

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MOBILEYE GLOBAL, INC., and
ZF ACTIVE SAFETY AND ELECTRONICS US LLC¹

Petitioners

v.

FACET TECHNOLOGY CORP.,
Patent Owner

Inter Partes Review No. IPR2024-01110
U.S. Patent No. 9,335,255

PATENT OWNER'S SURREPLY

¹ ZF Active Safety and Electronics US LLC, which filed a petition in IPR2025-00748, has been joined as a petitioner in this proceeding.

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	ARGUMENT	3
A.	There Is No Motivation to Combine Lumia and Gallagher so as to Determine Luminance Values	3
B.	The Board Should Adopt Patent Owner’s Construction of “a characterization profile of the at least one light intensity sensor”	6
1.	The Remainder of the Language of Claim 15 Contradicts Petitioner’s Construction, as Petitioner’s Construction Would Render the Claim Term Mere Surplusage	8
2.	The Specification Discloses a Single Sensor Characterization Profile Capable of Handling Various Conditions	9
3.	Petitioner’s Construction Improperly Equates the Claimed “characterization profile of the at least one light intensity sensor” with LUT 475 instead of Sensor Characterization 275	12
4.	Petitioner’s Argument that Patent Owner’s Construction Imports Limitations from Preferred Embodiments is Baseless	13
5.	Petitioner’s Alternative Construction is Improper	14
6.	Patent Owner’s Evidence Demonstrates the Ordinary Meaning of the Claim Term	15
C.	Lumia Does Not Disclose or Suggest “a characterization profile of the at least one light intensity sensor” as Properly Construed	19
III.	CONCLUSION	21

TABLE OF AUTHORITIES

Cases

<i>Amphastar Pharms., Inc. v. Aegis Therapeutics, LLC</i> , IPR2021-01324, Paper 43 (PTAB Feb. 9, 2023).....	17
<i>Elekta Instrument v. OUR Scientific Intern.</i> , 214 F. 3d 1302 (Fed. Cir. 2000)	9
<i>Henny Penny Corp. v. Frymaster LLC</i> , 938 F.3d 1324 (Fed. Cir. 2019)	4, 20
<i>In re Hogan</i> , 559 F. 2d 595 (CCPA 1977)	17
<i>Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.</i> , 821 F.3d 1359 (Fed. Cir. 2016)	4, 20
<i>Pause Tech., LLC v. TiVo, Inc.</i> , 419 F.3d 1326 (Fed. Cir. 2005)	16
<i>Phillips v. AWH Corp.</i> , 415 F.3d 1303 (Fed. Cir. 2005)	14, 15, 16
<i>Ruckus Wireless v. Innovative Wireless</i> , 824 F. 3d 999 (Fed. Cir. 2016)	13
<i>Telemac Cellular Corp. v. Topp Telecom, Inc.</i> , 247 F. 3d 1316 (Fed. Cir. 2001)	9
<i>Texas Instruments v. US Intern. Trade Com'n</i> , 988 F. 2d 1165 (Fed. Cir. 1993)	9
<i>Thorner v. Sony Computer Entertainment America LLC</i> , 669 F. 3d 1362 (Fed. Cir. 2012)	17

Rules

Fed. R. Evid. 703	18
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Regulations

37 C.F.R. § 42.23(b)20

PATENT OWNER'S EXHIBIT LIST

Exhibit	Description
2001	Exclusive Patent License Agreement between Facet Technology Corp. and Mandli Communications, Inc. (and patent assignment coversheet), recorded at Reel No. 062371, Frame 0313
2002	Statutory Disclaimer of certain claims filed in file wrapper of U.S. Patent No. 9,335,255
2003	U.S. Provisional Patent Appl. No. 60/296,596
2004	Docket Control Order filed in <i>Facet Tech. Corp. v. Mobileye Glob., Inc.</i> , No. 2:24-cv-00058 (E.D. Tex.)
2005	Excerpts from U.S. District Court — Judicial Caseload Profile (2024 Ed.), <i>available at</i> https://www.uscourts.gov/file/78884/download
2006	Complaint Filed in <i>Facet Tech. Corp. v. Mobileye Glob., Inc.</i> , No. 2:24-cv-00058 (E.D. Tex.)
2007	Cover Pleading to Plaintiff's Disclosure Of Asserted Claims And Infringement Contentions, as served on August 26, 2024 in <i>Facet Tech. Corp. v. Mobileye Glob., Inc.</i> , No. 2:24-cv-00058 (E.D. Tex.)
2008	Cover Pleading to Defendant's Invalidity Contentions, as served on November 4, 2024 in <i>Facet Tech. Corp. v. Mobileye Glob., Inc.</i> , No. 2:24-cv-00058 (E.D. Tex.)
2009	National Institute of Standards and Technology, "Redefinition of 'Candela,'" <i>available at</i> https://www.nist.gov/si-redefinition/candela
2010	International Commission on Illumination, Standard. No. CIE S 017:2020 ILV: International Lighting Vocabulary, 2nd edition., entry no. 17-21-050, <i>available at</i> https://cie.co.at/eilvterm/17-21-050
2011	Excerpts from Stefanov, Konstantin D. CMOS Image Sensors. Bristol, UK: IOP Publishing, 2022.

Exhibit	Description
2012	Ang, Bernard, Keysight Technologies, “How to Achieve Accurate Sensor Characterization Using a Digital Multimeter” (Feb. 21, 2019), <i>available at</i> https://www.keysight.com/blogs/en/tech/bench/2019/01/24/how-to-achieve-accurate-sensor-characterization-using-a-digital-multimeter
2013	Steely, Sidney L., H. S. Lowery III, and R. H. Fugerer. "Laser-based direct-write scene generation methods for closed-loop focal-plane-array diagnostics." Technologies for Synthetic Environments: Hardware-in-the-Loop Testing. Vol. 2741. SPIE, 1996.
2014	Collins Dictionary Entry for “profile,” <i>available at</i> https://www.collinsdictionary.com/us/dictionary/english/profile
2015	Plaintiff Facet Technology Corp.’s Opposed Motion For Leave To Join Additional Parties, filed as Dkt. No. 32 in <i>Facet Technology Corp. v. Mobileye Global, Inc.</i> , Case No. 2:24-cv-00058-RWS-RSP (E.D. Tex.).
2016	Defendant Mobileye Global, Inc.’s Opposition To Facet’s Motion For Leave To Join Additional Parties, filed as Dkt. No. 35 in <i>Facet Technology Corp. v. Mobileye Global, Inc.</i> , Case No. 2:24-cv-00058-RWS-RSP (E.D. Tex.).
2017	Complaint For Declaratory Judgment Of Noninfringement And Demand For Jury Trial, filed as Dkt. No. 1 in <i>Mobileye Vision Technologies Ltd. et al v. Facet Technology Corp.</i> , Case No. 0:24-cv-04149-NEB-DLM (D. Minn.)
2018	Complaint for Patent Infringement, filed as Dkt. No. 1 in <i>Facet Technology Corp. v. General Motors LLC</i> , Case No. 2:24-cv-00035-RWS-RSP (E.D. Tex.)
2019	Docket Control Order, filed as Dkt. No. 22 in <i>Facet Technology Corp. v. General Motors LLC</i> , Case No. 2:24-cv-00035-RWS-RSP (E.D. Tex.)

Exhibit	Description
2020	Mobileye, “Fact Sheet: Mobileye Advanced Driver-Assistance Systems (ADAS)” (July 19, 2020) (available at https://www.mobileye.com/blog/fact-sheet-mobileye-advanced-driver-assistance-systems-adass/)
2021	SEC, “Mobileye to Offer User-Generated Mapping for Autonomous Driving” (January 6, 2016) (available at https://www.sec.gov/Archives/edgar/data/1607310/000157104916010521/t1600008_ex99-1.htm)
2022	Joseph White, “GM Has 'Heightened Partnership' with Mobileye for Autonomous Cars” (October 1, 2015) (available at https://www.reuters.com/article/us-gm-investors-mobileye-idUSKCN0RV4ZC20151001/)
2023	Declaration Of Nikolaos Papanikolopoulos, Ph.D. In Support Of Patent Owner’s Response
2024	Curriculum Vitae of Nikolaos Papanikolopoulos, Ph.D.
2025	Transcript of Deposition of Dr. Thorpe, taken in IPR2024-01110 on May 30, 2025
2026	Transcript of Deposition of Dr. Thorpe, taken in IPR2024-01111 on May 29, 2025
2027	Definition of “photodiode,” A Dictionary of Physics, Oxford University Press. (6 ed.) <i>available at</i> , https://www.oxfordreference.com/display/10.1093/oi/authority.20110803100324432?p=emailAIVd1F/alp5o2&d=/10.1093/oi/authority.20110803100324432&print
2028	National Institute of Standards and Technology, OSAC Lexicon, Definition of “Lux,” <i>available at</i> https://www.nist.gov/glossary-term/26871

Exhibit	Description
2029	Fiorentin, P. & Iacomussi, Paola & Rossi, Giuseppe. (2005). Characterization and Calibration of a CCD Detector for Light Engineering. Instrumentation and Measurement, IEEE Transactions on. 54. 171 - 177. 10.1109/TIM.2004.834055., <i>available at</i> https://www.researchgate.net/publication/3090945_Characterization_and_Calibration_of_a_CCD_Detector_for_Light_Engineering
2030	Transcript of Deposition of Dr. Thorpe, taken in IPR2024-01110 on October 14, 2025, starting at 9:31 am CST

I. INTRODUCTION

Petitioner's reply demonstrates that the grounds in the Petition for claim 15 have irreparable flaws that require the Board to find claim 15 patentable. In particular, as discussed in the POR, Gallagher already discloses identifying whether markers comply with minimum acceptable retroreflectivity standards. Thus, Lumia would not provide any benefit to Gallagher in achieving the Petition's identified motivation to combine—complying with minimum retroreflectivity standards. Accordingly, the proposed combination is a product of mere hindsight. In reply, Petitioner's only response is to raise an improper new argument that Lumia would allow measuring retroreflectivity in different units. The Board should not consider that new argument, which in any event, fails on the merits.

Also as discussed in the POR, Petition's identified motivation to combine—complying with minimum retroreflectivity standards—cannot provide a motivation to “determine a luminance” value as claimed because both Lumia and Gallagher directly convert light intensity to retroreflectivity without calculating luminance. Petitioner's only response is another improper new argument—that one *could* use Lumia's equation 2 to determine luminance and then to determine retroreflectivity. This argument also fails on the merits—Lumia's equation 2 only allows one to calculate luminance if one already knows retroreflectivity and thus does not provide a way to calculate retroreflectivity (to comply with road authority

standards) via determining luminance. And in any event, what one *could* do with Lumia is not a motivation to combine Lumia and Gallagher in the manner claimed, particularly when Lumia and Gallagher already disclose achieving the purported motivation (calculating retroreflectivity) without practicing the claim.

Finally, Lumia fails to disclose or suggest “a characterization profile of the at least one light intensity sensor” as properly construed. In particular, as the POR demonstrated, Patent Owner’s construction is supported by both the ordinary meaning in the field and also by the specific disclosures of the specification. In response, Petitioner’s reply presents self-contradictory arguments. Petitioner fails to provide any extrinsic evidence of a different ordinary meaning in the field, but it simultaneously argues that Patent Owner’s construction somehow deviates from the ordinary meaning by importing limitations from the specification. To the contrary, the specification discloses preferred embodiments where a *single* sensor characterization is used to calculate luminance for various different colors, which is the stated purpose of sensor characterization in the disclosed embodiments. That example is fully consistent with the Patent Owner’s construction requiring that the characterization profile describe the sensor’s “properties and performance characteristics” “across *various* conditions”.

For these reasons, and the other reasons identified in the POR, the Board should find claim 15 patentable.

II. ARGUMENT

A. There Is No Motivation to Combine Lumia and Gallagher so as to Determine Luminance Values

The Petition identified one motivation to combine Lumia and Gallagher in claim 15: to “identify and tag any markers ‘that do not meet the predetermined minimum acceptable reflectance level’ for countries that require a minimum retroreflectivity level for road markers.” Pet., 46. However, as explained in the POR, Petitioner’s theory has a number of fatal flaws, two of which warrant emphasizing. First, as the Petition itself admits (*id.*) Gallagher already discloses identifying whether markers comply with minimum acceptable retroreflectance standards specified by minimum retroreflectivity, and thus adding Lumia would not provide any benefit to Gallagher in achieving that goal. Paper 25 (“POR”), 34. Second, both Gallagher and Lumia disclose calculating retroreflectivity values *directly* from light intensity values, without determining luminance values, and thus neither Gallagher nor Lumia, nor the reasoning provided in the Petition, provide any reason to add the additional intermediate step of determining a luminance value to accomplish the goal of measuring retroreflectivity. POR, 26, 28.

As to the first issue, Petitioner’s sole response is a blatantly improper new reply argument. In particular, Petitioner argues that a POSITA would be motivated

to use Lumia's approach—instead of Gallagher's existing approach for measuring retroreflectivity—because Lumia's system generates “coefficient of retroreflectivity” in “millicandelas per lux per meter squared” which is a “different” measure of retroreflectivity than Gallagher's “coefficient of luminous intensity” measured in “millicandela per Lux.” Reply, 20-21. This argument—which is not supported by expert testimony—is blatantly a new argument that should not be given consideration by the Board. *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1331 (Fed. Cir. 2019) (“An IPR petitioner may not raise in reply an entirely new rationale”) (internal quotation marks omitted); *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1370 (Fed. Cir. 2016) (reply brief improperly “relied on an entirely new rationale to explain why one of skill in the art would have been motivated to combine” references).

In particular, the Petition's motivation to combine contains no discussion of the different units or ways of measuring retroreflectivity in Gallagher and Lumia. Pet., 46-47; Ex. 1003 ¶¶ 116-117. To the contrary, the Petition equates the retroreflectivity standards mentioned in Gallagher with the retroreflectivity measurements that Lumia would generate. *Id.* To the extent that Petitioner is suggesting now that Gallagher does not measure retroreflectivity (Reply, 21), that is also blatantly inconsistent with the Petition. *E.g.*, Pet, 41 (“Lumia, similar to Gallagher, discloses a vehicle that measures ‘traffic sign retroreflectance.’”).

Moreover, Petitioners' argument fails on the merits because Petitioner provides no substantive explanation why adding Lumia's approach actually helps achieving the goal of changing Gallagher's units, as opposed to simply changing Gallagher's calibration factor to generate different units. Ex. 1005, [0017]-[0018], [0059].

As to the motivation to "determine a luminance value" in the combination, Petitioner's reply fails to provide meaningful response to Patent Owner's argument. Reply, 16-20. Rather than argue why a POSITA would be motivated to combine Gallagher and Lumia in a manner that would determine luminance values on the way to determining retroreflectivity, Petitioner focuses on the disclosures of Lumia alone. In particular, Petitioner argues that equation 2 allows a POSITA "to determine luminance and then determine retroreflectivity." Reply, 18; *see also* Reply, 12 (arguing that "Lumia's equation 2" discloses "determining a luminance value" so "that the system can then use that luminance value to determine retroreflectivity."). And, Petitioner asserts that "basic algebra" allows one to "convert[] between retroreflectivity and luminance measurements using" Lumia's equation 2. *Id.*, 13, 17. As a threshold issue, these are new reply arguments that should be disregarded by the Board. In particular, nothing in the Petition discusses *using* equation 2 to *calculate luminance* and then to calculate retroreflectivity. Rather, the Petition argued that if one could somehow "determin[e] the luminance," one could then use equation 2 to "obtain" "retroreflectance." Pet., 45-

46 (citing Ex. 1003 ¶ 115). Indeed, as discussed in the POR, actually using Lumia's equation 2 in an *automated* system (as recited in claims 12 and 15) would be a modification of Lumia that is not discussed in the Petition. POR, 31-32.

In any event, Petitioner's theory fails on the merits because Lumia's equation 2 only relates three values: coefficient of retroreflection (R'), luminance (L) of the reflected light, and the normal illumination incident on the retroreflector (E_n). Ex. 1014, 16 (pdf 7). As Petitioner's expert admits, calculating one of those values requires knowing the other two. *Id.*; Ex. 2030 (Thorpe reply depo), 43:19-22. Thus, using Lumia's equation 2, one can calculate coefficient of retroreflection (R') if and only if one already knows luminance (L) (and E_n). Or, one could use equation 2 to calculate luminance (L) if and only if one knows the coefficient of retroreflection (R') (and E_n). *Id.* However, plainly Lumia's equation 2 does not disclose or suggest addressing the stated motivation to combine (satisfying road authority retroreflectivity standards) by determining a luminance value: one would already need to know the retroreflectivity value to determine the luminance value using Lumia's equation 2.

B. The Board Should Adopt Patent Owner's Construction of "a characterization profile of the at least one light intensity sensor"

As Patent Owner explained in its POR, the appropriate construction of this term is "a compilation, presented in a usable format, of the description of the

properties and performance characteristics of a sensor across various conditions.”

Paper 25 (“POR”), 14. In particular, Patent Owner and its expert explained that a POSITA would immediately understand the term “characterization profile” to refer to the well-known concept of sensor characterization. POR, 15. Indeed, the specification specifically mentions “sensor characterization 275 of the light intensity sensor(s)” as being used to create LUT 475, which is used to compute foreground and background luminance values. POR, 15 (citing ‘255 Patent, 10:65-11:3). Moreover, Patent Owner and its expert demonstrated, with citations to technical documents, that “sensor characterization” is the process of describing the properties and performance characteristics of a sensor across various conditions. Ex. 2023 ¶ 78; POR, 16 (citing Exs. 2012-2014). And, Patent Owner demonstrated that it was understood in the art that sensor characterization is distinct from mere calibration. Ex. 2023 ¶ 79; POR, 17 (citing Ex. 2029).

Patent Owner also demonstrated that its construction was consistent with the specification, where light intensity sensor characterization 275 would have to describe the properties of the sensors under various conditions (e.g. how the sensor responds to signs of various colors). POR, 18; Ex. 2023 ¶ 81. And finally, Patent Owner demonstrated that the Board’s preliminary construction erred by equating the claimed “characterization profile” with the specification’s look up table 475—which contains conversion factors for converting light intensity to luminance

values—instead of the more direct comparison of “sensor characterization 275” which is “empirical information about the light intensity sensor 280 that is used to create the LUT 475.” POR, 20 (citing ‘255 Patent, 11:53-59).

1. The Remainder of the Language of Claim 15 Contradicts Petitioner’s Construction, as Petitioner’s Construction Would Render the Claim Term Mere Surplusage

Petitioner argues that the Board’s construction of “a conversion factor to convert measured light intensity into luminance” “is consistent with the claim’s existing recitations of both ‘the plurality of light intensity values’ and ‘the characterization profile’ being utilized when ‘determining a luminance value.’” Reply, 12-13.

To the contrary, the other language in claim 15 demonstrates that such construction is erroneous because their construction of “characterization profile” renders the language “utilizing ... a characterization profile of the at least one light intensity sensor” mere surplusage. In particular, the “utilizing a characterization profile” language already recites “determining a luminance value utilizing the plurality of light intensity values,” i.e. converting light intensity values to luminance values. Indeed, Petitioner’s expert was repeatedly asked whether he understood the Board’s construction to restrict the claim in any way beyond the “determining a luminance value utilizing the plurality of light intensity values.”

Ex. 2030, 13:18-14:17, 16:4-23:21. He could not provide any example or other substantive response. *Id.*

Thus, Petitioner's argument contradicts the doctrine against construing claim terms in a manner that would render claim language mere surplusage. *See Texas Instruments v. US Intern. Trade Com'n*, 988 F. 2d 1165, 1171 (Fed. Cir. 1993); *Elekta Instrument v. OUR Scientific Intern.*, 214 F. 3d 1302, 1307 (Fed. Cir. 2000); *Telemac Cellular Corp. v. Topp Telecom, Inc.*, 247 F. 3d 1316, 1325 (Fed. Cir. 2001).

2. The Specification Discloses a Single Sensor Characterization Profile Capable of Handling Various Conditions

In its reply, Petitioner and its expert assert that the Board's preliminary construction is nonetheless correct. Paper 28 ("Reply"), 3-4; Ex. 1030 ¶¶ 25, 28. Notably, Petitioner and its expert make no attempt to dispute Patent Owner's showing that "sensor characterization" has a well-established meaning in the field, or Patent Owner's evidence of that meaning. Rather, Petitioner notes that the specification itself mentions that light intensity values are converted into luminance values using "the background or foreground color of the object of interest 460 along with the light intensity sensor's 280 ability to sense, or the light intensity sensor's 280 profile for a particular color." Reply, 3-4 (citing '255 Patent, 11:43-48). But that sentence does not even mention "characterization." Rather,

the immediate *following sentence* mentions “light intensity sensor 280 characterization,” demonstrating that “sensor characterization” is not synonymous with “the light intensity sensor’s 280 ability to sense, or the light intensity sensor’s 280 profile *for a particular color*.” In particular, that following sentence states that “[l]ight intensity sensor 280 characterization is essential for high precision computations since N photons of a given particular color (or wavelength) of light will represent a different gray value (intensity level) in the sensor than N photons of another color (or wavelength) of light.” ‘255 Patent, 11:48-53. That is, the single characterization profile of the preferred embodiment provides a way to associate how the sensor responds to *various* intensity values of the greyscale sensor for *various* different colors of signs, consistent with Patent Owner’s construction.

Petitioner argues that, rather than a single characterization profile, there are six separate characterization profiles in the specification, corresponding to six different common colors used for road signs. Reply, 6. However, that is plainly contradicted by the specification. For example, Fig. 7 illustrates the *same* sensor characterization “275” being used to create the LUT 475 used to process two different colors: “background sheeting color 505” and “foreground sheeting color 506.” ‘255 Patent, Fig. 7; *see also id.*, 8:38-41 (“Using an intensity algorithm 490, a light intensity sensor characterization 275 and a look-up-table 475, the computer

processor 450 determines a background luminance value 500 and a foreground luminance value 510”). If Petitioner’s theory were correct, there would be a different sensor characterization in Figure 7 for the two different colors.

Similarly, the specification states that “luminance (expressed in candelas per square meter, or cd/m^2) will vary according to the intensity sensor characterization profile 275 of the light intensity sensor(s) 280 and the color of the material.” ‘255 Patent, 10:65-11:3 (emphasis added). That passage is plainly inconsistent with the existence of a sensor characterization profile *per* color. Similarly, the passage “[t]he light intensity sensor characterization 275 is empirical information about the light intensity sensor 280 that is used to create the LUT 475” (*id.*, 11:56-60) is consistent with a single characterization profile that addresses multiple colors (i.e. various conditions). Furthermore, in draft claim 2 of Provisional Appl. No. 60/296,596 (incorporated by reference into the ‘255 Patent, 1:17-25), the claim recites a single characterization profile being used for multiple colors: “utilizing a characterization profile for the intensity sensor to compute retroreflectivity for each color displayed on the at least one reflective surface.” Ex. 2003, pdf 34.

Moreover, Petitioner’s argument is inconsistent with other characterization profiles in the specification. For example, Figure 8 is the “light source intensity profile *over the visible electromagnetic spectrum*,” which plainly encompasses more than one color. ‘255 Patent, 4:56-59, Fig. 8.

3. **Petitioner's Construction Improperly Equates the Claimed "characterization profile of the at least one light intensity sensor" with LUT 475 instead of Sensor Characterization 275**

Patent Owner demonstrated in its brief that the Board's preliminary construction, adopted by Petitioner, is consistent with LUT 475 rather than "sensor characterization 275," which is evidently the more relevant element in the specification. POR, 20-22. Petitioner argues that look up table 475 does not store conversion factors, but instead stores a luminance value for every single combination of sign color and light intensity value. Reply, 6. This is plainly contrary to the specification's statement that "LUT 475 is **used for computing** foreground 510 and background luminance values 500." '255 Patent, 11:59-60.

Moreover, Petitioner's argument misses the point—regardless of what LUT 475 *stores*, the '255 Patent expressly states that LUT 475 inputs intensity values (i.e. "uses indexes of intensity") and "determine[es] the luminance," i.e. it converts the intensity to luminance. '255 Patent, 11:53-56. Whether LUT 475 does so by directly storing luminance values or whether LUT 475 does so by storing conversion values is irrelevant. The point is that LUT 475 is what is directly used in the specification to convert measured light intensity values into luminance, not the sensor characterization 275. Thus, the construction "conversion factor to convert measured light intensity into luminance" improperly equates the claim's

“characterization profile” to the conversion function performed by LUT 475, rather than “sensor characterization 275.”

4. Petitioner’s Argument that Patent Owner’s Construction Imports Limitations from Preferred Embodiments is Baseless

Petitioner argues that Patent Owner’s construction impermissibly imports limitations from a preferred embodiment to the claim. Reply, 4-5. However, this presupposes that the term “characterization profile” in claim 15 has an ordinary meaning *different* from what is recited in the specification. But, Petitioner has made no attempt to present any evidence of the ordinary meaning of “characterization profile”—only Patent Owner has, and Patent Owner’s evidence undisputedly supports Patent Owner’s construction. POR, 15-17, 20-22.

Petitioner’s construction cannot be correct if Petitioner cannot support it with intrinsic or extrinsic evidence. *See Ruckus Wireless v. Innovative Wireless*, 824 F. 3d 999, 1003 (Fed. Cir. 2016) (noting that the absence of “intrinsic or extrinsic evidence” prevented appellant from arguing that its construction was the ordinary meaning). And Petitioner’s construction is plainly not supported by the intrinsic evidence given that Petitioner itself argues that Patent Owner’s construction is consistent with embodiments described in the specification. Reply, 4.

Moreover, Petitioner’s “importation” argument is a red herring—it suggests that Patent Owner’s construction would require “assessing reflective surfaces with

different colors.” Reply, 5. But no such thing appears in Patent Owner’s construction—plainly “various conditions” is broader than “different colors.” As Patent Owner has explained, a sensor characterization that takes into account the sensor’s responsiveness to different colors is merely *one example* of a characterization profile in the preferred embodiments of the specification. POR, 21. However, the ordinary meaning of the term broadly includes a compilation of the description of the properties and performance characteristics of a sensor across *various conditions*. POR, 14. There is nothing wrong with identifying a narrower specific example in the preferred embodiments of the specification as supporting a broader construction based on the plain and ordinary meaning as evidenced in technical literature. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005) (“One of the best ways to teach a person of ordinary skill in the art how to make and use the invention is to provide an example of how to practice the invention in a particular case.”). Patent Owner has simply advanced a claim construction well supported by evidence, unlike Petitioner’s construction.

5. Petitioner’s Alternative Construction is Improper

Petitioner alternatively suggests that the claim term could be construed as “determining a luminance value” would “utiliz[e]” a conversion factor corresponding to the color of the object being measured.” Reply, 5-6. However, unlike Patent Owner’s construction, that construction *would* improperly rewrite the

claim by importing limitations from a preferred embodiment, for all the reasons that Petitioner (incorrectly) raises as to Patent Owner's construction. Reply, 3-4. Moreover, it would still be erroneous as contrary to the ordinary meaning of "characterization profile" and the description of sensor characterization in the specification, which, as discussed above, are not the same thing as a mere "conversion factor."

6. Patent Owner's Evidence Demonstrates the Ordinary Meaning of the Claim Term

As noted, Patent Owner provided significant evidence of the ordinary meaning of this claim term. In its reply, Petitioner continues to provide no contrary evidence, and instead simply criticizes Patent Owner's evidence. None of Petitioner's arguments are availing. Petitioner argues that Patent Owner's evidence is irrelevant under *Vitronics* because "the meaning is clear based on the intrinsic record" and is presented an incorrect order, consulting extrinsic evidence first. Reply, 7. This is plainly incorrect. There is no prohibited evidence or proscribed order for considering claim construction evidence. *Phillips*, 415 F.3d at 1324 ("there is no magic formula or catechism for conducting claim construction," "[n]or is the court barred from considering any particular sources or required to analyze sources in any specific sequence"). In particular, "a judge who encounters a claim term while reading a patent might consult a general purpose or specialized

dictionary to begin to understand the meaning of the term, before reviewing the remainder of the patent to determine how the patentee has used the term.” *Id.* And, as discussed, none of Petitioner’s arguments based on the specification are availing, and thus it is certainly proper to consider extrinsic evidence which contradicts Petitioner’s construction.

Petitioner also criticizes Patent Owner’s evidence regarding “sensor characterization” because it does not use the claim language verbatim. Reply, 7. But there is no such requirement. *Pause Tech., LLC v. TiVo, Inc.*, 419 F.3d 1326, 1333 (Fed. Cir. 2005) (“in clarifying the meaning of claim terms, courts are free to use words that do not appear in the claim so long as the resulting claim interpretation accords with the words chosen by the patentee to stake”) (cleaned up). Plainly, the meaning of “sensor characterization” in the field is highly relevant given that the claim uses the term “characterization profile” of a “sensor” and the specification uses the phrase “sensor characterization.” Nor is there any requirement that Patent Owner identify a sensor characterization involving converting light intensity to luminance, as Petitioner argues. As discussed, that specific aspect of the invention is reflected in a *different* language in claim 15 than the disputed claim term. Moreover, it is well established that a “patentee is free to choose a broad term [such as “characterization profile”] and expect to obtain the

full scope of its plain and ordinary meaning.” *Thorner v. Sony Computer Entertainment America LLC*, 669 F. 3d 1362, 1367 (Fed. Cir. 2012).

Petitioner also argues that Exhibits 2011, 2012, 2014, and 2029 should be given “no weight” because they are dated after the priority date. However, there is no categorical rule excluding extrinsic evidence that post-dates the priority of the patent. *See In re Hogan*, 559 F. 2d 595, 605 (CCPA 1977) (“This court has approved use of later publications as evidence of the state of art *existing on the filing date* of an application”); *Amphastar Pharms., Inc. v. Aegis Therapeutics, LLC*, IPR2021-01324, Paper 43, 72-73 (PTAB Feb. 9, 2023) (“We agree with Patent Owner that ‘[n]o bright line rule prohibits the consideration of postpriority date evidence.’”). Here, Patent Owner’s expert did opine that such treatises are consistent with the ordinary meaning of the claim term “at the time of the ‘255 Patent’s earliest priority date.” Ex. 2023 ¶ 78. Petitioner presents no evidence or argument that Patent Owner’s expert was not qualified to opine about the meaning of the term as of the priority date of the ‘255 Patent based on his experience. *See* Ex. 2023 ¶¶ 5-18; Ex. 2024. Thus, particularly given that Petitioner has offered no evidence as to a change in the meaning of the term, Exhibits 2011, 2012, 2014, and 2029 are pertinent and may be considered as demonstrating a reasoned basis for Patent Owner’s expert’s opinions, regardless of whether the treatises themselves would be considered independently admissible. Fed. R. Evid. 703. Moreover, it is

reasonable to conclude that Patent Owner's expert's explanation of the meaning of "sensor characterization" is the same one that existed as of the '255 Patent's priority date because he also cites Exhibit 2013, a 1996 reference, as supporting his opinion. Ex. 2023 ¶ 78.

Finally, Petitioner argues that Exhibit 2029 actually supports its construction because it states that "luminance calibration coefficient "gives for each pixel of the CCD array the value that links the A/D converter output with the luminance of the pixel-framed surface." Reply, 9. Petitioner asserts that this demonstrates that calibration can convert a camera's intensity value into a luminance value. *Id.* However, that misses the point. The pertinent question is what is the meaning of a "characterization profile" of a "sensor" to one of skill in the art, at the time of the invention. As Exhibit 2029 explains, calibration of a sensor under a single condition is distinct from calibration for "different camera conditions," which it equates with "characterization." POR, 17.

* * *

For all the foregoing reasons, and for the reasons set forth in the Patent Owner Response, the Board should construe "a characterization profile of the at least one light intensity sensor" as "a compilation, presented in a usable format, of the description of the properties and performance characteristics of a sensor across various conditions."

C. Lumia Does Not Disclose or Suggest “a characterization profile of the at least one light intensity sensor” as Properly Construed

Most of Petitioner's reply arguments that Lumia discloses or suggests this limitation appear to be premised on the Board adopting Petitioner's construction. Reply, 11 (“Consistent with the Board's preliminary construction of the ‘characterization profile’ term, ...”). As discussed above, that is the incorrect construction of the term, and thus Petitioner's arguments that Lumia discloses or suggests the “characterization profile of the at least one light intensity sensor” should be rejected. Accordingly, Petitioner's obviousness theory fails. And, as discussed, Lumia does not actually use its calibration to convert light intensity to luminance, and instead directly converts light intensity to retroreflectivity. *Supra* II.A; POR, 27-32, 41-43.

As to Petitioner's arguments that Lumia teaches utilizing a characterization profile under Patent Owner's proposed construction (Reply, 13-15), the Board already correctly determined that “Lumia does not appear to teach a ‘characterization profile’ based on a set of sensor characteristics across various conditions.” Paper 16 (“ID”), 28. In particular, the Petition identified Lumia's “calibrat[ion]” as corresponding to the claimed “characterization profile.” Pet., 45. However, as explained in the POR, Lumia's calibration cannot satisfy Patent Owner's construction because it uses a single “scale factor” which is calibrated

based on a single sign, measured, a single distance. POR, 43.

In its Reply, Petitioner nonetheless argues that “Lumia teaches determining multiple scale factors, each of which corresponds to a particular color, because it discloses ... that its design is ‘able to accommodate signs of different colors.’”

Reply, 14. That is an improper new reply argument—as Petitioner never relied on such disclosure in Lumia in its Petition. Pet., 44-47; 37 C.F.R. § 42.23(b); *Henny Penny*, 938 F.3d, 1331; *Intelligent Bio-Sys.*, 821 F.3d, 1370. Moreover, that argument fails because there is no connection between Lumia’s ability to accommodate signs of different colors and the conditions under which Lumia performs calibration. Indeed, Petitioner cites to no disclosure to Lumia—or anywhere else in the art—that it was known to be beneficial to create different calibrations for luminance sensors for different colors when measuring retroreflectivity.

Moreover, contrary to Petitioner’s argument, Lumia’s experimental results section *already* handles “[t]en signs” using a single scale factor generated by “[c]alibration of the system” using “an image of a calibrated white sheeting material.” Ex. 1014, 15; POR, 9-10; Ex. 2023 ¶¶ 71, 115. Although these signs all had a “white background,” they are not stated as having white legend text. Ex. 1014, 15. That is, the tested signs themselves had multiple colors, yet only a single calibration factor based on a single piece of white sheeting material was used for

calculating their retroreflectivity. *Id.* Moreover, even if Lumia suggested creating different calibration scale factors for different sign colors (it does not), Petitioner identifies no suggestion or disclosure to compile those different scale factors into a single characterization profile.

Petitioner also argues that Lumia satisfies Patent Owner's construction because it purportedly "discloses different modes with different measurement distances, warranting a scale factor for each distance." Reply, 14. Again, this is not only an improper new reply argument (Pet., 44-47), it is also unsupported by any disclosure or suggestion in Lumia or otherwise cited by Petitioner. Contrary to Petitioner's suggestion, Lumia does not suggest compiling scale factors for different modes into a characterization profile, rather than, for example, just changing Lumia's configuration as needed for different modes.

Finally, Petitioner cites to equation (2), however Petitioner presents no explanation for how equation (2) satisfies Patent Owner's construction. Reply, 14-15. To the contrary, as discussed, Lumia equation (2) only allows one to calculate luminance if one already knows retroreflectivity—it does not provide a mechanism for calculating luminance and then to calculate retroreflectivity. *Supra*, II.A.

III. CONCLUSION

For the foregoing reasons, the Board should find the challenged claim patentable.

Dated: October 22, 2025

Respectfully submitted,

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CERTIFICATE OF SERVICE

The undersigned certifies that on October 22, 2025, I will cause true and correct copies of the foregoing **PATENT OWNER'S SURREPLY** and all associated exhibits or appendices referred to therein, to be served electronically upon the following attorneys who have consented to service via email. Pet. at 75-76.

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