon CPU, giving you lightning-fast apps and incredible multitasking.[1] • **AI at your fingertips:** The Qualcomm® Hexagon™ NPU increases AI performance by 45%, handling everything from voice commands to image prompts. Your device is ready to adapt to your every move. • **Photography, reimagined:** With features like 4K Semantic Segmentation, Video Object Eraser, and real-time AI lighting adjustments, the Snapdragon 8 Elite camera tech turns your mobile photos into pro-level masterpieces. https://www.qualcomm.com/snapdragon/news/snapdragon-8-elite--the-power-behind-the-name
[7.b] a lens and a photoelectric conversion unit for performing photoelectric conversion	For example, the Samsung S25 incorporates one or more lenses e.g. a telephoto lens with an optical zoom including a drive unit to drive the optical zoom lens. In addition, the Samsung S25 incorporates an image sensor corresponding to each of the one or more lenses e.g. a 10MP image sensor for the telephoto lens. The image sensor incorporates a photoelectric conversion unit for

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
are disposed between the light intensity adjustment unit and the extraction unit; and	performing photoelectric conversion disposed between the focus lens and the extraction unit. For example, the image sensor converts light to electricity representing pixel elements.

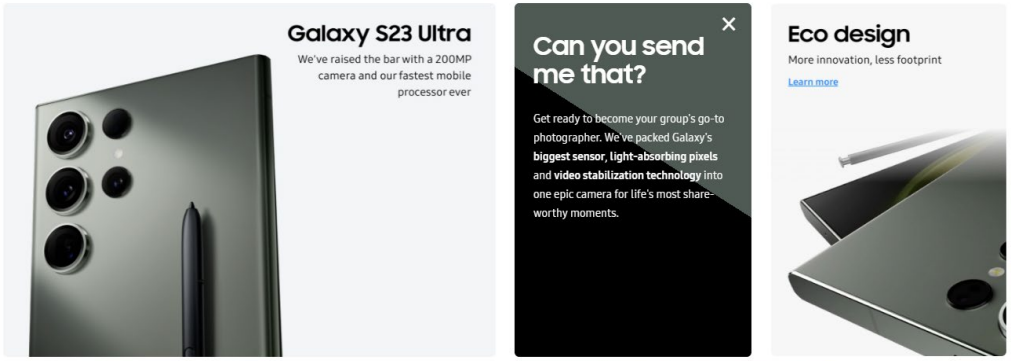
MAIN CAMERA	Triple	50 MP, f/1.8, 24mm (wide), 1/1.56", 1.0µm, dual pixel PDAF, OIS
		10 MP, f/2.4, 67mm (telephoto), 1/3.94", 1.0µm, PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 13mm, 120˚ (ultrawide), 1/2.55" 1.4µm, Super Steady video
	Features	Best Face, LED flash, auto-HDR, panorama
	Video	8K@24/30fps, 4K@30/60fps, 1080p@30/60/120/240fps, 10-bit HDR, HDR10+, stereo sound rec., gyro-EIS
SELFIE CAMERA	Single	12 MP, f/2.2, 26mm (wide), 1/3.2", 1.12µm, dual pixel PDAF
	Features	HDR, HDR10+
	Video	4K@30/60fps, 1080p@30fps

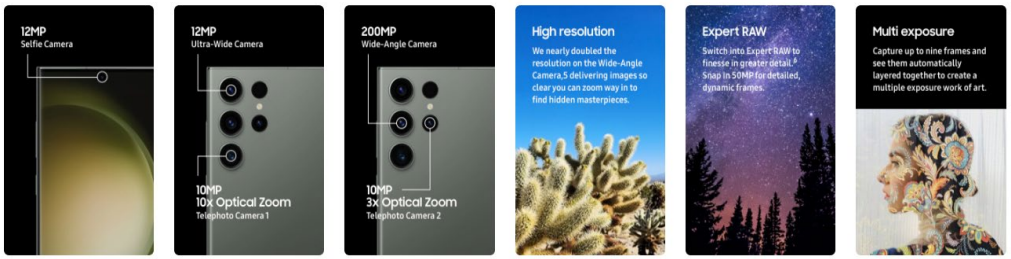
https://www.gsmarena.com/samsung_galaxy_s25-13610.php



U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU; https://www.gsmarena.com/samsung_galaxy_s23_ultra-12024.php.

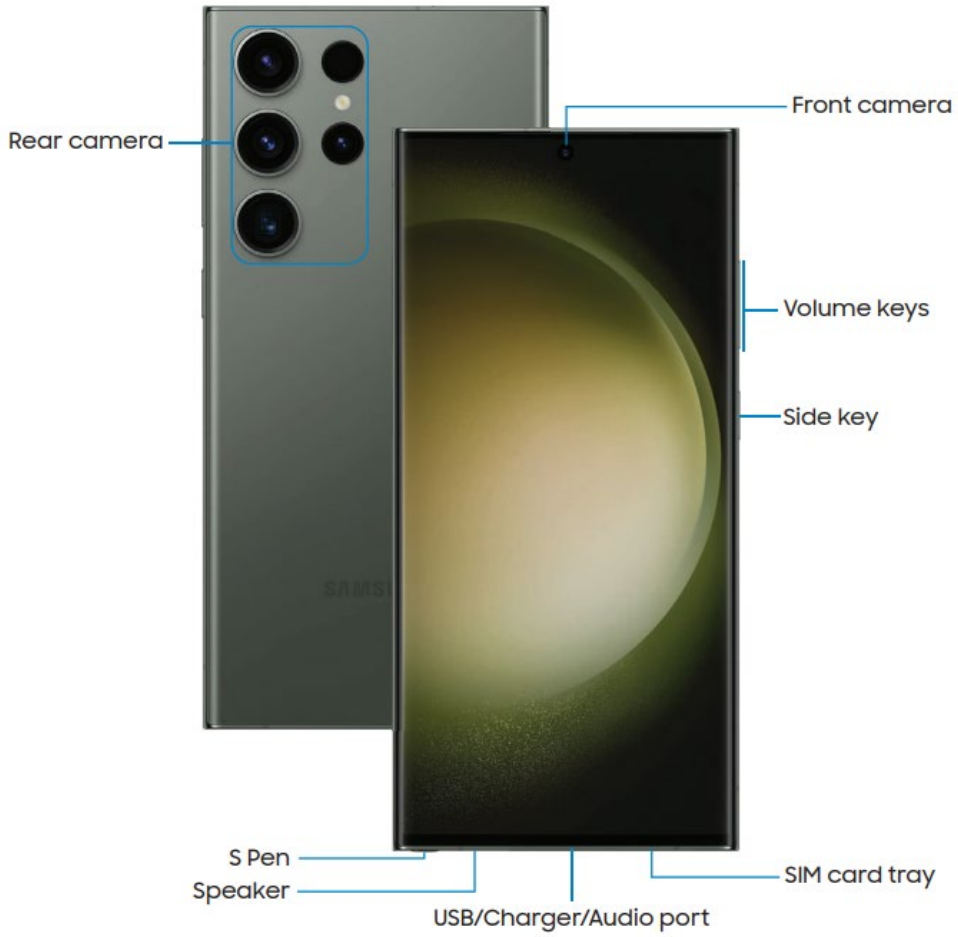
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

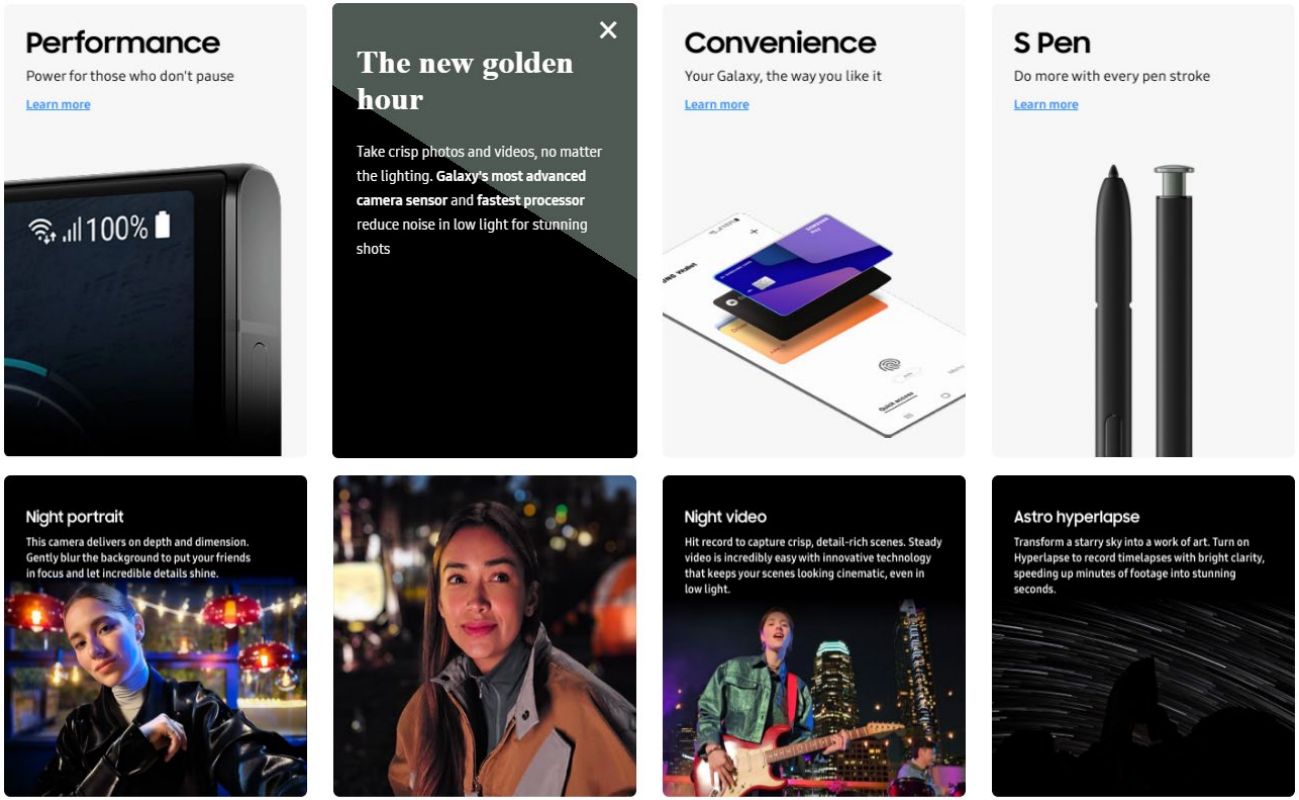




MAIN CAMERA	Quad	200 MP, f/1.7, 24mm (wide), 1/1.3", 0.6µm, multi-directional PDAF, Laser AF, OIS
		10 MP, f/4.9, 230mm (periscope telephoto), 1/3.52", 1.12µm, Dual Pixel PDAF, OIS, 10x optical zoom
		10 MP, f/2.4, 70mm (telephoto), 1/3.52", 1.12µm, Dual Pixel PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 13mm, 120˚ (ultrawide), 1/2.55", 1.4µm, Dual Pixel PDAF, Super Steady video
	Features	LED flash, auto-HDR, panorama
	Video	8K@24/30fps, 4K@30/60fps, 1080p@30/60/240fps, 1080p@960fps, HDR10+, stereo sound rec., gyro-EIS
SELFIE CAMERA	Single	12 MP, f/2.2, 26mm (wide), Dual Pixel PDAF
	Features	Dual video call, Auto-HDR, HDR10+
	Video	4K@30/60fps, 1080p@30fps

Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU; https://www.gsmarena.com/samsung_galaxy_s23_ultra-12024.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy S23 Ultra 

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy S23 Ultra technical specifications; https://downloadcenter.samsung.com/content/UM/202302/20230228053129621/SAM_S911_S916_S918_EN_UM_OS13_020223_FINAL_AC_022023.pdf at 5.  Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU.

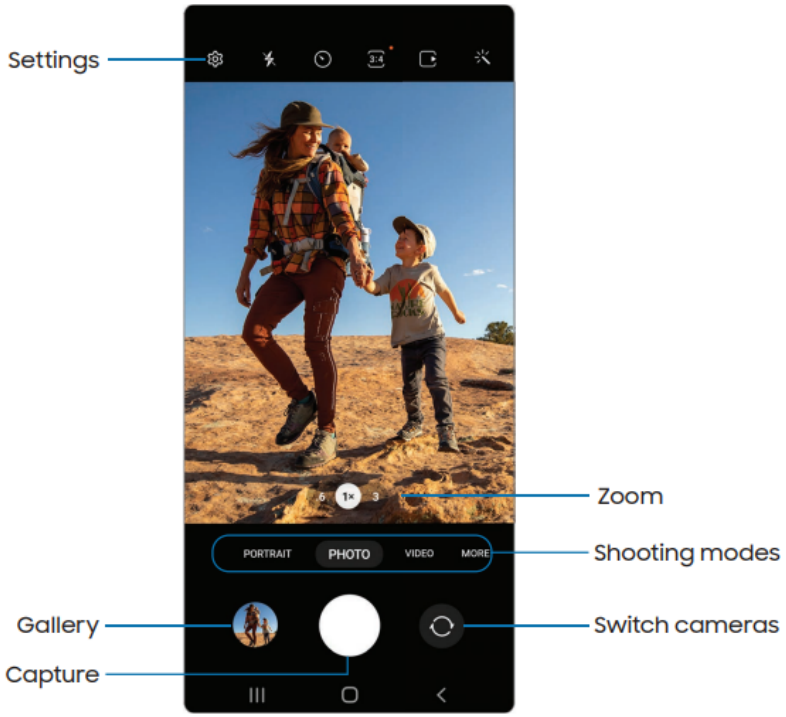
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Camera

Enjoy a full kit of pro lenses and pro-grade video modes and settings.

○ From Apps, tap Camera.

TIP Quickly press the **Side** key twice to open the Camera app.



Galaxy S23 Ultra technical specification; https://downloadcenter.samsung.com/content/UM/202302/20230228053129621/SAM_S911_S916_S918_EN_UM_OS13_020223_FINAL_AC_022023.pdf at 58.

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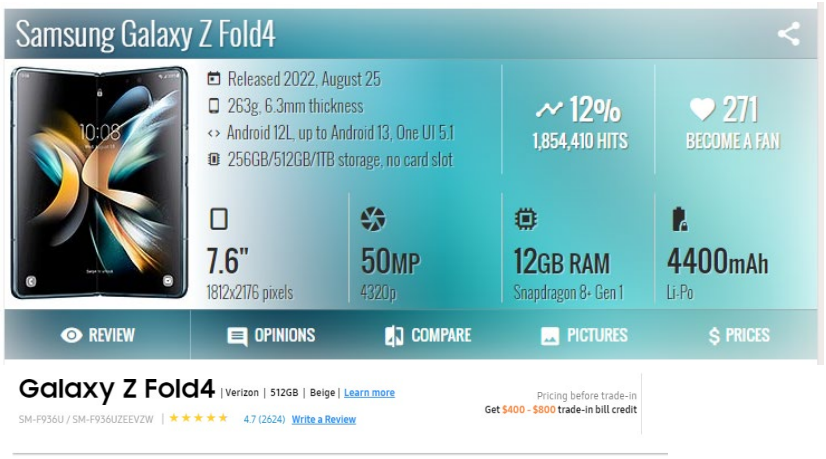

Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/; https://www.gsmarena.com/samsung_galaxy_z_fold4-11737.php.

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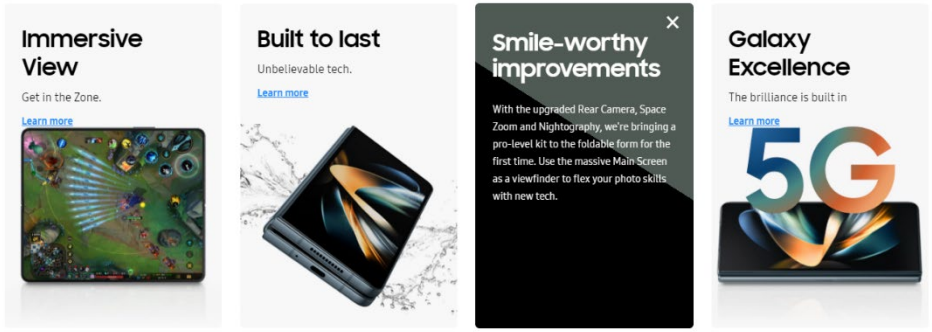
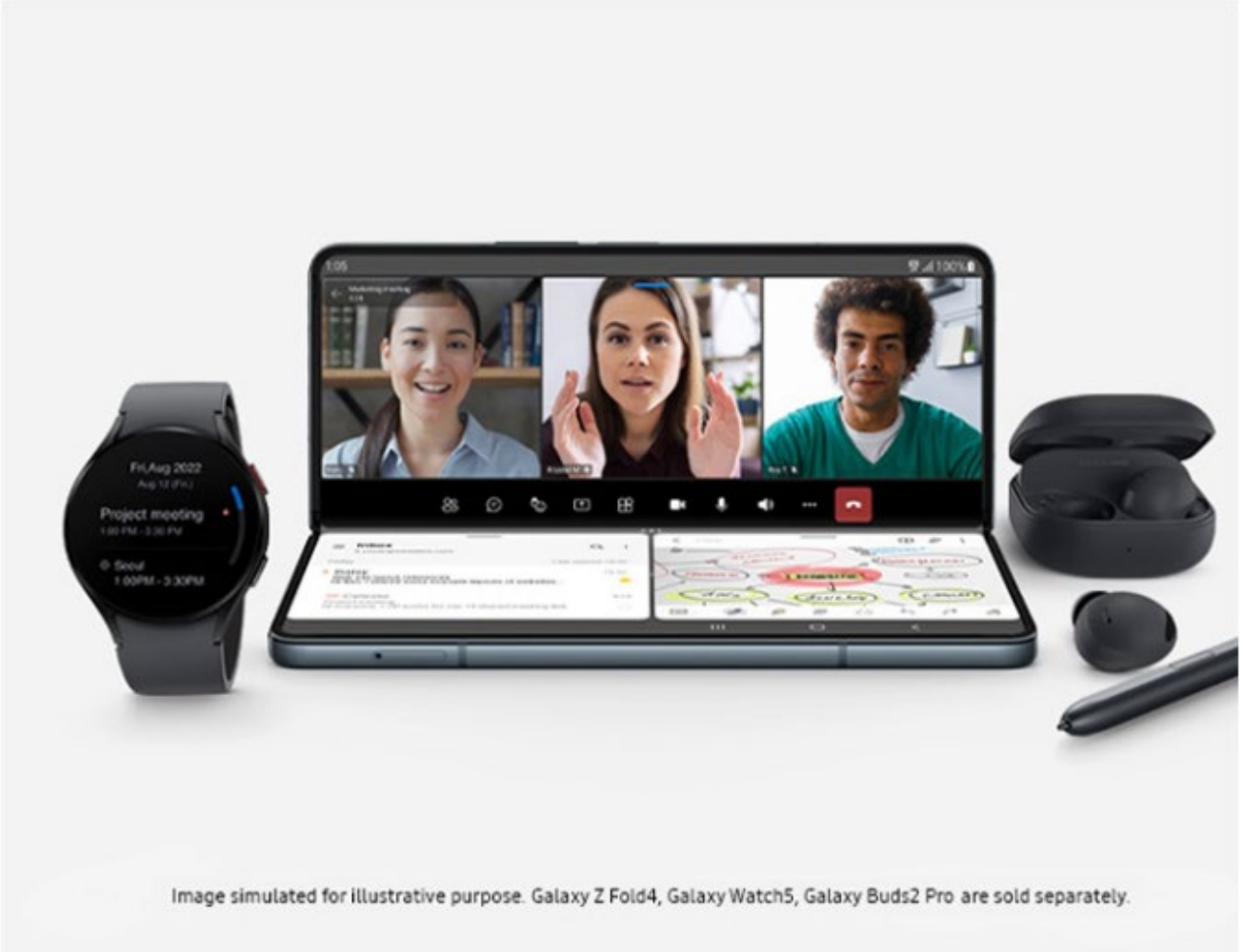
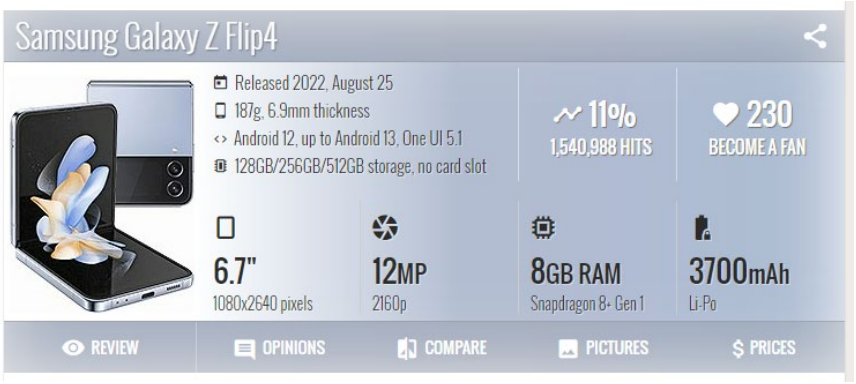
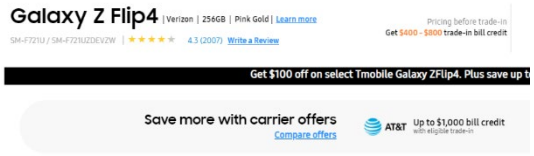


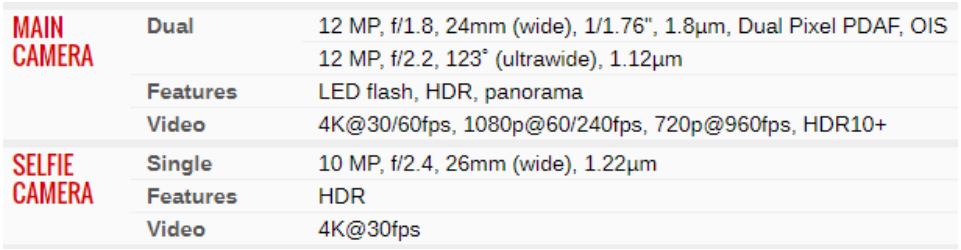
MAIN CAMERA	Triple	50 MP, f/1.8, 23mm (wide), 1.0µm, Dual Pixel PDAF, OIS
		10 MP, f/2.4, 66mm (telephoto), 1.0µm, PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 123°, 12mm (ultrawide), 1.12µm
	Features	LED flash, HDR, panorama
	Video	8K@24fps, 4K@60fps, 1080p@60/240fps (gyro-EIS), 720p@960fps (gyro-EIS), HDR10+
SELFIE CAMERA	Single	4 MP, f/1.8, 26mm (wide), 2.0µm, under display
		Cover camera:
		10 MP, f/2.2, 24mm (wide), 1/3", 1.22µm
	Features	HDR
	Video	4K@30/60fps, 1080p@30/60fps, gyro-EIS

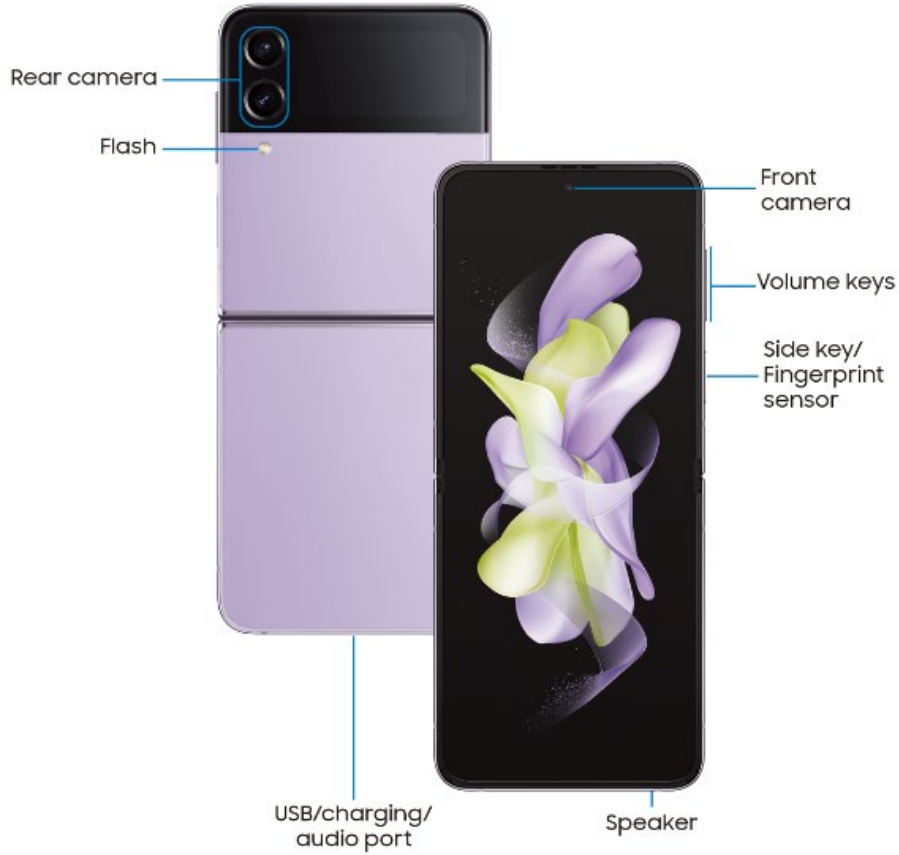
Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/; https://www.gsmarena.com/samsung_galaxy_z_fold4-11737.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Fold4 technical specification; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_fold4_d1e605.html.

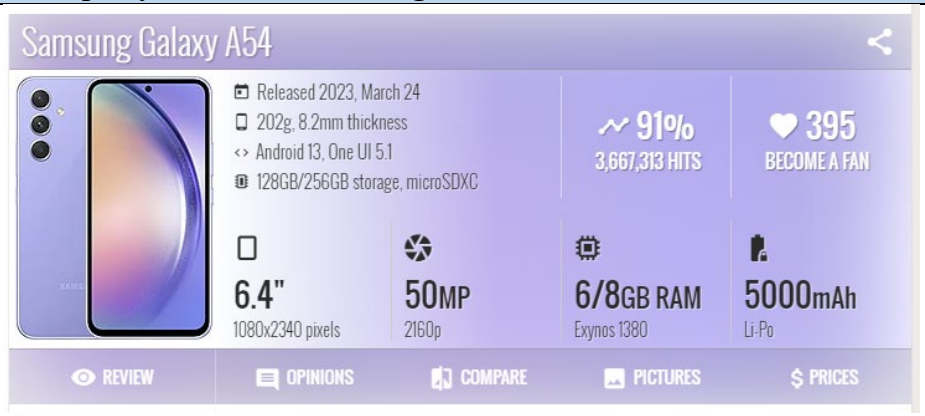
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/.

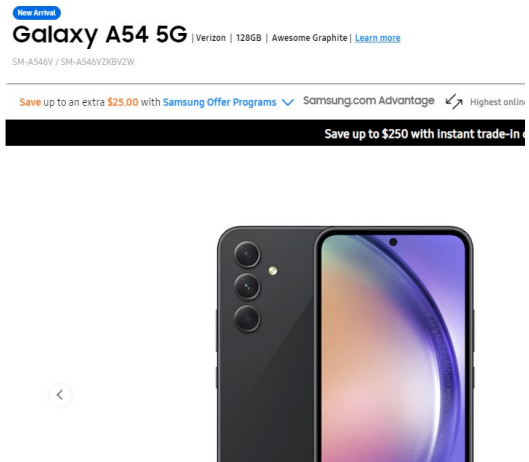
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy Z Fold4 technical specifications; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_fold4_camera_features_d1e3185.   Galaxy Z Flip4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-flip4/buy/galaxy-z-flip4-256gb-t-mobile-sm-f721uzdexau/; https://www.gsmarena.com/samsung_galaxy_z_flip4-11538.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Flip4 technical specifications; https://www.gsmarena.com/samsung_galaxy_z_flip4-11538.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy Z Flip4  Galaxy Z Flip4 technical specifications; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_flip4_d1e661.html.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement





Galaxy A54 5G technical specifications; https://www.samsung.com/us/mobile/phones/galaxy-a54/buy/; https://www.gsmarena.com/samsung_galaxy_a54-12070.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

MAIN CAMERA	Triple	50 MP, f/1.8, (wide), 1/1.56", 1.0µm, PDAF, OIS
		12 MP, f/2.2, 123° (ultrawide), 1.12µm
		5 MP, f/2.4, (macro)
	Features	LED flash, panorama, HDR
	Video	4K@30fps, 1080p@30/60fps, 720p@480fps
SELFIE CAMERA	Single	32 MP, f/2.2, 26mm (wide), 1/2.8", 0.8µm
	Video	4K@30fps, 1080p@30/60fps

Samsung Galaxy A54 5G technical specifications; Galaxy A54 5G, 128GB (Unlocked) Phones - SM-A546UZKBXAA | Samsung US; https://www.gsmarena.com/samsung_galaxy_a54-12070.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy A54 5G Galaxy A54 5G technical specifications; https://downloadcenter.samsung.com/content/UM/202304/20230407022332214/SAM_A546_EN_UM_OS13_040523_FINAL.pdf at 5.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
[7.c] the control unit controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed.	*See* claim [1.f] above. *See also*: The signal processor in each of the Accused Samsung '950 Products incorporates or operates as the control unit that controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed. As an example, the signal processor is configured to create a region that includes skin tones and textures and other region or regions that do not include skin tones and textures. To create other region or regions that do not contain the detected skin tones and textures, the signal processor excludes a skin tone region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contain a detected moving object or subject and other region or regions that do not contain the detected moving object or subject. To create other region or regions that do not contain the detected moving object, the signal processor excludes a moving object region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains a detected face and other region or regions that do not contain the detected face. To create other region or regions that do not contain the detected face, the signal processor excludes a face region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected natural skin and other region or regions that do not contain the detected natural skin. To create other region or regions that do not contain the detected natural skin, the signal processor excludes a natural skin region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected hair and other region or regions that do not contain the detected hair. To create other region or regions

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	that do not contain the detected hair, the signal processor excludes a hair region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected clothing and other region or regions that do not contain the detected clothing. To create other region or regions that do not contain the detected clothing, the signal processor excludes a clothing region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains a detected object in a foreground and other region or regions that are part of a background. To create other region or regions that do not contain the detected foreground, the signal processor excludes a foreground region that contains the pixels for which a position has been held in the hold unit or memory.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

	• Our Qualcomm Spectra™ AI ISP features:
	  • Limitless Real-time Semantic Segmentation for photo/video frame
	  • Insight AI provides real-time skin and sky adjustments to create more natural color and lighting in uncertain conditions.
	  • Ultra-low Light video capture
	  • Video Object Eraser can remove unwanted elements from videos
	  • Real-time AI Relighting make you appear professional wherever you are
	  • Truepic photo capture with C2PA standard support lets you snap a photo with Truepic's cryptographic seal to prove the photo is real and not Gen AI
	
	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	AI-powered camera redefines photography Infuse brilliance into mobile capture with our AI ISP, enhancing everything from selfies to crystal-clear video chats thanks to an overhauled Hexagon Direct Link. The first AI-powered Limitless Segmentation recognizes and enhances virtually anything in the frame, including faces, hair, clothing, objects, backgrounds, and beyond. Even furry friends appear crisp and cute—no matter how fast the zoomies—thanks to AI-Based Pet Capture. • Our powerful AI ISP is deeply integrated with the Hexagon NPU for enhanced, intuitive capture. • Limitless Segmentation can segment an image in over 250 layers, each optimized to perfection. • Real-time Insight AI captures and enhances natural skin and sky tones even in the most challenging conditions. • Truepic with C2PA adds cryptographic seals so you can authenticate your photos as real and not AI-generated—now including videos and audio recordings. • Video Object Eraser can remove unwanted elements from video footage—on-device. • Capture vivid videos at 4K60 FPS, even in near darkness. (https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Snapdragon-8-Elite-Platform-Product-Brief.pdf) For example, on information and belief, the Samsung Galaxy S25 includes an image signal processor (ISP) and/or digital signal processor (DSP) that adjusts an image, for example, by performing white balance correction. For example, the white balance is adjusted in accordance with the detected lighting conditions, e.g. fluorescent lighting, incandescent lighting, sunny outdoor lighting, cloudy outdoor lighting. Upon information and belief, certain adjustments are applied when one or more features e.g. skin tone, hair, or face, are detected in a particular region and certain adjustments are performed when the one or more such features are not contained in another region. For example, foliage or snow scene corrections are not performed when such features are not detected in a region but other image corrections are performed (e.g., face corrections and portrait mode corrections are applied). Similarly, certain white balance corrections are not performed when a white or black background is not contained but additional white balance corrections are applied to the content. Further, text scanning corrections are not performed when text is not detected but additional image corrections are applied. Moreover, image corrections to the foreground (e.g., the face of a person or object being captured) are applied but corrections to the background are not applied if a white or black background is not detected. Further if the face is close to the camera such

<table>
<tr><th>U.S. Patent No. 8,471,950</th><th>Exemplary Evidence of Infringement</th></tr>
<tr><td></td><td>that a background is not detected, then the face corrections are applied but background corrections are not applied and background pattern portions are not contained.
<table>
<tr><th>Input</th><th>Features</th><th>Features Contained</th><th>Video with Contents</th><th>Correction</th></tr>
<tr><td>
Portrait Photo</td><td>Snow</td><td>No</td><td>Cloth</td><td>Corrections based on the selected camera's parameters</td></tr>
<tr><td>
Person in front of a white wall</td><td>Snow</td><td>No</td><td>Face</td><td>Beauty face correction applied</td></tr>
</table></td></tr>
</table>

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Book Scan	Snow	No	Scanned image	Scan correction applied
Face close up	Stair	No	Face	Beauty face correction applied

Input	Features	Features Contained	Video with Contents	Correction
	Cloud	Yes	Cloth	No Correction.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement					
	Portrait Photo				No Blur	
	Person in front of a white wall	Wall	Yes	Face	No Correction. No Blur	
	Book Scan	Text	Yes	Scanned image	No Correction. No Blur	

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Face close up Cloth | Yes | Face | No White balance correction.
[8.a] A signal processor according to claim 7, wherein: the region creation unit includes a region segmentation unit for segmenting an effective region in advance, and an overlap detection unit which detects overlap of position information output from the hold unit with blocks segmented by the region segmentation unit; and	For example, the signal processor is configured to detect different regions in an image by performing segmentation of a photo or video frame. For example, the signal processor performs segmentation to detect one or more features including faces, natural skin, hair, clothing, objects, and backgrounds. On information and belief, the signal processor is configured to detect whether a region having a feature e.g. one of face, natural skin, hair, clothing, background overlaps another region having another one of the features face, natural skin, hair, clothing, background. For example, the signal processor can detect whether a region in which hair is detected overlaps with another region in which natural skin is detected. In another example, the signal processor can detect whether a region in which face is detected overlaps with another region in which natural skin is detected. In another example, the signal processor can detect whether a region in which face is detected overlaps with another region in which clothing is detected. In another example, the signal processor can detect whether a region in which face is detected overlaps with another region in which natural skin is detected.

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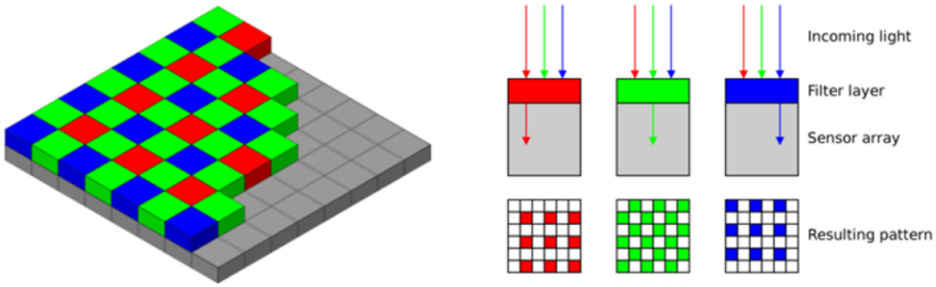
	3. WB (White Balance)[3] This block helps the camera adjust the color balance and render them accurately. It ensures that an image has a uniform WB Gain and that the RGB of the grey (achromatic) areas are adjusted to the same value (to depict the grey as grey). The sensor output fed to ISP has twice as many green channels as any other. This is the reason why the raw image before the application of WB Gain looks green overall. (Refer to 'De-mosaic' below) **4. De-mosaic (= Bayer Interpolation, Color Interpolation)** Most smartphone cameras use the Bayer type (or pattern) sensor. The Bayer sensor, as illustrated below [2] is 3 color filter combination sensor mounted on top of a photodiode array.  https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145

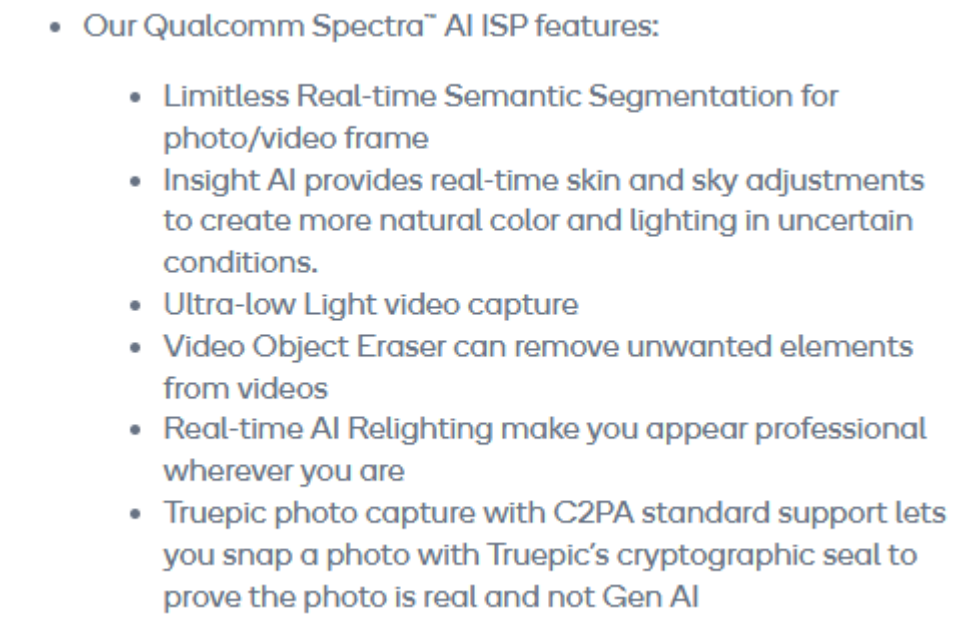
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	FD (Face Detection) This block detects faces in an image/video and passes their coordinates to the next block. The face coordinates can be used in other algorithms or solutions to implement different features. **[Example of application] Using FD information in AWB (Auto White Balance) and AE (Auto Exposure) algorithm blocks** 1. When a face is detected, it compares and corrects the difference between the face brightness and the targeted brightness of the whole image. It utilizes the face coordinates received, to adjust the face brightness, etc. 2. When multiple sources are detected illuminating a face and the face is overly affected by these lights, this FD data can be used to correct the color on it. For example, if a face is detected in a low-color temperature light setup giving off a slightly reddish glow, the face coordinates are used to adjust the color of the face. https://r2.community.samsung.com/t5/CamCyclopedia/ISP-Image-Signal-Processor/ba-p/13485145

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

	• Our Qualcomm Spectra™ AI ISP features:
	  • Limitless Real-time Semantic Segmentation for photo/video frame
	  • Insight AI provides real-time skin and sky adjustments to create more natural color and lighting in uncertain conditions.
	  • Ultra-low Light video capture
	  • Video Object Eraser can remove unwanted elements from videos
	  • Real-time AI Relighting make you appear professional wherever you are
	  • Truepic photo capture with C2PA standard support lets you snap a photo with Truepic's cryptographic seal to prove the photo is real and not Gen AI
	
	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	AI-powered camera redefines photography Infuse brilliance into mobile capture with our AI ISP, enhancing everything from selfies to crystal-clear video chats thanks to an overhauled Hexagon Direct Link. The first AI-powered Limitless Segmentation recognizes and enhances virtually anything in the frame, including faces, hair, clothing, objects, backgrounds, and beyond. Even furry friends appear crisp and cute—no matter how fast the zoomies—thanks to AI-Based Pet Capture. • Our powerful AI ISP is deeply integrated with the Hexagon NPU for enhanced, intuitive capture. • Limitless Segmentation can segment an image in over 250 layers, each optimized to perfection. • Real-time Insight AI captures and enhances natural skin and sky tones even in the most challenging conditions. • Truepic with C2PA adds cryptographic seals so you can authenticate your photos as real and not AI-generated—now including videos and audio recordings. • Video Object Eraser can remove unwanted elements from video footage—on-device. • Capture vivid videos at 4K60 FPS, even in near darkness. (https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Snapdragon-8-Elite-Platform-Product-Brief.pdf) Let's dive deeper into why Snapdragon 8 Elite is a game-changer: • **Incredible power:** Experience a 45% boost in performance with the Qualcomm Oryon CPU, giving you lightning-fast apps and incredible multitasking.[1] • **AI at your fingertips:** The Qualcomm® Hexagon™ NPU increases AI performance by 45%, handling everything from voice commands to image prompts. Your device is ready to adapt to your every move. • **Photography, reimagined:** With features like 4K Semantic Segmentation, Video Object Eraser, and real-time AI lighting adjustments, the Snapdragon 8 Elite camera tech turns your mobile photos into pro-level masterpieces. https://www.qualcomm.com/snapdragon/news/snapdragon-8-elite--the-power-behind-the-name
[8.b] the control unit controls the processing unit by using an evaluated value of a region from which pixels having an	*See* claim [1.f] above. *See also:* The signal processor in each of the Accused Samsung '950 Products incorporates or operates as the control unit that controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
extracted predetermined feature are removed.	As an example, the signal processor is configured to create a region that includes skin tones and textures and other region or regions that do not include skin tones and textures. To create other region or regions that do not contain the detected skin tones and textures, the signal processor excludes a skin tone region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contain a detected moving object or subject and other region or regions that do not contain the detected moving object or subject. To create other region or regions that do not contain the detected moving object, the signal processor excludes a moving object region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains a detected face and other region or regions that do not contain the detected face. To create other region or regions that do not contain the detected face, the signal processor excludes a face region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected natural skin and other region or regions that do not contain the detected natural skin. To create other region or regions that do not contain the detected natural skin, the signal processor excludes a natural skin region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected hair and other region or regions that do not contain the detected hair. To create other region or regions that do not contain the detected hair, the signal processor excludes a hair region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected clothing and other region or regions that do not contain the detected clothing. To create other region

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	or regions that do not contain the detected clothing, the signal processor excludes a clothing region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains a detected object in a foreground and other region or regions that are part of a background. To create other region or regions that do not contain the detected foreground, the signal processor excludes a foreground region that contains the pixels for which a position has been held in the hold unit or memory.  • Our Qualcomm Spectra™ AI ISP features: • Limitless Real-time Semantic Segmentation for photo/video frame • Insight AI provides real-time skin and sky adjustments to create more natural color and lighting in uncertain conditions. • Ultra-low Light video capture • Video Object Eraser can remove unwanted elements from videos • Real-time AI Relighting make you appear professional wherever you are • Truepic photo capture with C2PA standard support lets you snap a photo with Truepic's cryptographic seal to prove the photo is real and not Gen AI (https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
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U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

face of a person or object being captured) are applied but corrections to the background are not applied if a white or black background is not detected. Further if the face is close to the camera such that a background is not detected, then the face corrections are applied but background corrections are not applied and background pattern portions are not contained.

Input	Features	Features Contained	Video with Contents	Correction
Portrait Photo	Snow	No	Cloth	Corrections based on the selected camera's parameters
Person in front of a white wall	Snow	No	Face	Beauty face correction applied

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Book Scan	Snow	No	Scanned image	Scan correction applied
Face close up	Stair	No	Face	Beauty face correction applied

Input	Features	Features Contained	Video with Contents	Correction
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U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement					
	Portrait Photo				No Blur	
	Person in front of a white wall	Wall	Yes	Face	No Correction. No Blur	
	Book Scan	Text	Yes	Scanned image	No Correction. No Blur	

U.S. Patent No. 8,471,950	**Exemplary Evidence of Infringement**
	 Face close up Cloth Yes Face No White balance correction.
[10.a] A signal processor according to claim 1, wherein: the processing unit is a light intensity adjustment unit for controlling exposure;	As another example, the signal processor is configured to perform lighting adjustment for example by adjusting shutter and/or exposure. This includes performing AE.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

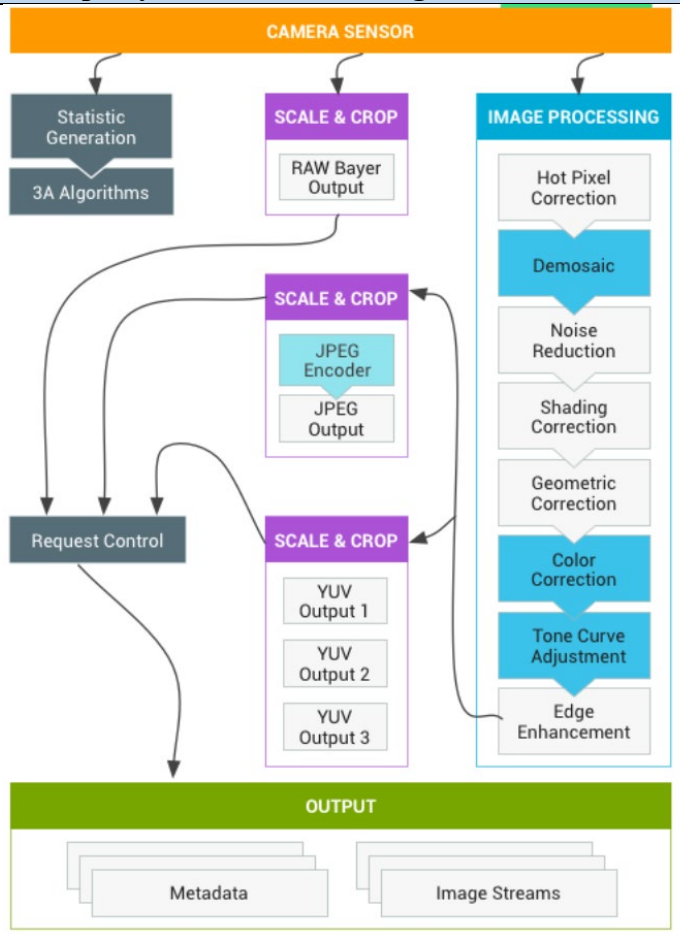
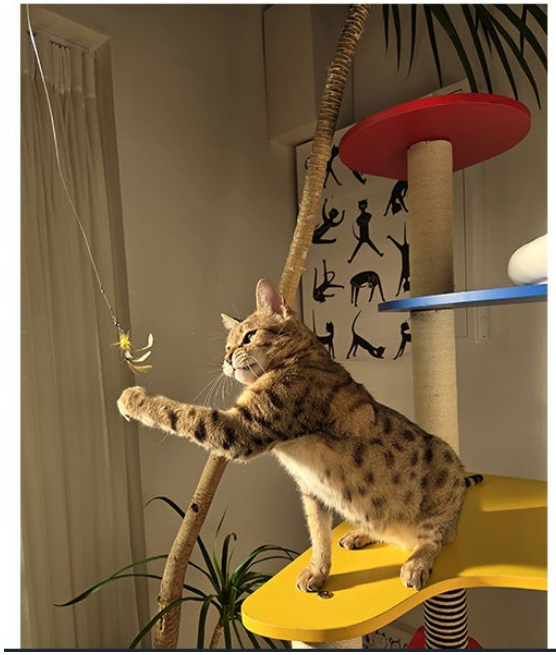


Figure 2. Camera pipeline

ttps://source.android.com/docs/core/camera/camera3_requests_hal

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Shots captured at lightning speed ProVisual Engine and advanced sensors join forces to create high-quality images even at fast shutter speeds so you can capture moving subjects with more clarity.[3]  https://www.samsung.com/us/smartphones/galaxy-s25/

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

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	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Camera Qualcomm Spectra™ Image Signal Processor • AI-ISP, Triple 18-bit ISPs Limitless real-time Semantic Segmentation photo and video processing Engine for Visual Analytics 4.0, including hardware acceleration for iToF depth sensors up to 4K 60 FPS Support for the latest HDR, DCG+VS, DCG, Staggered, QDOL, Less Blanking, and Multiframe HDR image sensors Support for triple video capture from HDR image sensors, with seamless switching between any HDR mode • Up to 48 MP triple camera @ 30 FPS with Zero Shutter Lag • Up to 108 MP single camera @ 30 FPS with Zero Shutter Lag • Up to 320-megapixel photo capture AI-based face detection, AI for 3A (auto-focus, autoexposure, and auto-white balance) Rec. 2020 color gamut photo and video capture Up to 10-bit color depth photo and video capture 10-bit HEIF: HEIC photo capture, HEVC video capture Google Ultra HDR photo capture Video capture HDR formats: HDR10+, HDR10, HLG, Dolby Vision 8K HDR video playback @ 60 FPS 4K video capture @ 120 FPS Slow-mo video capture at 1080p @ 480 FPS Hardware Bokeh Engine 2 for video capture (https://docs.qualcomm.com/bundle/publicresource/87-83196-1_REV_D_Snapdragon_8_Elite_Mobile_Platform_Product_Brief.pdf)

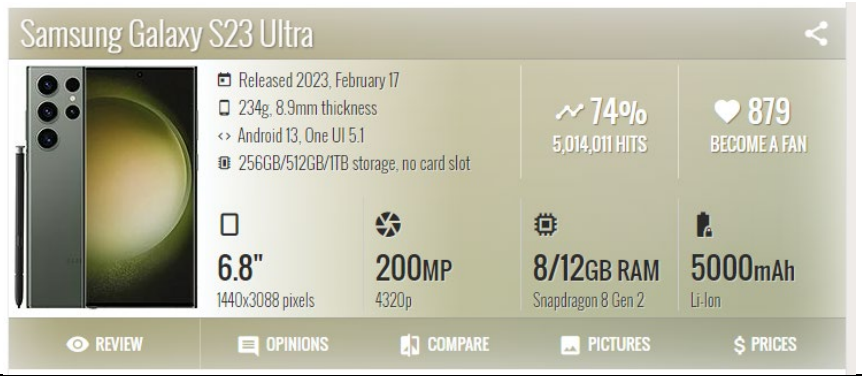
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	AI-powered camera redefines photography Infuse brilliance into mobile capture with our AI ISP, enhancing everything from selfies to crystal-clear video chats thanks to an overhauled Hexagon Direct Link. The first AI-powered Limitless Segmentation recognizes and enhances virtually anything in the frame, including faces, hair, clothing, objects, backgrounds, and beyond. Even furry friends appear crisp and cute—no matter how fast the zoomies—thanks to AI-Based Pet Capture. • Our powerful AI ISP is deeply integrated with the Hexagon NPU for enhanced, intuitive capture. • Limitless Segmentation can segment an image in over 250 layers, each optimized to perfection. • Real-time Insight AI captures and enhances natural skin and sky tones even in the most challenging conditions. • Truepic with C2PA adds cryptographic seals so you can authenticate your photos as real and not AI-generated—now including videos and audio recordings. • Video Object Eraser can remove unwanted elements from video footage—on-device. • Capture vivid videos at 4K60 FPS, even in near darkness. (https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Snapdragon-8-Elite-Platform-Product-Brief.pdf) Let's dive deeper into why Snapdragon 8 Elite is a game-changer: • **Incredible power:** Experience a 45% boost in performance with the Qualcomm Oryon CPU, giving you lightning-fast apps and incredible multitasking.[1] • **AI at your fingertips:** The Qualcomm® Hexagon™ NPU increases AI performance by 45%, handling everything from voice commands to image prompts. Your device is ready to adapt to your every move. • **Photography, reimagined:** With features like 4K Semantic Segmentation, Video Object Eraser, and real-time AI lighting adjustments, the Snapdragon 8 Elite camera tech turns your mobile photos into pro-level masterpieces. https://www.qualcomm.com/snapdragon/news/snapdragon-8-elite--the-power-behind-the-name
[10.b] a lens and a photoelectric conversion unit for performing photoelectric conversion	For example, the Samsung S25 incorporates one or more lenses e.g. a telephoto lens with an optical zoom including a drive unit to drive the optical zoom lens. In addition, the Samsung S25 incorporates an image sensor corresponding to each of the one or more lenses e.g. a 10MP image sensor for the telephoto lens. The image sensor incorporates a photoelectric conversion unit for

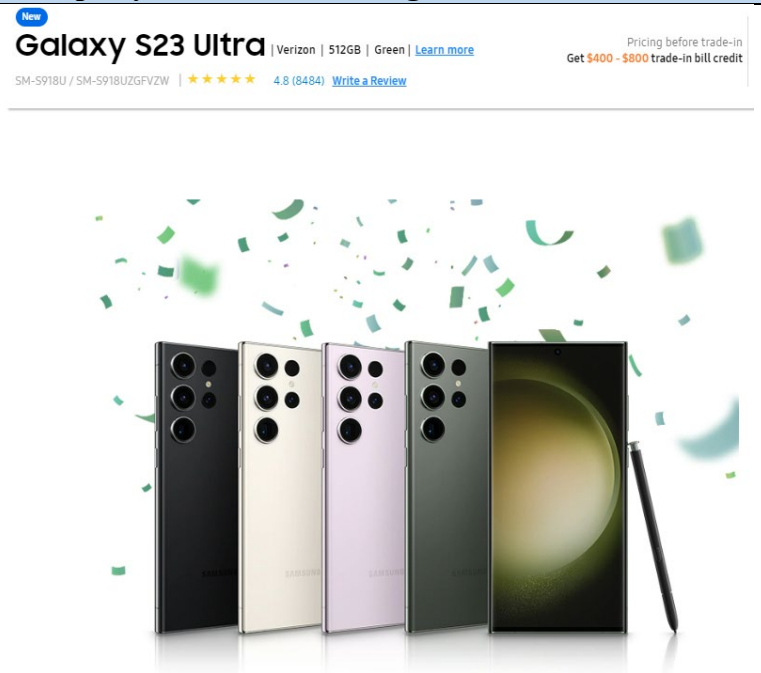
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
are disposed between the light intensity adjustment unit and the extraction unit; and	performing photoelectric conversion disposed between the focus lens and the extraction unit. For example, the image sensor converts light to electricity representing pixel elements.

MAIN CAMERA	Triple	50 MP, f/1.8, 24mm (wide), 1/1.56", 1.0µm, dual pixel PDAF, OIS
		10 MP, f/2.4, 67mm (telephoto), 1/3.94", 1.0µm, PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 13mm, 120˚ (ultrawide), 1/2.55" 1.4µm, Super Steady video
	Features	Best Face, LED flash, auto-HDR, panorama
	Video	8K@24/30fps, 4K@30/60fps, 1080p@30/60/120/240fps, 10-bit HDR, HDR10+, stereo sound rec., gyro-EIS
SELFIE CAMERA	Single	12 MP, f/2.2, 26mm (wide), 1/3.2", 1.12µm, dual pixel PDAF
	Features	HDR, HDR10+
	Video	4K@30/60fps, 1080p@30fps

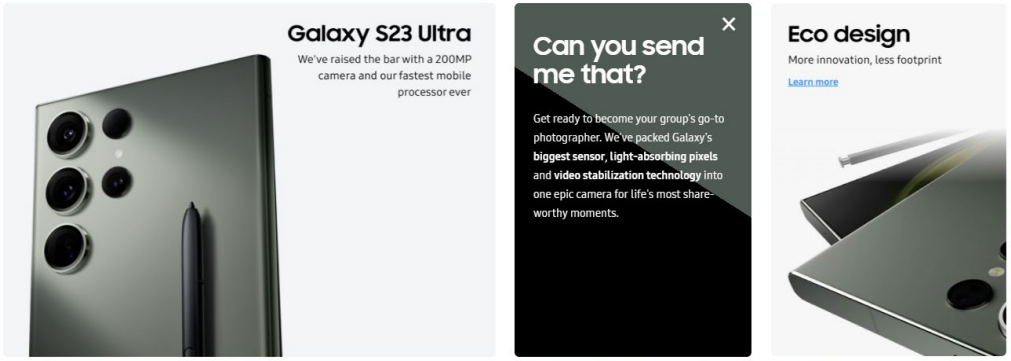
https://www.gsmarena.com/samsung_galaxy_s25-13610.php

The remaining accused products also include focus lens and a drive unit to, for example, perform AF or PDAF:



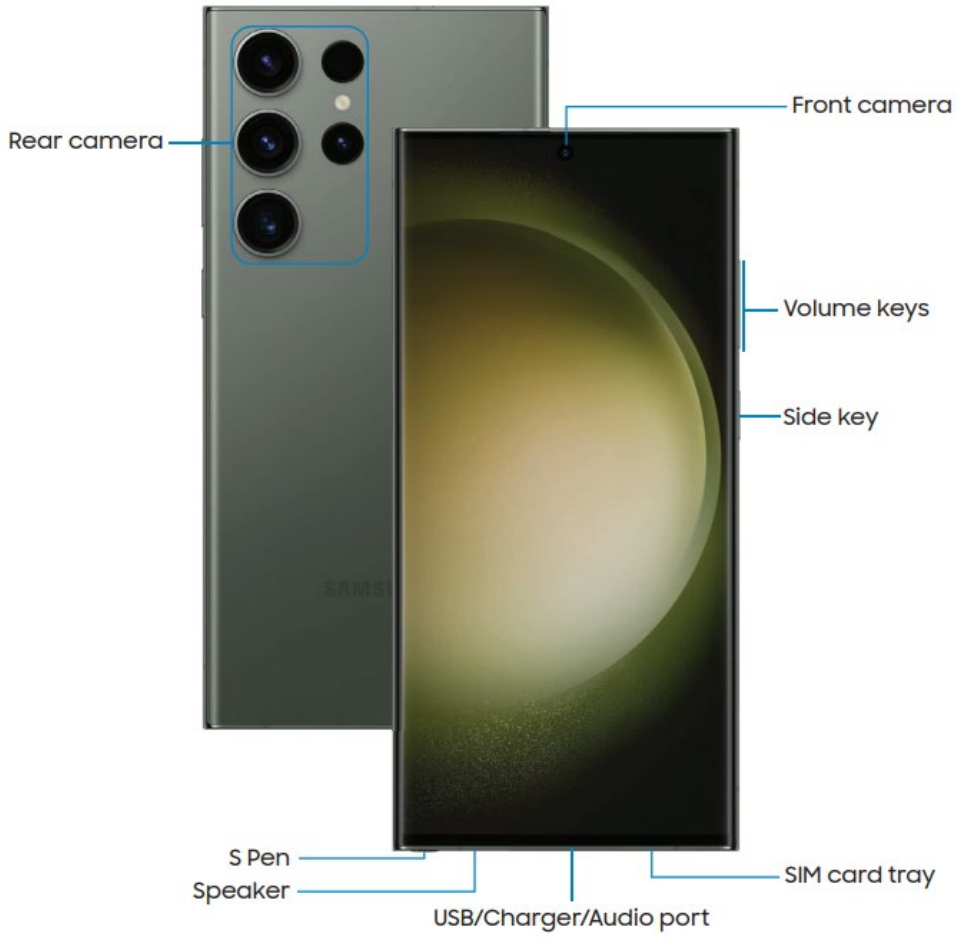
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU; https://www.gsmarena.com/samsung_galaxy_s23_ultra-12024.php.

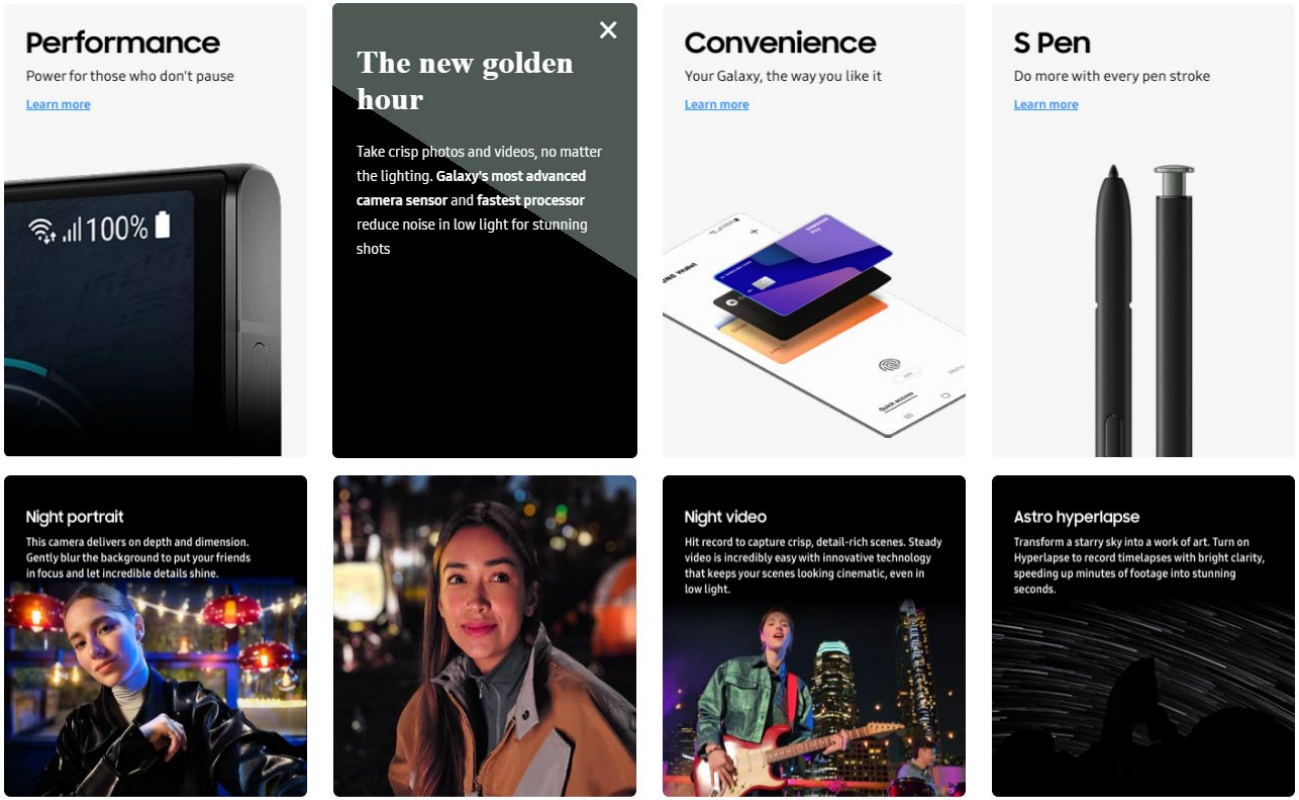
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



MAIN CAMERA	Quad	200 MP, f/1.7, 24mm (wide), 1/1.3", 0.6µm, multi-directional PDAF, Laser AF, OIS
		10 MP, f/4.9, 230mm (periscope telephoto), 1/3.52", 1.12µm, Dual Pixel PDAF, OIS, 10x optical zoom
		10 MP, f/2.4, 70mm (telephoto), 1/3.52", 1.12µm, Dual Pixel PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 13mm, 120˚ (ultrawide), 1/2.55", 1.4µm, Dual Pixel PDAF, Super Steady video
	Features	LED flash, auto-HDR, panorama
	Video	8K@24/30fps, 4K@30/60fps, 1080p@30/60/240fps, 1080p@960fps, HDR10+, stereo sound rec., gyro-EIS
SELFIE CAMERA	Single	12 MP, f/2.2, 26mm (wide), Dual Pixel PDAF
	Features	Dual video call, Auto-HDR, HDR10+
	Video	4K@30/60fps, 1080p@30fps

Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU; https://www.gsmarena.com/samsung_galaxy_s23_ultra-12024.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy S23 Ultra 

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy S23 Ultra technical specifications; https://downloadcenter.samsung.com/content/UM/202302/20230228053129621/SAM_S911_S916_S918_EN_UM_OS13_020223_FINAL_AC_022023.pdf at 5.  Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU.

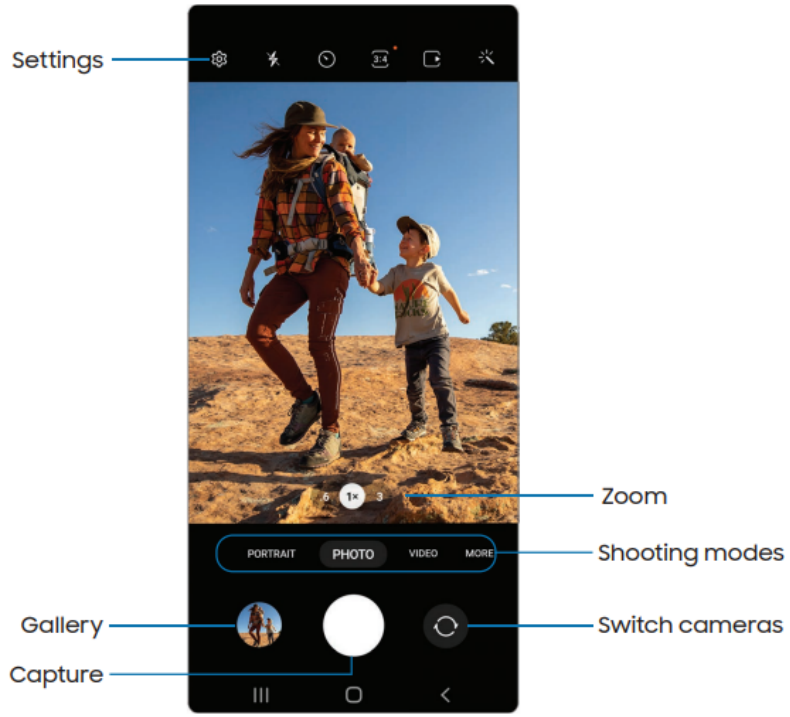
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Camera

Enjoy a full kit of pro lenses and pro-grade video modes and settings.

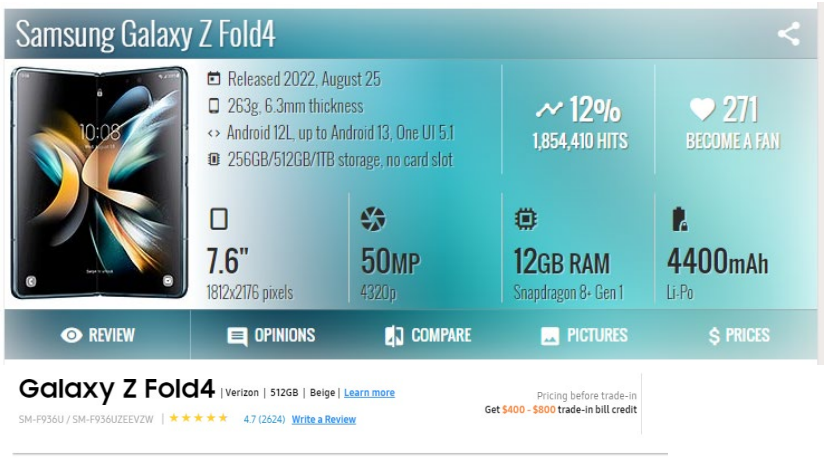
○ From Apps, tap Camera.

TIP Quickly press the **Side** key twice to open the Camera app.



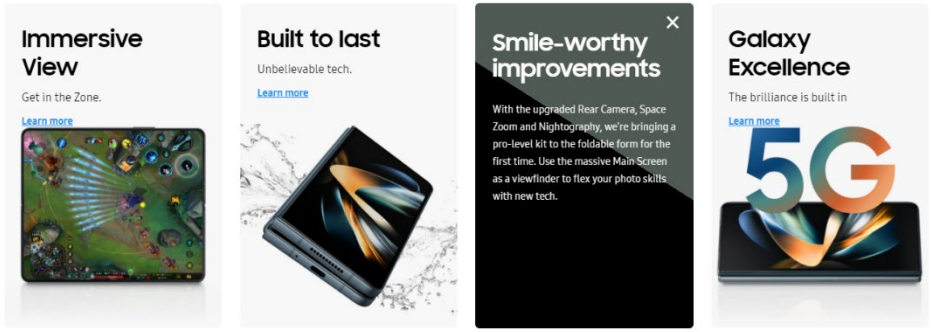
Galaxy S23 Ultra technical specification; https://downloadcenter.samsung.com/content/UM/202302/20230228053129621/SAM_S911_S916_S918_EN_UM_OS13_020223_FINAL_AC_022023.pdf at 58.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/; https://www.gsmarena.com/samsung_galaxy_z_fold4-11737.php.

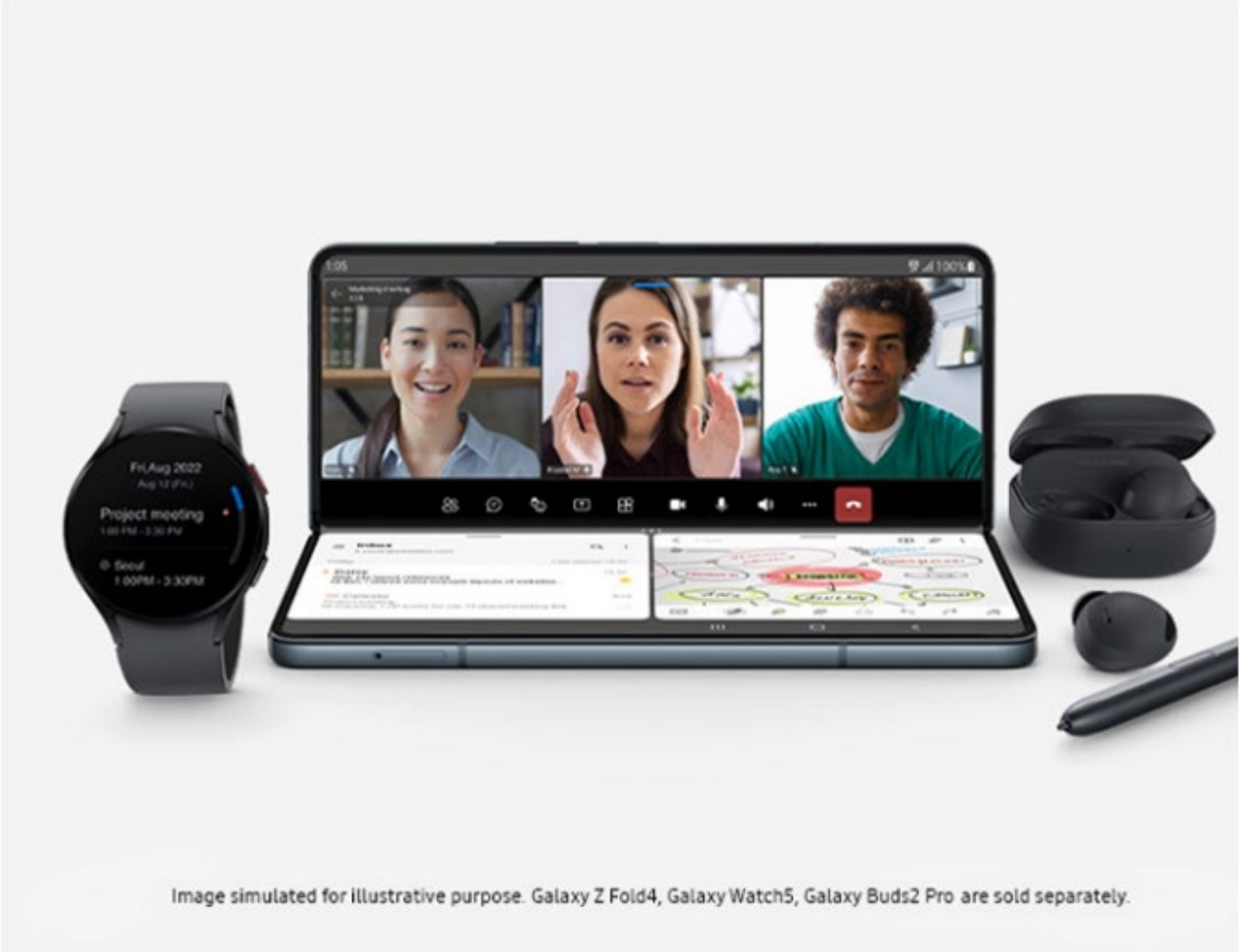
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

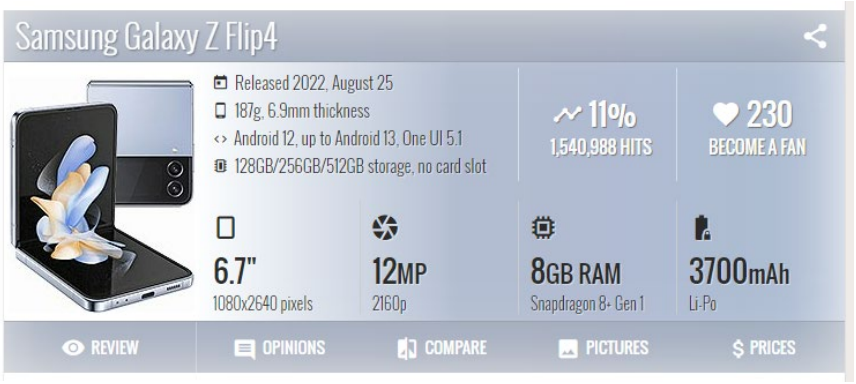
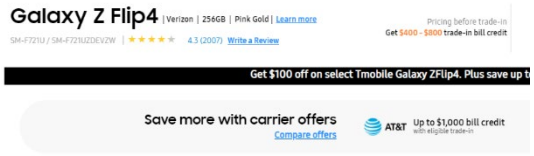


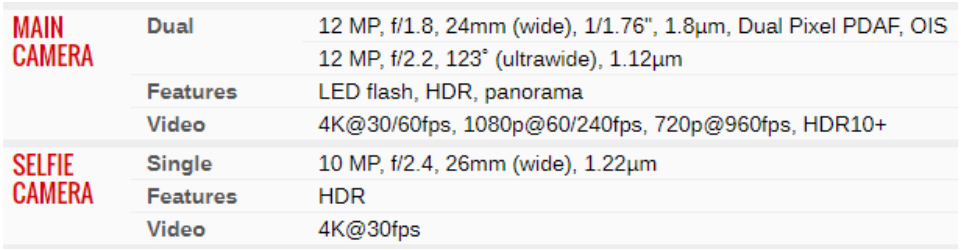
MAIN CAMERA	Triple	50 MP, f/1.8, 23mm (wide), 1.0µm, Dual Pixel PDAF, OIS
		10 MP, f/2.4, 66mm (telephoto), 1.0µm, PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 123°, 12mm (ultrawide), 1.12µm
	Features	LED flash, HDR, panorama
	Video	8K@24fps, 4K@60fps, 1080p@60/240fps (gyro-EIS), 720p@960fps (gyro-EIS), HDR10+
SELFIE CAMERA	Single	4 MP, f/1.8, 26mm (wide), 2.0µm, under display
		Cover camera:
		10 MP, f/2.2, 24mm (wide), 1/3", 1.22µm
	Features	HDR
	Video	4K@30/60fps, 1080p@30/60fps, gyro-EIS

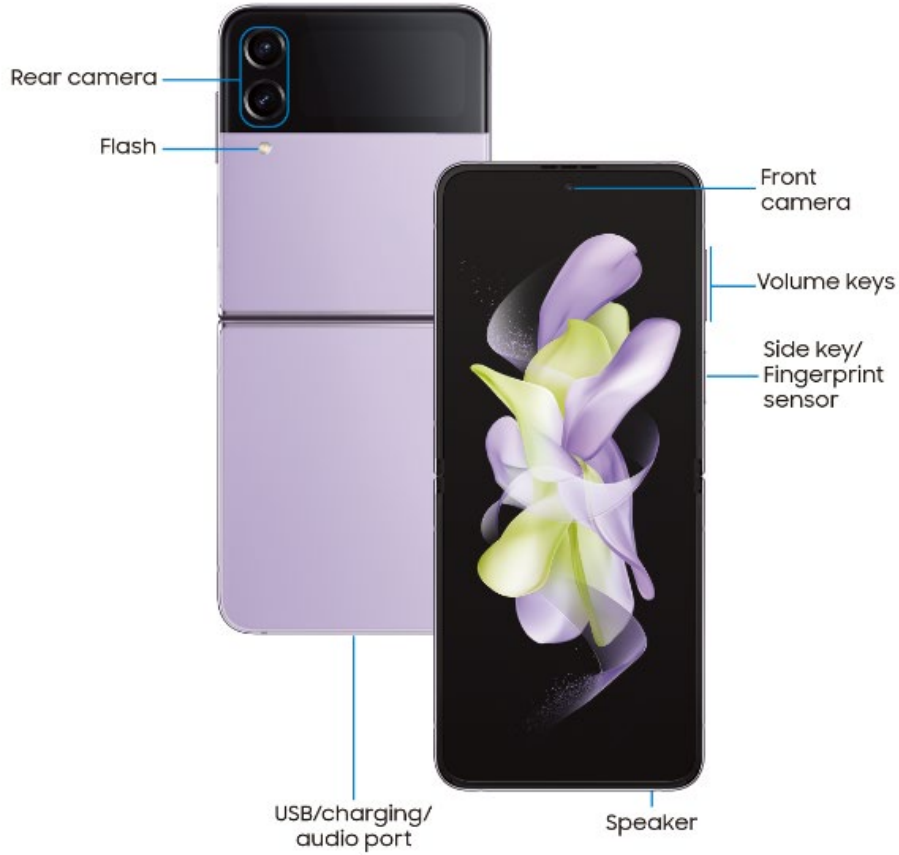
Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/; https://www.gsmarena.com/samsung_galaxy_z_fold4-11737.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Fold4 technical specification; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_fold4_d1e605.html.

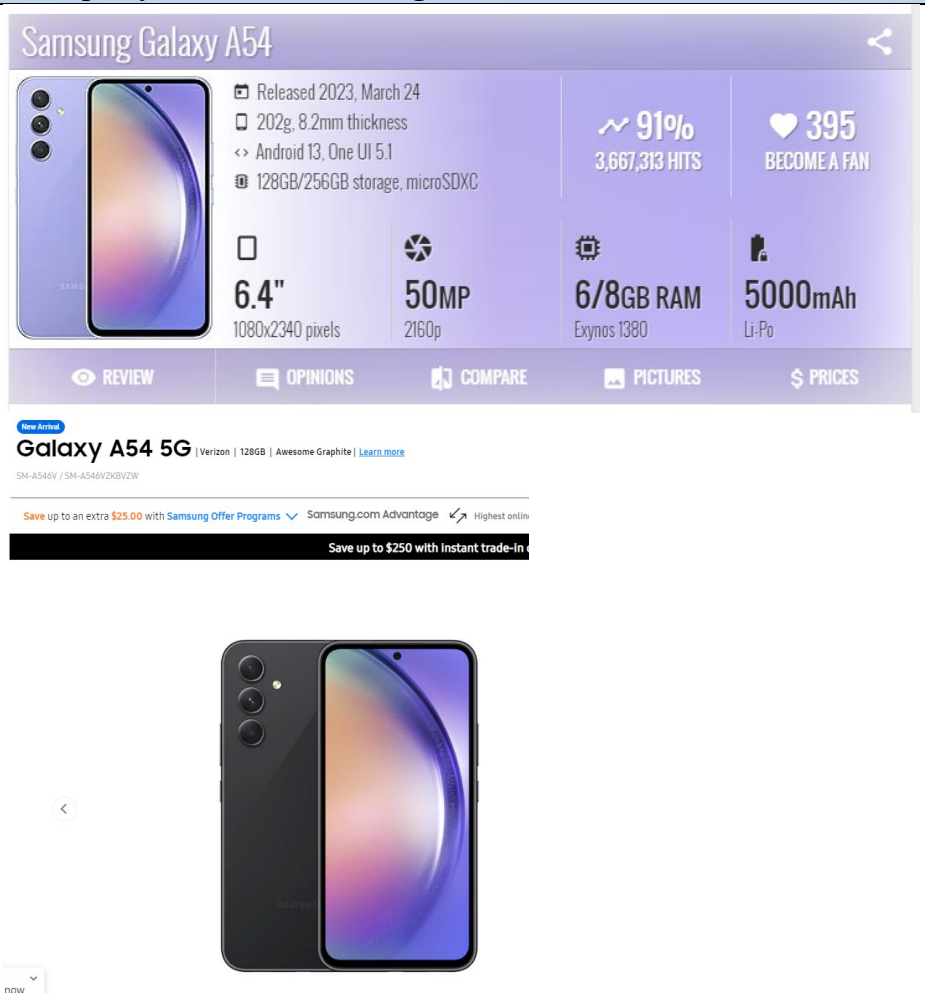
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy Z Fold4 technical specifications; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_fold4_camera_features_d1e3185.   Galaxy Z Flip4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-flip4/buy/galaxy-z-flip4-256gb-t-mobile-sm-f721uzdexau/; https://www.gsmarena.com/samsung_galaxy_z_flip4-11538.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Flip4 technical specifications; https://www.gsmarena.com/samsung_galaxy_z_flip4-11538.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy Z Flip4  Galaxy Z Flip4 technical specifications; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_flip4_d1e661.html.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Galaxy A54 5G technical specifications; https://www.samsung.com/us/mobile/phones/galaxy-a54/buy/; https://www.gsmarena.com/samsung_galaxy_a54-12070.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

MAIN CAMERA	Triple	50 MP, f/1.8, (wide), 1/1.56", 1.0µm, PDAF, OIS
		12 MP, f/2.2, 123° (ultrawide), 1.12µm
		5 MP, f/2.4, (macro)
	Features	LED flash, panorama, HDR
	Video	4K@30fps, 1080p@30/60fps, 720p@480fps
SELFIE CAMERA	Single	32 MP, f/2.2, 26mm (wide), 1/2.8", 0.8µm
	Video	4K@30fps, 1080p@30/60fps

Samsung Galaxy A54 5G technical specifications; Galaxy A54 5G, 128GB (Unlocked) Phones - SM-A546UZKBXAA | Samsung US; https://www.gsmarena.com/samsung_galaxy_a54-12070.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy A54 5G technical specifications; https://downloadcenter.samsung.com/content/UM/202304/20230407022332214/SAM_A546_EN_UM_OS13_040523_FINAL.pdf at 5.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
[10.c] the control unit controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed.	*See* claim [1.f] above. *See also*: The signal processor in each of the Accused Samsung '950 Products incorporates or operates as the control unit that controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed. As an example, the signal processor is configured to create a region that includes skin tones and textures and other region or regions that do not include skin tones and textures. To create other region or regions that do not contain the detected skin tones and textures, the signal processor excludes a skin tone region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contain a detected moving object or subject and other region or regions that do not contain the detected moving object or subject. To create other region or regions that do not contain the detected moving object, the signal processor excludes a moving object region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains a detected face and other region or regions that do not contain the detected face. To create other region or regions that do not contain the detected face, the signal processor excludes a face region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected natural skin and other region or regions that do not contain the detected natural skin. To create other region or regions that do not contain the detected natural skin, the signal processor excludes a natural skin region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected hair and other region or regions that do not contain the detected hair. To create other region or regions

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	that do not contain the detected hair, the signal processor excludes a hair region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected clothing and other region or regions that do not contain the detected clothing. To create other region or regions that do not contain the detected clothing, the signal processor excludes a clothing region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains a detected object in a foreground and other region or regions that are part of a background. To create other region or regions that do not contain the detected foreground, the signal processor excludes a foreground region that contains the pixels for which a position has been held in the hold unit or memory.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

	• Our Qualcomm Spectra™ AI ISP features:
	  • Limitless Real-time Semantic Segmentation for photo/video frame
	  • Insight AI provides real-time skin and sky adjustments to create more natural color and lighting in uncertain conditions.
	  • Ultra-low Light video capture
	  • Video Object Eraser can remove unwanted elements from videos
	  • Real-time AI Relighting make you appear professional wherever you are
	  • Truepic photo capture with C2PA standard support lets you snap a photo with Truepic's cryptographic seal to prove the photo is real and not Gen AI
	
	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	AI-powered camera redefines photography Infuse brilliance into mobile capture with our AI ISP, enhancing everything from selfies to crystal-clear video chats thanks to an overhauled Hexagon Direct Link. The first AI-powered Limitless Segmentation recognizes and enhances virtually anything in the frame, including faces, hair, clothing, objects, backgrounds, and beyond. Even furry friends appear crisp and cute—no matter how fast the zoomies—thanks to AI-Based Pet Capture. • Our powerful AI ISP is deeply integrated with the Hexagon NPU for enhanced, intuitive capture. • Limitless Segmentation can segment an image in over 250 layers, each optimized to perfection. • Real-time Insight AI captures and enhances natural skin and sky tones even in the most challenging conditions. • Truepic with C2PA adds cryptographic seals so you can authenticate your photos as real and not AI-generated—now including videos and audio recordings. • Video Object Eraser can remove unwanted elements from video footage—on-device. • Capture vivid videos at 4K60 FPS, even in near darkness. (https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Snapdragon-8-Elite-Platform-Product-Brief.pdf) For example, on information and belief, the Samsung Galaxy S25 includes an image signal processor (ISP) and/or digital signal processor (DSP) that adjusts an image, for example, by performing white balance correction. For example, the white balance is adjusted in accordance with the detected lighting conditions, e.g. fluorescent lighting, incandescent lighting, sunny outdoor lighting, cloudy outdoor lighting. Upon information and belief, certain adjustments are applied when one or more features e.g. skin tone, hair, or face, are detected in a particular region and certain adjustments are performed when the one or more such features are not contained in another region. For example, foliage or snow scene corrections are not performed when such features are not detected in a region but other image corrections are performed (e.g., face corrections and portrait mode corrections are applied). Similarly, certain white balance corrections are not performed when a white or black background is not contained but additional white balance corrections are applied to the content. Further, text scanning corrections are not performed when text is not detected but additional image corrections are applied. Moreover, image corrections to the foreground (e.g., the face of a person or object being captured) are applied but corrections to the background are not applied if a white or black background is not detected. Further if the face is close to the camera such

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

that a background is not detected, then the face corrections are applied but background corrections are not applied and background pattern portions are not contained.

Input	Features	Features Contained	Video with Contents	Correction
Portrait Photo	Snow	No	Cloth	Corrections based on the selected camera's parameters
Person in front of a white wall	Snow	No	Face	Beauty face correction applied

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Book Scan	Snow	No	Scanned image	Scan correction applied
Face close up	Stair	No	Face	Beauty face correction applied

Input	Features	Features Contained	Video with Contents	Correction
	Cloud	Yes	Cloth	No Correction.

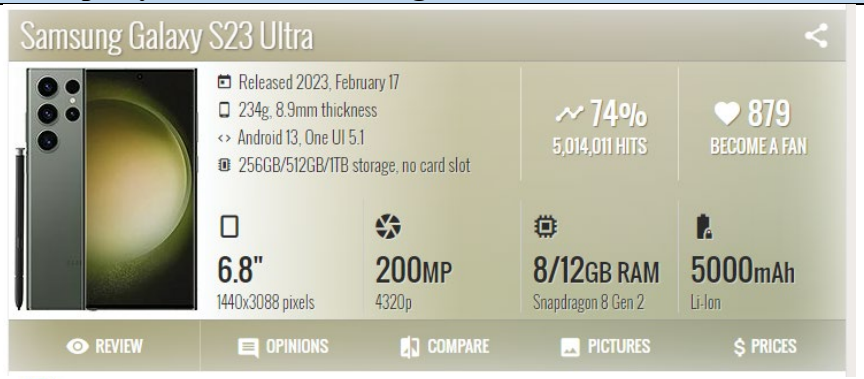
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement					
	Portrait Photo				No Blur	
	Person in front of a white wall	Wall	Yes	Face	No Correction. No Blur	
	Book Scan	Text	Yes	Scanned image	No Correction. No Blur	

<table>
<tr><th>U.S. Patent No. 8,471,950</th><th colspan="6">Exemplary Evidence of Infringement</th></tr>
<tr><td></td><td>
Face close up</td><td>Cloth</td><td>Yes</td><td>Face</td><td>No White balance correction.</td><td></td></tr>
<tr><td>[12.a] A signal processor according to claim 1, wherein: the processing unit includes a focus lens, and a drive unit for driving the focus lens;</td><td colspan="6">For example, the Samsung S25 incorporates one or more lenses e.g. a telephoto lens with an optical zoom including a drive unit to drive the optical zoom lens.

<table>
<tr><td>MAIN CAMERA</td><td>Triple</td><td>50 MP, f/1.8, 24mm (wide), 1/1.56", 1.0µm, dual pixel PDAF, OIS
10 MP, f/2.4, 67mm (telephoto), 1/3.94", 1.0µm, PDAF, OIS, 3x optical zoom
12 MP, f/2.2, 13mm, 120˚ (ultrawide), 1/2.55" 1.4µm, Super Steady video</td></tr>
<tr><td></td><td>Features</td><td>Best Face, LED flash, auto-HDR, panorama</td></tr>
<tr><td></td><td>Video</td><td>8K@24/30fps, 4K@30/60fps, 1080p@30/60/120/240fps, 10-bit HDR, HDR10+, stereo sound rec., gyro-EIS</td></tr>
<tr><td>SELFIE CAMERA</td><td>Single</td><td>12 MP, f/2.2, 26mm (wide), 1/3.2", 1.12µm, dual pixel PDAF</td></tr>
<tr><td></td><td>Features</td><td>HDR, HDR10+</td></tr>
<tr><td></td><td>Video</td><td>4K@30/60fps, 1080p@30fps</td></tr>
</table>
https://www.gsmarena.com/samsung_galaxy_s25-13610.php

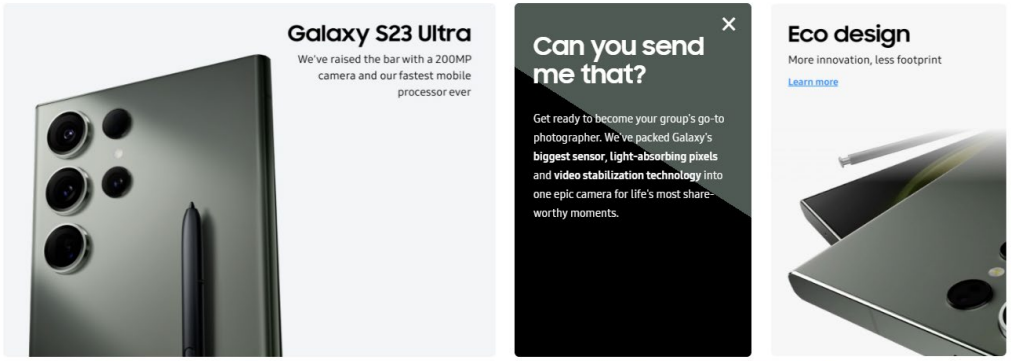
The remaining accused products also include focus lens and a drive unit to, for example, perform AF or PDAF:</td></tr>
</table>

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



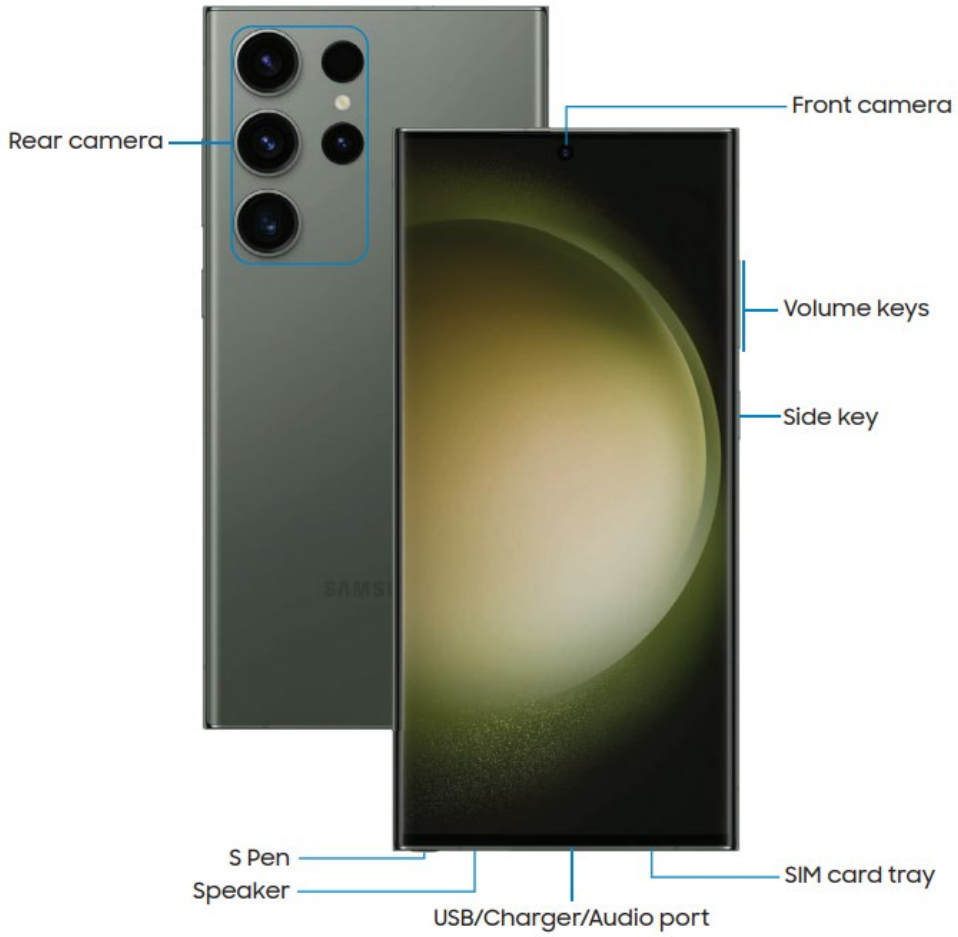
Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU; https://www.gsmarena.com/samsung_galaxy_s23_ultra-12024.php.

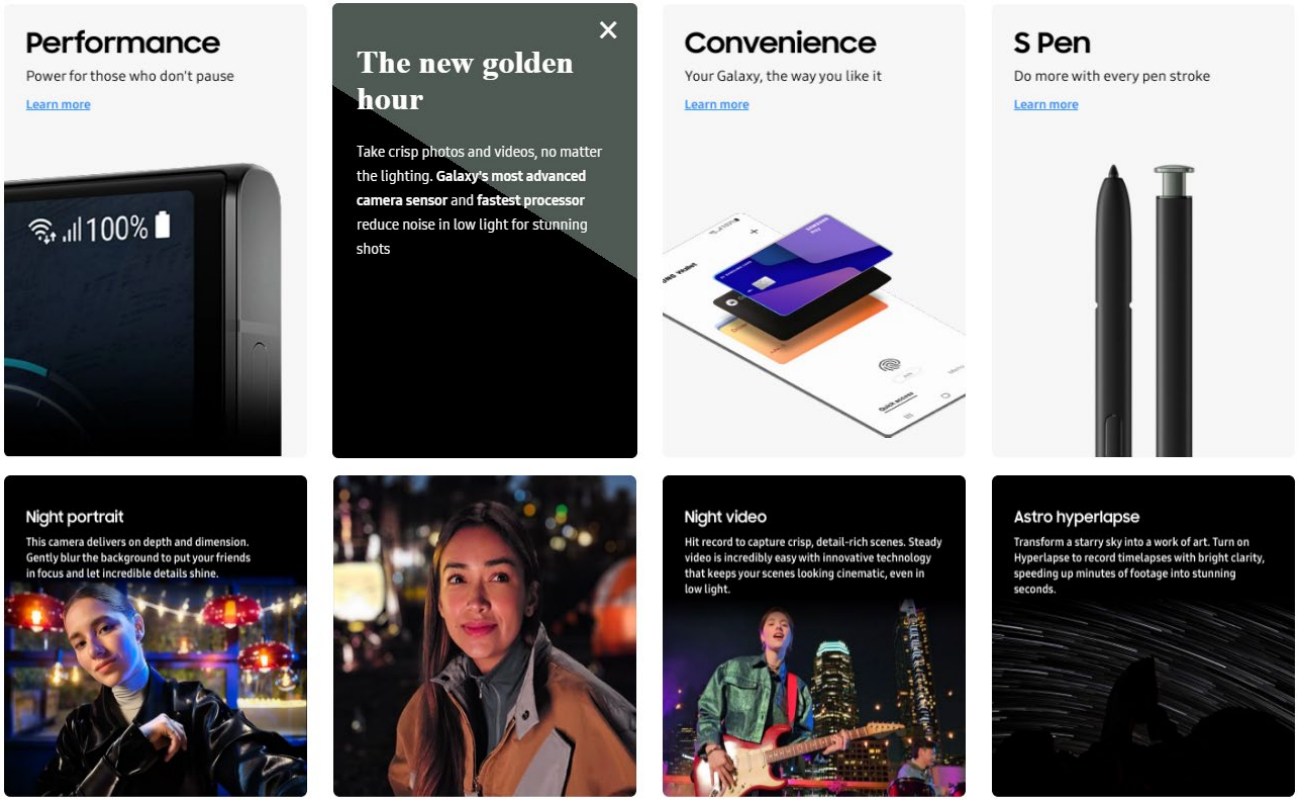
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



MAIN CAMERA	Quad	200 MP, f/1.7, 24mm (wide), 1/1.3", 0.6µm, multi-directional PDAF, Laser AF, OIS
		10 MP, f/4.9, 230mm (periscope telephoto), 1/3.52", 1.12µm, Dual Pixel PDAF, OIS, 10x optical zoom
		10 MP, f/2.4, 70mm (telephoto), 1/3.52", 1.12µm, Dual Pixel PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 13mm, 120˚ (ultrawide), 1/2.55", 1.4µm, Dual Pixel PDAF, Super Steady video
	Features	LED flash, auto-HDR, panorama
	Video	8K@24/30fps, 4K@30/60fps, 1080p@30/60/240fps, 1080p@960fps, HDR10+, stereo sound rec., gyro-EIS
SELFIE CAMERA	Single	12 MP, f/2.2, 26mm (wide), Dual Pixel PDAF
	Features	Dual video call, Auto-HDR, HDR10+
	Video	4K@30/60fps, 1080p@30fps

Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU; https://www.gsmarena.com/samsung_galaxy_s23_ultra-12024.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy S23 Ultra 

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy S23 Ultra technical specifications; https://downloadcenter.samsung.com/content/UM/202302/20230228053129621/SAM_S911_S916_S918_EN_UM_OS13_020223_FINAL_AC_022023.pdf at 5.  Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU.

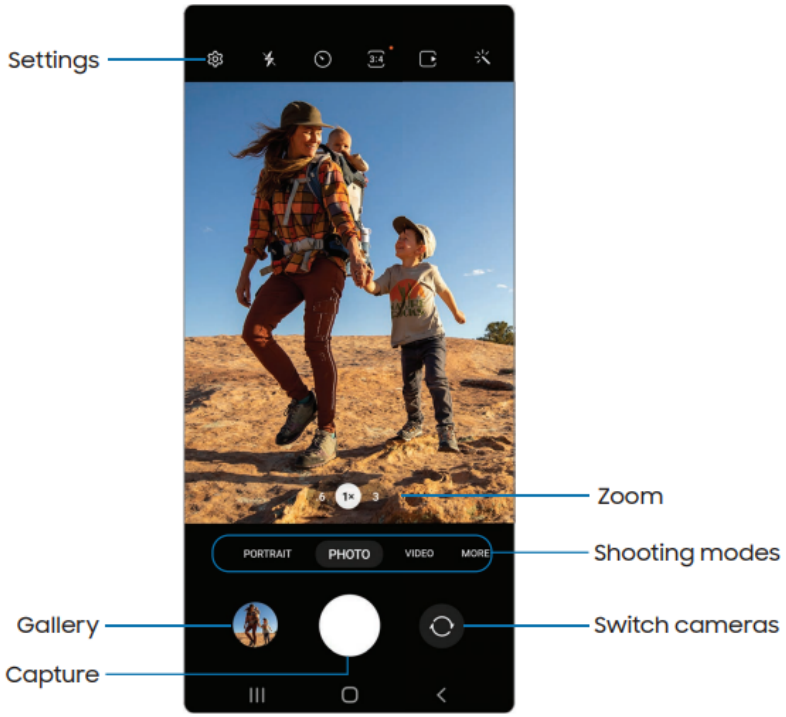
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

Camera

Enjoy a full kit of pro lenses and pro-grade video modes and settings.

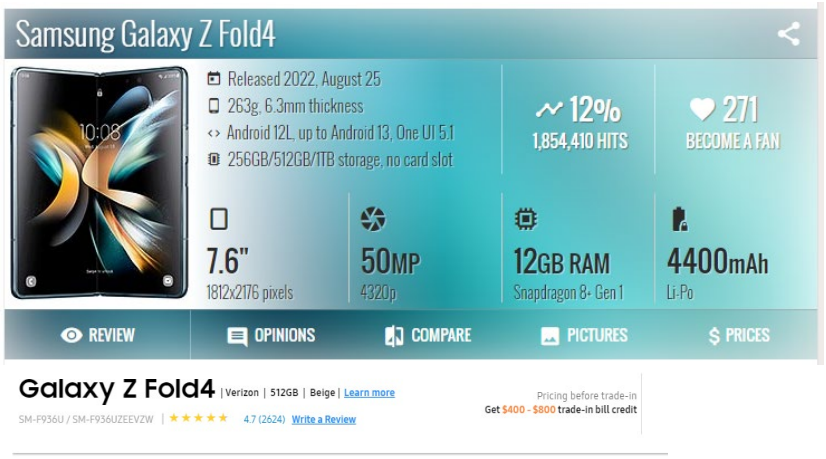
○ From Apps, tap Camera.

TIP Quickly press the **Side** key twice to open the Camera app.



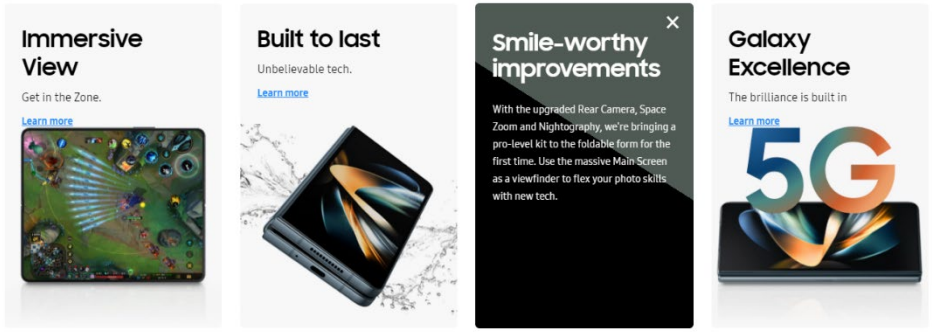
Galaxy S23 Ultra technical specification; https://downloadcenter.samsung.com/content/UM/202302/20230228053129621/SAM_S911_S916_S918_EN_UM_OS13_020223_FINAL_AC_022023.pdf at 58.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/; https://www.gsmarena.com/samsung_galaxy_z_fold4-11737.php.

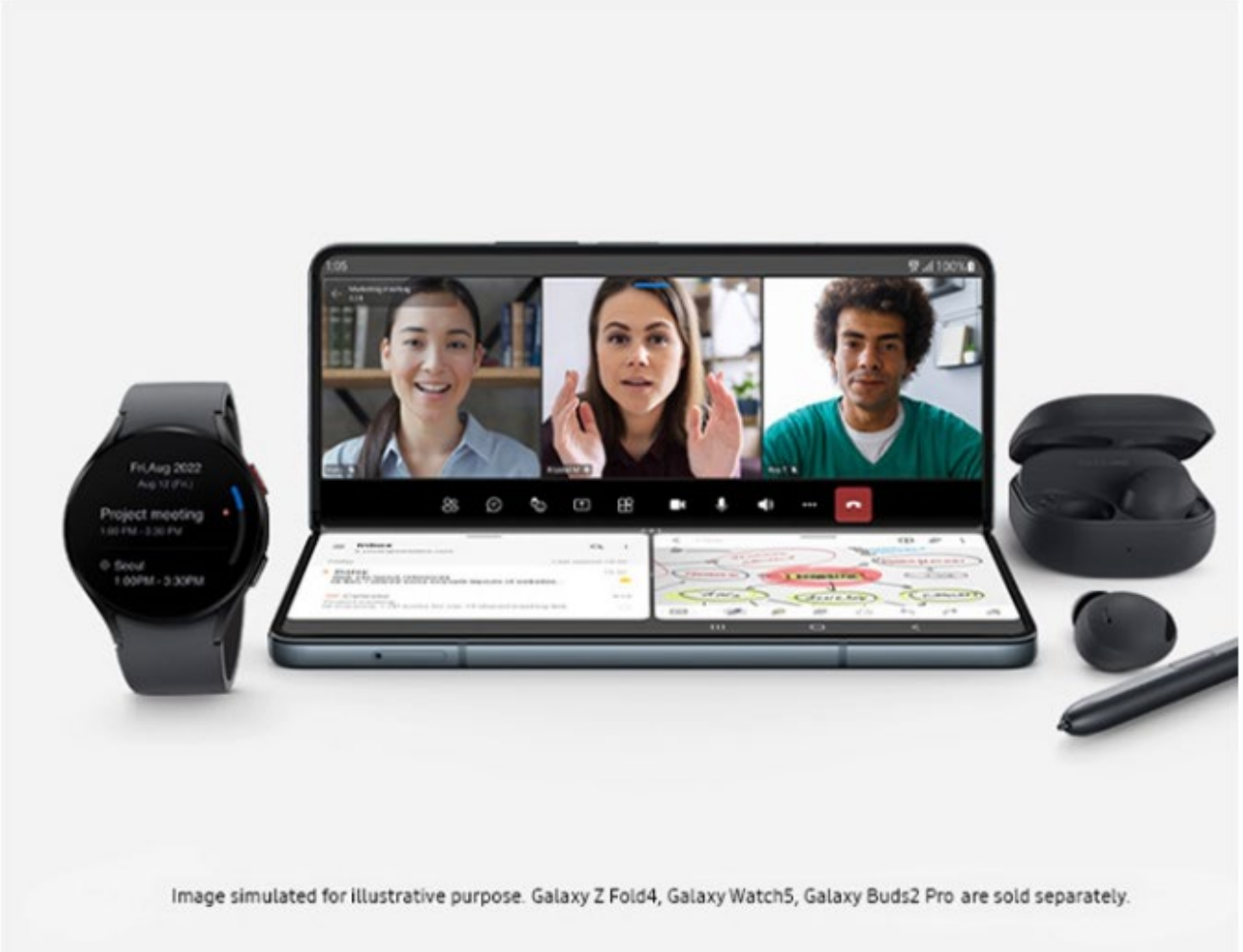
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

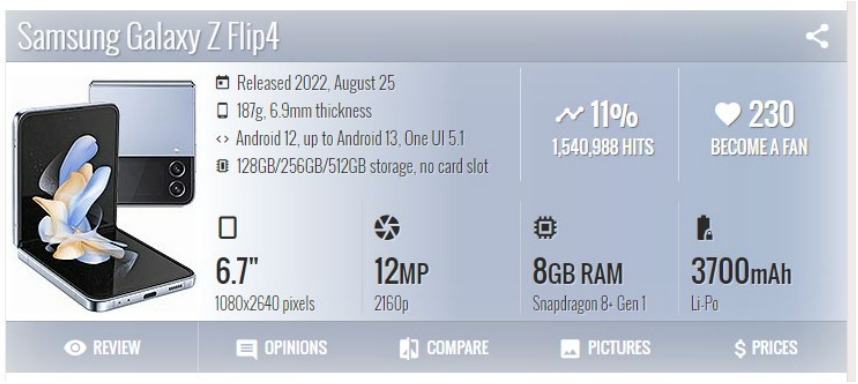
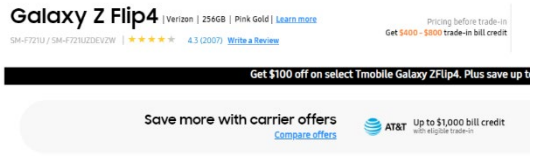


MAIN CAMERA	Triple	50 MP, f/1.8, 23mm (wide), 1.0µm, Dual Pixel PDAF, OIS
		10 MP, f/2.4, 66mm (telephoto), 1.0µm, PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 123°, 12mm (ultrawide), 1.12µm
	Features	LED flash, HDR, panorama
	Video	8K@24fps, 4K@60fps, 1080p@60/240fps (gyro-EIS), 720p@960fps (gyro-EIS), HDR10+
SELFIE CAMERA	Single	4 MP, f/1.8, 26mm (wide), 2.0µm, under display
		Cover camera:
		10 MP, f/2.2, 24mm (wide), 1/3", 1.22µm
	Features	HDR
	Video	4K@30/60fps, 1080p@30/60fps, gyro-EIS

Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/; https://www.gsmarena.com/samsung_galaxy_z_fold4-11737.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Fold4 technical specification; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_fold4_d1e605.html.

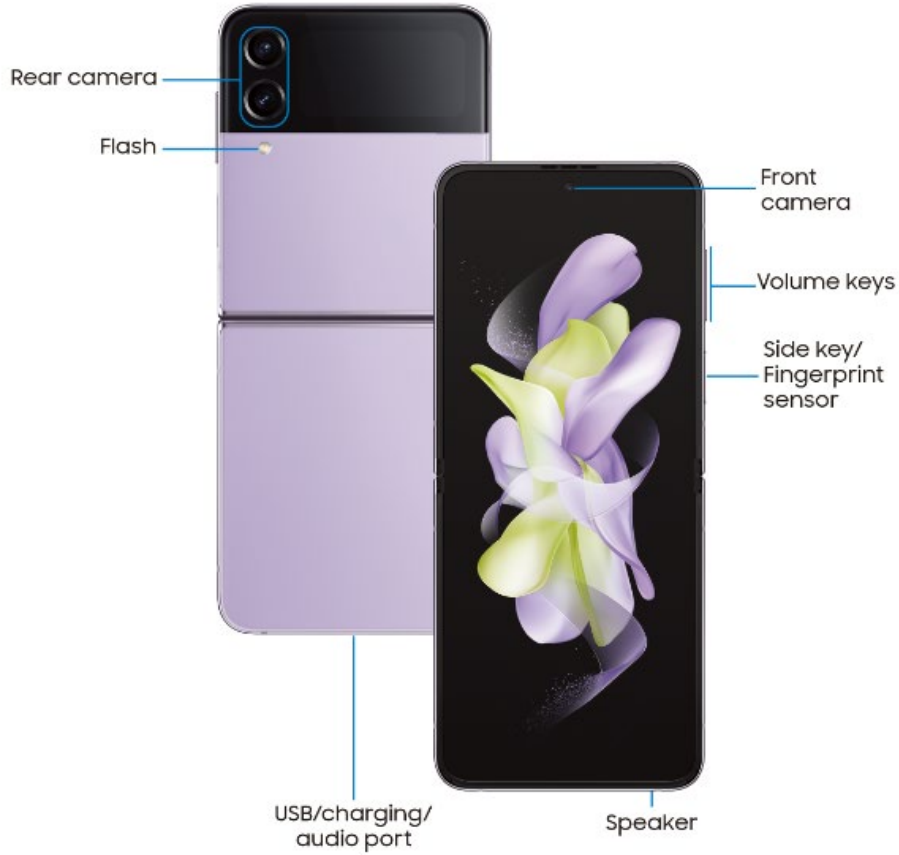
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy Z Fold4 technical specifications; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_fold4_camera_features_d1e3185.   Galaxy Z Flip4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-flip4/buy/galaxy-z-flip4-256gb-t-mobile-sm-f721uzdexau/; https://www.gsmarena.com/samsung_galaxy_z_flip4-11538.php.

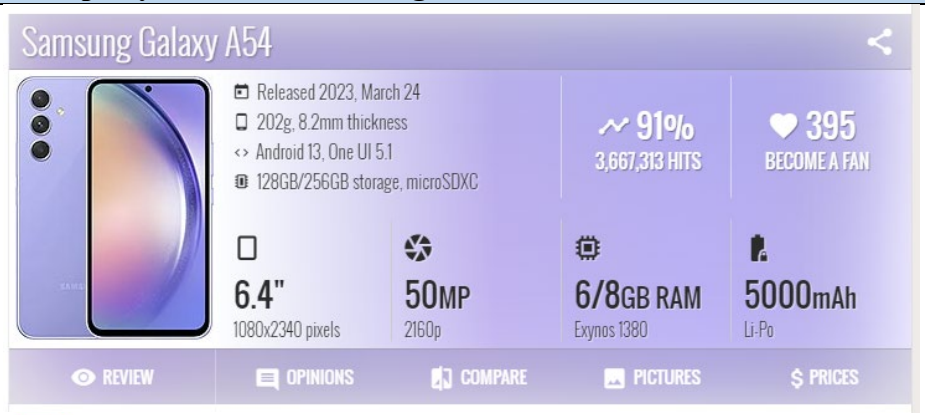
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

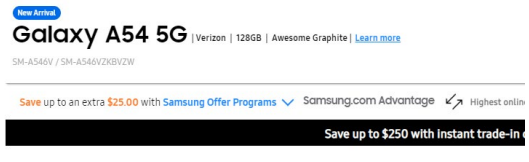
MAIN CAMERA	Dual	12 MP, f/1.8, 24mm (wide), 1/1.76", 1.8µm, Dual Pixel PDAF, OIS
		12 MP, f/2.2, 123˚ (ultrawide), 1.12µm
	Features	LED flash, HDR, panorama
	Video	4K@30/60fps, 1080p@60/240fps, 720p@960fps, HDR10+
SELFIE CAMERA	Single	10 MP, f/2.4, 26mm (wide), 1.22µm
	Features	HDR
	Video	4K@30fps

Galaxy Z Flip4 technical specifications; https://www.gsmarena.com/samsung_galaxy_z_flip4-11538.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy Z Flip4  Galaxy Z Flip4 technical specifications; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_flip4_d1e661.html.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement





Galaxy A54 5G technical specifications; https://www.samsung.com/us/mobile/phones/galaxy-a54/buy/; https://www.gsmarena.com/samsung_galaxy_a54-12070.php.

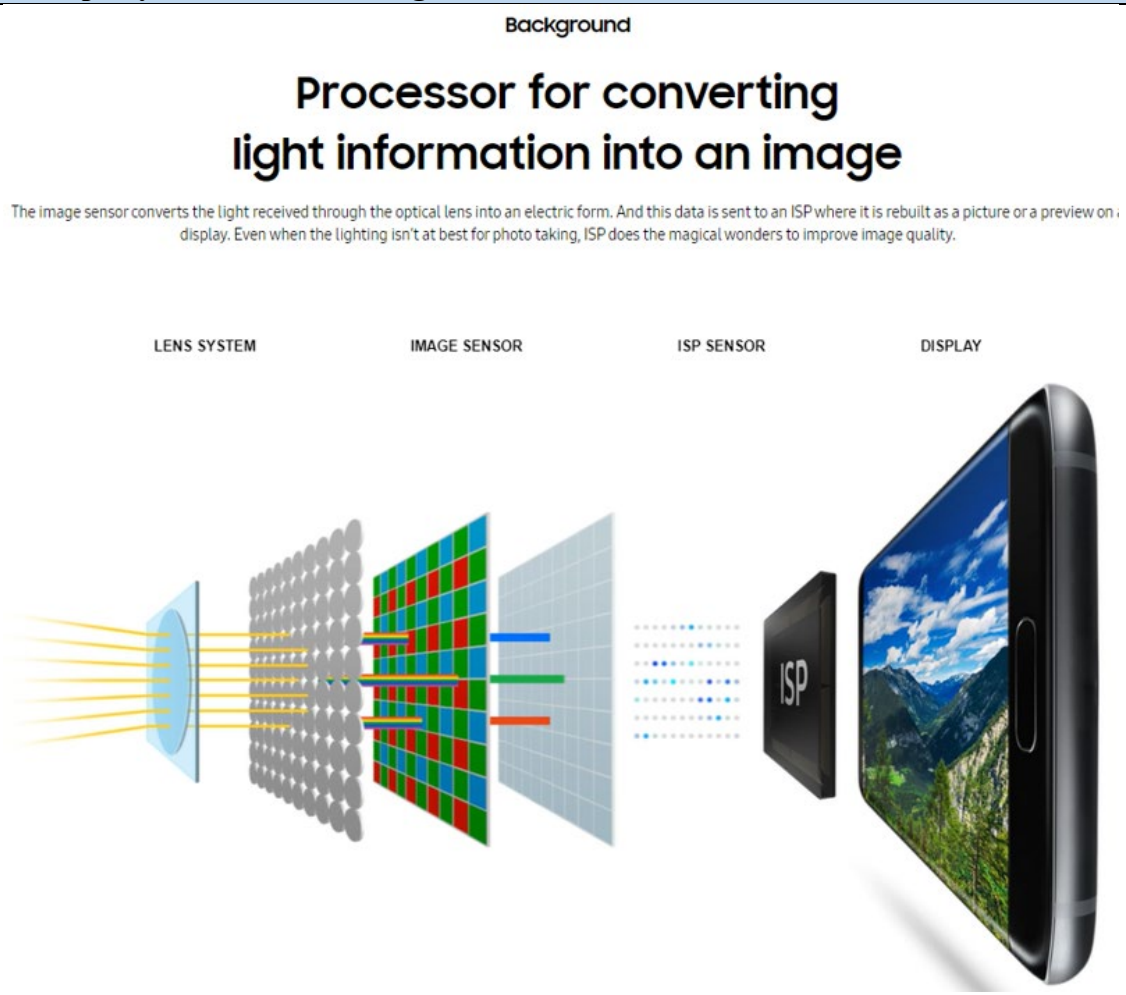
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

MAIN CAMERA	Triple	50 MP, f/1.8, (wide), 1/1.56", 1.0µm, PDAF, OIS
		12 MP, f/2.2, 123° (ultrawide), 1.12µm
		5 MP, f/2.4, (macro)
	Features	LED flash, panorama, HDR
	Video	4K@30fps, 1080p@30/60fps, 720p@480fps
SELFIE CAMERA	Single	32 MP, f/2.2, 26mm (wide), 1/2.8", 0.8µm
	Video	4K@30fps, 1080p@30/60fps

Samsung Galaxy A54 5G technical specifications; Galaxy A54 5G, 128GB (Unlocked) Phones - SM-A546UZKBXAA | Samsung US; https://www.gsmarena.com/samsung_galaxy_a54-12070.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy A54 5G Galaxy A54 5G technical specifications; https://downloadcenter.samsung.com/content/UM/202304/20230407022332214/SAM_A546_EN_UM_OS13_040523_FINAL.pdf at 5.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
[12.b] a photoelectric conversion unit for performing photoelectric conversion is disposed between the focus lens and the extraction unit; and	For example, the Samsung S25 incorporates an image sensor corresponding to each of the one or more lenses e.g. a 10MP image sensor for the telephoto lens. The image sensor incorporates a photoelectric conversion unit for performing photoelectric conversion disposed between the focus lens and the extraction unit. For example, the image sensor converts light to electricity representing pixel elements. As a nonlimiting example, each of the Accused Samsung '950 Products includes one or more image sensors associated with the plurality of cameras as front-facing and/or rear-facing cameras, which alone or in conjunction with other features and/or components discussed in this claim chart, allows each of the Accused Samsung '950 Products to convert light associated with an image into a digital signal representing the image as pixels. For example, each of the Accused Samsung '950 Products includes one or more image sensors that convert light received through optical lens into an electronic signal, which is sent to one or more image signal processors (ISP) where the electronic signal is rebuilt as a picture or a preview on a display. *See e.g.*, https://semiconductor.samsung.com/us/solutions/technology/image-processing/.

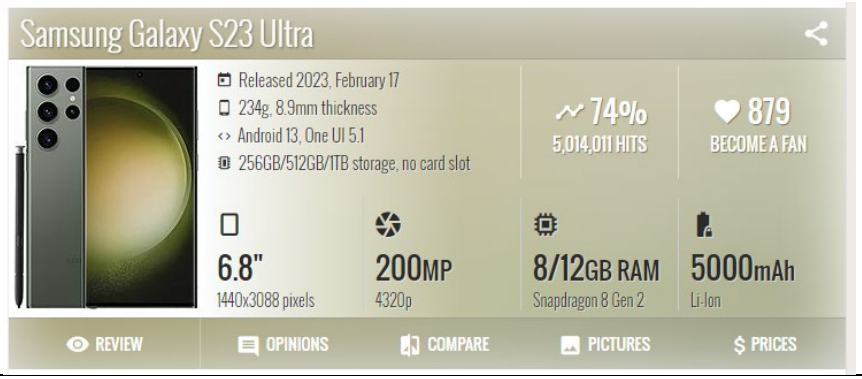
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Accused Samsung '0 Products provide evidence of one or more image sensors converting light into a digital signal, https://semiconductor.samsung.com/us/solutions/technology/image-processing/.

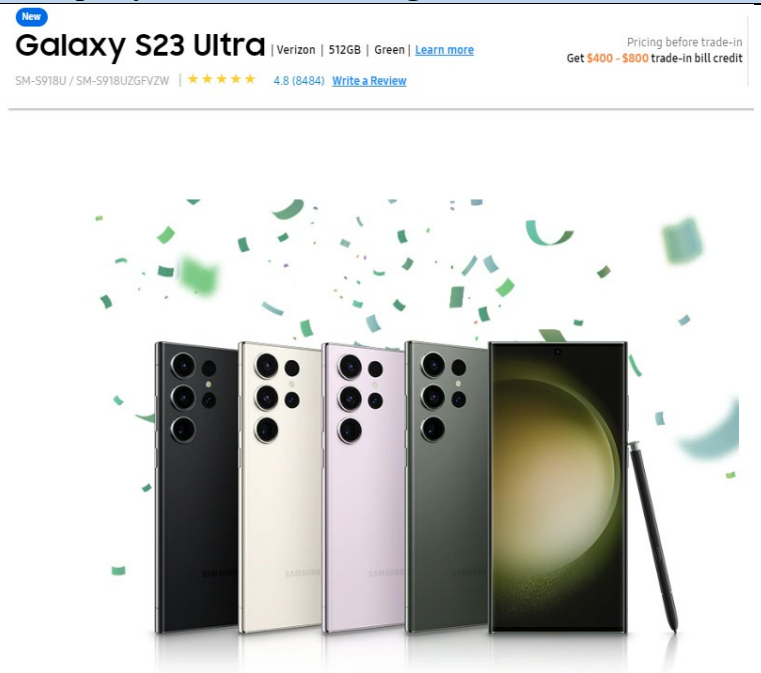
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

MAIN CAMERA	Triple	50 MP, f/1.8, 24mm (wide), 1/1.56", 1.0µm, dual pixel PDAF, OIS
		10 MP, f/2.4, 67mm (telephoto), 1/3.94", 1.0µm, PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 13mm, 120˚ (ultrawide), 1/2.55" 1.4µm, Super Steady video
	Features	Best Face, LED flash, auto-HDR, panorama
	Video	8K@24/30fps, 4K@30/60fps, 1080p@30/60/120/240fps, 10-bit HDR, HDR10+, stereo sound rec., gyro-EIS
SELFIE CAMERA	Single	12 MP, f/2.2, 26mm (wide), 1/3.2", 1.12µm, dual pixel PDAF
	Features	HDR, HDR10+
	Video	4K@30/60fps, 1080p@30fps

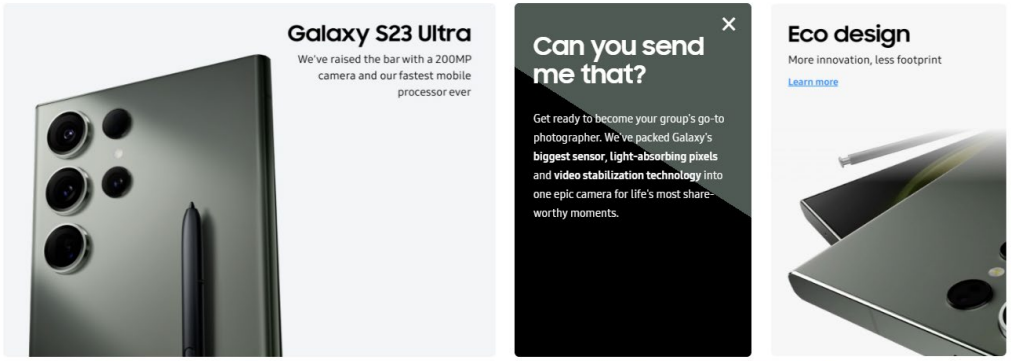
https://www.gsmarena.com/samsung_galaxy_s25-13610.php

Further, each of the Accused Samsung '950 Products includes a photoelectric conversion circuit for performing conversions by using CMOS image sensors to convert light into electricity:



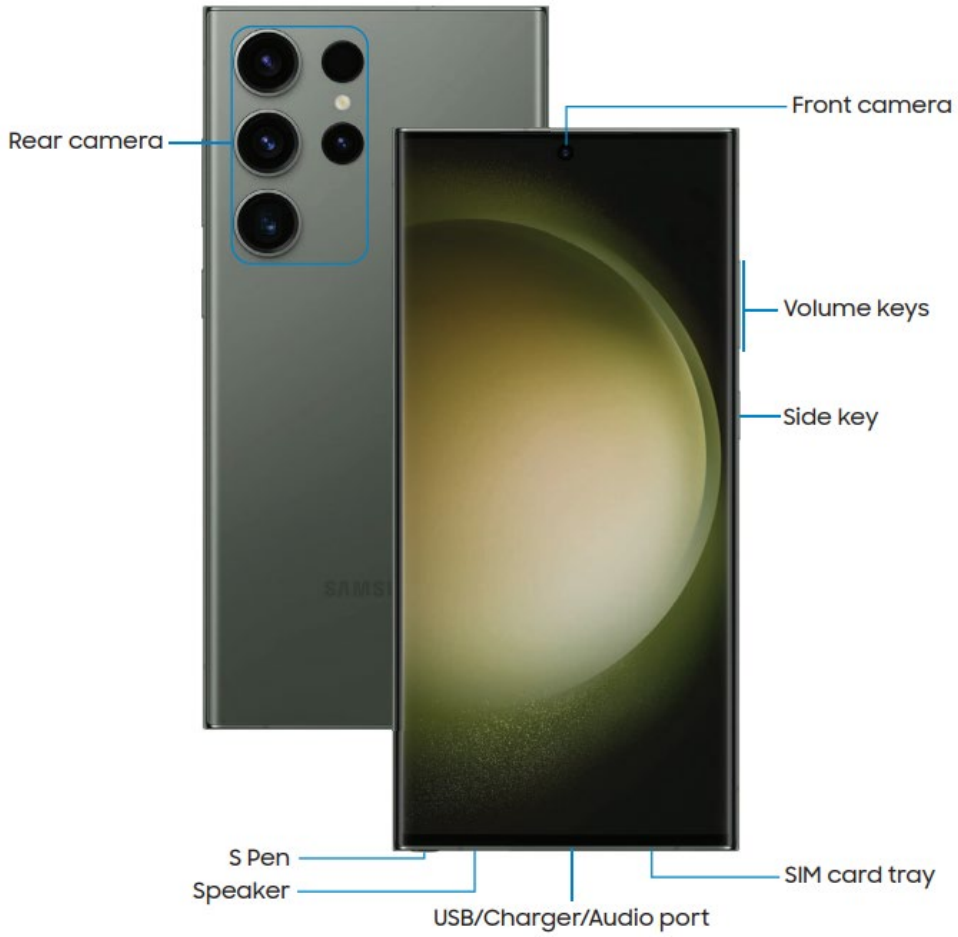
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU; https://www.gsmarena.com/samsung_galaxy_s23_ultra-12024.php.

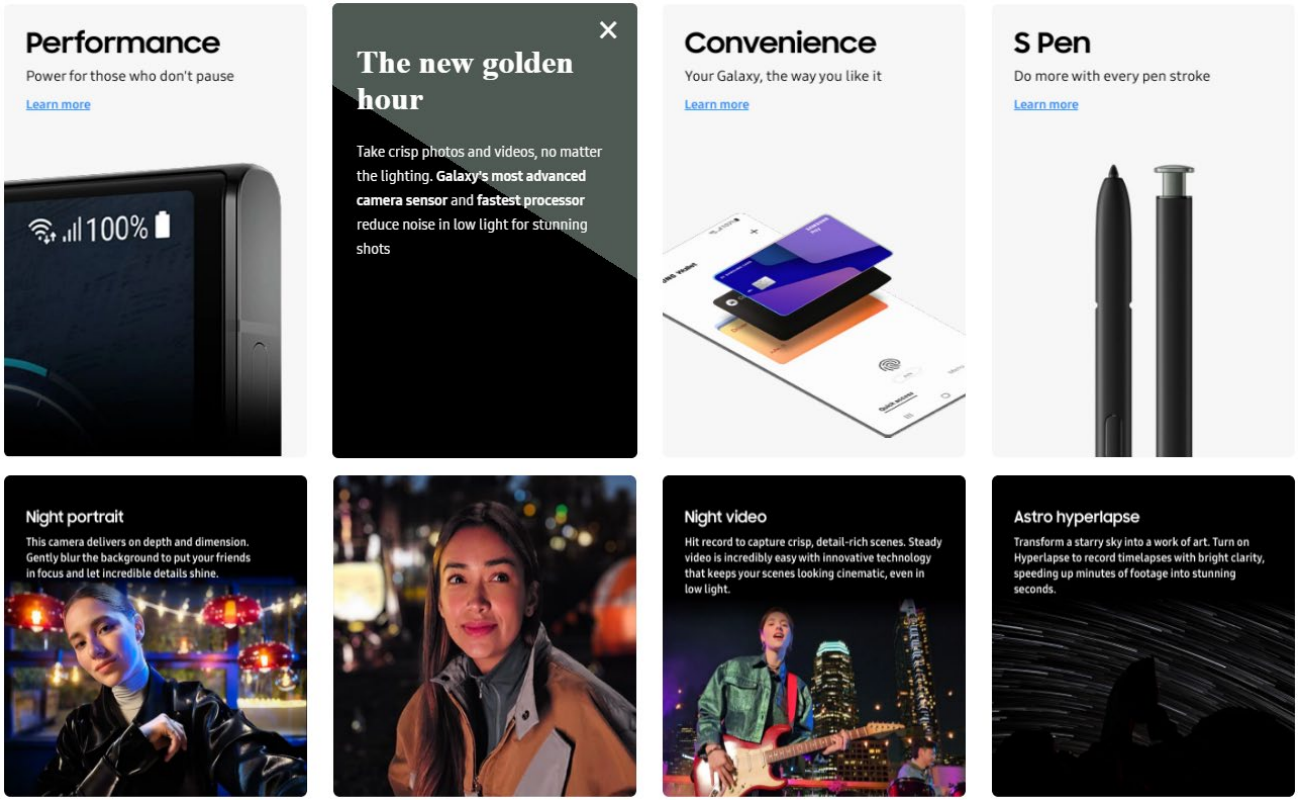
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

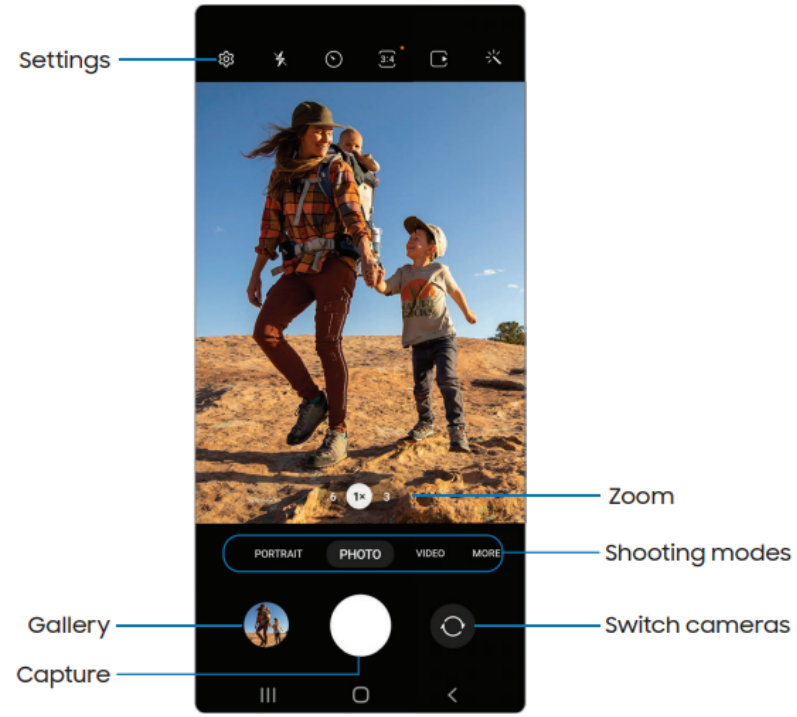


MAIN CAMERA	Quad	200 MP, f/1.7, 24mm (wide), 1/1.3", 0.6µm, multi-directional PDAF, Laser AF, OIS
		10 MP, f/4.9, 230mm (periscope telephoto), 1/3.52", 1.12µm, Dual Pixel PDAF, OIS, 10x optical zoom
		10 MP, f/2.4, 70mm (telephoto), 1/3.52", 1.12µm, Dual Pixel PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 13mm, 120˚ (ultrawide), 1/2.55", 1.4µm, Dual Pixel PDAF, Super Steady video
	Features	LED flash, auto-HDR, panorama
	Video	8K@24/30fps, 4K@30/60fps, 1080p@30/60/240fps, 1080p@960fps, HDR10+, stereo sound rec., gyro-EIS
SELFIE CAMERA	Single	12 MP, f/2.2, 26mm (wide), Dual Pixel PDAF
	Features	Dual video call, Auto-HDR, HDR10+
	Video	4K@30/60fps, 1080p@30fps

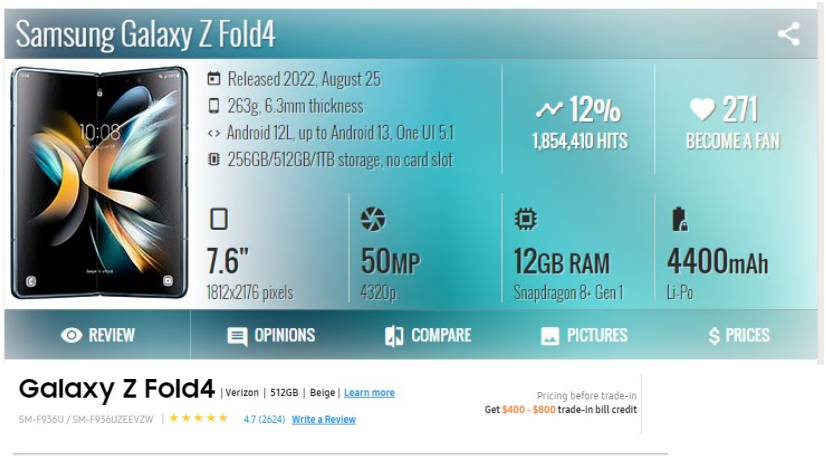
Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU; https://www.gsmarena.com/samsung_galaxy_s23_ultra-12024.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy S23 Ultra 

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy S23 Ultra technical specifications; https://downloadcenter.samsung.com/content/UM/202302/20230228053129621/SAM_S911_S916_S918_EN_UM_OS13_020223_FINAL_AC_022023.pdf at 5.  Galaxy S23 Ultra technical specifications; https://www.samsung.com/us/smartphones/galaxy-s23-ultra/buy/galaxy-s23-ultra-512gb-verizon-sm-s918uzgfvzw/?modelCode=SM-S918UZGFXAU.

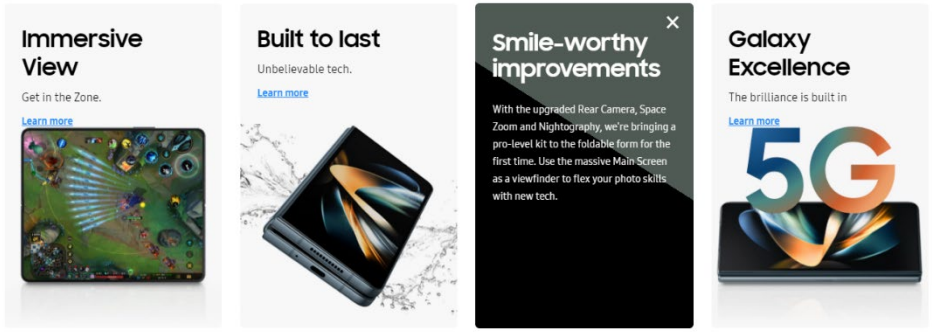
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Camera Enjoy a full kit of pro lenses and pro-grade video modes and settings. ○ From Apps, tap Camera. TIP Quickly press the **Side** key twice to open the Camera app.  Galaxy S23 Ultra technical specification; https://downloadcenter.samsung.com/content/UM/202302/20230228053129621/SAM_S911_S916_S918_EN_UM_OS13_020223_FINAL_AC_022023.pdf at 58.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement



Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/; https://www.gsmarena.com/samsung_galaxy_z_fold4-11737.php.

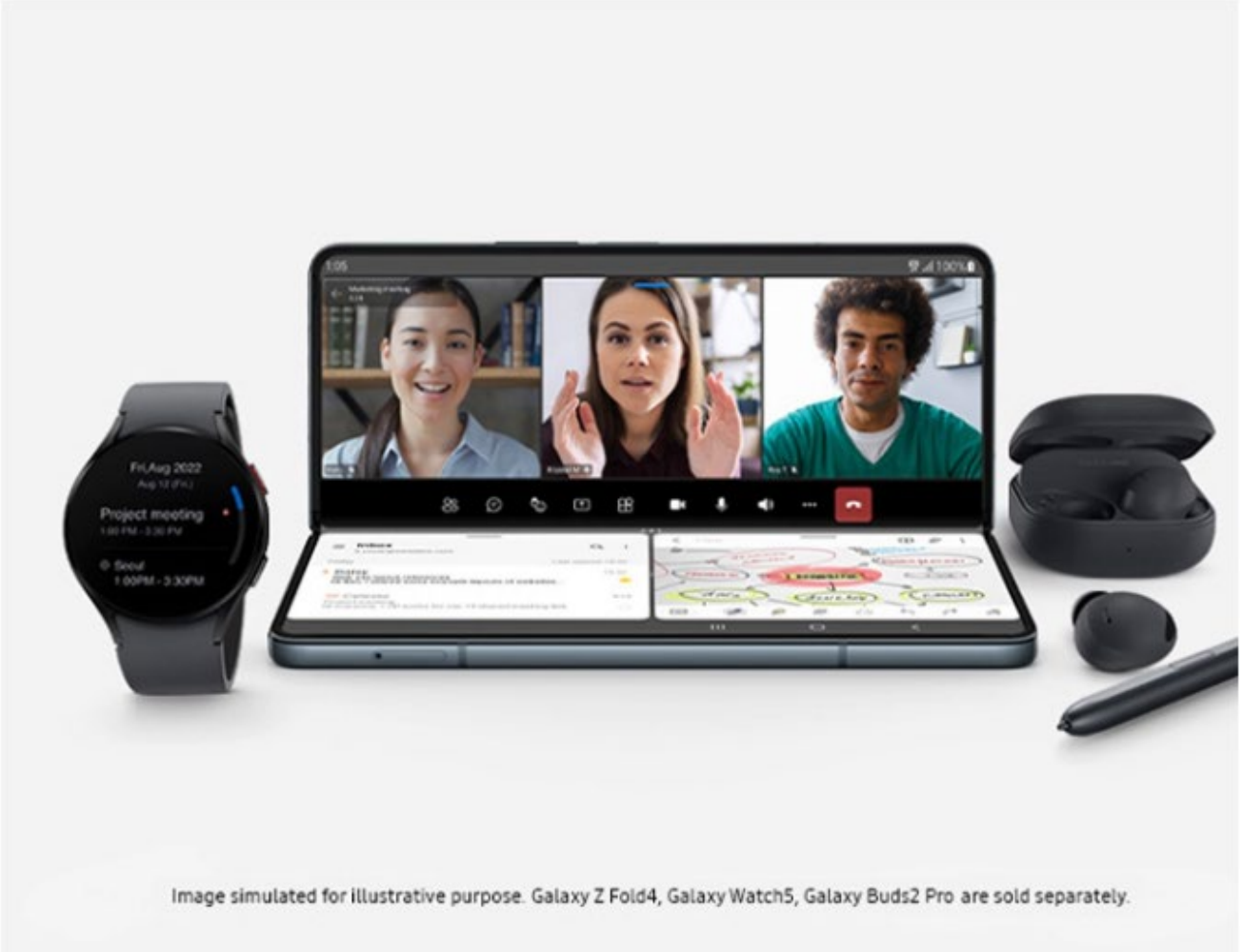
U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement

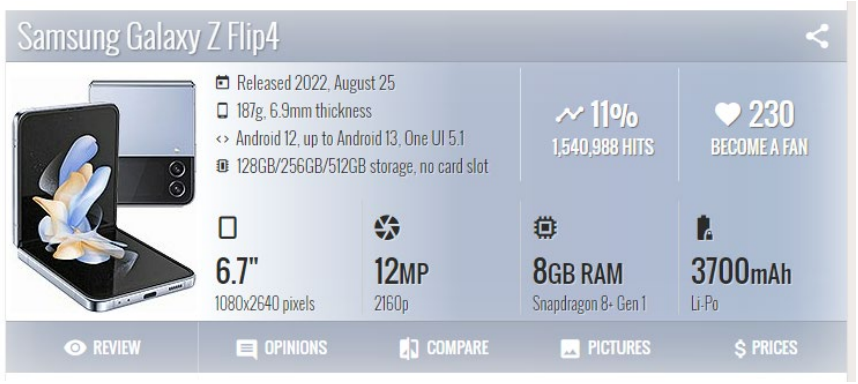
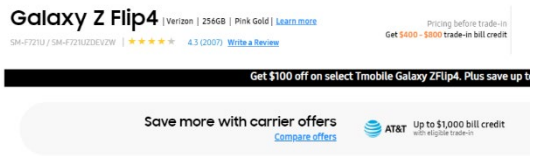


MAIN CAMERA	Triple	50 MP, f/1.8, 23mm (wide), 1.0µm, Dual Pixel PDAF, OIS
		10 MP, f/2.4, 66mm (telephoto), 1.0µm, PDAF, OIS, 3x optical zoom
		12 MP, f/2.2, 123°, 12mm (ultrawide), 1.12µm
	Features	LED flash, HDR, panorama
	Video	8K@24fps, 4K@60fps, 1080p@60/240fps (gyro-EIS), 720p@960fps (gyro-EIS), HDR10+
SELFIE CAMERA	Single	4 MP, f/1.8, 26mm (wide), 2.0µm, under display
		Cover camera:
		10 MP, f/2.2, 24mm (wide), 1/3", 1.22µm
	Features	HDR
	Video	4K@30/60fps, 1080p@30/60fps, gyro-EIS

Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/; https://www.gsmarena.com/samsung_galaxy_z_fold4-11737.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Fold4 technical specification; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_fold4_d1e605.html.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy Z Fold4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-fold4/buy/galaxy-z-fold4-512gb-att-sm-f936uzeeatt/.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy Z Fold4 technical specifications; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_fold4_camera_features_d1e3185.   Galaxy Z Flip4 technical specifications; https://www.samsung.com/us/smartphones/galaxy-z-flip4/buy/galaxy-z-flip4-256gb-t-mobile-sm-f721uzdexau/; https://www.gsmarena.com/samsung_galaxy_z_flip4-11538.php.

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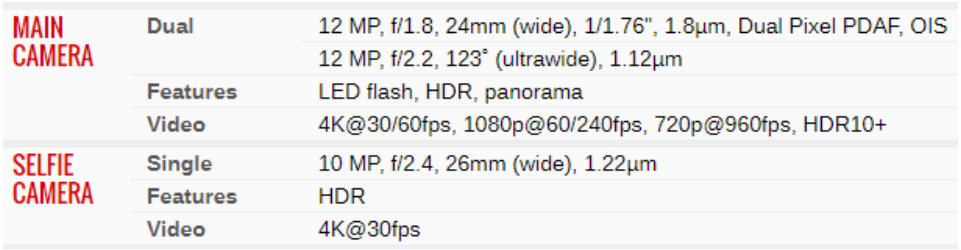
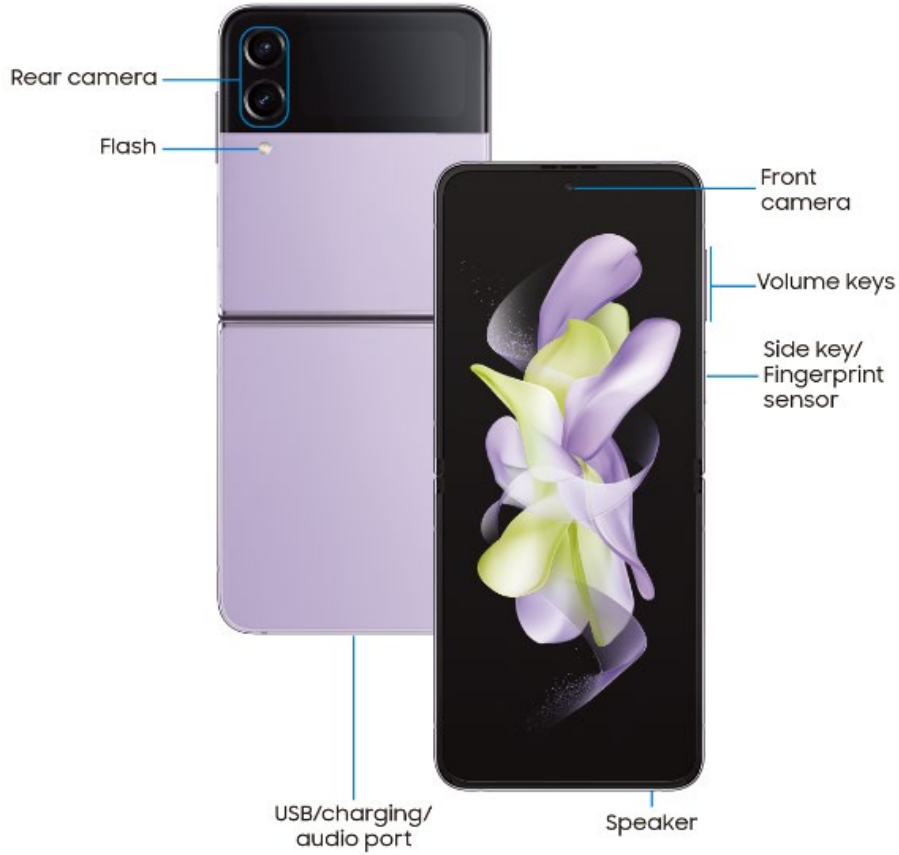
	 Galaxy Z Flip4 technical specifications; https://www.gsmarena.com/samsung_galaxy_z_flip4-11538.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	Galaxy Z Flip4  Galaxy Z Flip4 technical specifications; https://downloadcenter.samsung.com/content/PM/202303/20230313225909630/EB/SAM_F936_F721_EN_FINAL_230201/galaxy_z_flip4_d1e661.html.

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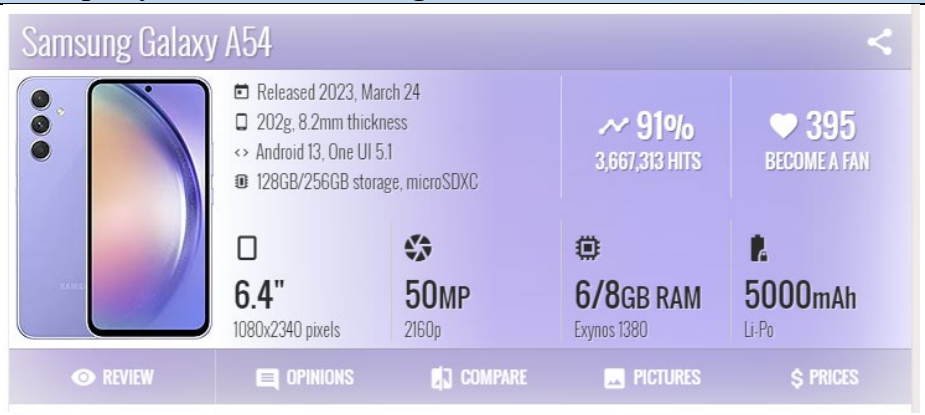

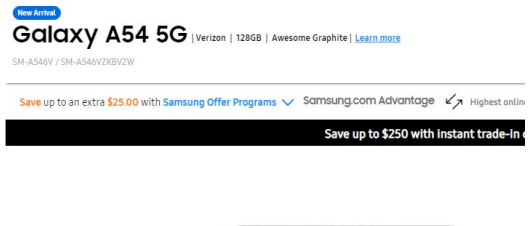

Galaxy A54 5G technical specifications; https://www.samsung.com/us/mobile/phones/galaxy-a54/buy/; https://www.gsmarena.com/samsung_galaxy_a54-12070.php.

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MAIN CAMERA	Triple	50 MP, f/1.8, (wide), 1/1.56", 1.0µm, PDAF, OIS
		12 MP, f/2.2, 123° (ultrawide), 1.12µm
		5 MP, f/2.4, (macro)
	Features	LED flash, panorama, HDR
	Video	4K@30fps, 1080p@30/60fps, 720p@480fps
SELFIE CAMERA	Single	32 MP, f/2.2, 26mm (wide), 1/2.8", 0.8µm
	Video	4K@30fps, 1080p@30/60fps

Samsung Galaxy A54 5G technical specifications; Galaxy A54 5G, 128GB (Unlocked) Phones - SM-A546UZKBXAA | Samsung US; https://www.gsmarena.com/samsung_galaxy_a54-12070.php.

U.S. Patent No. 8,471,950	Exemplary Evidence of Infringement
	 Galaxy A54 5G technical specifications; https://downloadcenter.samsung.com/content/UM/202304/20230407022332214/SAM_A546_EN_UM_OS13_040523_FINAL.pdf at 5.

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[12.c] the control unit controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed.	*See* [1.f] above. The signal processor in each of the Accused Samsung '950 Products incorporates or operates as the control unit that controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed. As an example, the signal processor is configured to create a region that includes skin tones and textures and other region or regions that do not include skin tones and textures. To create other region or regions that do not contain the detected skin tones and textures, the signal processor excludes a skin tone region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contain a detected moving object or subject and other region or regions that do not contain the detected moving object or subject. To create other region or regions that do not contain the detected moving object, the signal processor excludes a moving object region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains a detected face and other region or regions that do not contain the detected face. To create other region or regions that do not contain the detected face, the signal processor excludes a face region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected natural skin and other region or regions that do not contain the detected natural skin. To create other region or regions that do not contain the detected natural skin, the signal processor excludes a natural skin region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected hair and other region or regions that do not contain the detected hair. To create other region or regions

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	that do not contain the detected hair, the signal processor excludes a hair region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected clothing and other region or regions that do not contain the detected clothing. To create other region or regions that do not contain the detected clothing, the signal processor excludes a clothing region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains a detected object in a foreground and other region or regions that are part of a background. To create other region or regions that do not contain the detected foreground, the signal processor excludes a foreground region that contains the pixels for which a position has been held in the hold unit or memory.

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	• Our Qualcomm Spectra™ AI ISP features:
	  • Limitless Real-time Semantic Segmentation for photo/video frame
	  • Insight AI provides real-time skin and sky adjustments to create more natural color and lighting in uncertain conditions.
	  • Ultra-low Light video capture
	  • Video Object Eraser can remove unwanted elements from videos
	  • Real-time AI Relighting make you appear professional wherever you are
	  • Truepic photo capture with C2PA standard support lets you snap a photo with Truepic's cryptographic seal to prove the photo is real and not Gen AI
	
	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

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	AI-powered camera redefines photography Infuse brilliance into mobile capture with our AI ISP, enhancing everything from selfies to crystal-clear video chats thanks to an overhauled Hexagon Direct Link. The first AI-powered Limitless Segmentation recognizes and enhances virtually anything in the frame, including faces, hair, clothing, objects, backgrounds, and beyond. Even furry friends appear crisp and cute—no matter how fast the zoomies—thanks to AI-Based Pet Capture. • Our powerful AI ISP is deeply integrated with the Hexagon NPU for enhanced, intuitive capture. • Limitless Segmentation can segment an image in over 250 layers, each optimized to perfection. • Real-time Insight AI captures and enhances natural skin and sky tones even in the most challenging conditions. • Truepic with C2PA adds cryptographic seals so you can authenticate your photos as real and not AI-generated—now including videos and audio recordings. • Video Object Eraser can remove unwanted elements from video footage—on-device. • Capture vivid videos at 4K60 FPS, even in near darkness. (https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Snapdragon-8-Elite-Platform-Product-Brief.pdf)
[14.a] A signal processor according to claim 1, wherein: the processing unit is a signal processing unit for adjusting white balance of an input picture signal; and	*See* claim [4.a] above. *See also*: For example, all of the Accused Samsung '950 Products are equipped with white balance correction, which is activated when an object that appears white in person is detected in an image. The white balance correction adjusts for the color temperature of the light source so that an object that appears white in person also appears white in the image. As a result, the Accused Samsung '950 Products are necessarily configured to detect with a patterned portion (e.g. white object, white snow) formed of a single color of black or white is input, and contain one or more processors for doing same (e.g., CPU, ISP, and/or DSP). - **Pro**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while taking pictures. - **Pro video**: Manually adjust the ISO sensitivity, exposure value, white balance, and color tone while recording videos.

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	Samsung Galaxy S25 User Manual at 43. (https://downloadcenter.samsung.com/content/UM/202502/20250222040501249/SAM_S931_S936_S938_EN_UG_OS15_012425_FINAL_AC_02072025.pdf) Adaptive color tone Adjust the colors and white balance based on ambient lighting conditions to make colors appear more natural in different environments. ○ From Settings, tap Display > **Adaptive color tone** and tap to enable this feature. *Id*. at 116. Screen mode Your device has several screen mode options which adjust the screen quality for different situations. You can select the mode according to your preference. 1. From Settings, tap Display > **Screen mode**. 2. Tap an option to set a different screen mode. • Drag the slider to adjust the white balance. • Tap **Advanced settings** to manually change the RGB values. *Id*. at 117.

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	Intelligent features • **Scan documents and text**: Automatically show a button when a document is detected to scan it. Tap the option to enable Auto scanning, which will scan a document without a tap. You'll also have the option to remove unwanted objects, in case your fingers are in the frame. • **Scan QR codes**: Automatically detects QR codes when using the camera. • **Shot suggestions**: Get on-screen guides to help you line up great shots. • **Intelligent optimization**: Set the quality optimization options to prioritize quality or speed in Photo mode. You can also enable Scene optimizer to automatically adjust exposure, contrast, white balance, and more based on what is detected in the camera frame. The Scene optimizer is only available when using the rear camera. https://www.samsung.com/us/support/answer/ANS10004601/

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```
/**
 * <p>The camera device's autoexposure routine is disabled.</p>
 * <p>The application-selected {@link CaptureRequest#SENSOR_EXPOSURE_TIME android.sensor.exposureTime},
 * {@link CaptureRequest#SENSOR_SENSITIVITY android.sensor.sensitivity} and
 * {@link CaptureRequest#SENSOR_FRAME_DURATION android.sensor.frameDuration} are used by the camera
 * device, along with android.flash.* fields, if there's
 * a flash unit for this camera device.</p>
 * <p>Note that auto-white balance (AWB) and auto-focus (AF)
 * behavior is device dependent when AE is in OFF mode.
 * To have consistent behavior across different devices,
 * it is recommended to either set AWB and AF to OFF mode
 * or lock AWB and AF before setting AE to OFF.
 * See {@link CaptureRequest#CONTROL_AWB_MODE android.control.awbMode}, {@link CaptureRequest#CONTROL_AF_MODE android.control.afMode},
 * {@link CaptureRequest#CONTROL_AWB_LOCK android.control.awbLock}, and {@link CaptureRequest#CONTROL_AF_TRIGGER android.control.afTrigger}
 * for more details.</p>
 * <p>LEGACY devices do not support the OFF mode and will
 * override attempts to use this value to ON.</p>
 *
 * @see CaptureRequest#CONTROL_AF_MODE
 * @see CaptureRequest#CONTROL_AF_TRIGGER
 * @see CaptureRequest#CONTROL_AWB_LOCK
 * @see CaptureRequest#CONTROL_AWB_MODE
 * @see CaptureRequest#SENSOR_EXPOSURE_TIME
 * @see CaptureRequest#SENSOR_FRAME_DURATION
 * @see CaptureRequest#SENSOR_SENSITIVITY
 * @see CaptureRequest#CONTROL_AE_MODE
 */
public static final int CONTROL_AE_MODE_OFF = 0;
```

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```
/**
 * <p>The camera device's auto-white balance routine is disabled.</p>
 * <p>The application-selected color transform matrix
 * ({@link CaptureRequest#COLOR_CORRECTION_TRANSFORM android.colorCorrection.transform}) and gains
 * ({@link CaptureRequest#COLOR_CORRECTION_GAINS android.colorCorrection.gains}) are used by the camera
 * device for manual white balance control.</p>
 *
 * @see CaptureRequest#COLOR_CORRECTION_GAINS
 * @see CaptureRequest#COLOR_CORRECTION_TRANSFORM
 * @see CaptureRequest#CONTROL_AWB_MODE
 */
public static final int CONTROL_AWB_MODE_OFF = 0;

/**
 * <p>The camera device's auto-white balance routine is active.</p>
 * <p>The application's values for {@link CaptureRequest#COLOR_CORRECTION_TRANSFORM android.colorCorrection.transform}
 * and {@link CaptureRequest#COLOR_CORRECTION_GAINS android.colorCorrection.gains} are ignored.
 * For devices that support the MANUAL_POST_PROCESSING capability, the
 * values used by the camera device for the transform and gains
 * will be available in the capture result for this request.</p>
 *
 * @see CaptureRequest#COLOR_CORRECTION_GAINS
 * @see CaptureRequest#COLOR_CORRECTION_TRANSFORM
 * @see CaptureRequest#CONTROL_AWB_MODE
 */
public static final int CONTROL_AWB_MODE_AUTO = 1;
```

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```
     * <p>The camera device's auto-white balance routine is disabled;
     * the camera device uses incandescent light as the assumed scene
     * illumination for white balance.</p>
     * <p>While the exact white balance transforms are up to the
     * camera device, they will approximately match the CIE
     * standard illuminant A.</p>
     * <p>The application's values for {@link CaptureRequest#COLOR_CORRECTION_TRANSFORM android.colorCorrection.transform}
     * and {@link CaptureRequest#COLOR_CORRECTION_GAINS android.colorCorrection.gains} are ignored.
     * For devices that support the MANUAL_POST_PROCESSING capability, the
     * values used by the camera device for the transform and gains
     * will be available in the capture result for this request.</p>
     *
     * @see CaptureRequest#COLOR_CORRECTION_GAINS
     * @see CaptureRequest#COLOR_CORRECTION_TRANSFORM
     * @see CaptureRequest#CONTROL_AWB_MODE
     */
    public static final int CONTROL_AWB_MODE_INCANDESCENT = 2;

    /**
     * <p>The camera device's auto-white balance routine is disabled;
     * the camera device uses fluorescent light as the assumed scene
     * illumination for white balance.</p>
     * <p>While the exact white balance transforms are up to the
     * camera device, they will approximately match the CIE
     * standard illuminant F2.</p>
     * <p>The application's values for {@link CaptureRequest#COLOR_CORRECTION_TRANSFORM android.colorCorrection.transform}
     * and {@link CaptureRequest#COLOR_CORRECTION_GAINS android.colorCorrection.gains} are ignored.
     * For devices that support the MANUAL_POST_PROCESSING capability, the
     * values used by the camera device for the transform and gains
     * will be available in the capture result for this request.</p>
     *
     * @see CaptureRequest#COLOR_CORRECTION_GAINS
     * @see CaptureRequest#COLOR_CORRECTION_TRANSFORM
     * @see CaptureRequest#CONTROL_AWB_MODE
     */
    public static final int CONTROL_AWB_MODE_FLUORESCENT = 3;
```

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```
     * <p>The camera device's auto-white balance routine is disabled;
     * the camera device uses warm fluorescent light as the assumed scene
     * illumination for white balance.</p>
     * <p>While the exact white balance transforms are up to the
     * camera device, they will approximately match the CIE
     * standard illuminant F4.</p>
     * <p>The application's values for {@link CaptureRequest#COLOR_CORRECTION_TRANSFORM android.colorCorrection.transform}
     * and {@link CaptureRequest#COLOR_CORRECTION_GAINS android.colorCorrection.gains} are ignored.
     * For devices that support the MANUAL_POST_PROCESSING capability, the
     * values used by the camera device for the transform and gains
     * will be available in the capture result for this request.</p>
     *
     * @see CaptureRequest#COLOR_CORRECTION_GAINS
     * @see CaptureRequest#COLOR_CORRECTION_TRANSFORM
     * @see CaptureRequest#CONTROL_AWB_MODE
     */
    public static final int CONTROL_AWB_MODE_WARM_FLUORESCENT = 4;

    /**
     * <p>The camera device's auto-white balance routine is disabled;
     * the camera device uses daylight light as the assumed scene
     * illumination for white balance.</p>
     * <p>While the exact white balance transforms are up to the
     * camera device, they will approximately match the CIE
     * standard illuminant D65.</p>
     * <p>The application's values for {@link CaptureRequest#COLOR_CORRECTION_TRANSFORM android.colorCorrection.transform}
     * and {@link CaptureRequest#COLOR_CORRECTION_GAINS android.colorCorrection.gains} are ignored.
     * For devices that support the MANUAL_POST_PROCESSING capability, the
     * values used by the camera device for the transform and gains
     * will be available in the capture result for this request.</p>
     *
     * @see CaptureRequest#COLOR_CORRECTION_GAINS
     * @see CaptureRequest#COLOR_CORRECTION_TRANSFORM
     * @see CaptureRequest#CONTROL_AWB_MODE
     */
    public static final int CONTROL_AWB_MODE_DAYLIGHT = 5;
```

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```
/**
 * <p>The camera device's auto-white balance routine is disabled;
 * the camera device uses cloudy daylight light as the assumed scene
 * illumination for white balance.</p>
 * <p>The application's values for {@link CaptureRequest#COLOR_CORRECTION_TRANSFORM android.colorCorrection.transform}
 * and {@link CaptureRequest#COLOR_CORRECTION_GAINS android.colorCorrection.gains} are ignored.
 * For devices that support the MANUAL_POST_PROCESSING capability, the
 * values used by the camera device for the transform and gains
 * will be available in the capture result for this request.</p>
 *
 * @see CaptureRequest#COLOR_CORRECTION_GAINS
 * @see CaptureRequest#COLOR_CORRECTION_TRANSFORM
 * @see CaptureRequest#CONTROL_AWB_MODE
 */
public static final int CONTROL_AWB_MODE_CLOUDY_DAYLIGHT = 6;

/**
 * <p>The camera device's auto-white balance routine is disabled;
 * the camera device uses twilight light as the assumed scene
 * illumination for white balance.</p>
 * <p>The application's values for {@link CaptureRequest#COLOR_CORRECTION_TRANSFORM android.colorCorrection.transform}
 * and {@link CaptureRequest#COLOR_CORRECTION_GAINS android.colorCorrection.gains} are ignored.
 * For devices that support the MANUAL_POST_PROCESSING capability, the
 * values used by the camera device for the transform and gains
 * will be available in the capture result for this request.</p>
 *
 * @see CaptureRequest#COLOR_CORRECTION_GAINS
 * @see CaptureRequest#COLOR_CORRECTION_TRANSFORM
 * @see CaptureRequest#CONTROL_AWB_MODE
 */
public static final int CONTROL_AWB_MODE_TWILIGHT = 7;
```

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```
/**
 * <p>Same as OFF mode, except that this capture will not be
 * used by camera device background auto-exposure, auto-white balance and
 * auto-focus algorithms (3A) to update their statistics.</p>
 * <p>Specifically, the 3A routines are locked to the last
 * values set from a request with AUTO, OFF, or
 * USE_SCENE_MODE, and any statistics or state updates
 * collected from manual captures with OFF_KEEP_STATE will be
 * discarded by the camera device.</p>
 * @see CaptureRequest#CONTROL_MODE
 */
public static final int CONTROL_MODE_OFF_KEEP_STATE = 3;


/**
 * <p>If face detection support exists, use face
 * detection data for auto-focus, auto-white balance, and
 * auto-exposure routines.</p>
 * <p>If face detection statistics are disabled
 * (i.e. {@link CaptureRequest#STATISTICS_FACE_DETECT_MODE android.statistics.faceDetectMode} is set to OFF),
 * this should still operate correctly (but will not return
 * face detection statistics to the framework).</p>
 * <p>Unlike the other scene modes, {@link CaptureRequest#CONTROL_AE_MODE android.control.aeMode},
 * {@link CaptureRequest#CONTROL_AWB_MODE android.control.awbMode}, and {@link CaptureRequest#CONTROL_AF_MODE android.control.afMode}
 * remain active when FACE_PRIORITY is set.</p>
 *
 * @see CaptureRequest#CONTROL_AE_MODE
 * @see CaptureRequest#CONTROL_AF_MODE
 * @see CaptureRequest#CONTROL_AWB_MODE
 * @see CaptureRequest#STATISTICS_FACE_DETECT_MODE
 * @see CaptureRequest#CONTROL_SCENE_MODE
 */
public static final int CONTROL_SCENE_MODE_FACE_PRIORITY = 1;
```

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```
/**
 * <p>List of the maximum number of regions that can be used for metering in
 * auto-exposure (AE), auto-white balance (AWB), and auto-focus (AF);
 * this corresponds to the maximum number of elements in
 * {@link CaptureRequest#CONTROL_AE_REGIONS android.control.aeRegions}, {@link CaptureRequest#CONTROL_AWB_REGIONS android.control.awbRegions},
 * and {@link CaptureRequest#CONTROL_AF_REGIONS android.control.afRegions}.</p>
 * <p><b>Range of valid values:</b><br></p>
 * <p>Value must be &gt;= 0 for each element. For full-capability devices
 * this value must be &gt;= 1 for AE and AF. The order of the elements is:
 * <code>(AE, AWB, AF)</code>.</p>
 * <p>This key is available on all devices.</p>
 *
 * @see CaptureRequest#CONTROL_AE_REGIONS
 * @see CaptureRequest#CONTROL_AF_REGIONS
 * @see CaptureRequest#CONTROL_AWB_REGIONS
 * @hide
 */
public static final Key<int[]> CONTROL_MAX_REGIONS =
        new Key<int[]>("android.control.maxRegions", int[].class);


/**
 * <p>List of auto-white-balance modes for {@link CaptureRequest#CONTROL_AWB_MODE android.control.awbMode} that are supported by this
 * camera device.</p>
 * <p>Not all the auto-white-balance modes may be supported by a
 * given camera device. This entry lists the valid modes for
 * {@link CaptureRequest#CONTROL_AWB_MODE android.control.awbMode} for this camera device.</p>
 * <p>All camera devices will support ON mode.</p>
 * <p>Camera devices that support the MANUAL_POST_PROCESSING capability will always support OFF
 * mode, which enables application control of white balance, by using
 * {@link CaptureRequest#COLOR_CORRECTION_TRANSFORM android.colorCorrection.transform} and {@link CaptureRequest#COLOR_CORRECTION_GAINS android.colorCorrection.gains}({@l
 * mode camera devices.</p>
 * <p><b>Range of valid values:</b><br>
 * Any value listed in {@link CaptureRequest#CONTROL_AWB_MODE android.control.awbMode}</p>
 * <p>This key is available on all devices.</p>
 *
 * @see CaptureRequest#COLOR_CORRECTION_GAINS
 * @see CaptureRequest#COLOR_CORRECTION_MODE
 * @see CaptureRequest#COLOR_CORRECTION_TRANSFORM
 * @see CaptureRequest#CONTROL_AWB_MODE
 */
@PublicKey
@NonNull
public static final Key<int[]> CONTROL_AWB_AVAILABLE_MODES =
       new Key<int[]>("android.control.awbAvailableModes", int[].class);
```

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```
/**
 * <p>List of the maximum number of regions that can be used for metering in
 * auto-exposure (AE), auto-white balance (AWB), and auto-focus (AF);
 * this corresponds to the maximum number of elements in
 * {@link CaptureRequest#CONTROL_AE_REGIONS android.control.aeRegions}, {@link CaptureRequest#CONTROL_AWB_REGIONS android.control.awbRegions},
 * and {@link CaptureRequest#CONTROL_AF_REGIONS android.control.afRegions}.</p>
 * <p><b>Range of valid values:</b><br></p>
 * <p>Value must be &gt;= 0 for each element. For full-capability devices
 * this value must be &gt;= 1 for AE and AF. The order of the elements is:
 * <code>(AE, AWB, AF)</code>.</p>
 * <p>This key is available on all devices.</p>
 *
 * @see CaptureRequest#CONTROL_AE_REGIONS
 * @see CaptureRequest#CONTROL_AF_REGIONS
 * @see CaptureRequest#CONTROL_AWB_REGIONS
 * @hide
 */
public static final Key<int[]> CONTROL_MAX_REGIONS =
        new Key<int[]>("android.control.maxRegions", int[].class);


/**
 * <p>The mode control selects how the image data is converted from the
 * sensor's native color into linear sRGB color.</p>
 * <p>When auto-white balance (AWB) is enabled with {@link CaptureRequest#CONTROL_AWB_MODE android.control.awbMode}, this
 * control is overridden by the AWB routine. When AWB is disabled, the
 * application controls how the color mapping is performed.</p>
 * <p>We define the expected processing pipeline below. For consistency
 * across devices, this is always the case with TRANSFORM_MATRIX.</p>
 * <p>When either FAST or HIGH_QUALITY is used, the camera device may
 * do additional processing but {@link CaptureRequest#COLOR_CORRECTION_GAINS android.colorCorrection.gains} and
 * {@link CaptureRequest#COLOR_CORRECTION_TRANSFORM android.colorCorrection.transform} will still be provided by the
 * camera device (in the results) and be roughly correct.</p>
 * <p>Switching to TRANSFORM_MATRIX and using the data provided from
 * FAST or HIGH_QUALITY will yield a picture with the same white point
 * as what was produced by the camera device in the earlier frame.</p>
 * <p>The expected processing pipeline is as follows:</p>
 * <p><img alt="White balance processing pipeline" src="/reference/images/camera2/metadata/android.colorCorrection.mode/processing_pipeline.png" /></p>
 * <p>The white balance is encoded by two values, a 4-channel white-balance
 * gain vector (applied in the Bayer domain), and a 3x3 color transform
 * matrix (applied after demosaic).</p>
 * <p>The 4-channel white-balance gains are defined as:</p>
 * <pre><code>{@link CaptureRequest#COLOR_CORRECTION_GAINS android.colorCorrection.gains} = [ R G_even G_odd B ]
 * </code></pre>

@PublicKey
@NonNull
public static final Key<Integer> COLOR_CORRECTION_MODE =
        new Key<Integer>("android.colorCorrection.mode", int.class);
```

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```
/**
 * <p>Specifies the color temperature for CCT mode in Kelvin
 * to adjust the white balance of the image.</p>
 * <p>Sets the color temperature in Kelvin units for when
 * {@link CaptureRequest#COLOR_CORRECTION_MODE android.colorCorrection.mode} is CCT to adjust the
 * white balance of the image.</p>
 * <p>If CCT mode is enabled without a requested color temperature,
 * a default value will be set by the camera device. The default value can be
 * retrieved by checking the corresponding capture result. Color temperatures
 * requested outside the advertised {@link CameraCharacteristics#COLOR_CORRECTION_COLOR_TEMPERATURE_RANGE android.colorCorrection.colorTemperatureRange}
 * will be clamped.</p>
 * <p><b>Units</b>: Kelvin</p>
 * <p><b>Range of valid values:</b><br>
 * {@link CameraCharacteristics#COLOR_CORRECTION_COLOR_TEMPERATURE_RANGE android.colorCorrection.colorTemperatureRange}</p>
 * <p><b>Optional</b> - The value for this key may be {@code null} on some devices.</p>
 *
 * @see CameraCharacteristics#COLOR_CORRECTION_COLOR_TEMPERATURE_RANGE
 * @see CaptureRequest#COLOR_CORRECTION_MODE
 */
@PublicKey
@NonNull
@FlaggedApi(Flags.FLAG_COLOR_TEMPERATURE)
public static final Key<Integer> COLOR_CORRECTION_COLOR_TEMPERATURE =
        new Key<Integer>("android.colorCorrection.colorTemperature", int.class);
```

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```
/**
 * <p>Whether auto-white balance (AWB) is currently locked to its
 * latest calculated values.</p>
 * <p>When set to <code>true</code> (ON), the AWB algorithm is locked to its latest parameters,
 * and will not change color balance settings until the lock is set to <code>false</code> (OFF).</p>
 * <p>Since the camera device has a pipeline of in-flight requests, the settings that
 * get locked do not necessarily correspond to the settings that were present in the
 * latest capture result received from the camera device, since additional captures
 * and AWB updates may have occurred even before the result was sent out. If an
 * application is switching between automatic and manual control and wishes to eliminate
 * any flicker during the switch, the following procedure is recommended:</p>
 * <ol>
 * <li>Starting in auto-AWB mode:</li>
 * <li>Lock AWB</li>
 * <li>Wait for the first result to be output that has the AWB locked</li>
 * <li>Copy AWB settings from that result into a request, set the request to manual AWB</li>
 * <li>Submit the capture request, proceed to run manual AWB as desired.</li>
 * </ol>
 * <p>Note that AWB lock is only meaningful when
 * {@link CaptureRequest#CONTROL_AWB_MODE android.control.awbMode} is in the AUTO mode; in other modes,
 * AWB is already fixed to a specific setting.</p>
 * <p>Some LEGACY devices may not support ON; the value is then overridden to OFF.</p>
 * <p>This key is available on all devices.</p>
 *
 * @see CaptureRequest#CONTROL_AWB_MODE
 */
@PublicKey
@NonNull
public static final Key<Boolean> CONTROL_AWB_LOCK =
        new Key<Boolean>("android.control.awbLock", boolean.class);
```

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```
/**
 * <p>Whether auto-white balance (AWB) is currently setting the color
 * transform fields, and what its illumination target
 * is.</p>
 * <p>This control is only effective if {@link CaptureRequest#CONTROL_MODE android.control.mode} is AUTO.</p>
 * <p>When set to the AUTO mode, the camera device's auto-white balance
 * routine is enabled, overriding the application's selected
 * {@link CaptureRequest#COLOR_CORRECTION_TRANSFORM android.colorCorrection.transform}, {@link CaptureRequest#COLOR_CORRECTION_GAINS android.colorCorrection.gains} and
 * {@link CaptureRequest#COLOR_CORRECTION_MODE android.colorCorrection.mode}. Note that when {@link CaptureRequest#CONTROL_AE_MODE android.control.aeMode}
 * is OFF, the behavior of AWB is device dependent. It is recommended to
 * also set AWB mode to OFF or lock AWB by using {@link CaptureRequest#CONTROL_AWB_LOCK android.control.awbLock} before
 * setting AE mode to OFF.</p>
 * <p>When set to the OFF mode, the camera device's auto-white balance
 * routine is disabled. The application manually controls the white
 * balance by {@link CaptureRequest#COLOR_CORRECTION_TRANSFORM android.colorCorrection.transform}, {@link CaptureRequest#COLOR_CORRECTION_GAINS android.colorCorrection.g
 * and {@link CaptureRequest#COLOR_CORRECTION_MODE android.colorCorrection.mode}.</p>
 * <p>When set to any other modes, the camera device's auto-white
 * balance routine is disabled. The camera device uses each
 * particular illumination target for white balance
 * adjustment. The application's values for
 * {@link CaptureRequest#COLOR_CORRECTION_TRANSFORM android.colorCorrection.transform},
 * {@link CaptureRequest#COLOR_CORRECTION_GAINS android.colorCorrection.gains} and
 * {@link CaptureRequest#COLOR_CORRECTION_MODE android.colorCorrection.mode} are ignored.</p>
 * <p><b>Possible values:</b></p>
 * <ul>
 *   <li>{@link #CONTROL_AWB_MODE_OFF OFF}</li>
 *   <li>{@link #CONTROL_AWB_MODE_AUTO AUTO}</li>
 *   <li>{@link #CONTROL_AWB_MODE_INCANDESCENT INCANDESCENT}</li>
 *   <li>{@link #CONTROL_AWB_MODE_FLUORESCENT FLUORESCENT}</li>
 *   <li>{@link #CONTROL_AWB_MODE_WARM_FLUORESCENT WARM_FLUORESCENT}</li>
 *   <li>{@link #CONTROL_AWB_MODE_DAYLIGHT DAYLIGHT}</li>
 *   <li>{@link #CONTROL_AWB_MODE_CLOUDY_DAYLIGHT CLOUDY_DAYLIGHT}</li>
 *   <li>{@link #CONTROL_AWB_MODE_TWILIGHT TWILIGHT}</li>
 *   <li>{@link #CONTROL_AWB_MODE_SHADE SHADE}</li>
 * </ul>
 *
 * <p><b>Available values for this device:</b><br>
 * {@link CameraCharacteristics#CONTROL_AWB_AVAILABLE_MODES android.control.awbAvailableModes}</p>
 * <p>This key is available on all devices.</p>
 */
@PublicKey
@NonNull
public static final Key<Integer> CONTROL_AWB_MODE =
        new Key<Integer>("android.control.awbMode", int.class);
```

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```
/**
 * <p>Current state of auto-white balance (AWB) algorithm.</p>
 * <p>Switching between or enabling AWB modes ({@link CaptureRequest#CONTROL_AWB_MODE android.control.awbMode}) alway
 * resets the AWB state to INACTIVE. Similarly, switching between {@link CaptureRequest#CONTROL_MODE android.control.
 * or {@link CaptureRequest#CONTROL_SCENE_MODE android.control.sceneMode} if <code>{@link CaptureRequest#CONTROL_MODE
 * the algorithm states to INACTIVE.</p>
 * <p>The camera device can do several state transitions between two results, if it is
 * allowed by the state transition table. So INACTIVE may never actually be seen in
 * a result.</p>
 * <p>The state in the result is the state for this image (in sync with this image): if
 * AWB state becomes CONVERGED, then the image data associated with this result should
 * be good to use.</p>
 * <p>Below are state transition tables for different AWB modes.</p>
 * <p>When <code>{@link CaptureRequest#CONTROL_AWB_MODE android.control.awbMode} != AWB_MODE_AUTO</code>:</p>
 * <table>
 * <thead>
 * <tr>
 * <th style="text-align: center;">State</th>
 * <th style="text-align: center;">Transition Cause</th>
 * <th style="text-align: center;">New State</th>
 * <th style="text-align: center;">Notes</th>
 * </tr>
 * </thead>
 * <tbody>
 * <tr>
 * <td style="text-align: center;">INACTIVE</td>
 * <td style="text-align: center;"></td>
 * <td style="text-align: center;">INACTIVE</td>
 * <td style="text-align: center;">Camera device auto white balance algorithm is disabled</td>
 * </tr>
     */
    @PublicKey
    @NonNull
    public static final Key<Integer> CONTROL_AWB_STATE =
            new Key<Integer>("android.control.awbState", int.class);
```

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```
/**
 * <p>Whether auto-white balance (AWB) is currently setting the color
 * transform fields, and what its illumination target
 * is.</p>
 * <p>This control is only effective if {@link CaptureRequest#CONTROL_MODE android.control.mode} is AUTO.</p>
 * <p>When set to the AUTO mode, the camera device's auto-white balance
 * routine is enabled, overriding the application's selected
 * {@link CaptureRequest#COLOR_CORRECTION_TRANSFORM android.colorCorrection.transform}, {@link CaptureRequest#COLOR_CORRECTION_GAINS android.colorCorrection.gains} and
 * {@link CaptureRequest#COLOR_CORRECTION_MODE android.colorCorrection.mode}. Note that when {@link CaptureRequest#CONTROL_AE_MODE android.control.aeMode}
 * is OFF, the behavior of AWB is device dependent. It is recommended to
 * also set AWB mode to OFF or lock AWB by using {@link CaptureRequest#CONTROL_AWB_LOCK android.control.awbLock} before
 * setting AE mode to OFF.</p>
 * <p>When set to the OFF mode, the camera device's auto-white balance
 * routine is disabled. The application manually controls the white
 * balance by {@link CaptureRequest#COLOR_CORRECTION_TRANSFORM android.colorCorrection.transform}, {@link CaptureRequest#COLOR_CORRECTION_GAINS android.colorCorrection.
 * and {@link CaptureRequest#COLOR_CORRECTION_MODE android.colorCorrection.mode}.</p>
 * <p>When set to any other modes, the camera device's auto-white
 * balance routine is disabled. The camera device uses each
 * particular illumination target for white balance
 * adjustment. The application's values for
 * {@link CaptureRequest#COLOR_CORRECTION_TRANSFORM android.colorCorrection.transform},
 * {@link CaptureRequest#COLOR_CORRECTION_GAINS android.colorCorrection.gains} and
 * {@link CaptureRequest#COLOR_CORRECTION_MODE android.colorCorrection.mode} are ignored.</p>
 * <p><b>Possible values:</b></p>
 * <ul>
 *   <li>{@link #CONTROL_AWB_MODE_OFF OFF}</li>
 *   <li>{@link #CONTROL_AWB_MODE_AUTO AUTO}</li>
 *   <li>{@link #CONTROL_AWB_MODE_INCANDESCENT INCANDESCENT}</li>
 *   <li>{@link #CONTROL_AWB_MODE_FLUORESCENT FLUORESCENT}</li>
 *   <li>{@link #CONTROL_AWB_MODE_WARM_FLUORESCENT WARM_FLUORESCENT}</li>
 *   <li>{@link #CONTROL_AWB_MODE_DAYLIGHT DAYLIGHT}</li>
 *   <li>{@link #CONTROL_AWB_MODE_CLOUDY_DAYLIGHT CLOUDY_DAYLIGHT}</li>
 *   <li>{@link #CONTROL_AWB_MODE_TWILIGHT TWILIGHT}</li>
 *   <li>{@link #CONTROL_AWB_MODE_SHADE SHADE}</li>
 * </ul>
 */
@PublicKey
@NonNull
public static final Key<Integer> CONTROL_AWB_MODE =
        new Key<Integer>("android.control.awbMode", int.class);
```

See
https://android.googlesource.com/platform/frameworks/base/+/master/core/java/android/hardware/camera2/CameraMetadata.java;
https://android.googlesource.com/platform/frameworks/base/+/master/core/java/android/hardware/camera2/CameraCharacteristics.java;

https://android.googlesource.com/platform/frameworks/base/+/master/core/java/android/hardware/camera2/CaptureResult.java;

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	https://android.googlesource.com/platform/frameworks/base/+/master/core/java/android/hardware/camera2/CaptureRequest.java; As an additional example, the Accused Samsung '950 Products detect white attributes (e.g., based on scene classification or skin) and applies color temperature corrections by adjusting hue and saturation. For example, the "Camera" application includes a scene mode feature, which adjusts the camera settings based on detection of the type of scene including detecting white attributes in the scene. CONTROL_SCENE_MODE_FACE_PRIORITY Added in API level 21 `public static final int CONTROL_SCENE_MODE_FACE_PRIORITY` If face detection support exists, use face detection data for auto-focus, auto-white balance, and auto-exposure routines. If face detection statistics are disabled (i.e. `android.statistics.faceDetectMode` is set to OFF), this should still operate correctly (but will not return face detection statistics to the framework). Unlike the other scene modes, `android.control.aeMode`, `android.control.awbMode`, and `android.control.afMode` remain active when FACE_PRIORITY is set.

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	CONTROL_SCENE_MODE_FIREWORKS Added in API level 21
	
	`public static final int CONTROL_SCENE_MODE_FIREWORKS`
	
	Optimized for nighttime photos of fireworks.
	
	CONTROL_SCENE_MODE_HDR Added in API level 22
	
	`public static final int CONTROL_SCENE_MODE_HDR`
	
	Turn on a device-specific high dynamic range (HDR) mode.
	
	In this scene mode, the camera device captures images that keep a larger range of scene illumination levels visible in the final image. For example, when taking a picture of a object in front of a bright window, both the object and the scene through the window may be visible when using HDR mode, while in normal AUTO mode, one or the other may be poorly exposed. As a tradeoff, HDR mode generally takes much longer to capture a single image, has no user control, and may have other artifacts depending on the HDR method used.
	
	Therefore, HDR captures operate at a much slower rate than regular captures.

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	CONTROL_SCENE_MODE_LANDSCAPE Added in API level 21
	
	`public static final int CONTROL_SCENE_MODE_LANDSCAPE`
	
	Optimized for photos of distant macroscopic objects.
	
	See also:
	
	`CaptureRequest.CONTROL_SCENE_MODE`
	
	Constant Value: 4 (0x00000004)
	
	CONTROL_SCENE_MODE_NIGHT Added in API level 21
	
	`public static final int CONTROL_SCENE_MODE_NIGHT`
	
	Optimized for low-light settings.
	
	See also:
	
	`CaptureRequest.CONTROL_SCENE_MODE`
	
	Constant Value: 5 (0x00000005)

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	CONTROL_SCENE_MODE_NIGHT_PORTRAIT Added in API level 21
	
	`public static final int CONTROL_SCENE_MODE_NIGHT_PORTRAIT`
	
	Optimized for still photos of people in low-light settings.
	
	See also:
	
	`CaptureRequest.CONTROL_SCENE_MODE`
	
	Constant Value: 6 (0x00000006)
	CONTROL_SCENE_MODE_PARTY Added in API level 21
	
	`public static final int CONTROL_SCENE_MODE_PARTY`
	
	Optimized for dim, indoor settings with multiple moving people.
	
	See also:
	
	`CaptureRequest.CONTROL_SCENE_MODE`
	
	Constant Value: 14 (0x0000000e)

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	CONTROL_SCENE_MODE_PORTRAIT Added in API level 21
	
	`public static final int CONTROL_SCENE_MODE_PORTRAIT`
	
	Optimized for still photos of people.
	
	See also:
	
	`CaptureRequest.CONTROL_SCENE_MODE`
	
	Constant Value: 3 (0x00000003)
	CONTROL_SCENE_MODE_SNOW Added in API level 21
	
	`public static final int CONTROL_SCENE_MODE_SNOW`
	
	Optimized for bright, outdoor settings containing snow.
	
	See also:
	
	`CaptureRequest.CONTROL_SCENE_MODE`
	
	Constant Value: 9 (0x00000009)

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	COLOR_CORRECTION_MODE Added in API level 21 `public static final Key<Integer> COLOR_CORRECTION_MODE` The mode control selects how the image data is converted from the sensor's native color into linear sRGB color. When auto-white balance (AWB) is enabled with `CaptureRequest#CONTROL_AWB_MODE`, this control is overridden by the AWB routine. When AWB is disabled, the application controls how the color mapping is performed. *See* https://developer.android.com/reference/android/hardware/camera2/CameraMetadata#CONTROL_SCENE_MODE_FACE_PRIORITY As another example, the signal processor is configured to control image enhancement or color correction such as lighting adjustment or white balance on a detected face while performing different image enhancement, or color correction such as white balance for other region or regions that do not include the detected face. As another example, the signal processor is configured to control image enhancement or color correction such as lighting adjustment or white balance on a detected natural skin while performing different image enhancement, or color correction such as white balance for other region or regions that do not include the detected natural skin. As another example, the signal processor is configured to control image enhancement or color correction such as lighting adjustment or white balance in a hair region while performing different image enhancement, or color correction such as white balance for other region or regions that do not include the detected hair. As another example, the signal processor is configured to control image enhancement or color correction such as lighting adjustment or white balance in a clothing region while performing

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	different image enhancement, or color correction such as white balance for other region or regions that do not include the detected clothing. As another example, the signal processor is configured to control image enhancement or object deletion in a moving object region while performing different image enhancement, or color correction such as white balance for other region or regions that do not include the detected moving object.
[14.b] the control unit controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed.	*See* claim [1.f] above. *See also*: The signal processor in each of the Accused Samsung '950 Products incorporates or operates as the control unit that controls the processing unit by using an evaluated value of a region from which pixels having an extracted predetermined feature are removed. As an example, the signal processor is configured to create a region that includes skin tones and textures and other region or regions that do not include skin tones and textures. To create other region or regions that do not contain the detected skin tones and textures, the signal processor excludes a skin tone region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contain a detected moving object or subject and other region or regions that do not contain the detected moving object or subject. To create other region or regions that do not contain the detected moving object, the signal processor excludes a moving object region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains a detected face and other region or regions that do not contain the detected face. To create other region or

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	regions that do not contain the detected face, the signal processor excludes a face region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected natural skin and other region or regions that do not contain the detected natural skin. To create other region or regions that do not contain the detected natural skin, the signal processor excludes a natural skin region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected hair and other region or regions that do not contain the detected hair. To create other region or regions that do not contain the detected hair, the signal processor excludes a hair region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains detected clothing and other region or regions that do not contain the detected clothing. To create other region or regions that do not contain the detected clothing, the signal processor excludes a clothing region that contains the pixels for which a position has been held in the hold unit or memory. As another example, the signal processor is configured to create a region that contains a detected object in a foreground and other region or regions that are part of a background. To create other region or regions that do not contain the detected foreground, the signal processor excludes a foreground region that contains the pixels for which a position has been held in the hold unit or memory.

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	• Our Qualcomm Spectra™ AI ISP features:
	  • Limitless Real-time Semantic Segmentation for photo/video frame
	  • Insight AI provides real-time skin and sky adjustments to create more natural color and lighting in uncertain conditions.
	  • Ultra-low Light video capture
	  • Video Object Eraser can remove unwanted elements from videos
	  • Real-time AI Relighting make you appear professional wherever you are
	  • Truepic photo capture with C2PA standard support lets you snap a photo with Truepic's cryptographic seal to prove the photo is real and not Gen AI
	
	(https://www.qualcomm.com/products/mobile/snapdragon/smartphones/snapdragon-8-series-mobile-platforms/snapdragon-8-elite-mobile-platform)

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	AI-powered camera redefines photography Infuse brilliance into mobile capture with our AI ISP, enhancing everything from selfies to crystal-clear video chats thanks to an overhauled Hexagon Direct Link. The first AI-powered Limitless Segmentation recognizes and enhances virtually anything in the frame, including faces, hair, clothing, objects, backgrounds, and beyond. Even furry friends appear crisp and cute—no matter how fast the zoomies—thanks to AI-Based Pet Capture. • Our powerful AI ISP is deeply integrated with the Hexagon NPU for enhanced, intuitive capture. • Limitless Segmentation can segment an image in over 250 layers, each optimized to perfection. • Real-time Insight AI captures and enhances natural skin and sky tones even in the most challenging conditions. • Truepic with C2PA adds cryptographic seals so you can authenticate your photos as real and not AI-generated—now including videos and audio recordings. • Video Object Eraser can remove unwanted elements from video footage—on-device. • Capture vivid videos at 4K60 FPS, even in near darkness. (https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/Snapdragon-8-Elite-Platform-Product-Brief.pdf) For example, on information and belief, the Samsung Galaxy S25 includes an image signal processor (ISP) and/or digital signal processor (DSP) that adjusts an image, for example, by performing white balance correction. For example, the white balance is adjusted in accordance with the detected lighting conditions, e.g. fluorescent lighting, incandescent lighting, sunny outdoor lighting, cloudy outdoor lighting. Upon information and belief, certain adjustments are applied when one or more features e.g. skin tone, hair, or face, are detected in a particular region and certain adjustments are performed when the one or more such features are not contained in another region. For example, foliage or snow scene corrections are not performed when such features are not detected in a region but other image corrections are performed (e.g., face corrections and portrait mode corrections are applied). Similarly, certain white balance corrections are not performed when a white or black background is not contained but additional white balance corrections are applied to the content. Further, text scanning corrections are not performed when text is not detected but additional image corrections are applied. Moreover, image corrections to the foreground (e.g., the face of a person or object being captured) are applied but corrections to the background are not applied if a white or black background is not detected. Further if the face is close to the camera such

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that a background is not detected, then the face corrections are applied but background corrections are not applied and background pattern portions are not contained.

Input	Features	Features Contained	Video with Contents	Correction
Portrait Photo	Snow	No	Cloth	Corrections based on the selected camera's parameters
Person in front of a white wall	Snow	No	Face	Beauty face correction applied

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Book Scan	Snow	No	Scanned image	Scan correction applied
Face close up	Stair	No	Face	Beauty face correction applied

Input	Features	Features Contained	Video with Contents	Correction
	Cloud	Yes	Cloth	No Correction.

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	Portrait Photo				No Blur	
	Person in front of a white wall	Wall	Yes	Face	No Correction. No Blur	
	Book Scan	Text	Yes	Scanned image	No Correction. No Blur	

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	 Face close up	Cloth	Yes	Face	No White balance correction.