

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VIZIO, Inc.,
Petitioner

v.

Polaris PowerLED Technologies, LLC,
Patent Owner

Case No. IPR2020-00043
Patent No. 8,223,117

**PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,223,117
(Claims 1-2, 4-7, 9, 13-16, and 18)**

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EXHIBIT LIST

- Exhibit 1001: U.S. Patent No. 8,223,117 to Ferguson (“the ’117 patent”)
- Exhibit 1002: Prosecution History of U.S. Patent No. 8,223,117
- Exhibit 1003: Japanese Patent Application Publication No. 2003-150291A to Oki
- Exhibit 1004: Certified English Translation of Japanese Patent Application Publication No. 2003-150291A to Oki (“*Oki*”)¹
- Exhibit 1005: Declaration of William A. Lise attesting to accuracy of Certified English Translation of Japanese Patent Application Publication No. 2003-150291A to Oki
- Exhibit 1006: U.S. Patent No. 6,337,675 (“Toffolo”)
- Exhibit 1007: U.S. Patent Publication No. 2003/0112353 (“Morris”)
- Exhibit 1008: U.S. Patent Publication No. 2002/0118182 (“Weindorf”)
- Exhibit 1009: U.S. Patent Publication No. 2002/0070914 (“Bruning”)
- Exhibit 1010: Declaration of Richard T. Mihran, Ph.D., Regarding U.S. Patent No. 8,223,117 (“Mihran”)
- Exhibit 1011: Claim Language and Reference Numbers of U.S. Patent No. 8,223,117

¹ This Petition includes a certified English translation of Exhibit 1003 as well as a Declaration of William A. Lise that the certified English translation of Exhibit 1003 is accurate (Ex. 1005). All references to the text of Exhibit 1003 herein are to the certified English translation of Exhibit 1003 (Exhibit 1004, hereafter “*Oki*”) instead of to the actual Japanese version of Exhibit 1003).

- Exhibit 1012: Declaration of Ravin Balakrishnan in Support of Plaintiff’s Opening Claim Construction Brief for 8:18-cv-01571-JVS-DFM (“Balakrishnan”)
- Exhibit 1013: U.S. Provisional Patent Application No. 60/543,094
- Exhibit 1014: *Samsung Electronics Co., Ltd. v. Polaris PowerLED Technologies, LLC*, IPR2018-01262, Patent Owner Preliminary Response, Paper 13, (P.T.A.B. Jun. 15, 2018)
- Exhibit 1015: Prosecution History of U.S. Patent No. 7,468,722
- Exhibit 1016: *Samsung Electronics Co., Ltd. v. Polaris PowerLED Technologies, LLC*, IPR2018-01262, Petition, Paper 4, (P.T.A.B. Jun. 15, 2018)
- Exhibit 1017: *Samsung Electronics Co., Ltd. v. Polaris PowerLED Technologies, LLC*, IPR2018-01262, Decision, Paper 14, (P.T.A.B. January 17, 2019)
- Exhibit 1018: *Polaris PowerLED Technologies, LLC v. VIZIO, Inc.*, Case No. 8:18-cv-01571-JVS-DFM (C.D. Cal.), Plaintiff’s Disclosure of Asserted Claims and Infringement Contentions, p. 11
- Exhibit 1019: *Polaris PowerLED Technologies, LLC v. Samsung Elecs. Am., Inc.*, Case No. 2:17-cv-00715-JRG (E.D. Tex.), Plaintiff’s Opening Claim Construction Brief, Dkt. 113
- Exhibit 1020: *Polaris PowerLED Technologies, LLC v. Samsung Elecs. Am., Inc.*, Joint Claim Construction Statement, Dkt. 85-1
- Exhibit 1021: *Polaris PowerLED Technologies, LLC v. VIZIO, Inc.*, Proof of Service, Dkt. 13, October 15, 2018
- Exhibit 1022: *Polaris PowerLED Technologies, LLC v. Samsung Elecs. Am., Inc.*, Claim Construction Memorandum Opinion And Order, Dkt. 138
- Exhibit 1023: U.S. Patent No. 5,760,760 (“Helms”)

Exhibit 1024: U.S. Patent No. 5,554,912 (“Thayer”)

Exhibit 1025: European Patent Application EP 0570037 (“Godwin”)

Exhibit 1026: U.S. Patent No 5,270,818 (“Ottenstein”)

Exhibit 1027: *Polaris PowerLED Technologies, LLC v. VIZIO, Inc.*, Joint Claim Construction Statement, Dkt. 78 (August 13, 2019)

I. INTRODUCTION

Petitioner, VIZIO, Inc., respectfully requests *inter partes* review under 35 U.S.C. §§311-319 and 37 C.F.R. §42.100 *et seq.* for claims 1-2, 4-7, 9, 13-16, and 18 of U.S. Patent No. 8,223,117, assigned to the Patent Owner, Polaris PowerLED Technologies, LLC.

The '117 patent should never have been granted because it does not promote the progress of science and useful arts. In fact, the '117 patent adds nothing to the state of the art and is no more than an attempt to monopolize the inventions of numerous predecessors. In the Patent Owner's own words, the '117 patent "is directed to methods and apparatuses that control the brightness of a display device." Ex. 1014: *Samsung Electronics Co., Ltd. v. Polaris PowerLED Technologies, LLC.*, IPR2018-01262, Patent Owner Preliminary Response, Paper 43, p.3 (P.T.A.B. Jun. 15, 2018). To achieve the control of the brightness of a display device, the '117 patent adjusts the brightness in various lighting conditions using a user signal indicative of a user selectable brightness setting and a sensing signal indicative of the ambient light level, where the brightness of the display decreases as the ambient light level decreases. To ensure the display does not go completely dark in low lighting conditions, the '117 patent maintains the brightness of the display at a minimum brightness level when the detected ambient light level approaches zero. This technology is not new; the only contribution of the '117 patent appears to be a new phrase – "dark level bias" – to refer to a well-known concept.

The Patent Owner has filed six separate lawsuits to date asserting the '117 patent. *See* section II.B. After the first was filed, *Polaris PowerLED Technologies, LLC v. Samsung Elecs. Am., Inc.*, defendant Samsung filed a petition for *inter partes* review. Ex. 1016. Ultimately, Samsung's petition was not instituted, largely because the Board found the petition did not "clearly identify" how the cited references taught or suggested each and every limitation claimed in the '117 patent. Ex. 1017, pp. 12-15. Moreover, the Board appears to have agreed with the Patent Owner's contention that Samsung's petition ignored entire portions of the claimed limitations. Ex. 1017, p. 12. In contrast, this Petition is nothing like Samsung's, as it clearly identifies how each and every limitation claimed by the '117 patent is disclosed by the prior work of others.

II. MANDATORY NOTICES UNDER 37 C.F.R. §42.8(a)(1)

A. Real Party-In-Interest 37 C.F.R. §42.8(b)(1)

The real party-in-interest is VIZIO, Inc.

B. Related Matters (37 C.F.R. §42.8(b)(2))

Patent Owner has asserted the '117 patent in litigation against the real party-in-interest in *Polaris PowerLED Technologies, LLC v. VIZIO, Inc.*, Case No. 8:18-cv-01571-JVS-DFM (C.D. Cal.) ("the Litigation").

In addition, four additional infringement actions are currently pending in which the Patent Owner has asserted the '117 patent:

Polaris PowerLED Technologies, LLC v. AmTRAN Technology Co., Ltd. et al., Case No. 8:19-cv-01630-JVS-DFM (C.D. Cal.), filed August 23, 2019.

Polaris PowerLED Technologies, LLC v. Top Victory Electronics Taiwan Co. Ltd. et al., Case No. 8:19-cv-01580-JLS-DFM (C.D. Cal.), filed August 16, 2019.

Polaris PowerLED Technologies, LLC v. Hon Hai Precision Industry Co., Ltd. d/b/a Foxconn Technology Group, Case No. 8:19-cv-01926 (C.D. Cal.), filed October 8, 2019.

Polaris PowerLED Technologies, LLC v. Wistron Corporation, Case No. 8:19-cv-01935 (C.D. Cal.), filed October 9, 2019.

C. Lead and Backup Counsel (37 C.F.R. §42.8(b)(3))

Lead counsel is Jason W. Croft (Reg. No. 65,195) and backup counsel is John T. Gadd (Reg. No. 52,928), both of:

Maschoff Brennan
111 S. Main Street, Suite 600
Salt Lake City, UT 84111

and backup counsel is Charles S. Barquist (*pro hac vice* to be requested), of:

Maschoff Brennan
300 South Grand Ave., Suite 1400
Los Angeles, California 90071

D. Service Information (37 C.F.R. §42.8(b)(4))

Service information is provided in the designation of counsel above. A power of attorney is submitted with this Petition. Counsel for Petitioner consents to service of all documents via electronic mail at the email addresses jcroft@mabr.com, jgadd@mabr.com, and cbarquist@mabr.com.

III. PAYMENT OF FEES (37 C.F.R. §42.103)

The undersigned authorizes the Office to charge \$30,500 (\$15,500 request fee and \$15,000 post-institution fee) to Deposit Account No. 50-5394 for the fees set forth in 37 C.F.R. §42.15(a). The undersigned further authorizes payment for any additional fees that might be due in connection with this Petition to be charged to the above-referenced Deposit Account.

IV. REQUIREMENTS FOR INTER PARTES REVIEW UNDER 37 C.F.R. §42.104

A. Grounds for Standing (37 C.F.R. §42.104(a))

Pursuant to 37 C.F.R. §42.104(a), Petitioner certifies that the '117 patent is available for IPR and that Petitioner is not barred or estopped from requesting an IPR challenging the '117 patent on the grounds identified in this petition. Petitioner was served with a complaint by the Patent Owner on October 12, 2018. Ex. 1021.

This Petition is timely filed.²

B. Claims and Statutory Grounds (37 C.F.R. §§42.104(b)(1) & (b)(2))

Ground 1: Claims 1-2, 4-7, 9, 15-16, and 18 are unpatentable as anticipated under §102 over *Oki*.

Ground 2: Claims 1-2, 4-7, 9, 15-16, and 18 are unpatentable as obvious under §103 over *Oki*.

Ground 3: Claim 13 is unpatentable as obvious under §103 over *Oki* in view of *Morris*.

Ground 4: Claim 14 is unpatentable as obvious under §103 over *Oki* in view of *Morris* and *Weindorf*.

Ground 5: Claims 1-2, 4-5, 9, 15-16, and 18 are unpatentable as anticipated under §102 over *Toffolo*.

Ground 6: Claims 1-2, 4-5, 9, 15-16, and 18 are unpatentable as obvious under §103 over *Toffolo*.

Ground 7: Claim 6 is unpatentable as obvious under §103 over *Toffolo* in view of *Bruning*.

Ground 8: Claim 13 is unpatentable as obvious under §103 over *Toffolo* in view

² See *Samsung Electronics Co. v. Immersion Corp.*, IPR2018-01468, Paper 10 at 13-19 (PTAB Feb. 20, 2019).

of *Morris*.

Ground 9: Claim 14 is unpatentable as obvious under §103 over *Toffolo*, *Morris* and *Weindorf*.

Ground 10: Claim 7 is unpatentable as obvious under §103 over *Toffolo* in view of *Weindorf*.

C. Claim Construction (37 C.F.R. §42.104(b)(3))

A discussion regarding the interpretation of certain claim limitations appears in Section VI.D, below.

D. Unpatentability of the Construed Claims (37 C.F.R. §42.104(b)(4))

An explanation of how the challenged claims of the '117 patent are unpatentable is provided in Section VII, below.

E. Supporting Evidence and Citation of Prior Art (37 C.F.R. §42.104(b)(5))

The evidence relied upon to support the challenge and its relevance , including identifying specific portions that support the challenge, are provided below. An Exhibit List is set forth above.

The prior art relied upon is:

Exhibit	Reference	Publication Date	Availability as Prior Art
1004	Oki	May 23, 2003	§ 102(a)
1006	Toffolo	January 8, 2002	§§102(a), (b), (e)
1007	Morris	June 19, 2003	§§102(a), (e)
1008	Weindorf	August 29, 2002	§§102(a), (b), (e)
1009	Bruning	June 13, 2002	§§102(a), (b), (e)

F. Person of Ordinary Skill in the Art

A person of ordinary skill in the art at the time of filing (2004) would have at least a bachelor's degree in electrical engineering, physics, optics or a related field, and at least three (3) years of further practical or educational experience working with analog circuit design, and optical sensors. *Mihran*, ¶¶31-36.

G. Explanation of Unpatentability and Supporting Evidence

An explanation of how claims 1-2, 4-7, 9, 13-16, and 18 of the '117 patent are unpatentable, with supporting evidence, is provided below. In Exhibit 1011, each claim element is labeled with either a claim number or an element number/letter (e.g., claim 1, 2nd element is labeled as "Element 1b"). These claim and element labels are employed below for the sake of clarity.

V. TECHNOLOGY OVERVIEW

As of February 9, 2004—the filing date of a provisional patent application, the benefit of which is claimed by the '117 patent—the particular features of the '117 patent's purported invention had been described in numerous references, as described below and in Dr. Mihran's declaration. *Mihran*, ¶¶56-113.

A. Selective Ambient Light Sensing – User Can Turn Automatic Adjustment On Or Off

Oki, Toffolo and other automatic brightness systems that predate the '117 patent featured the ability to selectively turn on and off the automatic brightness adjustment function. *Mihran*, ¶¶39-113. One well-known method for selective

ambient light sensing in such systems was to select a manual mode where only user input was used and a photodiode was not used, as taught by, e.g., *Oki* and *Toffolo*. *Mihran*, ¶¶104-113.

B. Using User Input And Ambient Light Levels To Adjust Display Brightness Level

Automatic adjustment of the brightness of a display screen based on sensed ambient light levels has also been thoroughly described in prior art patents and publications prior to the '117 patent. *Mihran*, ¶¶56-83. As Dr. Mihran explained, numerous systems and methods had been developed to automatically adjust a screen's brightness based on the brightness of the environment as detected by a sensor, a value that could rapidly change, such as based on device movement. *Mihran*, ¶¶57,61.

Oki, *Toffolo* and other automatic brightness systems that existed prior to the '117 patent featured user input devices through which a user could customize the automatic brightness adjustment system to particular preferences. *Mihran*, ¶¶65-83. One well-known method for customizing the automatic brightness adjustment in such systems was to calculate display brightness by multiplying a user's input by the sensed level of ambient light, as taught by, e.g., *Oki* and *Toffolo*. *Mihran*, ¶¶67-83.

C. Maintaining a Minimum Display Brightness Level in Very Low Ambient Light

The automatic display brightness systems described above commonly recognized that conditions of no (or very little) ambient light in the environment required a minimum level of display screen brightness to allow the screen to be visible to a user. *Mihran*, ¶¶84-91. Further, as a 1995 patent explained “it is obvious that the contents of an LCD can be much more easily viewed in a dark room than a bright one.” Ex. 1023, 1:45-47. Although reduction of screen brightness as the ambient light level decreases is desirable for comfortable viewing and for the sake of reducing power consumption, it was recognized that such reduction should cease at some minimum ambient light threshold to avoid the screen going entirely dark. *Mihran*, ¶¶87. As *Helms* noted, it was known that display systems would require display brightness to be “set to the minimum level necessary to enable the contents of the display to be perceived,” Ex. 1023, 1:54-57, even if the display was in a pitch-black environment.

Accordingly, many references that predate the ’117 patent disclosed the need to set a minimum brightness regardless of ambient light level. *Mihran*, ¶¶87-91. For example, *Oki* disclosed a “minimum used luminance value” below which the display screen could not fall below even when “it is dark outside,” *i.e.*, when the ambient light dropped to zero. Ex. 1004, [0027]. Similarly, *Toffolo* disclosed that when a photosensor detects that the level of ambient light is low, the display is set to a

minimum luminance level. Ex. 1006, 2:21-24.

VI. SUMMARY OF THE '117 PATENT

A. Overview

The '117 patent is entitled “Method and Apparatus to Control Display Brightness with Ambient Light Correction.” The application leading to the '117 patent was filed on December 17, 2008, issued on July 17, 2012, and claims priority to a provisional application filed on February 9, 2004. The Patent Owner has asserted in litigation that the '117 patent is “entitled to a priority date of at least March 28, 2003, or upon filing of a provisional application on February 9, 2004, and possibly earlier than that date.” Ex. 1018, p. 11. Despite making the claim, the Patent Owner has not provided any evidence to support a priority date prior to the filing of the provisional application on February 9, 2004. Thus, Petitioner challenges any assertion of a priority date prior to the February 9, 2004 filing date of the provisional application.

Ambient light detection and display brightness adjustment were well known at the time of the '117 patent. Ex. 1001 at 1:18-56; *Mihran*, ¶¶56-113. In general, the '117 patent is directed to a specific implementation of “selective ambient light correction” for a visible display that adjusts for user input and keeps the brightness level of the visible display above a “predetermined level” when the ambient light level “decreases to approximately zero.” Ex. 1001, cl. 1; *Mihran*, ¶¶39-55.

Claim 1 is an apparatus claim for a “brightness control circuit” comprising four different claim elements: (1) a “first input configured to receive a user signal”; (2) a “light sensor configured to sense ambient light and to output a sensing signal”; (3) a “multiplier configured to” generate a combined signal based on the user signal and the sensing signal; and (4) a “dark level bias configured to adjust the combined signal to generate a brightness control signal” that is used to control the brightness of a visible display. Ex. 1001, cl. 1. These four components comprise the claimed circuit, which performs “selective ambient light correction” by “maintain[ing] [the brightness control signal] above a predetermined level when the ambient light level decreases to approximately zero.” *Id.*

Claim 15 recites a method for receiving an input signal, multiplying the input signal with a sense signal indicating the ambient light level, and adjusting the combined signal with “a dark level bias” to generate a brightness control signal. Ex. 1001, cl. 15. As with claim 1, these steps “selectively provide ambient light correction” in a visible display and thereby “maintain[] [the brightness control signal] above a predetermined level when the ambient light level decreases to approximately zero.” *Id.*

The ’117 patent specification states that “selective ambient light correction” is allegedly desirable in visible displays because ambient light reflects off the surface of the LCD, “which reduces the display contrast to give the LCD a washed-out appearance.” Ex. 1001, 1:27-30. The specification explains that it was well known

that adjusting the brightness of the display according to ambient brightness was a way to improve visibility, including avoiding a “washed-out appearance” in conditions of high ambient brightness. *Id.*, 1:30-36 (“the backlight should be adjusted to be brighter for high ambient lighting conditions and less bright for low ambient lighting conditions”).

B. Prosecution history

The ’117 patent issued from a continuation of U.S. Patent Application No. 11/023,295, which issued as U.S. Patent No. 7,468,722, which claims the benefit of U.S. Provisional Application No. 60/543,094, filed on Feb. 9, 2004. The ’722 patent was originally filed on December 27, 2004 with 21 pending claims. During prosecution, the examiner rejected all twenty-one of the originally pending claims (including dependent claim 2, which recited “a dark level bias circuit configured to maintain the brightness control signal above a predetermined level when the ambient light level decreases to approximately zero”) as either anticipated and/or rendered obvious over various prior art references. Ex. 1015, 429-440.

The claims of the ’722 patent were ultimately allowed after the claims were amended to recite a detailed description of the physical structure of the claimed “multiplier circuit.” Ex. 1015, 35-43, 54-68.

In the continuation application that resulted in the ’117 patent, filed December 12, 2008, the independent claims lacked the detailed description of the “multiplier”

that had resulted in allowance of the '722 patent, but included the “dark level bias” element that had been present in dependent claim 2 of the '722 patent. Ex. 1002, 114-118.

Adjusting display brightness for ambient light and user input was well known at the time of the '117 patent. Ex. 1001, 1:18-56. For instance, during prosecution of the '117 patent, the examiner rejected nearly all of the pending claims (except for pending claims 30-31, directed to the structural implementation of the “multiplier”) as anticipated and/or rendered obvious over various prior art references. Ex. 1002, 76-89. Specifically, the examiner rejected the '117 claims over a reference disclosing a CRT display with a brightness control circuit associated with both a sensor that measured ambient light and an input that received user input regarding preferred brightness. Ex. 1002, 50-62. The applicant then amended each independent claim to recite that the dark level bias adjusted the brightness control signal so that it would be “maintained above a minimum level when the ambient light level decreases to approximately zero.” Ex. 1002, 50-62. The applicant argued that the applied prior art did not “disclose, teach or suggest the use of [such] a dark level bias,” which the applicant characterized as “ensur[ing] a predefined (or minimum) brightness in total ambient darkness.” *Id.* Following this amendment, and despite previously rejecting over the prior art dependent claim 2 of the parent application (which, as noted above, recited “a dark level bias circuit configured to maintain the brightness control signal above a predetermined level when the ambient light level

decreases to approximately zero”), the examiner allowed the claims without further comment. Ex. 1002, 37-41.

C. Selected Illustrative Figures and Examples from the Specification of the '117 patent

Figure 1 is described in the patent as “a block diagram of one embodiment of a brightness control circuit with ambient light correction,” Ex. 1001 at 4:17-19, and illustrates the four claim elements comprising the brightness control circuit:

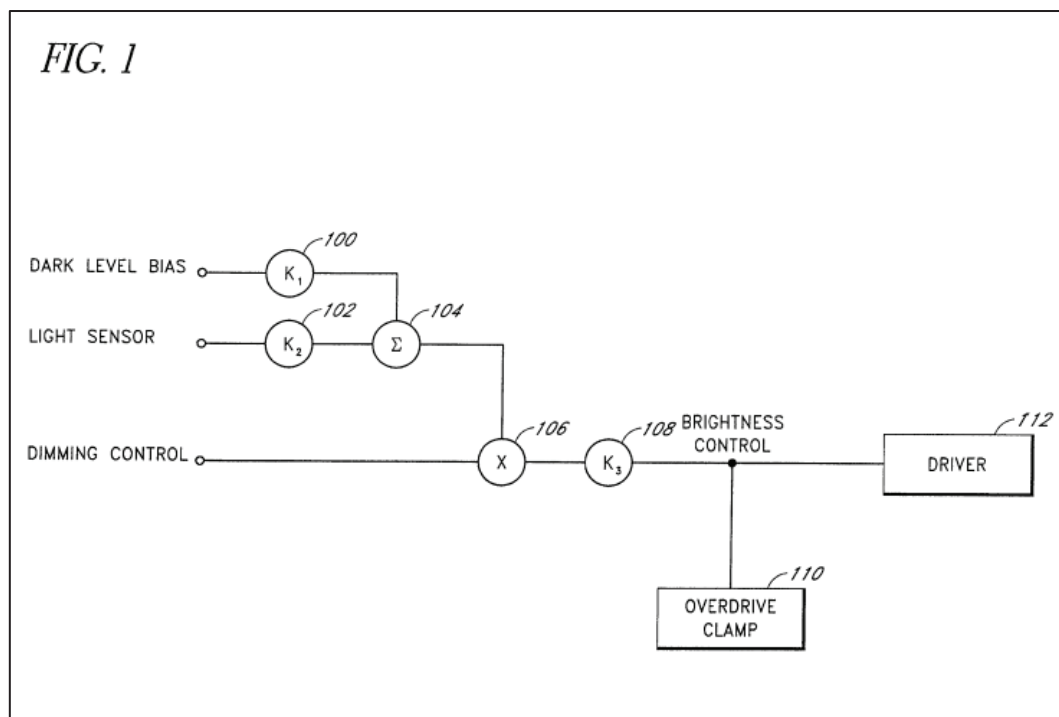


Figure 1 depicts a “dark level bias,” a “light sensor,” and a “dimming control,” which the patent describes as the “user input.” Ex. 1001, 4:46-59. As described in the patent, the “multiplier circuit” (106) receives inputs from the “dark level bias”/“light sensor” and separately from the “dimming control” (“user input”), and

then provides an output adjusted by a “scalar circuit” (108) to produce the “brightness control signal” for the “display driver” of the visible display (112). *Id.*

Figure 2 provides a similar “block diagram of another embodiment of a brightness control circuit with ambient light correction,” *id.*, 4:19-20, and further illustrates the four claim elements of the brightness control circuit:

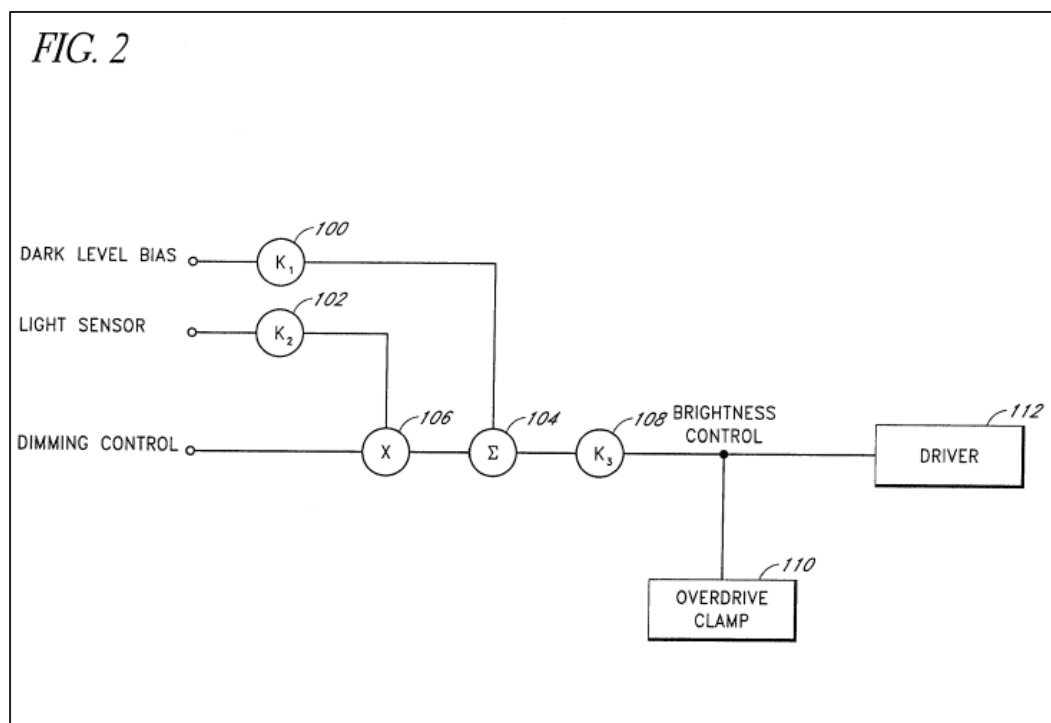


Figure 2 depicts a “dark level bias,” a “light sensor,” and a “dimming control,” which the patent describes as the “user input.” Ex. 1001, 5:19-20. As described in the patent, the “multiplier circuit” (106) receives inputs from the “light sensor”/“dimming control” (“user input”), and then a “summing circuit (104) adds the product to a dark level bias,” thus providing an output that is adjusted by a “scalar

circuit” (108) to generate the “brightness control signal” for the “display driver” of the visible display (112). *Id.* at 5:15-29.

D. Claim Construction Under 37 C.F.R. §42.104(B)(3)

In an IPR, the Board construes claim terms in an unexpired patent according to the standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (*en banc*). *See* 83 Fed. Reg. 51,340 (Oct. 11, 2018).

For the purposes of this Petition only, Petitioner is applying constructions adopted by the District Court in the Samsung litigation or what the Patent Owner contends are the plain and ordinary meanings of the terms as read in light of the specification by a POSA. In other words, Petitioner is applying these constructions herein simply to avoid having a dispute over the proper constructions as part of this IPR, but in doing so Petitioner is not conceding any particular construction of the claim limitations, implicitly or otherwise. Moreover, Petitioner submits that the grounds for invalidity presented here would not change if alternative constructions were adopted.

The District Court in the Samsung litigation adopted the following constructions of the “multiplier” terms:

Term	Construction
a multiplier configured to selectively generate a combined signal based on both the user signal and the sensing signal	a multiplier configured to selectively generate a combined signal based on both the user signal and the sensing signal, wherein the combined signal includes, but is not necessarily limited to, the product of the user signal and the sensing signal
selectively multiplying the input signal with a sense signal to generate a combined signal	selectively multiplying the input signal with a sense signal to generate a combined signal, wherein the sense signal indicates an ambient light level and wherein the combined signal includes, but is not necessarily limited to, the product of the input signal and the sense signal

Ex. 1022, 21.

With regard to the word “selectively” in these “multiplier” limitations, the

Patent Owner stated as follows:

“The plain meaning of ‘selectively’ is ‘on a selective basis.’ Ex. 2005 at Exhibit A at 1; *see also*, Ex. 2008 at 5; Ex. 2009 at 6. The specification describes performing ambient light correction on a selective basis when particular conditions are met (*e.g.*, when an ‘auto’ mode is enabled) and not performing it under other conditions (*e.g.*, when a ‘manual’ mode is enabled). Ex. 1001, 2:17–30.”

Ex. 1014, 12.

With regard to the term “based on” in these “multiplier” limitations, the Patent Owner has advocated for its plain meaning, stating: “the claim language, which states ‘generate a combined signal based on both the user signal and the sensing signal,’ means generate a signal ‘based on,’ or from, a user signal and sensing signal.” Ex. 1019, 7. The Patent Owner further stated that “based on” should not “be limited to only the direct multiplication of the user signal and the sensing signal,” and should “allow other mathematical functions, like those described in the preferred embodiments, that have additional terms.” *Id.* at 7-8.

Petitioner will apply these constructions.³

³ With regard only to the “multiplier” term of claim 1, Petitioner does not contest Patent Owner’s contention that “configured to” means “actually programmed or implemented with hardware or software to.” See Ex. 1027.

With regard to the “dark level bias” limitations, the Patent Owner has contended as follows:

Claim Term	Patent Owner Construction
“a dark level bias configured to adjust the combined signal” (claim 1)	“a dark level bias (<i>i.e.</i> , a value) configured to adjust the combined signal”
“adjusting the combined signal with a dark level bias” (claim 15)	“adjusting the combined signal with a dark level bias (<i>i.e.</i> , a value)”

Ex. 1020, 13-14.

The District Court in the Samsung litigation found that the “dark level bias” terms have their plain and ordinary meaning. Ex. 1022, 25.

With regard to the limitation in claim 6 -- “an overdrive clamp circuit coupled to the brightness control signal to limit its amplitude to a predefined range” – the

Petitioner does not concede that construction of “configured to” with respect to any other claim limitation.

District Court in the Samsung litigation adopted the following construction: “an overdrive clamp circuit coupled to the brightness control signal to limit the absolute value of the brightness control signal’s amplitude to be less than a predefined level.” Ex. 1022, 28-29. Petitioner will apply this construction.

While applying the foregoing meanings of certain claim terms for purposes of this Petition, including Patent Owner’s asserted plain and ordinary meanings, Petitioner expressly reserves the right to argue for a different construction in other proceedings, including that certain claim terms are indefinite, and reserves the right to propose a particular construction at a later time during this proceeding for any other term for which construction is proposed by the Board or Patent Owner.

VII. CLAIMS 1-2, 4-7, 9, 13-16, AND 18 OF THE ’117 PATENT ARE UNPATENTABLE BASED ON EACH OF *OKI* AND *TOFFOLO*, INDIVIDUALLY, AND IN COMBINATION WITH SECONDARY REFERENCES

While certain elements and/or claims are addressed together, this is only done when the elements are only minor variations of each other, with the differences so minor that the same portions of prior art teach the same elements of the claims, even with their minor variations in wording.

A. Prior Art References

1. Oki

Oki, entitled “Mobile Terminal Screen Display Control Method And Device,” was filed in the Japanese Patent Office on November 14, 2001 by Oki Electric Industry Co., Ltd, and thus is prior art under 35 U.S.C. §102(a). The sole inventor of *Oki* is Takahiro Watanabe. *Oki* published on May 23, 2003. *Oki* was not cited or considered during the prosecution of the ’117 patent.

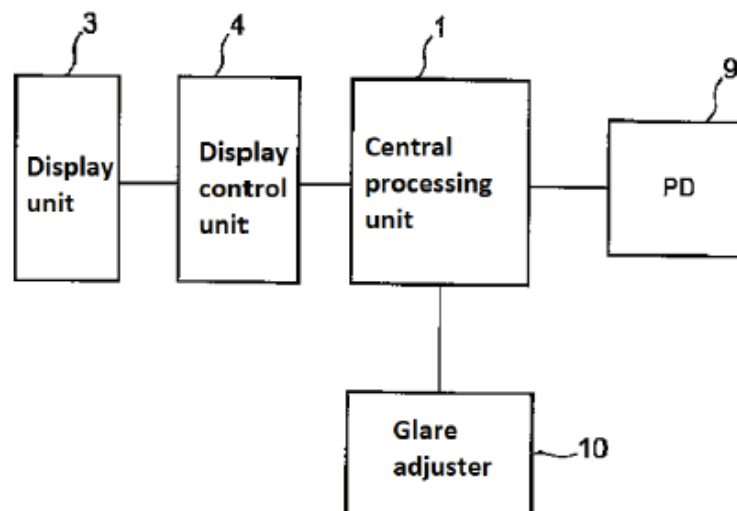
Oki discloses selective control of a display, using user input and sensed ambient light levels to adjust a display brightness level, and maintaining a minimum display brightness level at low ambient light levels. Ex. 1004, [0026]-[0035], FIGs. 5-6, cl. 4-5; *Mihran*, ¶¶137-158.

Oki discloses “a screen display control method for automatically switching the display mode of the screen so as to adapt to ... changes in the use environment.” Ex. 1004, [0035]. *Oki* discloses a photodiode that measures illuminance, or ambient brightness, which can change depending on the use environment of the device. *Id.* A brightness level of a display, which *Oki* calls “luminance,” is adjusted based on a user input signal and a sensor signal indicative of illuminance (ambient light) measured by the photodiode 9. *Id.*, cl. 4; *Mihran*, ¶139.

FIG. 5 of *Oki* illustrates a display controller which may be used with any electronic device, for example, a mobile telephone. Ex. 1004, [0026]-[0027]. A user

may provide input to adjust various brightness settings of the display controller. *Id.* For example, the user input may include a selection of a “maximum used luminance value,” which is a setting that can increase a brightness level of a display to avoid glare when the ambient light is high. *Id.* Similarly, the user input may include a selection of a “minimum used luminance value,” which is a setting that controls the brightness level of the display such that it is maintained above a predetermined level when the ambient light level is low, such as when it is dark outside. *Id.*

[FIG. 5]



The display controller depicted in FIG. 5 includes a photodiode (PD) 9 that senses illumination information (i.e., ambient light level) surrounding a display unit 3. Ex. 1004, [0026]. The PD 9 outputs “an electrical signal” (a PD output value) indicative of the ambient light level surrounding the display unit 3. *Id.*, [0026]; [0028]. The display controller includes a central processing unit 1 that processes

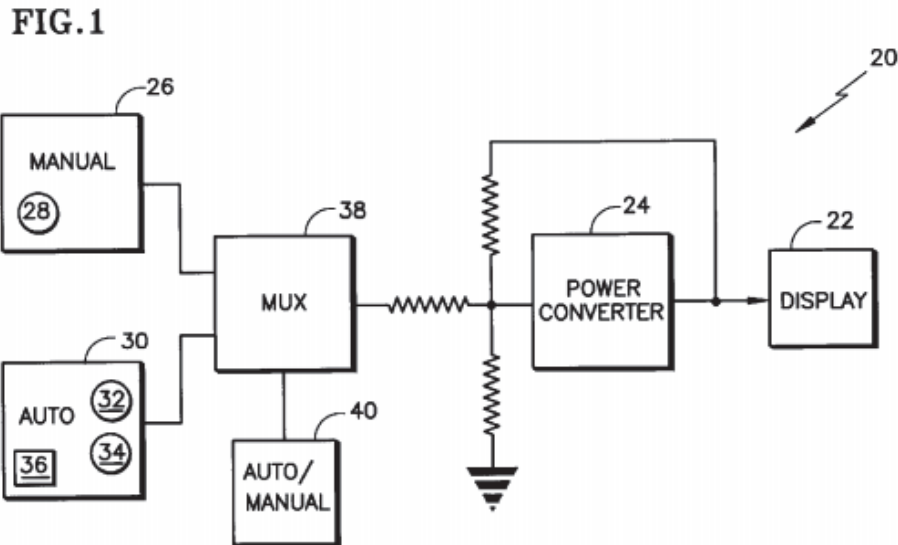
display data based on the PD output value signal and on input provided to the display controller by a user. *Id.* The display controller includes a glare adjuster 10 that receives the PD output value signal from the CPU and the user input signal, calculates the display screen luminance value based on one or both of those two signals, and provides that value to the CPU, which sends that value to the display control unit 4, which adjusts the luminance value of the display unit 3. *Id.*, [0026]-[0028]. The display brightness controller may automatically adjust the display luminance of the display unit 3. *Id.*, [0031]. In some embodiments, the automatic adjustment may be selectively disabled. *Id.*

2. Toffolo

Toffolo is a U.S. Patent titled “Display System with Automatic and Manual Brightness Control” that was filed on October 30, 1997 and issued on August 29, 2001, and thus is prior art under 35 U.S.C. §§102(a), (b), and (e). *Toffolo* was not cited or considered during the prosecution of the ’117 patent. *Toffolo* was cited as a secondary reference in the Samsung IPR petition, Ex. 1016, but was not cited or relied upon for the purposes that are provided in this Petition.

Like *Oki*, *Toffolo* discloses an automatic brightness control system for a display—in particular, a system that allows a user to switch between manual control of the display brightness and an automatic brightness adjustment mode based on ambient light levels and user input. Ex. 1006, Abstract; see *Mihran*, ¶¶159-161. A

multiplexer 38 in the display system selects between the manual brightness control mode and the automatic brightness control mode based on an input from switch 40, *id.*, 2:6-13, as depicted in Fig. 1 of *Toffolo*:



Toffolo discloses that in the “manual brightness control” mode, *id.*, the user of the display system inputs the display brightness using a “user activated input device 28, such as a switch or rotary knob.” Ex. 1006, 1:65-66. In the “automatic brightness control” mode, “[a] brightness controller varies the luminance of the display based upon ambient light as sensed by an ambient light sensor,” *id.*, Abstract, and the minimum and maximum luminance levels between which the display brightness can automatically vary. *Id.*, 2:48-61. Those minimum and maximum luminance levels can be set by the user utilizing “a first user input device 32 and a second user input device 34.” *Id.*, 1:66-2:2. *Toffolo* discloses that the luminance of

the display will be maintained at the minimum luminance level at the lowest level of illuminance distinguishable by the photosensor. *Id.*, 2:38-53. *Toffolo* also discloses circuits for conditioning the signal from the photosensor. *Id.*, 3:13-16.

3. Morris

Morris is a U.S. Patent Publication titled “Pre-Subtracting Architecture for Enabling Multiple Spectrum Image Sensing” that was filed on May 6, 1998 and published on June 19, 2003, and thus is prior art under 35 U.S.C. §§102(a), (e). *Morris* was not cited or considered during the prosecution of the ’117 patent. *Morris* discloses an ambient light sensor that generates a visible light signal by subtracting sensed infrared spectrum energy from sensed energy from both the infrared and visual light spectra. *Mihran*, ¶¶162-164.

Specifically, *Morris* discloses an “imaging system . . . in which [infrared light] does not appreciably affect resulting visible image signals.” Ex. 1007, [0007]. *Morris*’ imaging system is made up of infrared pixel sensors and pixel sensors responsive to both IR and visible light. *Id.*, [0029]. *Morris* explains that by “electronically subtracting signals generated by IR pixel sensors from signals generated by pixel sensors responsive to both IR and visible light,” “the effect of IR energy upon an image signal is substantially reduced.” *Id.*, [0019]. The pixel sensors utilized in *Morris*’ system are photodiodes. *Id.*, [0022].

4. Weindorf

Weindorf is a U.S. Patent Publication titled “Automatic Brightness Control System And Method For A Display Device Using A Logarithmic Sensor” that was filed on December 22, 2000 and was published on August 29, 2002, and thus is prior art under 35 U.S.C. §§102(a), (b), and (e). *Weindorf* was cited but not used in any rejections during the prosecution of the ’117 patent.

Weindorf discloses an automatic day selector 348 that determines a luminance value for a display device, based on ambient light conditions. Ex. 1008, [0072]; *Mihran*, ¶¶165-167. The automatic day selector 348 includes a filter to reduce or eliminate fluttering that may result from rapid changes in ambient light conditions. *Id.* *Weindorf* further teaches that if “ambient light changes are large, the filter may cause the backlight display device to wait a longer time before changing the brightness.” *Id.* A POSA would have understood that the filter of *Weindorf* would serve to reduce sensitivity to transient variations of ambient light. *Mihran*, ¶166.

Weindorf explains that “[a] poorly lit environment usually requires less brightness than a brightly lit environment,” and that “[a]mbient light seems to constantly change or changes very frequently in many applications such as automobiles and other vehicles or in portable applications.” Ex. 1008, [0006]-[0007]. Accordingly, *Weindorf* disclosed, “[t]he different ambient light conditions usually require adjustments to the brightness level for comfortable viewing of the

display device,” and that “automatic adjustments to the brightness level may improve battery consumption” and “improve light source life.” *Id.*, [0007].

5. Bruning

Bruning is a U.S. Patent Publication titled “Control And Drive Circuit Arrangement For Illumination Performance Enhancement With LED Light Sources” that was filed on December 12, 2000, and published on June 13, 2002, and thus is prior art under 35 U.S.C. §§102(a), (b), and (e). *Bruning* was not cited or considered during the prosecution of the ’117 patent.

Bruning discloses “a backlight for an LCD display comprised of an array of LEDs.” Ex. 1009, Abstract. *Bruning* also discloses a driver for driving and controlling the backlight that includes drive circuitry, which may comprise a power regulated converter.” Ex. 1009, [0011].

Bruning states that, “[t]he electronic components and circuitry associated with the entire circuit shown in FIG. 4 provides the driving electronics of the LEDs,” further noting that “[a]s known in the art, capacitor C₁ and switch Q₂ comprise the clamping feature of the circuit.” Ex. 1009, [0032]. The clamp circuit shown will limit the amplitude of the backlight provided to the display, which determines its brightness. Ex. 1009, [0039]; *Mihran*, ¶¶168-174.

B. Ground 1: Claims 1-2, 4-7, 9, 15-16, and 18 are Unpatentable Under 35 U.S. C. §102 Over *Oki* and Ground 2: Claims 1-2, 4-7, 9, 15-16, and 18 are Unpatentable as Obvious Under §103 Over *Oki*

The alleged invention recited in claims 1-2, 4-7, 9, 15-16, and 18 of the '117 patent is anticipated and/or rendered obvious by the disclosure of *Oki*. *Oki*'s equation, $y = (b - a)x + a$, is a formulaic representation of what is claimed in the '117 patent. *Mihran*, ¶¶176-234.

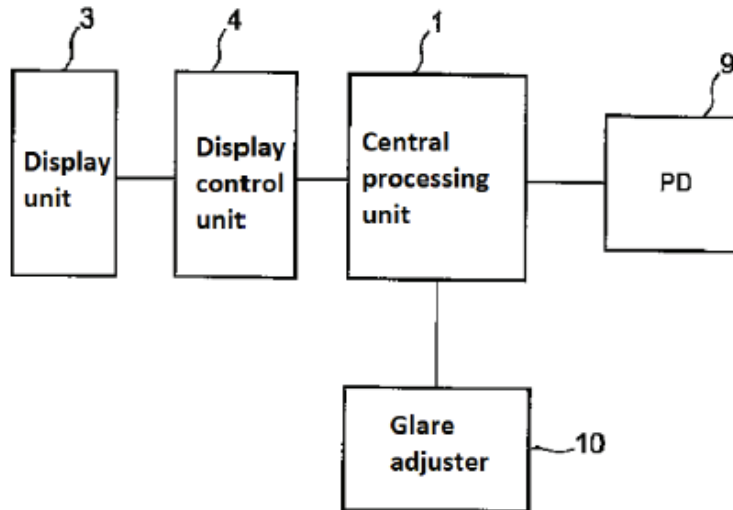
1. Claims 1 and 15 are anticipated and/or rendered obvious by *Oki*

Claim Element	Example Elements in <i>Oki</i>
1[preamble] A brightness control circuit with selective ambient light correction comprising:	- brightness control circuit = display controller Ex. 1004, [0006]; [0026]; FIG. 5
15[preamble] A method to selectively provide ambient light correction, said method comprising:	- selective = external brightness automatic adjustment may be disabled Ex. 1004, [0031]
	- ambient light correction = display controller adjusts a luminance value to control the luminance of a display unit Ex. 1004, [0026]; FIG. 5

To the extent it is limiting, the preamble is disclosed by *Oki*, which discloses a “display controller” that processes display data based on (1) an electrical signal (e.g., illumination information) from a photodiode 9 and (2) a value selected by a user. Ex. 1004, [0006], [0026], FIG. 5; *See Mihran*, ¶¶177-181. The display controller adjusts a luminance value that may be used by a display control unit 4 to control the luminance (*i.e.*, brightness) of a display unit 3. *Id.*, [0026], [0031], FIG.

5; *Mihran*, ¶177.

[FIG. 5]



Oki discloses that “although the external brightness is periodically measured ... the automatic adjustment may be made subject to disabling.” Ex. 1004, [0031]. When the automatic display screen luminance adjustment is disabled, a user may provide input to manually adjust the display screen luminance. *Id.*, [0031]. This is consistent with the Patent Owner’s interpretation of “selectively.” For example, in the *Patent Owner Preliminary Response* in IPR2018-01262,⁴ the Patent Owner states that “[t]he specification describes performing ambient light correction on a selective basis when particular conditions are met (e.g., when an “auto” mode is enabled) and not performing it under other conditions (e.g., when a “manual” mode is enabled).” (internal citations omitted).

⁴ Ex. 1014, 12.

Claim Element	Example Elements in <i>Oki</i>
1[a] a first input configured to receive a user signal indicative of a user selectable brightness setting;	- First input = numerical keys of the mobile terminal; an input device other than the numerical keys of the mobile terminal Ex. 1004, [0027]
15[a] receiving a user input signal indicative of a user selectable brightness setting;	- user [input] signal indicative of a user selectable brightness setting = maximum used luminance value; minimum used luminance value; luminance setting Ex. 1004, [0027]

Oki discloses these limitations. See *Mihran*, ¶¶182-184. According to *Oki*, the display controller may receive user input to adjust various brightness settings of the display controller. Ex. 1004, [0027]; *Mihran*, ¶184. The first input includes “the numerical keys of the mobile terminal” or any input device “other than the numerical keys of the mobile terminal” that can be used to input the maximum used luminance value and the minimum used luminance value, one or both of which is the user signal (claim 1), which is referred to as the user input signal in claim 15. *Id.* “This luminance setting [*i.e.*, the user [input] signal] may be made and input to the glare adjuster 10.” *Id.* The maximum and/or minimum used luminance values are user inputs indicative of a user selectable brightness setting of the display. *Id.*, Ex. 1004, [0030].

Claim Element	Example Elements in <i>Oki</i>
1[b] a light sensor configured to sense ambient light and to output a sensing signal indicative of the ambient light level;	- light sensor = photodiode (PD) 9 - ambient light = brightness surrounding the display unit 3 - output a sensing signal [or sense signal] indicative of the ambient light level = a photodiode 9 that has the function of sensing and outputting as an electrical signal (PD output value) the brightness surrounding the display unit 3 Ex. 1004, [0026]; [0027]; [0029]
15[b] wherein the sense signal indicates an ambient light level	

Oki discloses “a photodiode 9 that has the function of sensing and outputting as an electrical signal (the PD output value) the brightness surrounding the display unit 3.” Ex. 1004, [0026]. *Mihran*, ¶¶185-186.

Claim Element	Example Elements in <i>Oki</i>
1[c] a multiplier configured to selectively generate a combined signal based on both the user signal and the sensing signal;	- multiplier = display controller, glare adjuster 10 - selectively generate a combined signal based on both the user signal and the sensing signal = combined signal $(b - a)x$ is generated based on the user signal (a, b, or both) and the sensing signal x Ex. 1004, [0029]-[0031]
15[c] selectively multiplying the input signal with a sense signal to generate a combined signal;	

Oki discloses these limitations. *Mihran*, ¶¶187-201. As discussed above, the Patent Owner has already taken the position with respect to the “selectively” limitation that “performing ambient light correction on a selective basis” is disclosed, for example, when a device has both an auto mode and a manual mode.

Mihran, ¶197. The system of *Oki* generates a combined signal based on measured, or sensed, ambient brightness and user input only when automatic adjustment has been *selected* by the user, thereby disclosing “a multiplier configured to *selectively generate a combined signal* based on both the user signal and the sensing signal,” as recited in claim 1 of the ‘117 Patent. *Mihran*, ¶200. If manual mode is instead selected by disabling automatic mode, then the combined signal is not generated as recited. *Id.* As such, *Oki* discloses “**selectively multiplying** the input signal with a sense signal to generate a combined signal,” as recited in claim 15.

Oki discloses the “multiplier” and “multiplying” limitations. *Mihran*, ¶¶188-195. The display controller uses an equation to determine how to adjust the display screen luminance value, *i.e.*, the display brightness -- $y = (b - a)x + a$, where y is the display screen luminance value, a and/or b may be determined by user input, *i.e.*, user signal, and x is the PD output value. Ex. 1004, [0029]; *Mihran*, ¶190. *Oki* discloses an example where “ a ” is set as the minimum used luminance value and “ b ” is set as the maximum used luminance value. *Id.* Per the equation $y = (b - a)x + a$, the display controller (which includes the glare adjuster 10) multiplies the user signal portion $(b - a)$ by x , which is the PD output value. The result of the multiplication of $(b - a)$ and x is a combined signal. Thus, *Oki* discloses a multiplier (the display controller, glare adjuster 10) configured to selectively generate a combined signal based on both the user signal and the sensing signal, as recited in claim 1. Similarly, *Oki* discloses multiplying the user signal (or input signal) with a

sensing signal (or sense signal) to generate a combined signal, as recited in claim 15.

Claim Element	Example Elements in <i>Oki</i>
1[d] a dark level bias configured to adjust the combined signal to generate a brightness control signal that is used to control a brightness level of a visible display such that the brightness control signal is maintained above a predetermined level when the ambient light level decreases to approximately zero. 15[d] adjusting the combined signal with a dark level bias to generate a brightness control signal for controlling brightness of a visible display such that the brightness control signal is maintained above a predetermined level when the ambient light level decreases to approximately zero.	- a dark level bias = minimum used luminance value, a - combined signal = $(b - a)x$ - brightness control signal = display screen luminance value, y - such that the brightness control signal is maintained above a predetermined level when the ambient light level decreases to approximately zero = For $y = (b - a)x + a$, when the PD output value, x, is approximately zero, then the minimum used luminance value, a maintains the display screen luminance value, y at least at a level greater than or equal to the minimum used luminance value, a Ex. 1004, [0029]

Oki discloses these limitations as shown, at least in part, by the equation $y = (b - a)x + a$ that defines the brightness control signal, which is illustrated below in FIG. 6 (with added annotations). *Mihran*, ¶¶202-215. The minimum used luminance value, a , adjusts the combined signal (*i.e.*, the product of $(b - a)$ and x), to generate the display screen luminance value, y . Ex. 1004, [0029]; *Mihran*, ¶205. The display control unit 4 changes the brightness of the display unit 3, based on the luminance value y . *Id.* *Oki* discloses that the minimum used luminance value, a , is added to the

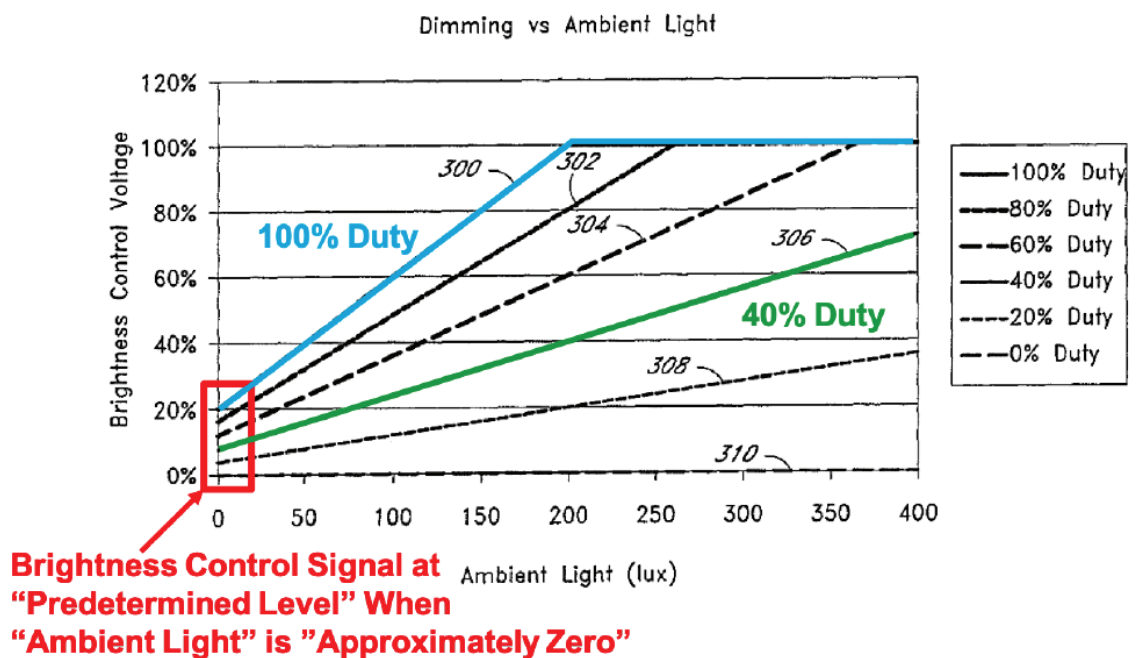
combined signal, and ensures that the display screen luminance value, y , is not zero, but is maintained at a predetermined value even in low-light conditions. *Oki*, [0029]; *Mihran*, ¶207. In other words, the minimum used luminance value, a , is a “dark level bias.” *Mihran*, ¶215.

The Patent Owner’s expert, Ravin Balakrishnan, states that a POSA would understand the limitation “‘dark level bias’ as a value (e.g., voltage value of an electrical signal or a value of a software variable) that adjusts the combined signal to generate a brightness control signal that is maintained above a predetermined level when the ambient light level is very low (i.e., ‘approximately zero’).” Ex. 1012, 11. *Balakrishnan* further states that “the ‘dark level bias’ term is responsible for maintaining the brightness control signal above a predetermined level by ensuring that, even if ISRC [sensing signal] equals zero, a non-zero number will result for the brightness control signal.” *Id.*, 16. *Oki* discloses the dark level bias because even when the PD output value, x , is zero, the minimum used luminance value, a , ensures that the display screen luminance value, y , is not zero. Ex. 1004, [0029], FIG. 6; *Mihran*, ¶¶207-209.

In describing the “dark level bias” that maintains the brightness control signal “above a predetermined level when the ambient light level decreases to approximately zero,” Balakrishnan opines that “[o]ne of ordinary skill in the art would thus understand that, as long as there is a predetermined level above which

the brightness control signal is maintained when the ambient light reaches zero, then the ‘predetermined level’ limitation is met.” Ex. 1012, 17-18. This is exactly what *Oki* discloses. *Mihran*, ¶209.

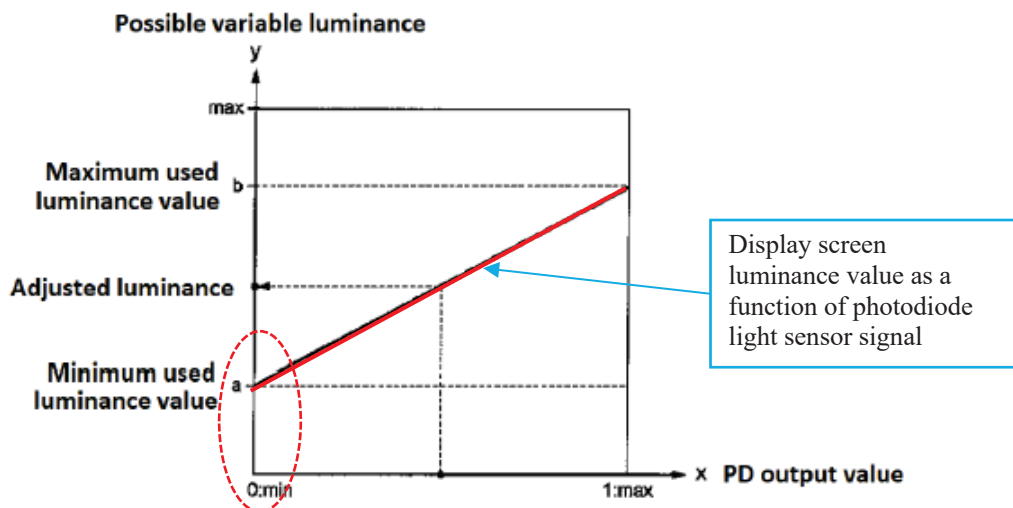
In characterizing Figure 3 of the ’117 patent, Balakrishnan provided the below annotated Figure 3, which presents graphical depictions of the behavior of six brightness control signals, which are labelled 300, 302, 304, 306, 308, and 310 in the figure. Ex. 1012, 39. Each of these graphs shows a respective brightness control signal as a function of ambient light level given a respective user input setting at various duty cycles, with 310 representing a 0% duty cycle. *Id.*, 39-40; *Mihran*, ¶210.



Balakrishnan opines that “[o]ne of skill in the art would understand from the ’117 patent disclosure that the **minimum value for each respective brightness**

control signal graph is an example of the claimed “predetermined level” since each graph is maintained above that level even when ambient light approaches zero. Ex. 1012, 42 (emphasis added). In other words, Balakrishnan explains that Figure 3 of the '117 patent showing graphs intersecting the y axis above zero discloses how the '117 patent's dark level bias maintains a minimum level of brightness. *Mihran*, ¶211. As similarly shown in *Oki's* FIG. 6, which has been reproduced below, *Oki* likewise discloses a dark level bias (the minimum used luminance value, *a*) that ensures that the display screen luminance value, *y*, is maintained above zero even when the PD output value, *x*, is zero, as illustrated by Dr. Mihran's dashed oval annotation. Ex. 1004, [0029]; *Mihran*, ¶¶212-214.

[FIG. 6]



According to *Oki*, as the ambient light level decreases, the PD output value, *x*, correspondingly decreases, and the display screen luminance value (highlighted in red in annotated FIG. 6 above) also decreases until reaching the minimum used

luminance value, a , as illustrated in FIG. 6. Ex. 1004, [0029], FIG. 6; *Mihran*, ¶204. Thus, at a PD output value at or near 0, the display screen luminance value is equal to, or approximately equal to, the minimum used luminance value, a . *Mihran*, ¶204. In other words, *Oki* discloses that the brightness of the display unit 3 is maintained at the minimum used luminance value, a , even when the ambient light level decreases to at or near zero. *Mihran*, ¶204.

In sum, the display screen luminance value, y , is a brightness control signal created based on the dark level bias (minimum used luminance value, a), the PD output value from a light sensor x , and a user signal indicative of a user selectable brightness setting (either a or b , or both), as in the equation $y = (b - a)x + a$. Ex. 1004, [0029]; *Mihran*, ¶215. Once the user signal, *e.g.*, $(b - a)$, is multiplied by the PD output value, x , to generate a combined value, the minimum used luminance value, a , adjusts this combined value and the result becomes the display screen luminance value, y . *Id.*

Thus, *Oki* discloses all of the limitations of claims 1 and 15. *Mihran*, ¶216.

2. Claim 2: The brightness control circuit of claim 1, wherein the dark level bias is provided to the multiplier such that the amount of adjustment to the combined signal is dependent on the user selectable brightness setting.

Oki discloses this limitation, which requires that “combined signal is dependent on the user selectable brightness setting.” *Mihran*, ¶¶217-218. *Oki*

discloses that “**it is possible** for the user to set the maximum used luminance value and the minimum used luminance value of the display screen.” Ex. 1004, [0035]. A POSA would understand that the user would not necessarily set both values, and could set either or both, and that one of the values could be a predetermined value independent of user input. *Mihran*, ¶217.

In *Oki*’s equation for the brightness control signal, $y = (b - a)x + a$, if either a or both a and b are set by the user, then the amount of adjustment to the combined signal $(b - a)x$ will depend on a (which is one of the user selectable brightness settings and also provides the dark level bias) because a is *added* to the combined signal. *Mihran*, ¶218.

3. Claim 4: The brightness control circuit of claim 1, wherein the dark level bias is added to the combined signal such that the amount of adjustment to the combined signal is independent of the user selectable brightness setting.

Oki discloses this limitation, which requires, in contrast to claim 2, that “combined signal is *independent* of the user selectable brightness setting.” *Mihran*, ¶219. As noted above, the user selectable brightness setting may be a or b or both a and b . *Mihran*, ¶¶183, 219. In *Oki*’s equation for the brightness control signal, $y = (b - a)x + a$, a (the minimum brightness setting) may be a predetermined value and only b (the maximum brightness setting) is set by the user. *Mihran*, ¶219. When the ambient light is at or near zero such that $x = 0$, then the combined signal $(b - a)x$ will equal zero. *Mihran*. ¶219. The value of a is then added to that signal as the dark

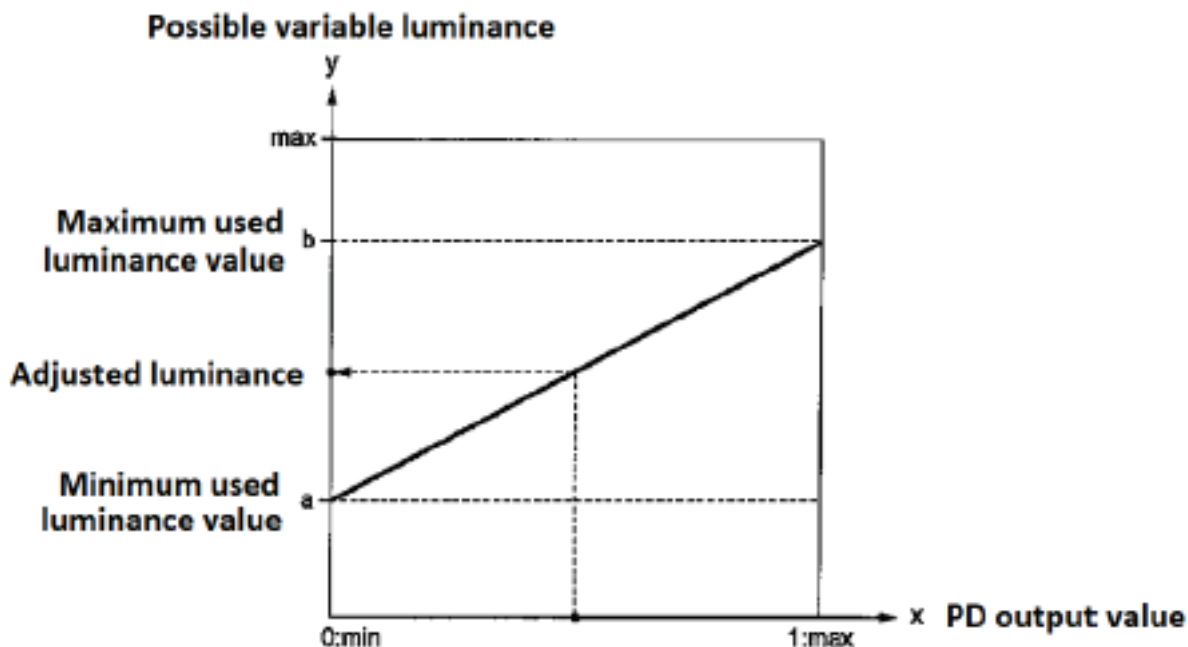
level bias, and the amount of adjustment to the combined signal equals a but is independent of b (which is the user selectable brightness setting). *Mihran*, ¶219.

4. Claim 5: The brightness control circuit of claim 4, wherein the dark level bias is added to an output of the multiplier.

Oki discloses this limitation. *Mihran*, ¶220. It is apparent from the equation $y = (b - a)x + a$ the minimum luminance value a , which represents a dark level bias, is added to the output of the multiplier that generates the product, $(b - a)x$. *Mihran*, ¶220. Once the user signal, e.g., $(b - a)$, is multiplied by the PD output value, x , to generate a combined signal (which is an output of the multiplier), the minimum used luminance value, a , is added to the combined value and the result becomes the brightness control signal, y , determining the display screen luminance value. Ex. 1004, [0029]; *Mihran*, ¶220.

5. Claim 6: The brightness control circuit of claim 1, further comprising an overdrive clamp circuit coupled to the brightness control signal to limit its amplitude to a predefined range.

Oki discloses this limitation. *Mihran*, ¶221. FIG. 6 discloses a scenario where the maximum used luminance value, b , is lower than the maximum possible variable luminance value of the physical display device. Ex. 1004, [0029]-[0030]; *Mihran*, ¶221. In order to control the adjusted luminance value to be below the maximum possible variable luminance value, *Oki* discloses, through FIG. 6, that the adjusted luminance value is limited to a predefined range between the maximum used luminance value, b , and the minimum used luminance value, a . *Mihran*, ¶221.



6. Claim 7: The brightness control circuit of claim 1, wherein the brightness control signal is provided to a display driver to control backlight illumination of a liquid crystal display.

Oki discloses this limitation. *Mihran*, ¶¶222-226. “Next, the glare adjuster 10 sends the calculated luminance value y to the central processing unit 1. Next, the central processing unit 1 sends the luminance value y to the display control unit 4. Next, the display control unit 4 changes the display luminance of the display unit 3, based on the luminance value y .” Ex. 1004, [0029]. The “display unit 3 [] displays an image on a liquid crystal panel or the like.” *Id.*, [0006]. The brightness control signal y is provided to the display control unit 4, i.e., the display driver, to control the illumination of the display. *Mihran*, ¶¶222-226.

7. Claim 9: The brightness control circuit of claim 1, further comprising a second input configured to receive a selection signal to selectively operate the brightness control circuit in an auto mode or a manual mode, wherein the selection signal enables the light sensor in the auto mode and disables the light sensor in the manual mode.

Oki discloses this limitation. *Mihran*, ¶¶227-230. *Oki* discloses both an automatic mode and a manual mode. *Mihran*, ¶¶228-229. *Oki* specifically discloses that “the automatic adjustment may be made subject to disabling.” Ex. 1004, [0031]. *Mihran*, ¶230. *Oki* discloses the second input: “manual adjustment, that is, by the user of the display screen luminance may be made possible by making input to the glare adjuster 10, using numerical keys or the like of the mobile terminal.” *Id.* When the automatic display screen luminance adjustment is disabled, the photodiode 9 is not in use and thus, is disabled. *Mihran*, ¶230.

8. Claim 16: The method of claim 15, wherein the step of selectively multiplying the input signal with the sense signal is performed by a software algorithm, an analog circuit, or a mixed-signal circuit.

Oki discloses this limitation. *Mihran*, ¶¶231-232. “FIG. 5 is a drawing showing the constitution of a display controller in a third embodiment of the present invention. This display controller has a central processing unit 1 that processes display data based on an electrical signal, that is, illumination information, from a photodiode 9 to be described later, based on a value selected by a user, a glare adjuster 10 that adjusts the luminance value, a display unit 3 that displays a screen on a liquid-crystal panel or the like, a display control unit 4 that controls the display

to the display unit 3, and a photodiode 9 that has the function of sensing and outputting as an electrical signal the brightness surrounding the display unit 3.” Ex. 1004, [0026]. *Mihran*, ¶¶231-232.

9. Claim 18: The method of claim 15, wherein the dark level bias is added to the combined signal after selective multiplication such that the amount of adjustment to the combined signal is independent of the input signal and the sense signal.

Oki discloses this limitation. *Mihran*, ¶¶233-234. Similar to claim 4, for a PD output value that equals zero, the amount of adjustment to the combined signal $(b - a)x$ is independent of the user selectable brightness setting $(b - a)$ because when multiplied with the user selectable brightness setting $(b - a)$, the PD output value, x , will “zero out” the user selectable brightness setting $(b - a)$. *Mihran*, ¶233. For a PD output value that equals zero and when the only user selectable brightness setting is the maximum used luminance value, b , the only amount of adjustment will be based on a . *Id.* *Oki* discloses that “it is possible for the user to set the maximum used luminance value and the minimum used luminance value of the display screen,” which does not necessarily mean that the only way to identify the minimum used luminance value is through user input. Ex. 1004, [0035]; *Mihran*, ¶233. A POSA would understand that this setting may also be a predetermined value and independent of user input. *Mihran*, ¶¶233-234.

C. Ground 3: Claim 13 is Unpatentable Under 35 U.S. C. §103 Over *Oki* and *Morris*

1. Claim 13: The brightness control circuit of claim 1, wherein the light sensor comprises a full spectrum PIN diode, an infrared sensitive PIN diode, and an amplifier configured to generate the sensing signal based on a difference between an output of the full spectrum PIN diode and an output of the infrared sensitive PIN diode.

Oki as modified by *Morris* teaches this limitation. *Mihran*, ¶¶235-246. Specifically, *Oki* teaches that “the photodiode 9 [] has the function of sensing and outputting as an electrical signal the brightness surrounding the display unit 3,” Ex. 1004, [0026], which a POSA would have recognized includes the PIN diodes recited in claim 13. *Mihran*, ¶¶244-246. Moreover, in the '094 provisional patent application, the Patent Owner referred to these terms interchangeably (“photodiode or PIN diode”). Ex. 1013, A-2.

A POSA would have understood that *Morris* teaches a light sensor that measures only the amount of visible ambient light by subtracting an amount of light measured by an infrared-sensitive photodiode from an amount of light measured by a photodiode sensitive to both visible and infrared light energy—that is, a light sensor that comprises a full spectrum PIN diode, an infrared sensitive PIN diode, and circuitry that generates a sensing signal based on a difference between an output of the full spectrum PIN diode and an output of the infrared sensitive PIN diode, as found in the claim above. *Mihran*, ¶¶236-246. *Morris* discloses a device in which “the effect of IR energy upon an image signal is substantially reduced by

electronically subtracting signals generated by IR pixel sensors from signals generated by pixel sensors responsive to both IR and visible light.” Ex. 1007, [0029]. *Morris* specifically states that these pixel sensors are photodiodes. *Id.*, [0022]. *Morris* performs the subtraction of the IR signal using analog circuitry, which it describes as “signal duplication/mirror unit 610,” *Id.*, 4:61-5:13 and as illustrated in Fig. 6. *Morris* explains, for example, that “node A receives the current mirrored value from duplication/mirror unit 610 such that the current which represents the amount of infrared light detected by IR pixel sensor 516 is subtracted from the IR plus color light which is detected by photodiode 822.” *Id.*, 5:58-62; Fig. 8.

A POSA would further have been motivated to substitute *Morris*’ light sensors for the ambient light sensors in *Oki*’s automatic brightness control system to improve that system, as discussed above. *Mihran*, ¶¶236-246. As *Oki* explains, an ambient light sensor used in an automatic brightness control system for a display measures the external brightness, which changes depending upon the use environment of the mobile terminal, Ex. 1004, [0035], and *Morris* discloses just such an ambient light sensor that measures the visible portion of the light spectrum. Ex. 1007, [0020]; *Mihran*, ¶¶236-246. Substituting *Morris*’ light sensors for the sensors disclosed by *Oki*, therefore, would have been a straightforward operation and would have produced predictable results—a POSA would have recognized that the signal output by *Morris*’ light sensor could be used to calculate display brightness in the system of *Oki*. *Mihran*, ¶¶236-246.

D. Ground 4: Claim 14 is Unpatentable Under 35 U.S. C. §103 Over *Oki*, *Morris*, and *Weindorf*

1. Claim 14: The brightness control circuit of claim 13, wherein the light sensor further comprises a low pass filter to reduce sensitivity to transient variations of ambient light

Oki as modified by *Morris* (to the extent that claim 14 depends from claim 13) and *Weindorf* teaches this limitation. *Mihran*, ¶¶247-250. A POSA would have understood that *Weindorf* teaches an automatic day selector 348 that determines a luminance value for a display device, based on ambient light conditions. Ex. 1008, [0072]; *Mihran*, ¶248. The automatic day selector 348 includes a filter to reduce or eliminate fluttering that may result from rapid changes in ambient light conditions. *Id.* *Weindorf* further teaches that if “ambient light changes are large, the filter may cause the backlight display device to wait a longer time before changing the brightness,” *id.*, which a POSA would have understood to reduce sensitivity to transient variations of ambient light in the *Oki* brightness control circuit. *Id.* A POSA would have been motivated to use the filter of *Weindorf* in the *Oki* brightness control circuit in order to reduce sensitivity to transient variations of ambient light based on “changes in the use environment.” Ex. 1004, [0004]; *Mihran*, ¶¶249-250. Such a combination of *Weindorf* with *Oki* would have been a straightforward operation and would have produced predictable results. *Mihran*, ¶¶249-250.

E. Ground 5: Claims 1-2, 4-5, 9, 15-16, and 18 are Unpatentable Under 35 U.S. C. §102 Over *Toffolo* and Ground 6: Claims 1-2, 4-5, 9, 15-16, and 18 are Unpatentable as Obvious Under §103 Over *Toffolo*

The alleged invention recited in claims 1-2, 4-5, 9, 15-16, and 18 of the '117 patent is anticipated and/or rendered obvious in view of the disclosure of *Toffolo*. *Mihran*, ¶¶249-250.

1. Claims 1 and 15 are anticipated and/or rendered obvious by *Toffolo*

Claim Element	Example Elements in <i>Toffolo</i>
1[preamble] A brightness control circuit with selective ambient light correction comprising:	- brightness control circuit = display system 20 with a brightness controller Ex. 1006, 1:58-60; 1:22-28; Abstract; FIG. 1
15[preamble] A method to selectively provide ambient light correction, said method comprising:	- selective = selectively chooses manual input circuit 26 or automatic input circuit 30 <i>Id.</i> , 2:6-8; 2:53-61
	- ambient light correction = brightness controller varies the brightness (“luminance”) of the display based upon ambient light (“illuminance”) <i>Id.</i> , 1:22-28; Abstract

To the extent it is limiting, the preamble is disclosed by *Toffolo*, which discloses a “brightness controller [that] varies the brightness (‘luminance’) of the display based upon the ambient light (‘illuminance’), as sensed by an ambient light sensor.” Ex. 1006, 1:58-60; 1:22-24; Abstract; FIG. 1; *Mihran*, ¶¶252-259. The brightness controller also varies the luminance of the display based on user input –

either one or both of a minimum luminance setting and a maximum luminance setting. Ex. 1006, 1:24-28, Abstract, FIG. 1; *Mihran*, ¶¶252-259.

“The present invention provides a display system having automatic and manual brightness control,” which selectively provides ambient light correction. Ex. 1006, 1:20-21; *Mihran*, ¶258. This is consistent with the Patent Owner’s interpretation of “selectively.” *Mihran*, ¶258. For example, in Exhibit 1014,⁵ the Patent Owner states that “[t]he specification describes performing ambient light correction on a selective basis when particular conditions are met (e.g., when an “auto” mode is enabled) and not performing it under other conditions (e.g., when a “manual” mode is enabled).” (internal citations omitted).

Claim Element	Example Elements in <i>Toffolo</i>
1[a] a first input configured to receive a user signal indicative of a user selectable brightness setting;	- First input = user activated input device 28 first user input device 32; second user input device 34 <i>Toffolo</i> , 1:65-67; 2:1-2; 2: 29-43
15[a] receiving a user input signal indicative of a user selectable brightness setting;	- user [input] signal indicative of a user selectable brightness setting = the user can adjust the illuminance at which the display 22 displays its maximum luminance; <i>Id.</i> , 2:30-33

Toffolo discloses these limitations. *Mihran*, ¶¶260-269. “A manual input

⁵ At page 12.

circuit 26 includes a user activated input device 28, such as a switch or rotary knob. An automatic input circuit 30 includes a first user input device 32 and a second user input device 34.” Ex. 1006, 1:65-67; 2:1-2; *see also* 2: 29-43; *Mihran*, ¶268. *Toffolo* also discloses that “the user can adjust the illuminance at which the display 22 displays its maximum luminance,” which is to say that the user signal is indicative of a user selectable brightness setting. *Id.*, 2:32-34; *Mihran*, ¶266.

Claim Element	Example Elements in <i>Toffolo</i>
1[b] a light sensor configured to sense ambient light and to output a sensing signal indicative of the ambient light level;	- light sensor = photosensor 36, ambient light sensor Ex. 1006, Claim 1; 2:2-6; 2:53-54
15[b] wherein the sense signal indicates an ambient light level	- ambient light = ambient light, or “illuminance”, near the display 22 Ex. 1006, Claim 1; 2:2-6; 2:53-54
	- output a sensing signal [or sense signal] indicative of the ambient light level = the photosensor 36 detects the ambient light level; an ambient light sensor for generating a signal indicating ambient illuminance Ex. 1006, Claim 1; 2:2-6; 2:53-54

Toffolo discloses that an “automatic input circuit 30 further includes a photo sensor 36 for sensing the level of ambient light, or ‘illuminance’, near the display 22.” Ex. 1006, 2:2-6; *Mihran*, ¶¶270-274. Claim 1 of *Toffolo* discloses “an ambient light sensor for generating a signal indicating ambient illuminance.” Ex. 1006, cl. 1,

3:38-39; *Mihran*, ¶273.

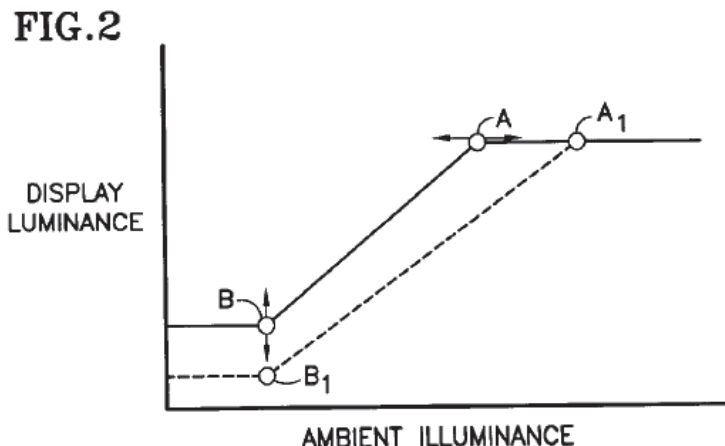
Claim Element	Example Elements in <i>Toffolo</i>
1[c] a multiplier configured to selectively generate a combined signal based on both the user signal and the sensing signal;	- multiplier = display controller - selectively generate a combined signal based on both the user signal and the sensing signal = a relationship between luminance of the display 22 and the illuminance as sensed by the photosensor 36, while taking into account user input (minimum luminance value B, maximum luminance value A, or both); various combinations of user input multiplied by the sensing signal; see below for more analysis on how the combined signal is disclosed
15[c] selectively multiplying the input signal with a sense signal to generate a combined signal;	Ex. 1006, 2:14-67; 3:1-34; claims 1-12

Claim Element	Example Elements in <i>Oki</i>
1[d] a dark level bias configured to adjust the combined signal to generate a brightness control signal that is used to control a brightness level of a visible display such that the brightness control signal is maintained above a predetermined level when the ambient light level decreases to approximately zero.	- a dark level bias = minimum luminance value <i>B</i> Ex. 1006, 2:14-67; 3:1-34; claims 1-12 - combined signal = various combinations of user input multiplied by the sensing signal <i>Id.</i>, 2:14-67; 3:1-34; claims 1-12 - brightness control signal = signal that is used to control the display luminance; voltage can be varied, or other techniques for varying the luminance of the display 22 <i>Id.</i>, 2:14-67; 3:1-34; claims 1-12 - such that the brightness control signal is maintained above a predetermined level when the ambient light level decreases to approximately zero = The display displays the minimum luminance when the ambient light sensor senses less than or equal to the minimum illuminance. <i>Id.</i>, 1:30-34
15[d] adjusting the combined signal with a dark level bias to generate a brightness control signal for controlling brightness of a visible display such that the brightness control signal is maintained above a predetermined level when the ambient light level decreases to approximately zero.	

For ease and clarity in explanation, elements 1(c) and 1(d) are analyzed together. Similarly, elements 15(c) and 15(d) are analyzed together below. *Toffolo* discloses these limitations. *Mihran*, ¶¶275-314.

The system of *Toffolo* uses a multiplier to generate a combined signal based on both a user signal and a sensing signal. *Mihran*, ¶276. As explained by Dr.

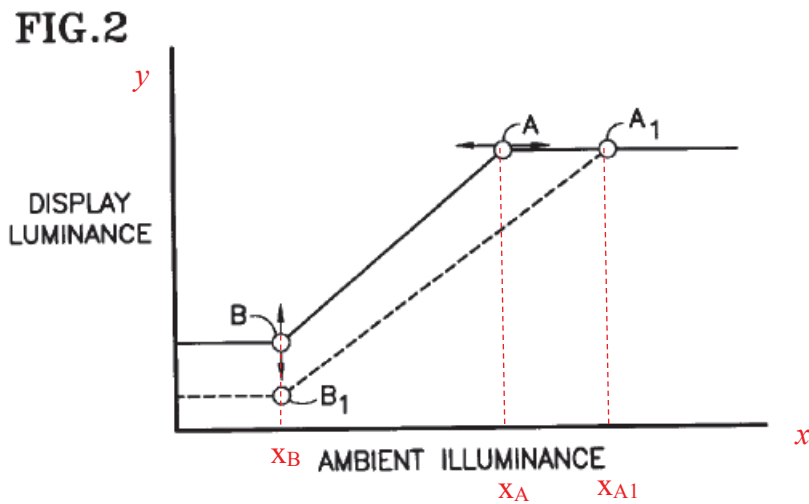
Mihran, *Toffolo* discloses that the display system controller implements a brightness control function as illustrated in FIG. 2:



Id.

Toffolo discloses that points A and B define a continuous function for the ambient light correction of display luminance vs. ambient illuminance. Ex. 1006, 2:14-28; *Mihran*, ¶277. The user may provide input to define one or both of a minimum luminance setting (“B”), and a setting controlling the level of ambient light at which maximum display luminance will be used (“A”). *Mihran*, ¶253.

A POSA would understand each of “points” A, A₁, B and B₁ to have corresponding x and y coordinates, where point A is located at (x_A, A), point B is at (x_B, B). *Mihran*, ¶279. Dr. Mihran has annotated FIG. 2 to indicate the x- and y-axes and x-coordinate values corresponding to points A/A₁ and B/B₁:



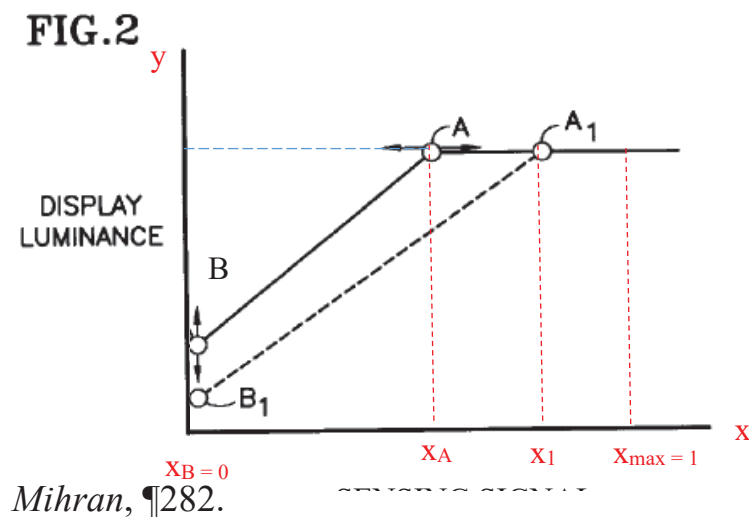
Mihran, ¶¶279-280.

In the annotated figure above, the ambient illuminance value shown as x_B is the minimum level of ambient light that the photodetector can detect and indicate, *i.e.*, an ambient illuminance where the sensor signal output of the photodetector is effectively zero. *Mihran*, ¶281.

Toffolo discloses that “[a]t point B, the photosensor 36 is preferably measuring ambient light at or near its threshold level, *i.e.* the **photosensor 36 cannot distinguish ambient light levels below** that of point B.” Ex. 1006, 2: 21-24 (emphasis added); *Mihran*, ¶280. In other words, at point B of FIG. 2, the signal from the photosensor is effectively zero, while the x-axis indicates near, but not total, darkness at this point. *Mihran*, ¶280.

Since the display luminance between $x=0$ and x_B is the same, POSA would have therefore understood that FIG. 2 of *Toffolo* may be redrawn to show the Display

Luminance as a function of the normalized *photosensor signal* (where 1 = max detectable and 0 = min detectable) that is *indicative of* the Ambient Illuminance, rather than the *Ambient Illuminance* itself. *Mihran*, ¶282. In this representation, the x-value corresponding to point B, x_B , – i.e., the minimum level of ambient light that the photodetector can detect and indicate – is zero. *Mihran*, ¶282. This is shown below in Dr. Mihran’s annotated FIG. 2 of *Toffolo*, redrawn with the x-axis shown in terms of photosensor output:



A POSA would have further understood that the general equation of the solid line between points A (x_A, A) and B (x_B, B) depicted in the figure above is:

$$y = [(A-B)/x_A]x + B,$$

where y = display luminance, B = minimum luminance value (indicative of a *first* component of a user selectable brightness setting), the point A (x_A, A) = condition for maximum luminance value (indicative of a *second* component of a user

selectable brightness setting); $x_B=0$, and x = sensing signal (indicative of ambient light level). *Mihran*, ¶284. As can be observed from equation $y = [(A-B)/x_A]x + B$, the user signal portion $(A - B)/x_A$ is multiplied by x , which is the photosensor signal value. *Mihran*, ¶290. The result of the multiplication of $(A - B)/x_A$ and x is a combined signal, $[(A - B)/x_A]x$. *Id.*

A POSA would have therefore understood that *Toffolo* discloses that the user preferences for characterizing maximum and/or minimum luminance values are represented in a *user signal (or input signal)* that is *multiplied* with the photodiode sensing signal indicating ambient light levels to provide a mathematical product that is used as part of the brightness control operation. *Mihran*, ¶291. *Toffolo* discloses that the user may select one or both of these two brightness settings, *i.e.*, a minimum luminance value B , corresponding to “a user selectable brightness setting”, B , under very low ambient light conditions, and the level of ambient light at which a maximum luminance value A is used, corresponding to “a user selectable brightness setting”, A , under *high* ambient light conditions. *Id.*

Where points A , B , or both A and B is the user selectable brightness setting, and the ambient light is at or near zero such that x , the sensing signal, is zero, the brightness control signal is defined by the equation $y = [(A-B)/x_A]x + B$. *Mihran*, ¶¶302-305. The control circuit of *Toffolo* performs a **multiplication** operation, $[(A-B)/x_A]x$, to generate a combined signal, which equals zero under very low ambient light conditions. *Mihran*, ¶307. The minimum used luminance value defined by B

serves as the dark level bias and ensures that the display screen luminance value corresponding to y is maintained above zero even when the photosensor output value, x , is zero. *Mihran*, ¶¶307-313.

Based on this understanding of what *Toffolo*, and in particular its Figure 2, discloses, *Toffolo* anticipates and/or renders obvious claim 1 of the '117 patent whether the user selectable brightness setting is A , B , or both A and B , and the ambient light is at or near zero such that x , the sensing signal, is zero. *Mihran*, ¶¶289-314.

Further, in light of the auto mode and a manual mode disclosed by *Toffolo* and discussed herein, *Toffolo* discloses “a multiplier configured to *selectively* generate” a combined signal, and further discloses “*selectively* multiplying the input signal with the sense signal.” *Mihran*, ¶¶295-300.

2. Claim 2: The brightness control circuit of claim 1, wherein the dark level bias is provided to the multiplier such that the amount of adjustment to the combined signal is dependent on the user selectable brightness setting.

Toffolo discloses this limitation. *Mihran*, ¶¶315-318. *Toffolo* discloses that, “In operation, a user *selectively alters* points A and B utilizing user input devices 32 and 34, respectively.” Ex. 1006, 2: 48-49 (emphasis added); *Mihran*, ¶315. A POSA would therefore understand that the user would not necessarily set both values, and could set either or both, and that one of the values could be a predetermined value independent of user input. *Mihran*, ¶315.

In the equation for the function describing the brightness control signal, $y = [(A - B)/x_A]x + B$, if either points B or both A and B are set by the user as the user input, then the dark level bias determined by the parameter B is both provided to the multiplier, and done so in such a way that the amount of adjustment to the combined signal $[(A - B)/x_A]x$ will depend on B (which is one of the user selectable brightness settings and also provides the dark level bias) because B is *added* to the combined signal, as described above: $y = [(A - B)/x_A]x + B$. *Mihran*, ¶315.

This is further confirmed by *Toffolo*'s disclosure that “[w]hen the photosensor 36 detects that the level of ambient light is below point B, the display 22 is displayed at a minimum luminance level, which is selected by the second user input device 34.” Ex. 1006, 2: 49-52. *Mihran*, ¶315.

3. Claims 4 and 18:

Claim 4: The brightness control circuit of claim 1, wherein the dark level bias is added to the combined signal such that the amount of adjustment to the combined signal is independent of the user selectable brightness setting.

Claim 18: The method of claim 15, wherein the dark level bias is added to the combined signal after selective multiplication such that the amount of adjustment to the combined signal is independent of the input signal and the sense signal.

Toffolo discloses these limitations. *Mihran*, ¶¶319-320. Where the user signal defines point A, i.e., the condition for maximum luminance value, and the minimum

luminance value B is predetermined (i.e., not selected by the user), the amount of adjustment to the combined signal is independent of the user selectable brightness setting. *Mihran*, ¶320. As shown by the equation $y = [(A - B)/x_A]x + B$, when the ambient light is approximately zero such that $x = 0$, the dark level bias B is added to the combined signal (which will be 0 when $x = 0$) such that the amount of adjustment of the combined signal is simply B , which is independent of the user signal defining point A . *Mihran*, ¶320.

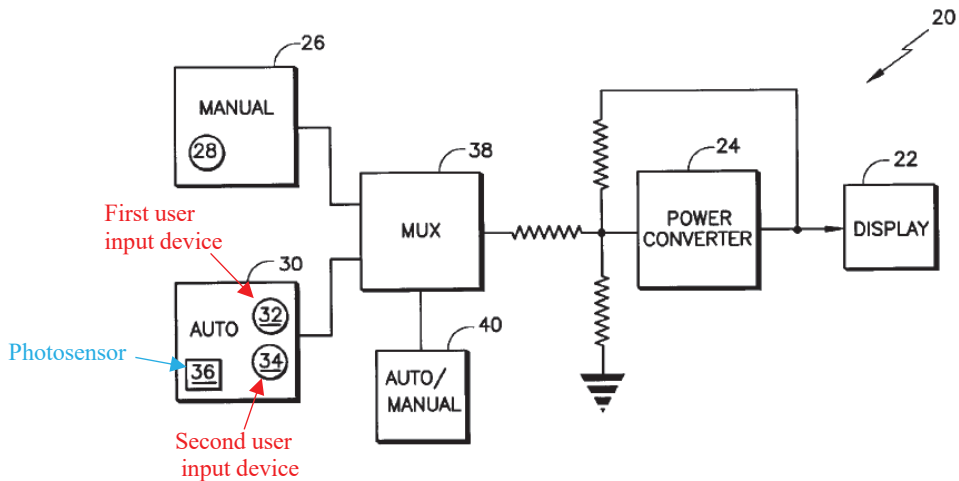
4. Claim 5: The brightness control circuit of claim 4, wherein the dark level bias is added to an output of the multiplier.

Toffolo discloses this limitation. *Mihran*, ¶¶321-322. As noted above, the user selectable brightness setting may define either point A or B , or both A and B . *Mihran*, ¶321. In the equation for the function describing the brightness control signal of *Toffolo*, $y = [(A - B)/x_A]x + B$, it can be observed that the multiplier generates the product of $[(A - B)/x_A]x$ as its output. *Id.* It can be further observed that the dark level bias determined by the parameter B is added to the output of the multiplier. *Id.*

5. Claim 9: The brightness control circuit of claim 1, further comprising a second input configured to receive a selection signal to selectively operate the brightness control circuit in an auto mode or a manual mode, wherein the selection signal enables the light sensor in the auto mode and disables the light sensor in the manual mode

Toffolo discloses these limitations. *Mihran*, ¶¶323-328. One embodiment of the brightness control circuit disclosed in *Toffolo* is shown in FIG. 1, which is

reproduced below, with color annotations from Dr. Mihran:



Ex. 1006, FIG. 1 (annotation added); *Mihran*, ¶324.

As shown in FIG. 1 above, the brightness control circuit of *Toffolo* includes an input switch 40 that allows selective activation of either the automatic mode, which provides ambient light correction, or a manual mode, in which the ambient light correction function is disabled, and the display brightness is determined by an input made to manual input circuit 26. *Mihran*, ¶325. As explained by Dr. Mihran, the multiplexer 38 may select the manual input circuit 26 under various conditions, such as when a change is detected in the manual input circuit 26 level (via input device 28), or based on the input provided at switch 40. *Mihran*, ¶328. When selected, the “manual input circuit 26 overrides the automatic input circuit 30.” Ex. 1006, 2:9-14; *Mihran*, ¶328. Because the photosensor 36 is part of the automatic input circuit 30, when the automatic input circuit 30 is overridden by the manual input circuit 26, the operation of the photosensor 36 is disabled, and does not affect the state of the brightness control signal. *Mihran*, ¶328.

6. Claim 16: The method of claim 15, wherein the step of selectively multiplying the input signal with the sense signal is performed by a software algorithm, an analog circuit, or a mixed-signal circuit.

Toffolo discloses this limitation. *Mihran*, ¶¶329-333. *Toffolo* discloses that the multiplier, i.e., automatic input circuit 30 may be implemented in several ways:

there are numerous circuits which could be used to implement the automatic input circuit 30 of FIG. 1. Those reasonably skilled in the art would recognize that the manual input circuit 26, automatic input circuit 30 and multiplexer 38 could all be **implemented entirely in software operated by a microprocessor circuit.** As an alternative, or in addition, those reasonably skilled in the art would be aware of many circuits for conditioning and shaping the signal generated by the photosensor 36. For example, the signal from the photosensor 36 could be converted to digital form and processed in software, such as with a lookup table.

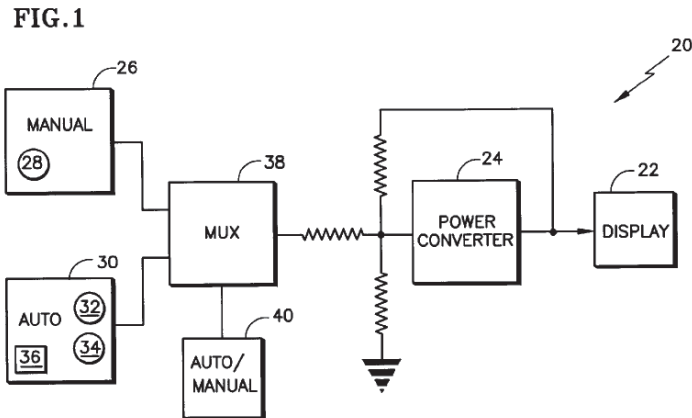
Ex. 1006, 3:8:19 (emphasis added); *Mihran*, ¶332.

F. Ground 7: Claim 6 is Unpatentable Under 35 U.S. C. §103 Over *Toffolo* and *Bruning*

1. Claim 6: The brightness control circuit of claim 1, further comprising an overdrive clamp circuit coupled to the brightness control signal to limit its amplitude to a predefined range.

Toffolo as modified by *Bruning* teaches this limitation. *Mihran*, ¶¶334-350.

Toffolo discloses a power converter 24 used as part of the display drive circuit, shown in FIG. 1 below:



Ex. 1006, FIG. 1; *Mihran*, ¶335.

Toffolo explains that power converter 24 is used to control the brightness of the display. Ex. 1006, 1: 57-64. *Mihran*, ¶336. A POSA would understand the brightness control signal of *Toffolo* to be coupled to an overdrive clamp circuit in the power converter to limit its amplitude to a predefined range, e.g., to less than “the physical limitation of the display.” Ex. 1006, 2:20; *Mihran*, ¶339.

Bruning provides detail of a clamp circuit used in a power converter for providing backlight for a display, and thus a POSA would have been motivated to apply the teachings of *Bruning* to the display controller of *Toffolo*. *Mihran*, ¶¶339-350.

Bruning discloses “a backlight for an LCD display comprised of an array of LEDs.” Ex. 1009, Abstract. *Bruning* also discloses a driver for driving and controlling the backlight that includes drive circuitry, which may comprise a power

regulated converter.” Ex. 1009, [0011]; *Mihran*, ¶¶341-344. As explained by *Mihran*, FIG. 4 includes a clamp circuit shown in red outline below:

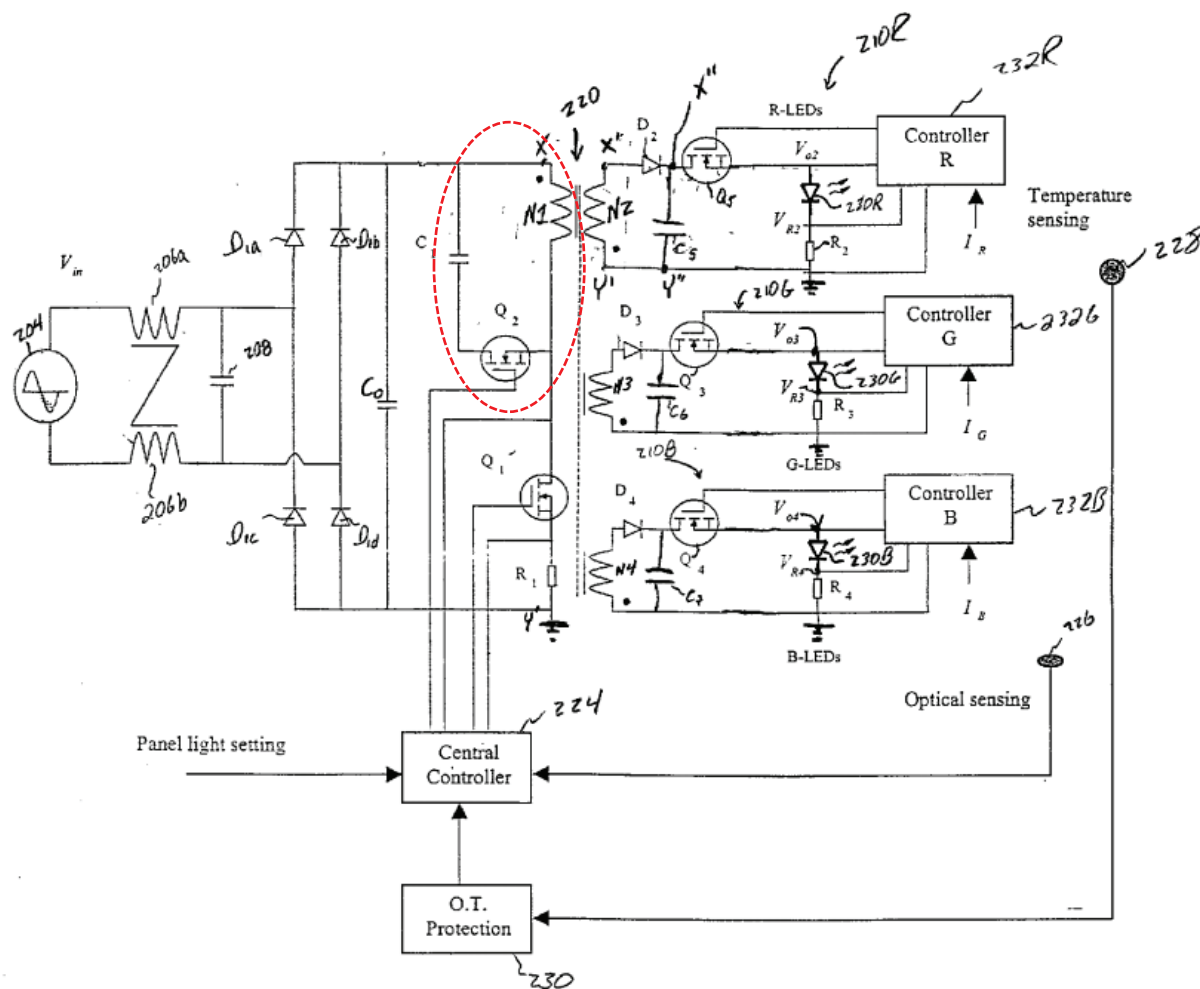


Fig. 4

Ex. 1009, FIG. 4 (annotation added); *Mihran*, ¶344.

Bruning states that, “[t]he electronic components and circuitry associated with the entire circuit shown in FIG. 4 provides the driving electronics of the LEDs,”

further noting that “[a]s known in the art, capacitor C₁ and switch Q₂ comprise the clamping feature of the circuit.” Ex. 1009, [0032]; *Mihran*, ¶345. The clamp circuit shown will limit the amplitude of the backlight provided to the display, which determines its brightness. Ex. 1009, [0039]; *Mihran*, ¶345.

A POSA would have been motivated to implement the clamp circuit disclosed in the power converter of *Bruning* in the power converter 24 of *Toffolo* as one way to implement the function of limiting of the amplitude of the brightness control signal, which *Toffolo* itself teaches. *Mihran*, ¶¶345-350. *Toffolo* discloses that “[a]t point A, the display 22 is preferably displaying its maximum luminance, i.e. the luminance at point A is a physical limitation of the display 22.” Ex. 1006, 2:17-21; *Mihran*, ¶348.

A POSA would understand the brightness control signal of *Toffolo* to be coupled to an overdrive clamp circuit in its power converter 24 to limit its amplitude to that of the “physical limitation of the display 22,” Ex. 1006, 2:20, but *Toffolo* does not provide details of implementation. *Mihran*, ¶349. Thus, a POSA would have been motivated to combine the teachings of *Bruning* describing in more detail the use of such a clamp circuit in a power converter used to drive a display backlight to limit the amplitude if a brightness control signal controlling the brightness of a display. *Mihran*, ¶¶349-350.

G. Ground 8: Claim 13 is Unpatentable Under 35 U.S. C. §103 Over *Toffolo* and *Morris*

1. Claim 13: The brightness control circuit of claim 1, wherein the light sensor comprises a full spectrum PIN diode, an infrared sensitive PIN diode, and an amplifier configured to generate the sensing signal based on a difference between an output of the full spectrum PIN diode and an output of the infrared sensitive PIN diode.

Toffolo as modified by *Morris* teaches this limitation. *Mihran*, ¶¶351-361. As discussed above, *Morris* teaches a light sensor that comprises a full spectrum photodiode, an infrared sensitive photodiode, and an amplifier configured to generate the sensing signal based on a difference between an output of the full spectrum and an output of the infrared sensitive. *Mihran*, ¶351.

A POSA would further have been motivated to substitute *Morris*' sensors for the sensors in *Toffolo*'s automatic brightness control system as a POSA would have recognized that a sensor that measures only the level of visible light (and not the invisible infrared light) would be desirable and easily used with *Toffolo*'s system, and that the improved ambient light measurement would improve the accuracy of its automatic display brightness. A further motivation to combine *Morris*' sensors for the sensors in *Toffolo*'s system is to improve that system because PIN diodes were well known in the art at the time of invention and a POSA would have recognized that the signal output by *Morris*' light sensor could be used to calculate display brightness in the system of *Toffolo*. *Mihran*, ¶¶356-361.

H. Ground 9: Claim 14 is Unpatentable Under 35 U.S. C. §103 Over Toffolo, Morris and Weindorf

1. Claim 14: The brightness control circuit of claim 13, wherein the light sensor further comprises a low pass filter to reduce sensitivity to transient variations of ambient light.

Toffolo as modified by *Morris* (to the extent that claim 14 depends from claim 13) and *Weindorf* teaches this limitation. *Mihran*, ¶¶362-365. As discussed above, *Weindorf* teaches an automatic day selector 348 that determines a luminance value for a display device, based on ambient light conditions. Ex. 1008, [0072]. The automatic day selector 348 includes a filter to reduce or eliminate fluttering that may result from rapid changes in ambient light conditions. *Id.*; *Mihran*, ¶363. *Weindorf* further teaches that if “ambient light changes are large, the filter may cause the backlight display device to wait a longer time before changing the brightness,” Ex. 1008, [0072], which a POSA would have understood to reduce sensitivity to transient variations of ambient light in the *Toffolo* brightness control circuit. *Mihran*, ¶363.

Toffolo teaches that one “reasonably skilled in the art would be aware of many circuits for conditioning and shaping the signal generated by the photosensor 36.” Ex. 1008, 3:14-16; *Mihran*, ¶364. A POSA would be motivated by *Toffolo* to seek other “circuits for conditioning and shaping,” such as the filter taught by *Weindorf*. *Mihran*, ¶¶360-361, 364-365. A POSA would have been motivated to use the filter of *Weindorf* in the *Toffolo* brightness control circuit in order to condition and shape

the signal generated by the photosensor 36. *Id.* Such a combination of *Weindorf* with *Toffolo* would have been a straightforward operation and would have produced predictable results. *Id.*

I. Ground 10: Claim 7 is Unpatentable Under 35 U.S. C. §103 Over Toffolo and Weindorf

1. Claim 7: The brightness control circuit of claim 1, wherein the brightness control signal is provided to a display driver to control backlight illumination of a liquid crystal display.

Toffolo as modified by *Weindorf* teaches this limitation. *Mihran*, ¶¶366-374. *Weindorf* teaches brightness controls for display devices by reducing the brightness of a backlight display device. Ex. 1006, 1:24-25; 2:21-22; *Mihran*, ¶¶366-367. *Weindorf* further teaches that a “backlight 102 and the display panel 104 form a liquid crystal display (LCD).” Ex. 1006, 5:19-20; *Mihran*, ¶367. A POSA would further have been motivated to combine the brightness control system of *Toffolo* with the backlit LCD display device of *Weindorf*. *Mihran*, ¶¶368-373.

VIII. THE BOARD SHOULD NOT EXERCISE ITS DISCRETION UNDER §325(D)

The unpatentability arguments presented in grounds 1-10 of this Petition are based on disclosures in *Toffolo*, *Morris*, and *Weindorf* that have never been addressed by the Office, and are accompanied by new evidence, including *Oki*, *Bruning*, and the declaration of Dr. Mihran, confirming the unpatentability of the challenged claims. The Board should institute review because this Petition does *not* present the same or substantially the same prior art or arguments that were previously presented.

As explained in Section VIII(A) above, none of *Oki*, *Toffolo*, *Morris*, or *Bruning* cited in the grounds in this Petition were of record during prosecution of the '117 patent. Although *Weindorf* is identified on the cover page of the '117 Patent, it was not discussed by the examiner during prosecution. Also, in the recent Samsung IPR, neither *Oki* nor *Bruning* was cited. Therefore, the Office has never considered the validity of the '117 patent in light of *Oki* and *Bruning*.

Further, although *Toffolo* and *Morris* were cited in the Samsung IPR, these references were only cited in connection with limitations found in *dependent* claims. See Ex. 1016, p. 5, Grounds II and III. When the Board denied institution because Samsung had failed to adequately address “dark level bias” limitations of the *independent* claims, the Board did *not* describe Toffolo and Morris *in any way* because Samsung “does not rely on [Toffolo or Morris] to disclose the ‘dark level bias’ limitations and ... [Samsung’s] failure to establish how [other cited art] discloses these limitations is dispositive of this Petition.” See Ex. 1017, p. 16, fn. 1. Therefore, although *Toffolo* and *Morris* were before the Board in the Samsung IPR, it does not appear to have been necessary for the Board to *analyze* either reference *in any way* because institution was denied based on the Board’s analysis of the *independent* claims, and *Toffolo* and *Morris* were only cited in connection with limitations found in *dependent* claims. Finally, although *Weindorf* was included as Exhibit 1008 in Samsung’s petition, it does *not* appear to have ever been referenced *in any way* by Samsung or the Board,

and therefore does not appear to have been analyzed *in any way* by the Board.

Accordingly, in light of the fact that this Petition presents ten grounds of invalidity based on prior art references that were not of record during the original prosecution of the '117 patent, and that appear to have not been analyzed or considered in any way in the recent Samsung IPR, Petitioner respectfully submits that the Board should decline to invoke §325(d). Under these facts, the *Becton* factors weight in favor of institution. *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, 2017 WL 6405100, at *6 (PTAB Dec. 15, 2017) (informative) (citations omitted); *see also NHK Spring Co. v. Intri-Plex Techs., Inc.*, Case IPR2018-00752, slip op. at 11–12 (PTAB Sept. 12, 2018) (Paper 8) (precedential) (adopting and applying Becton factors).

IX. CONCLUSION

In light of the foregoing Petitioner respectfully submits that a reasonable likelihood that claims 1-2, 4-7, 9, 13-16, and 18 of the '117 patent are unpatentable has been established. Petitioner respectfully requests cancellation of all claims challenged in this Petition.

Dated: October 15, 2019

Respectfully submitted.

By /Jason W. Croft/
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CERTIFICATE OF WORD COUNT UNDER 37 CFR §42.24(d)

Under the provisions of 37 CFR §42.24(d), the undersigned hereby certifies that the word count for the foregoing PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 8,223,117 totals 13,958 excluding the cover page, signature block, and parts exempted by 37 C.F.R. §42.24(a).

This word count was made by using the built-in word count function tool in the Microsoft Word for Mac Version 16.29 used to prepare the document.

/Jason W. Croft/

Jason W. Croft, Reg. No. 65,195

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§42.6 and 42.105, I hereby certify that on this 15th day of October, 2019, the foregoing PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 8,223,117, together with Petitioner's Exhibits Nos. 1001-1027, were served via Federal Express, postage prepaid, on the following counsel of record for patent owner.

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