Appendix D2 - ’339 Patent Infringement Contentions – Samsung

Samsung—U.S. Patent No. 8,451,339 claims 1–4, 6-16, 18

Optimum Imaging Technologies LLC (“OIT”) provides its Infringement Contentions as to Defendant Samsung Electronics Co., Ltd. (“Samsung”). Samsung has made, used, sold, offered for sale, and/or imported digital cameras that include digital lens aberration correction, including but not limited to Galaxy S10, S10+, S10 5G, S10 Lite, S20, S20+, S20 Ultra 5G, S20 FE, S21, S21 Ultra, S21 FE, S22, S22+, S22 Ultra, S23, S23+, S23 Ultra, S24, S24+, Z Fold, Z Flip, Z Flip 5G, Z Fold 2, Z Fold 3, Z Flip 3, Z Fold 4, Z Flip 4, Z Fold 5, and Z Flip 5. (the “Samsung Accused Devices”). These cameras use zoom, and single and multiple fixed focal lenses, and also have video capabilities. These infringement contentions apply equally to any other Samsung cameras that are used to implement in-camera systems and methods for filtering and correcting image aberrations or distortions, regardless of the specific product, method, process, system, or service name(s).

This claim chart relates to the operation of a type of digital camera. This claim chart describes how those digital cameras can use methods to optimize optical processing. Aberration correction systems, which are performed in-camera, are described and are shown to dramatically improve image quality. Unless otherwise stated, the descriptions below apply to all of the Samsung Accused Devices.

OIT presently contends that the Samsung Accused Devices literally infringe the asserted claims of the ’339 Patent. Nevertheless, with respect to any claim limitation that may be found not to be literally infringed, OIT contends in the alternative that the Samsung Accused Devices infringe such claim limitations under the doctrine of equivalents and that any element not found to be literally met is equivalently met because any difference between the claim limitation and the Samsung Accused Devices is not a substantial difference. Accordingly, OIT contends that any asserted claim that the Samsung Accused Devices are not found to infringe literally is nevertheless embodied by the Samsung Accused Devices under the doctrine of equivalents under an operative doctrine of equivalents test (e.g., function-way-result or insubstantial differences).

OIT asserts Claims 1–4, 6-16, 18 of the ’339 Patent as infringed by Samsung under 35 U.S.C. § 271(a). Additionally, OIT asserts Claims 1–18 of the ’339 Patent as being infringed by Samsung under 35 U.S.C. § 271(b). Specifically, OIT asserts that Samsung induces its customers to infringe Claims 1–4, 6-16, 18 by using the accused digital cameras. Samsung instructs its customers about the in-camera systems for filtering and correcting image aberrations or distortions. Samsung has knowledge of the ’339 Patent and knowledge that the induced acts are substantially likely to infringe the ’339 Patent. Further, Samsung has been and is now liable under 35 U.S.C. § 271(c) because it offers to sell or sells within the United States or imports into the United States a component of a machine patented by one or more claims of the ’339 Patent as set forth above that constitutes a material part of the invention, knowing the same to be especially made or especially adapted for use in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial non-infringing use. Further, OIT presently contends that any element, in whole or in part, may include a software limitation executed within the accused products. OIT reserves the right to seek leave to supplement and/or amend

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these disclosures as new information, including source code, becomes available and as OIT has the opportunity to review relevant document productions.

To date, the parties in this litigation have not engaged in any discovery, and no documents have been produced. All information contained in these disclosures is the result of publicly available information and independent examination and analysis of the Samsung Accused Devices. Based on these circumstances, OIT presents these Infringement Contentions reflecting OIT’s current analysis of the facts presently known to it. To the best of OIT’s knowledge, information, and belief, formed after an inquiry that is reasonable under the circumstances, the information contained in this disclosure is correct. Certain information about the Samsung Accused Devices operation is not available without engaging in further discovery. Accordingly, OIT reserves the right to seek leave to supplement and/or amend these disclosures as new information becomes available and as OIT has the opportunity to review relevant Samsung document productions. Infringement investigations are ongoing, and OIT anticipates that additional facts and relevant documents will be uncovered and disclosed that could create good cause for further supplementation and/or amendment of these contentions. OIT will continue to develop the evidence of infringement by all Samsung entities, and OIT reserves the right to amend and supplement these Infringement Contentions. Furthermore, OIT’s Infringement Contentions may include alternative theories of infringement for the Samsung Accused Devices, which may be mutually exclusive of other infringement theories or which may overlap with other infringement theories in certain respects.

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Claim No.	Claim Language	Samsung Accused Devices
		A plot of this function (Fig. 4.67) shows that the computational advantage increases rapidly as a function of p. For example, when $p = 15$ (32,768 points), the FFT has nearly a 2,200 to 1 advantage over a brute-force implementation of the DFT. Thus, we would expect that the FFT can be computed nearly 2,200 times faster than the DFT on the same machine. As you learned in Section 4.1, the FFT also offers significant computational advantages over spatial filtering, with the cross-over between the two approaches being for relatively small kernels. *See, e.g.,* “Digital Image Processing”, Rafael C. Gonzalez & Richard E. Woods, Pearson/Prencite Hall, 2018. Further, OIT presently contends that any element, in whole or in part, may include a software limitation executed within the accused products. OIT reserves the right to seek leave to supplement and/or amend these disclosures as new information, including source code, becomes available and as OIT has the opportunity to review relevant document productions.
6.	A digital imaging system for correcting image aberrations comprising:	The Samsung Accused Devices contain digital imaging system for correcting optical image aberrations. For example, the Samsung Accused Devices in-camera software can correct optical image aberrations. First a discussion of optical defects.

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Mobile photo: optical defects and how to deal with them

(Topic created on: 19-04-2023 09:33 AM) 1472 Views

Labels: Photography

Libb
MegaStar

19-04-2023 09:33 AM - last edited 19-04-2023 09:35 AM

Hello Community!

In the previous articles, I wrote about mistakes a photographer can make when taking pictures. Today we will look at the traps that the most beautiful science, physics, sets for us.

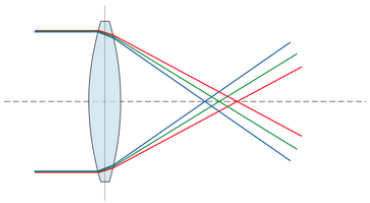
Even though development is moving forward with giant steps, there are and will be limitations given by the laws of physics, and it is up to the manufacturers of photographic equipment to eliminate their negative effects as much as possible. We will talk mainly about mobile phones. The big brothers, whether compact or SLR, also have their problems; however, the miniaturization required in mobile phones presents designers with much greater challenges.

So let's take a look at optical defects, how they arise and what can be done about them. Some effects can be mitigated during the photo shoot, while others have to be dealt with in post-production.

Chromatic aberration

This is a phenomenon that can be observed when photographing a very contrasting scene, typically bare twigs against the sky. It's caused by the bending of light, and there's not much you can do about it - other than being aware that the problem exists and avoiding shooting scenes where it occurs.

Chromatic aberration, also called chromatic aberration, is a color distortion in a lens or a more complex optical system (for example, a lens), which is caused by the different focal lengths of the lenses for different wavelengths of light. It manifests itself as iridescent edges around the contrast areas of the image and overall reduces the quality of the image. This kind of distortion is most noticeable at the edges of the image, which is why telephoto lenses with many lenses are very susceptible to it. Special optical elements are often added to such lenses to minimize chromatic aberration.



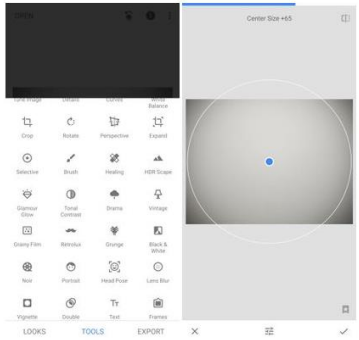
The essence of chromatic aberration is the dependence of the refractive index of transparent substances on the wavelength of light. Each color of light is refracted differently in the lens, resulting in iridescent fringing around contrasting areas of the image, usually red, purple or blue. These effects can only be observed in certain parts of the image. Chromatic aberration, like other optical distortions, manifests itself most at the edges of the image.

This ailment is rather difficult to remove, Lightroom has a special function for this, but the results were not convincing.

Vignette

Vignetting is a defect of optical systems, manifested by lower brightness at the edges of the displayed image. Vignetting is often caused by camera settings or lens imperfections.
A slightly exaggerated example is here (I added the vignette artificially):

You can't do anything with vignetting during photography, but it can be removed relatively easily in post-production, either in Photoshop on a PC, or on a mobile phone, for example, in the Snapseed application:



Geometric distortion

It can make straight lines appear curved or with other shape distortion. This can be caused by a wide-angle lens or imperfections in the optical system. Geometric distortion can be corrected in post-production.

A - barrel distortion, B - pincushion distortion, C - real image

We most often encounter barrel distortion, which is especially evident when photographing tiles with a wide-angle lens up close. But it's actually the same as if you take a close-up picture of someone and they have a big nose.

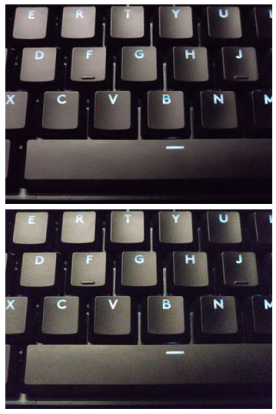
Lack of sharpness

It can be a photographer's mistake (you can read how to shoot so that your photos are sharp in my very first article in the series We take photos with a mobile phone: Sharpness), but it can also be a limitation of the lens. This is more visible the more pixels the sensor has, while the lens is not able to render such a fine pattern on the sensor. Don't confuse depth of field!

Can something be done about it? I don't think, you need to keep in mind that this limitation exists, know the limits of your camera and if sharpness really matters a lot, use better equipment, or adjust the environment as much as possible - studio, tripod, good lighting...

Noise

I will again refer to an older article from the series, this time about the Exposure. The camera evaluates the brightness of the scene and sets three basic parameters accordingly, namely time, aperture and sensitivity (ISO). The aperture is only one in most mobile phones, so we can move the time and sensitivity. Both of these values have an effect on the noise - the higher the value, the higher the noise (I remind you that time is given as a fraction, so 1/100 is a higher value than 1/500!), but sensitivity has a much higher effect than time. If we are shooting a static scene, it is better to set a lower ISO and extend the time (night mode will do it for us) - but beware, as soon as something moves in the photo, it will be blurry! This can be avoided by increasing the sensitivity, which will reduce the time, but at the cost of increasing the noise in the resulting photo. I am attaching two photos, one at ISO 50, the other at ISO 3200 (I purposely took the photo at 3x zoom to make it more visible):



As you can see, at ISO 50 the photo is fine, at ISO 3200 it is very noisy (the colored stripes in the letters are caused by the lighting of the keys on the keyboard - the LEDs flash and it can look like this in the photo).

Noise reduction can be done, for example, in the Snapseed application (detail, structure, negative values), but beware, denoising always entails a loss of detail at the same time! And again, don't expect miracles.

Flare ghosting

This defect manifests itself as light streaks or circles caused by the reflection of light from the internal elements of the lens. It can be corrected by using a sunscreen or avoiding direct sunlight.

It is often caused by additional protective glasses on the lens. I am attaching a picture taken on a walk with the mirrorless Lumix DC-GX9 with a protective UV filter attached and without a filter:

In the first picture, there is the defect mentioned in the middle. As you can see, it was enough to remove the protective filter and the problem disappeared. It would also help to rotate the camera (but I would be photographing something else) and maybe a sun hood, but this is difficult to apply in the case of mobile phones.

Conclusion

Although many of these optical defects can be corrected with image processing software, the best way to achieve quality photos is to invest in a mobile phone with a quality camera. Higher quality optical components and sensors will reduce the occurrence of these defects and improve the overall quality of the photos.

It's also important to follow basic photography techniques, such as keeping a steady grip on the phone, using image stabilization (if available), and setting the exposure and focus correctly. These factors will help minimize optical defects and ensure your photos are the best they can be. You can read more in my earlier articles about mobile photo.

Claim No.	Claim Language	Samsung Accused Devices
		https://eu.community.samsung.com/t5/photography-talk/mobile-photo-optical-defects-and-how-to-deal-with-them/td-p/7332640 Samsung Accused Devices address these image aberrations, for example: For example, the Samsung Accused Devices allow for “the camera to determine the ideal mode for your pictures.” In addition, the Samsung Accused Devices include “built-in Optical Image Stabilization (OIS) software to reduce blurry images. 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. • **Single take:** Capture multiple pictures and video clips from different angles. • **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. Samsung S10 User Manual, p. 53.

Claim No.	Claim Language	Samsung Accused Devices
		Galaxy S10 **Single front camera** The Galaxy S10 has a single front camera which features a 10MP dual pixel auto focus and UHD selfie technology. **Triple rear camera** In the rear side you have the following three cameras aligned horizontally: 1 A 12MP telephoto lens (45^0) with a 2x zoom and OIS anti-blur software. 2 A 12MP wide angle lens (77^0) with dual aperture and dual pixel. It also includes in-built Optical Image Stabilisation (OIS) software to reduce blurry images. 3 A 16MP ultra wide angle lens (123^0). *See, e.g.*, https://www.samsung.com/uk/support/mobile-devices/camera-specifications-on-the-galaxy-s10/

Claim No.	Claim Language	Samsung Accused Devices
		For the Samsung Accused Devices, as understood by a person of ordinary skill in the art, in-camera software can digitally process an image to correct an optical image aberration. Examples of optical image aberrations can include vignetting, spherical aberration, pin cushion distortion, barrel distortion . *See* ’805 Patent Fig. 6. For example: Samsung has also added ‘Distortion Correction,’ which automatically corrects curved or bent lines caused by lens distortion and perspective. This option appears as deactivated in the Camera Assistant settings, unlike the previous one that comes active by default after updating to the latest version. *See, e.g.* https://qqplayer.net/samsung-updates-galaxy-camera-app-enhance-photos-taken-digital-zoom/#google_vignette

Galaxy S7/S7 edge: How to Turn On Shape Correction?

Last Update date : Sep 25, 2020

· The front camera of Galaxy S7 uses wide-angle lens. It's suitable for taking wide-angle photos when using the camera close to the subject (e.g. when taking a picture of yourself.)

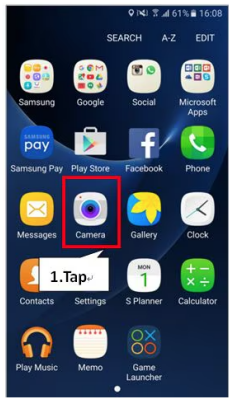
Minor image distortion may occur in wide-angle photos.

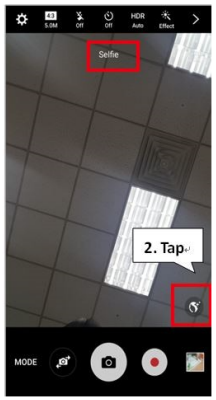
· **Enable Shape correction option to correct your face shape.**

Shape correction option corrects your face distorted at the edges dynamically according to angles and distance from center. **You can set the option on Beauty effects.**

To set Shape correction option, please follow next steps.

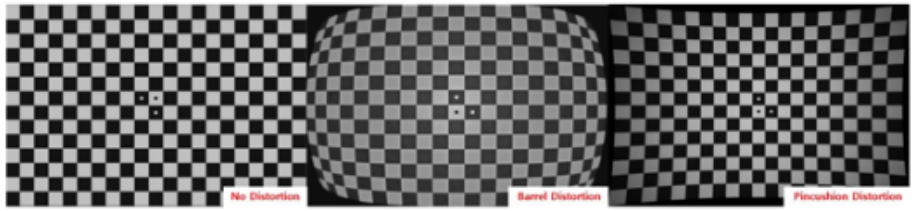
1. On Apps screen, tap Camera
2. On Selfie mode, tap beauty effects icon





Claim No.	Claim Language	Samsung Accused Devices
		3 Tap Shape correction to turn on the option · Please note that after shape correction, the background may appear slightly distorted since the correction algorithm is applied to the overall image. If you do not want this, please use after deactivating the Shape correction. https://www.samsung.com/hk_en/support/mobile-devices/galaxy-s7-s7-edge-how-to-turn-on-shape-correction/

Claim No.	Claim Language	Samsung Accused Devices
		[3] Lens phenomena 1. Vignetting Vignetting is a phenomenon where the amount of light near the perimeter decreases compared to the center, causing the picture to become darker. The light intensity decreases towards the periphery due to the Cosine 4th rule [2]. Vignetting is corrected by a process called LSC (Lens Shading Correction) in the ISP (Image Signal Processor) of a smartphone. Sometimes, vignetting is deliberately applied to a picture via post-edit to focus on the subject. https://r2.community.samsung.com/t5/CamCyclopedia/Lens/ba-p/13414939

Claim No.	Claim Language	Samsung Accused Devices
		• Optical distortion  Optical Distortion or TV Distortion is one of the many aberrations resulting from the characteristics of lens design. The distortions shown above are Barrel Distortion or Pincushion Distortion. Lens distortions such as these are corrected by a process known as LDC (Lens Distortion Correction). *Id.* Further, OIT presently contends that any element, in whole or in part, may include a software limitation executed within the accused products. OIT reserves the right to seek leave to supplement and/or amend these disclosures as new information, including source code, becomes available and as OIT has the opportunity to review relevant document productions.
	a digital camera mechanism, an optical lens mechanism, a digital sensor, an integrated circuit, a digital signal processor, system software, a database management system and a memory storage sub-system;	The Samsung Accused Devices contain a digital camera mechanism, an optical lens mechanism, a digital sensor, a microprocessor, a digital signal processor, system software, a database management system and a memory storage sub-system. The Samsung Accused Devices contain a digital camera mechanism, an optical lens mechanism, a digital sensor, a microprocessor, a digital signal processor including an application specific integrated circuit, system software, a database management system and multiple memory storage sub-systems, e.g., RAM and ROM.

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Claim No.	Claim Language	Samsung Accused Devices
		For example, the Samsung Accused Devices are digital cameras contain optical lenses, digital sensors, microprocessors, DSPs, software, databases, and memory storage sub-systems, *e.g.*, RAM and ROM:

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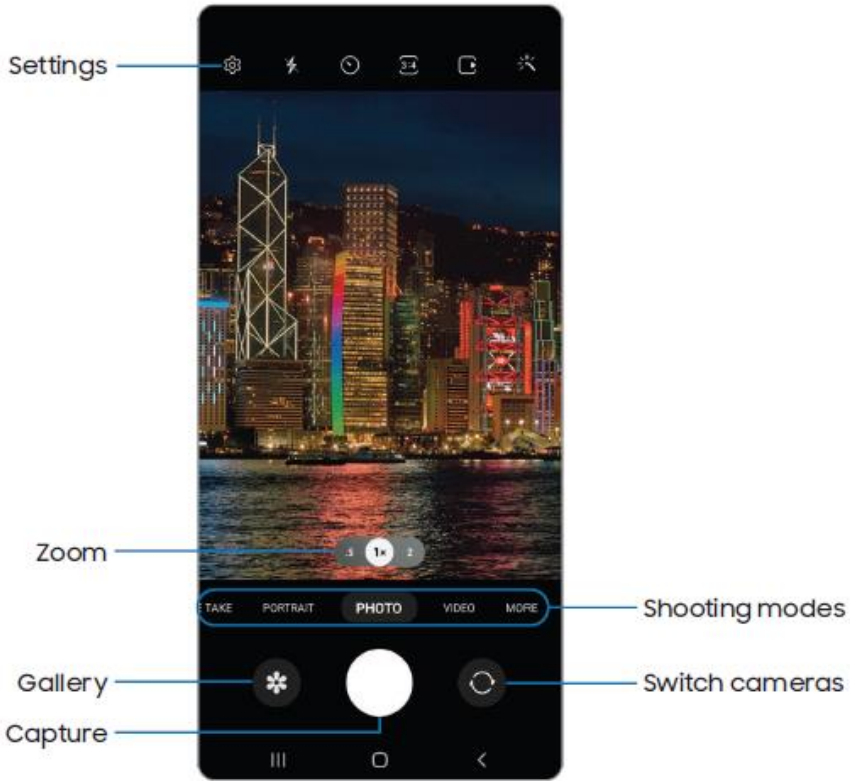
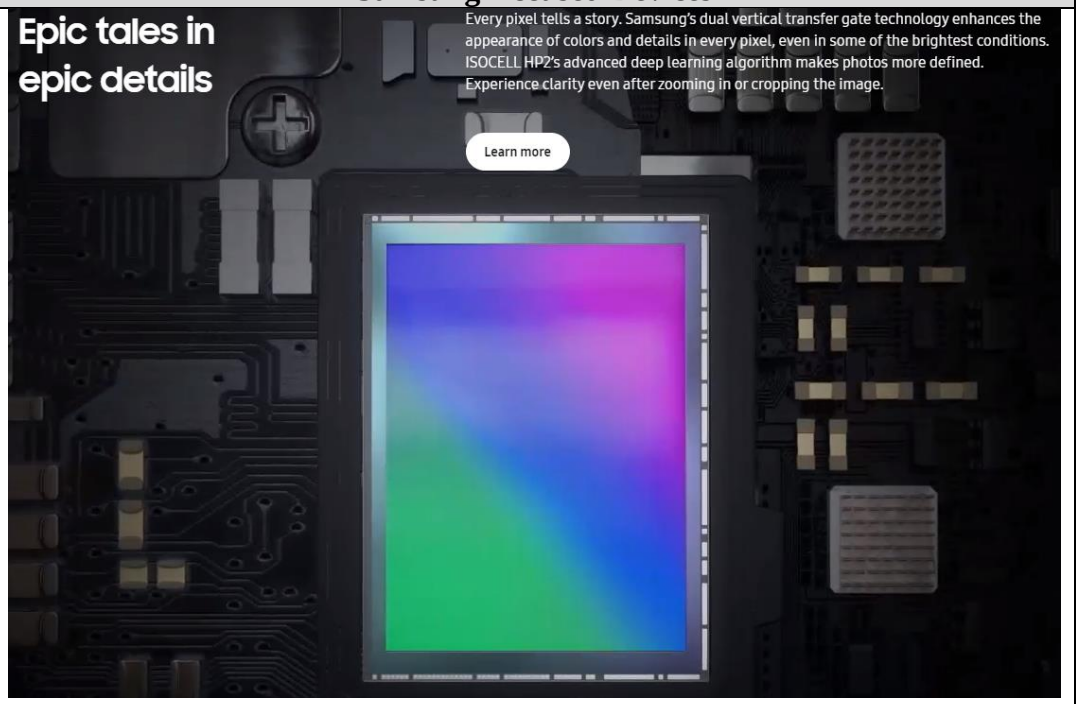
Claim No.	Claim Language	Samsung Accused Devices
		Galaxy S10 5G Samsung S10 User Manual, p. 8. Lenses:

Claim No.	Claim Language	Samsung Accused Devices
		Camera Enjoy a full kit of pro lenses and pro-grade video modes and settings. From Apps, tap Camera. TIP Quickly press the **Power** key twice to open the Camera app.  Samsung S10 User Manual, p. 52.

Claim No.	Claim Language	Samsung Accused Devices
		Lenses: **Does the Samsung Galaxy S24 have the highest camera resolution?** The Samsung Galaxy S series is synonymous with epic mobile cameras and the Galaxy S24 series is no different. With its remarkable camera resolution and advanced AI integration, it sets a new standard for smartphone imaging. Boasting the highest resolution across all Samsung Galaxy phones, the Galaxy S24 Ultra pushes the boundaries of what's possible with smartphone photography. The 200MP main camera captures what your eyes see in pin-sharp resolution and natural colours. Whether you're spending the night at a game or gig, you can now capture all the action from afar without sacrificing detail or clarity. With the groundbreaking Quad-telephoto camera, you get 2x, 3x, 5x and 10x optical zoom thanks to the new 50MP telephoto lens. And if you need even more? The epic, AI-powered 100x Space Zoom intelligently processes information to capture clearer, brighter pictures, without compromising quality. It's now possible to capture stunning landscapes, intricate low-light details, and vibrant colours with unparalleled precision. Whether you are a photography enthusiast or someone who wants to remember special family occasions, the Galaxy S24 series is your go-to for capturing life's extraordinary moments. Galaxy S24 Ultra | Galaxy S24+ | Galaxy S24 Rear Cameras: Wide: 200MP, Ultra Wide: 12MP, Tele 1: 10MP, Tele 2: 50MP; Optical Zoom at 3x 5x, Optical Quality at 2x 10x; Space Zoom at 100x | Wide: 50MP, Ultra Wide: 12MP, Tele: 10MP; Optical Zoom at 3x, Optical Quality at 2x; Space Zoom at 30x | Wide: 50MP, Ultra Wide: 12MP, Tele: 10MP; Optical Zoom at 3x, Optical Quality at 2x; Space Zoom at 30x Front Camera: 12MP | 12MP | 12MP Buy now | Buy now | Buy now https://www.samsung.com/uk/mobile-phone-buying-guide/samsung-galaxy-s24-camera-specs-explained/

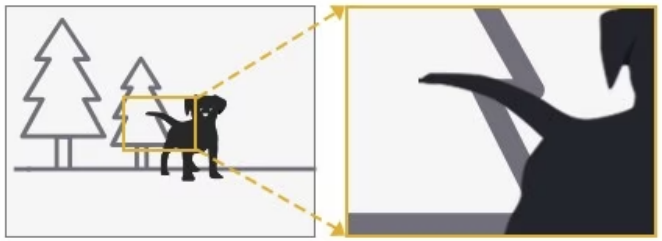
Claim No.	Claim Language	Samsung Accused Devices
		Take Ultra-Wide angle photos On the Galaxy S10 and S10+, having three rear cameras gives you three views to choose from. The Ultra-wide lens gives you a 123° field of view, as if seeing through the human eye. It also enables even wider panorama shots. You can seamlessly switch between cameras by tapping the **leaf**, **tree** and **forest** icons on the screen to get the right shot. https://www.samsung.com/latin_en/support/mobile-devices/camera-features-on-the-galaxy-s10/ Image Sensors:

Claim No.	Claim Language	Samsung Accused Devices
		 https://semiconductor.samsung.com/us/image-sensor/mobile-image-sensor/isocell-hp2/

Industry’s smallest 0.56㎛-sized pixel

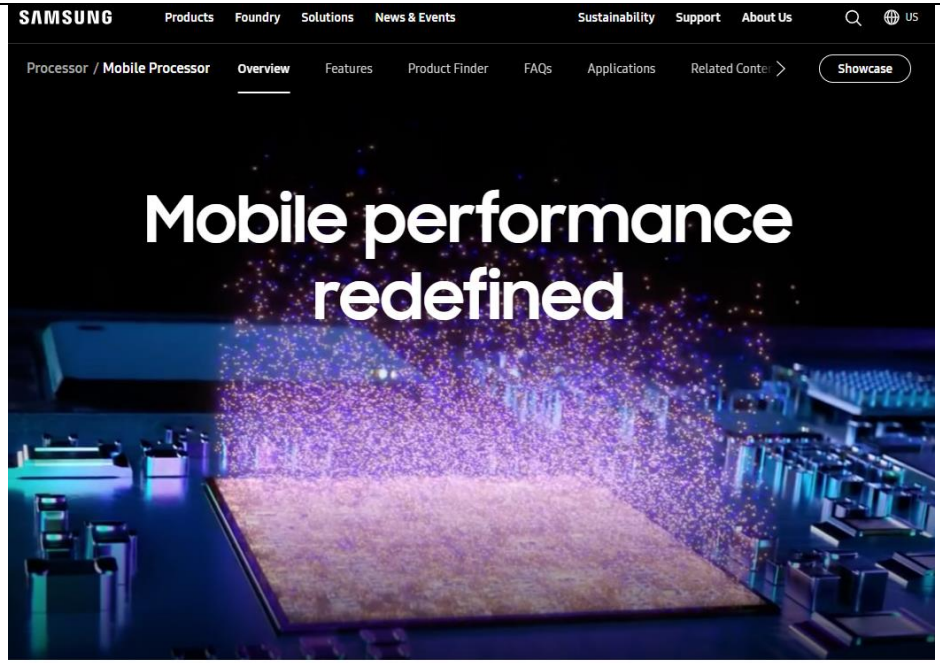
The ISOCELL HP3's improved pixel technology allows the sensor to fully harness the power of minute 0.56㎛-sized pixels. The new DTI technology eliminated the walls between photo diodes within four same colored pixels, enabling the ISOCELL HP3 to capture more light information. Furthermore, the structure of the photo diode has been optimized to maximize the amount of light that can be stored.

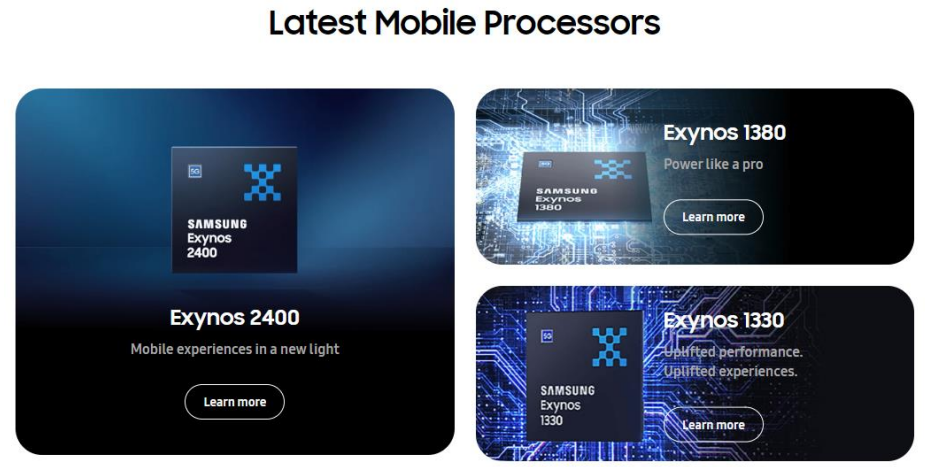
4x Lossless Zoom by Tetra²pixel



With four times Lossless Zoom, there’s little to no loss in the field of view with the ISOCELL HP3. Even when zoomed in four times, it maintains the same 12.5MP resolution as in preview mode.

Claim No.	Claim Language	Samsung Accused Devices
		https://semiconductor.samsung.com/us/image-sensor/mobile-image-sensor/isocell-hp3/ Microprocessor:


SAMSUNG
Products
Foundry
Solutions
News & Events
Sustainability
Support
About Us
US
Processor / Mobile Processor
Overview
Features
Product Finder
FAQs
Applications
Related Conte
Showcase
Mobile performance redefined


Latest Mobile Processors
SAMSUNG
Exynos
2400
Exynos 2400
Mobile experiences in a new light
Learn more
Exynos 1380
Power like a pro
Learn more
Exynos 1330
Uplifted performance.
Uplifted experiences.
Learn more

Claim No.	Claim Language	Samsung Accused Devices
		Digital Signal Processor with integrated application specific circuit:

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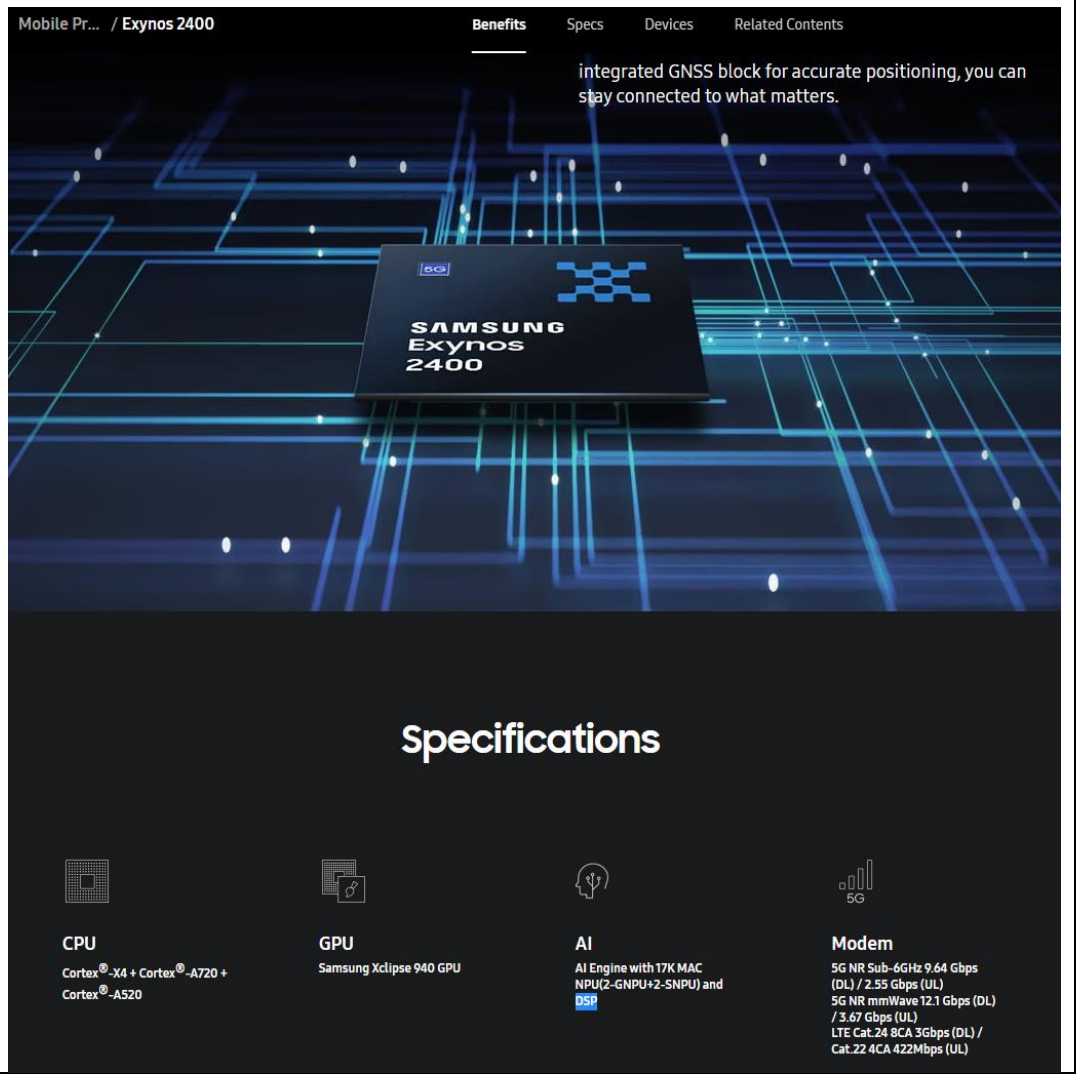
AI

Inspiring intelligence

Enjoy the full measure of artificial intelligence on the go. A powerful neural processing unit (NPU) and digital signal processor (DSP) are built into the Exynos 990 for the next-level of on-device artificial intelligence. The Exynos 990, featuring dual-core neural processing unit (NPU) and improved digital signal processor (DSP), can perform up to approx. fifteen trillion operations per second (TOPS).[1] This allows smartphone to offer richer mobile experiences with diverse intelligent features including intelligent camera, virtual assistant and extended reality. The Exynos 990 processor designed for AI will take smartphone's capabilities to the next level.

02 SAMSUNG

Claim No.	Claim Language	Samsung Accused Devices
		https://image.semiconductor.samsung.com/content/samsung/p6/etc/exynos/file/solution/MobileProcessor-990.pdf 

Claim No.	Claim Language	Samsung Accused Devices
		https://semiconductor.samsung.com/us/processor/mobile-processor/exynos-2400/

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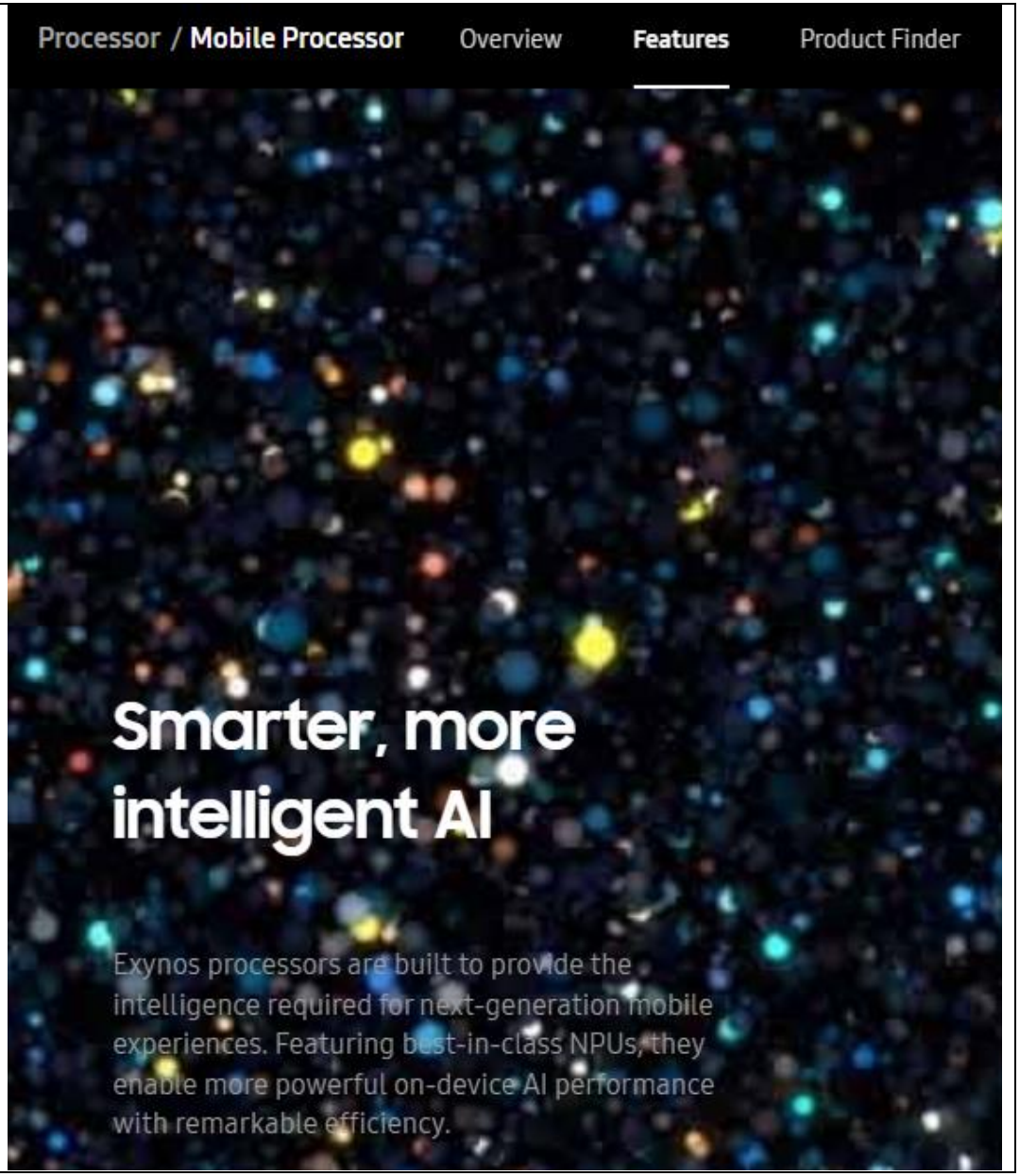
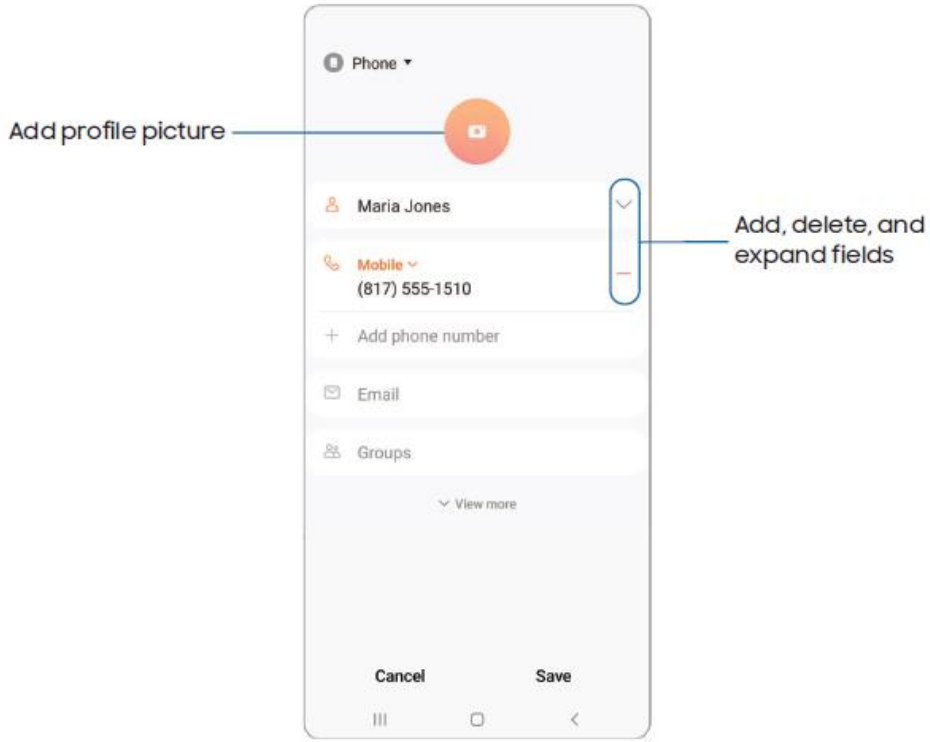

Processor / Mobile Processor
Overview
Features
Product Finder
Smarter, more intelligent AI
Exynos processors are built to provide the intelligence required for next-generation mobile experiences. Featuring best-in-class NPUs, they enable more powerful on-device AI performance with remarkable efficiency.

Claim No.	Claim Language	Samsung Accused Devices
		https://semiconductor.samsung.com/us/processor/mobile-processor/ Software: Software update/System updates Check for and install available software updates for your device. Options may vary by carrier. ○ From Settings, tap **Software update/System updates** for the following options: • **Check for updates:** Manually check for software updates. • **Check for software updates:** Manually check for software updates. • **Continue update:** Resume an update that was interrupted. • **Show software update history:** View a list of all software updates on your device. • **Smart updates:** Install security updates automatically. • **Use software upgrade assistant:** Install a tool to install system updates. Samsung S10 User Manual, p. 157. Database: For example, contacts, gallery, email, calendar, etc.

Claim No.	Claim Language	Samsung Accused Devices
		Contacts Store and manage your contacts. You can synchronize with personal accounts added to your device. Accounts may also support email, calendars, and other features.  Samsung S10 User Manual, p. 78.

Claim No.	Claim Language	Samsung Accused Devices
		Memory Storage Sub-System, *e.g.*, RAM and ROM. :

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Is RAM important on a smartphone?

The more RAM your smartphone has the quicker you can access and switch between apps without experiencing any lag. Without RAM, apps would close when you switch to another one, causing delays and slowing your phone down.

What is the difference between phone storage and memory?

Phone memory refers to RAM (Random Access Memory). RAM is the part of the phone that is used to store the operating system (OS) and where apps and data currently in use are kept. Phone storage, on the other hand, is used to store data such as apps, photos, videos, and files that are necessary for the phone to run. RAM is a lot faster than phone storage but you don't have as much of it.

How much memory do videos use?

Recording in 4K will use around 300MB of storage for every 1 minute of filming. While recording in Full HD only uses approximately 100MB of storage per minute. Operating at 4x the resolution of 4K UHD, 8K requires around 600MB of storage per minute of recording. While this is a significant amount, all Galaxy S23 & Galaxy S23+ smartphones come with at least 256GB of expandable storage.

What are GB?

When you're choosing your new Samsung smartphone you will need to decide between different Gigabytes options. But, if you are not familiar with this technology jargon you may be wondering what does Gigabytes actually mean? GB is an abbreviation for gigabyte, and you may also hear it referred to as 'gigs'. It's simply the measurement used to calculate storage on smartphones, computers, tablets and gaming consoles.

Claim No.	Claim Language	Samsung Accused Devices
		https://www.samsung.com/us/explore/mobile/how-much-phone-memory-and-storage-do-I-need/ Further, OIT presently contends that any element, in whole or in part, may include a software limitation executed within the accused products. OIT reserves the right to seek leave to supplement and/or amend these disclosures as new information, including source code, becomes available and as OIT has the opportunity to review relevant document productions.
	wherein the optical lens mechanism is a zoom lens or a fixed focal length lens;	The Samsung Accused Devices may include both a fixed focal length lens and a zoom lens. For example, the Samsung Accused Devices allow for the inclusion of a number of multiple fixed focal length lenses.

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		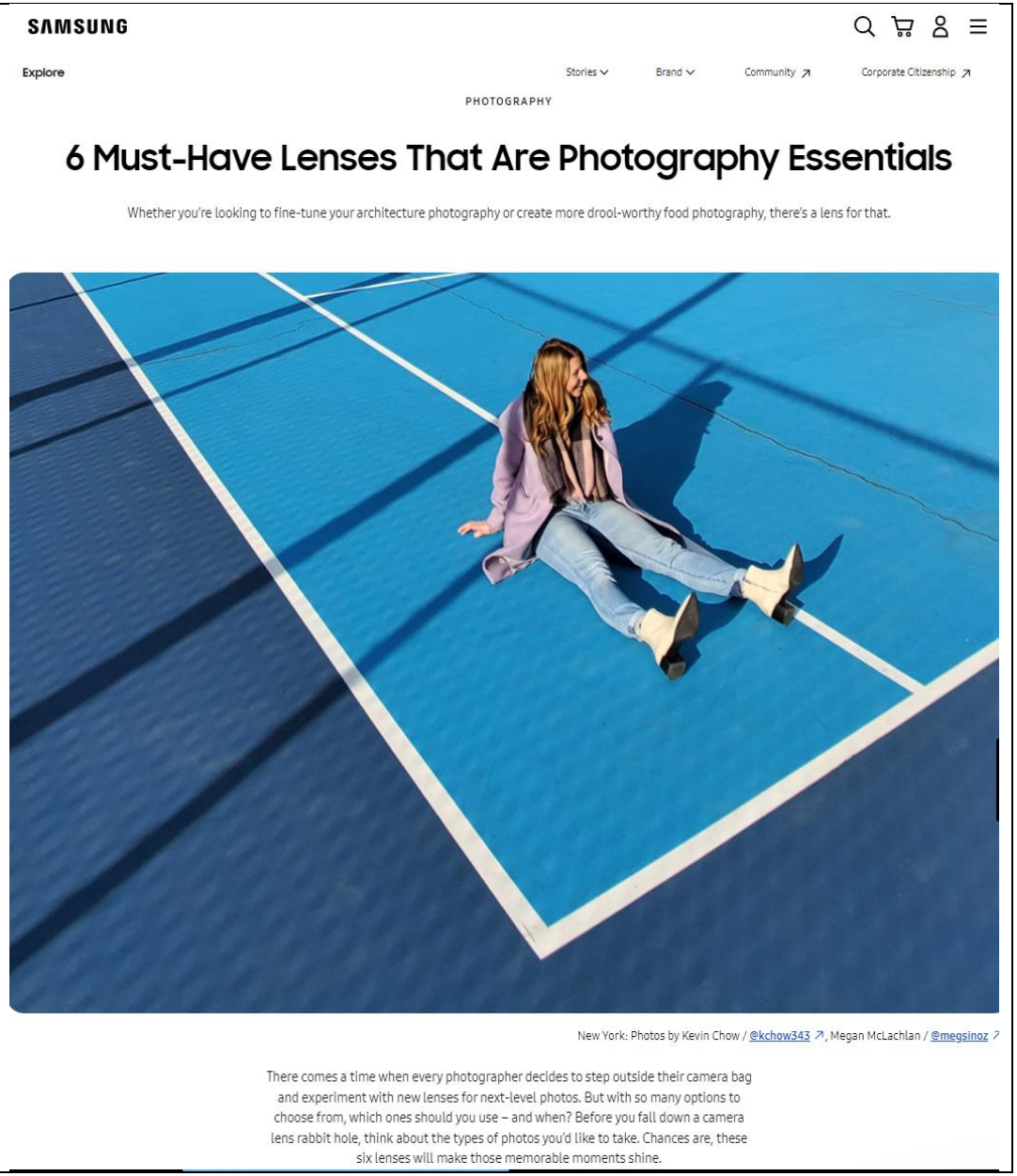 SAMSUNG Explore Stories Brand Community Corporate Citizenship PHOTOGRAPHY 6 Must-Have Lenses That Are Photography Essentials Whether you’re looking to fine-tune your architecture photography or create more drool-worthy food photography, there’s a lens for that. New York: Photos by Kevin Chow / @kchow343, Megan McLachlan / @megsinoz There comes a time when every photographer decides to step outside their camera bag and experiment with new lenses for next-level photos. But with so many options to choose from, which ones should you use – and when? Before you fall down a camera lens rabbit hole, think about the types of photos you’d like to take. Chances are, these six lenses will make those memorable moments shine.

Claim No.	Claim Language	Samsung Accused Devices
		https://www.samsung.com/uk/explore/photography/6-must-have-lenses-that-are-photography-essentials/

Panoramas, ultra wide angle photography
Captured with the Ultra Wide Camera on the Galaxy S10+

TIP

The lower the number focal length, the more view will fit in your frame.

For panoramic landscapes, get ultra wide

If you need more out of your wide angle, set your sights on an ultra wide angle lens: the ultimate travel companion—and for good reason. With a focal length of less than 24mm (the shortest of all lens types), the ultra wide's 123-degree field of view captures the panorama of the human eye, so what you see is what you get. We're picturing sweeping New York City skyline shots, the full Caldera view in Santorini, or Lake Louise in Banff – mountaintops included. The downfall? Your photos are bound to suffer some distortion from trying to squeeze such a wide perspective into one shot. Luckily, phones like the Galaxy S10 include an ultra wide lens correction feature on its Ultra Wide Camera so you can spare yourself the trouble of photo editing after your holiday.

Claim No.	Claim Language	Samsung Accused Devices
		Id. **For intimate encounters, go all in on macro** Need a hand in taking extreme close-up shots that will still turn out crisp? Macro is your lens. Few situations may call for macro photography, but when they do, the results are magical. You might use it to blow up the details of a unique flower or insect you stumbled upon on a hike, or to capture foodstagram shots like your perfect latte art. If you’re going for the former, aim for early golden hour – an ideal time to mix macro with nature photography. Any morning dew or bit of fog that creeps into the shot can add some atmosphere to your photo and bring it to life.

Claim No.	Claim Language	Samsung Accused Devices
		Id. **For everything else, there’s telephoto** While the telephoto lens is best known for shooting scenes from far away, its abilities definitely don’t end there. Whether you want to play up your friend’s best features through its shallow depth of field or pull other details to the limelight through its zoom capability, the beauty of this lens lies in its catch-all versatility. It’s perfect for capturing distant stars in night photography or game-winning shots at a sports game. *Id.*

Claim No.	Claim Language	Samsung Accused Devices
		Samsung Accused Devices may also include a zoom lens:

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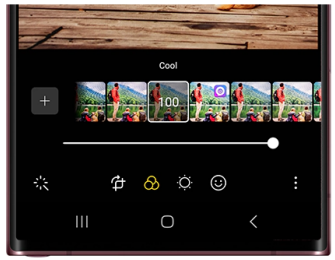
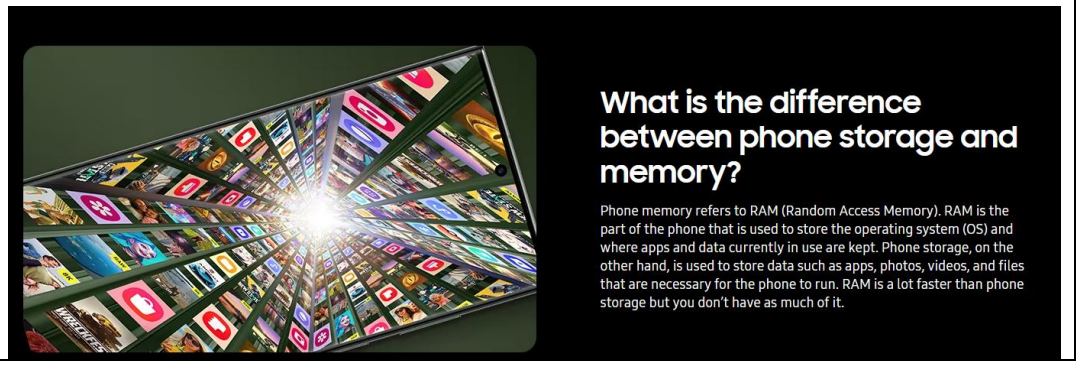
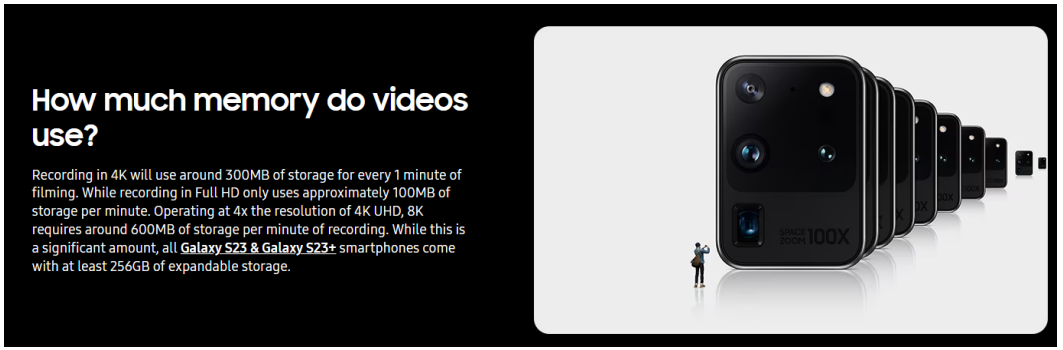
Captured with the Galaxy S10+

For commitment issues, zoom out

If the macro feels a little too close for comfort and you want to keep your options open, the zoom lens is your best bet. Ideal for candid photography or wildlife photography, the zoom lens can vary its focal length to take a range of different shots (including close-ups) while you stay put in one place. Best of all, you can snap photos quickly as you shift gears on auto focus – perfect for those times when you just can’t miss a beat.

Claim No.	Claim Language	Samsung Accused Devices
		https://www.samsung.com/uk/explore/photography/6-must-have-lenses-that-are-photography-essentials/ **Dual ISP** The latest Exynos processor features dual ISP for smartphone that enables dual cameras feature on the front of back of devices. It enables picture to have richer tones and colors by using different light information from two separate cameras. Optical zoom is also possible by combining two lenses that have different focal lengths. In addition, with 2nd camera recognizing depth information, user can adjust focusing with depth of field after capturing a picture. The usage and benefit of dual ISP is not only enhanced performance but also enhanced power efficiency. The asymmetric dual ISP consists of low power ISP core and high quality core. Two ISP cores divide up the processing tasks efficiently by work load of each task so that the overall power consumption could be decreased. https://semiconductor.samsung.com/solutions/technology/image-processing/
	wherein the image data file is forwarded from the digital sensor to storage in memory;	The Samsung Accused Devices forward an image data file from the digital sensor to storage in memory. For example, new pictures containing corrections are stored on internal memory.

Claim No.	Claim Language	Samsung Accused Devices
		1. Open the **Camera** app, and then select **PHOTO**. 2. Tap the **Effects** icon (it looks like two stacked squares), and then tap **Filters**. 3. Line up your desired shot using the camera's viewfinder. Then, swipe to one of the new filters to see how it looks. 4. If you’d like to see how your photo will look without the filter, tap the **Original** filter option to compare. 5. When you're ready and have chosen your desired filter, tap **Capture** to take your photo. 6. You can view your new photo by navigating to and opening the **Gallery** app. Select the photo you just took. 7. To adjust the picture's filter, tap the **Edit** icon (it looks like a pencil), and then tap the **Filters** icon (it looks like three circles). 8. You can adjust the intensity of the filter with the **slider**. To change the current filter, simply choose one from the list or tap the **+** icon to create a new one.  9. You can delete a filter by touching and holding it, and then tapping its **Delete** icon (the minus sign). Your filters can also be organized by touching and holding the icons, and then dragging them into a different order. 10. When you are done adjusting the filters, tap **Save** to save all of your changes. *Id.* 

Claim No.	Claim Language	Samsung Accused Devices
		https://www.samsung.com/us/explore/mobile/how-much-phone-memory-and-storage-do-I-need/  *Id.* Further, OIT presently contends that any element, in whole or in part, may include a software limitation executed within the accused products. OIT reserves the right to seek leave to supplement and/or amend these disclosures as new information, including source code, becomes available and as OIT has the opportunity to review relevant document productions.
	wherein at least one optical and/or digital aberration in the image file are identified by comparing image files in the database management system by using the system software and the integrated circuit;	The Samsung Accused Devices identify at least one optical and/or digital aberration in the image file by comparing image files in the database management system by using the system software and an integrated circuit. For example, Samsung uses flaw detection to identify aberrations in the image files, for example:

How Flaw Detection feature works or Galaxy mobile devices

Last Update date : Sep 17, 2020

Please Note:

- This content is created for Indian variant devices.
- Steps and Images may vary according to Operating System.

The Intelligent Camera on your Galaxy device has Flaw Detection software that can detect when certain blemishes or flaws appear in your photos. The Flaw Detection feature directly analyses the pictures you take with your mobile device and provides re-shooting notifications when an error is detected.

However, it has some limitations; for example, some Flaw Detection pops up only appear when certain settings are enabled.

Accuracy of Flaw Detection may differ depending on surrounding conditions or subject. Blink and blur detection works best when there are three or fewer people in the frame, 1.5 meters or closer to the camera. Lens smudge and backlight detection may only work once in a 24-hour span. Please refer to below operation algorithm used for Flaw detection.

• Eye Blink
- Measures the eye size in preview

- Detects any change in the eye size when the shutter clicks, and checks whether the eyes blinked.

Close Eyes*

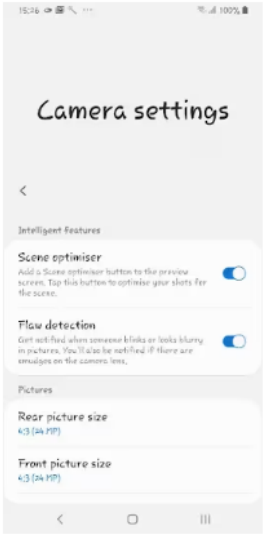
• Motion Blur
- Detects blur caused from the photographer's shaky hands by using the sensor in the device.

- Detects face blur by recognizing the subject's face movement.

Motion Blur*

• Lens Smudge
- Gives a notice only once during the first 10 seconds of opening the Camera app to prevent its usability from decreasing.

Lens Smudge

Claim No.	Claim Language	Samsung Accused Devices
		• **Back Light** - Detects backlight by distinguishing saturated areas in the image data input into the sensor. - Recommends the user to use "HDR auto" when HDR is off. **Activate Flaw Detection** Flaw detection is on my default, but you here's how to turn it on. Open the **Camera** app, and then tap **Settings**. Scroll to and select **Flaw detection** to turn on or off.  https://www.samsung.com/in/support/mobile-devices/how-flaw-detection-feature-work-on-galaxy-mobile-devices/
	wherein the at least one filtration algorithms required to correct the at least one optical and/or digital aberration are	The Samsung Accused Devices send filtration algorithms used to correct optical and/or digital aberration from an integrated circuit to a digital signal processor.

Claim No.	Claim Language	Samsung Accused Devices
	sent from the integrated circuit to the digital signal processor;	For example, Samsung Accused Products contain a microprocess, a GPU, a neural processing unit, *e.g.*, an ASIC, and a digital signal processor.

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Connectivity

Keeps you connected

Relax with better connectivity. The Exynos 980 supports Wi-Fi® 6 so that you can connect safely and quickly even in a crowded space. The cutting-edge Wi-Fi 6 means faster speed and greater stability for stutter-free online-gaming and buffer-less high resolution video streaming over the Wi-Fi network. In addition, the Exynos 980 also features Bluetooth® 5.1 for multi-device connectivity and GNSS for accurate location based experiences.

Specifications

CPU
2.2GHz Dual-core (Cortex®-A77) + 1.8GHz Hexa-core (Cortex®-A55)

GPU
Mali™-G76 MP5

AI
AI Engine with NPU and DSP

Process
8nm FinFET

Display
WQHD+ (3360x1440)

Modem
5G NR Sub-6GHz 2.55Gbps (DL) / 1.28Gbps (UL), EN-DC 3.55Gbps (DL) / 1.38Gbps (UL), LTE Cat.16 5CA 1Gbps (DL) / Cat.18 2CA 200Mbps (UL)

Connectivity
Bluetooth®5.1, Wi-Fi 802.11ax, FM Radio

Storage
UFS 2.1, eMMC 5.1

Claim No.	Claim Language	Samsung Accused Devices
		https://semiconductor.samsung.com/processor/mobile-processor/exynos-980/ Microprocessor:

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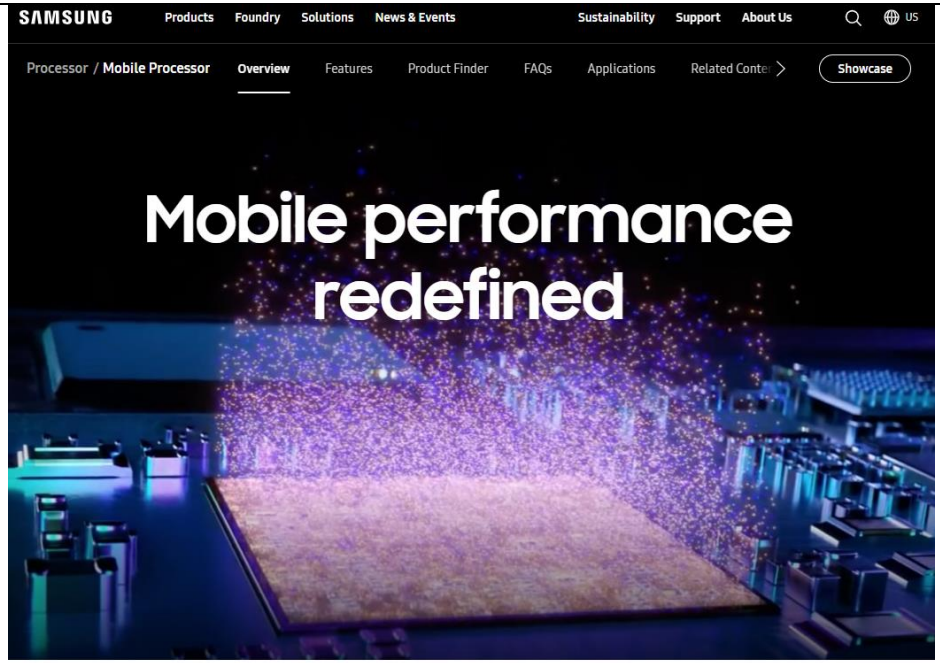
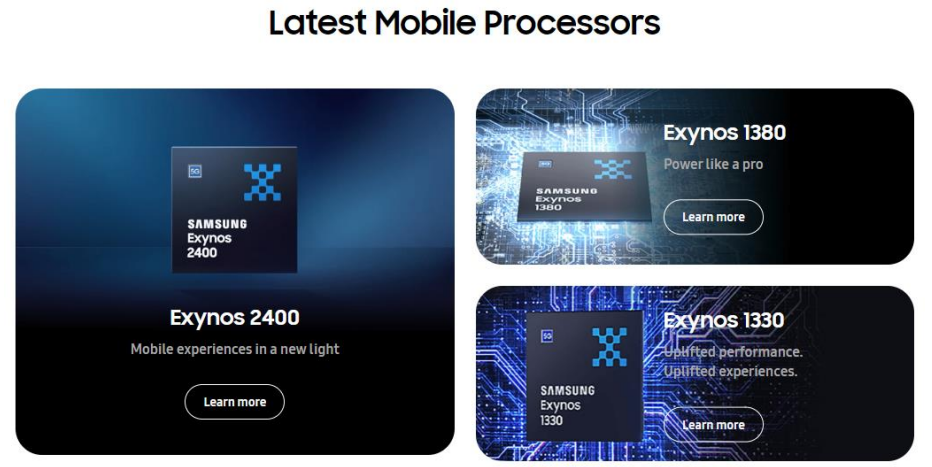

SAMSUNG
Products
Foundry
Solutions
News & Events
Sustainability
Support
About Us
US
Processor / Mobile Processor
Overview
Features
Product Finder
FAQs
Applications
Related Conte
Showcase
Mobile performance redefined


Latest Mobile Processors
SAMSUNG
Exynos
2400
Exynos 2400
Mobile experiences in a new light
Learn more
Exynos 1380
Power like a pro
Learn more
Exynos 1330
Uplifted performance.
Uplifted experiences.
Learn more

Claim No.	Claim Language	Samsung Accused Devices
		Digital Signal Processor:

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AI

Inspiring intelligence

Enjoy the full measure of artificial intelligence on the go. A powerful neural processing unit (NPU) and digital signal processor (DSP) are built into the Exynos 990 for the next-level of on-device artificial intelligence. The Exynos 990, featuring dual-core neural processing unit (NPU) and improved digital signal processor (DSP), can perform up to approx. fifteen trillion operations per second (TOPS).[1] This allows smartphone to offer richer mobile experiences with diverse intelligent features including intelligent camera, virtual assistant and extended reality. The Exynos 990 processor designed for AI will take smartphone's capabilities to the next level.

02 SAMSUNG

Claim No.	Claim Language	Samsung Accused Devices
		https://image.semiconductor.samsung.com/content/samsung/p6/etc/exynos/file/solution/MobileProcessor-990.pdf Neural Processing Unit:

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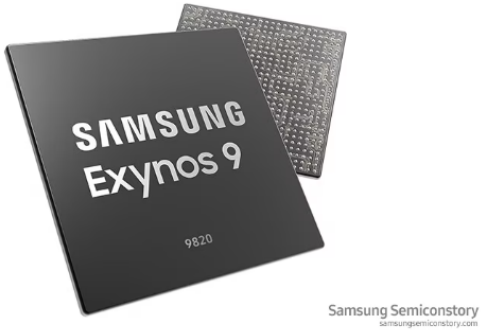
In a computer, the CPU (Central Processing Unit) performs the same role and processes data. While the CPU is also able to process all types of data, the NPU is optimized for simultaneous matrix operations, meaning it is capable for handling multiple operations simultaneously in real time. Not only that, but the NPU is also able to learn based on accumulated data in order to deduce optimal solutions. This is why the NPU is appraised as the perfect technology for deep learning, where computers are made to think and learn the same way humans do.

Fast, smart and brainy NPU



Samsung Electronics launched the premium mobile application processor (AP) ‘Exynos 9 (9820)’ in November. With the addition of an AI-enabled NPU, the Exynos 9 (9820) has approximately 7 times the computing power of the previous model (the 9810).
This impressive speed comes into its own when working with technologies like augmented reality (AR) or virtual reality (VR) by providing a dynamic and entertaining user experience that requires fast and accurate identification of features in humans and objects. While AI operations were previously carried out through a server connection, the Exynos 9 (9820) allows AI operations to occur within a mobile device for improved security.
The NPU is essential for AI applications, and is expected to find uses beyond the mobile world in the fourth industries such as self-driving automobiles. It’ll be exciting to see what the age of artificial intelligence (AI) will hold for the future of NPUs.

Claim No.	Claim Language	Samsung Accused Devices
		https://semiconductor.samsung.com/us/support/tools-resources/dictionary/the-neural-processing-unit-npu-a-brainy-next-generation-semiconductor/#:~:text=Samsung%20Electronics%20launched%20the%20premium,previous%20model%20(the%209810). Further, OIT presently contends that any element, in whole or in part, may include a software limitation executed within the accused products. OIT reserves the right to seek leave to supplement and/or amend these disclosures as new information, including source code, becomes available and as OIT has the opportunity to review relevant document productions.
	wherein the at least one optical and/or digital aberration from the optical lens mechanism are corrected by using the digital signal processor to apply digital filtration algorithm; and	The Samsung Accused Devices use a DSP applying a digital filtration algorithm to correct optical and/or digital aberrations. For example: For the Samsung Accused Devices, in-camera software can digitally process an image to correct an optical image aberration. Examples of optical image aberrations can include vignetting, spherical aberration, pin cushion distortion, barrel distortion . *See* ’805 Patent Fig. 6. For example:

Galaxy S7/S7 edge: How to Turn On Shape Correction?

Last Update date : Sep 25, 2020

· The front camera of Galaxy S7 uses wide-angle lens. It's suitable for taking wide-angle photos when using the camera close to the subject (e.g. when taking a picture of yourself.)

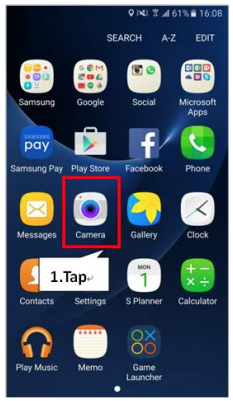
Minor image distortion may occur in wide-angle photos.

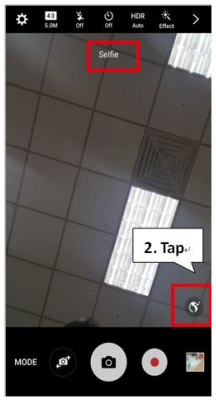
· **Enable Shape correction option to correct your face shape.**

Shape correction option corrects your face distorted at the edges dynamically according to angles and distance from center. **You can set the option on Beauty effects.**

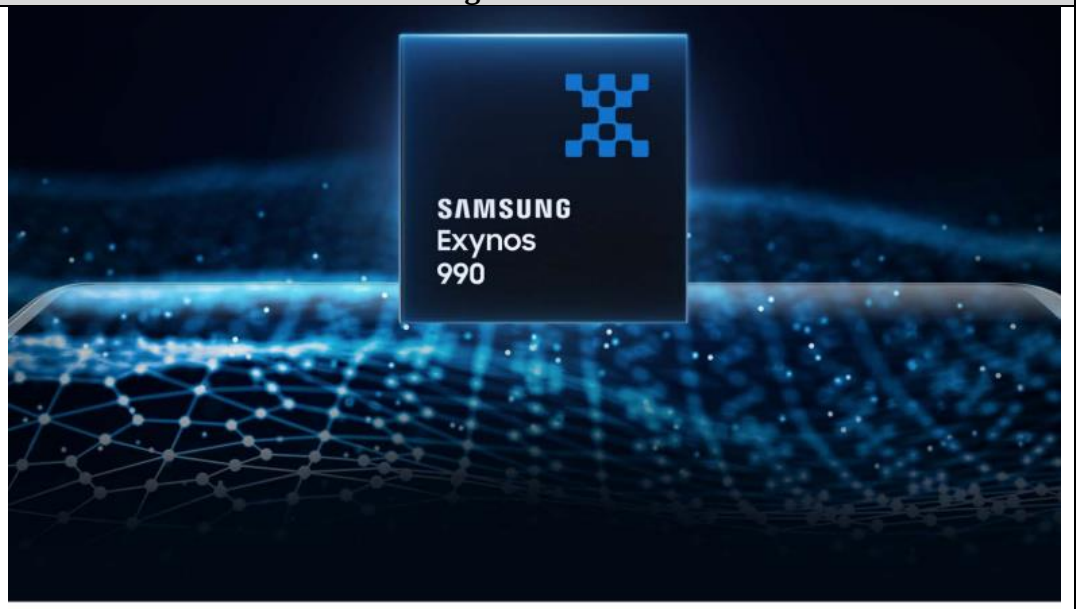
To set Shape correction option, please follow next steps.

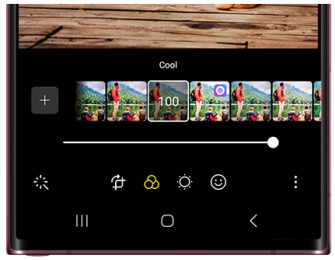
1. On Apps screen, tap Camera
2. On Selfie mode, tap beauty effects icon

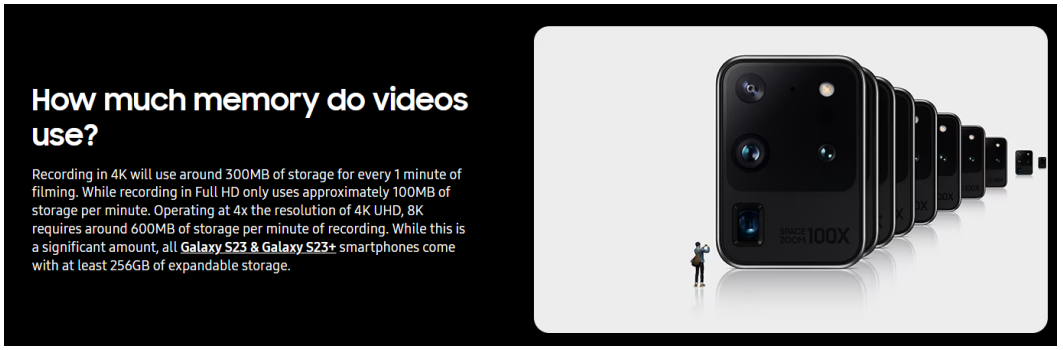




Claim No.	Claim Language	Samsung Accused Devices
		3 Tap Shape correction to turn on the option · Please note that after shape correction, the background may appear slightly distorted since the correction algorithm is applied to the overall image. If you do not want this, please use after deactivating the Shape correction. https://www.samsung.com/hk_en/support/mobile-devices/galaxy-s7-s7-edge-how-to-turn-on-shape-correction/ Further, the Samsung Accused Devices utilize its mobile processor and integrated digital signal processor to deliver an “intelligent camera.”

Claim No.	Claim Language	Samsung Accused Devices
		 AI **Inspiring intelligence** Enjoy the full measure of artificial intelligence on the go. A powerful neural processing unit (NPU) and digital signal processor (DSP) are built into the Exynos 990 for the next-level of on-device artificial intelligence. The Exynos 990, featuring dual-core neural processing unit (NPU) and improved digital signal processor (DSP), can perform up to approx. fifteen trillion operations per second (TOPS).[1] This allows smartphone to offer richer mobile experiences with diverse intelligent features including intelligent camera, virtual assistant and extended reality. The Exynos 990 processor designed for AI will take smartphone's capabilities to the next level. 02 SAMSUNG

Claim No.	Claim Language	Samsung Accused Devices
		https://image.semiconductor.samsung.com/content/samsung/p6/etc/exynos/file/solution/MobileProcessor-990.pdf Further, OIT presently contends that any element, in whole or in part, may include a software limitation executed within the accused products. OIT reserves the right to seek leave to supplement and/or amend these disclosures as new information, including source code, becomes available and as OIT has the opportunity to review relevant document productions.
	wherein the modified digital file consisting of the digital data optimized from the at least one aberration that are corrected from the original optical image is stored in memory.	The Samsung Accused Devices store a corrected image file in memory. For example, new pictures containing corrections are stored on internal memory. 1. Open the **Camera** app, and then select **PHOTO**. 2. Tap the **Effects** icon (it looks like two stacked squares), and then tap **Filters**. 3. Line up your desired shot using the camera's viewfinder. Then, swipe to one of the new filters to see how it looks. 4. If you'd like to see how your photo will look without the filter, tap the **Original** filter option to compare. 5. When you're ready and have chosen your desired filter, tap **Capture** to take your photo. 6. You can view your new photo by navigating to and opening the **Gallery** app. Select the photo you just took. 7. To adjust the picture's filter, tap the **Edit** icon (it looks like a pencil), and then tap the **Filters** icon (it looks like three circles). 8. You can adjust the intensity of the filter with the **slider**. To change the current filter, simply choose one from the list or tap the **+** icon to create a new one.  9. You can delete a filter by touching and holding it, and then tapping its **Delete** icon (the minus sign). Your filters can also be organized by touching and holding the icons, and then dragging them into a different order. 10. When you are done adjusting the filters, tap **Save** to save all of your changes. *Id.*

Claim No.	Claim Language	Samsung Accused Devices
		Samsung also saves videos and photos into internal memory: https://www.samsung.com/us/explore/mobile/how-much-phone-memory-and-storage-do-I-need/  *Id.* Further, OIT presently contends that any element, in whole or in part, may include a software limitation executed within the accused products. OIT reserves the right to seek leave to supplement and/or amend these disclosures as new information, including source code, becomes available and as OIT has the opportunity to review relevant document productions.