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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

XU PEICHENG (HONG KONG) OPTOELECTRIC
TECHNOLOGY CO., LIMITED,
Petitioner,
v.

SEMISILICON TECHNOLOGY CORP.,
Patent Owner.

Case IPR2024-00156

Patent No. 8,884,546

PATENT OWNER'S SUR-REPLY

TABLE OF CONTENTS

I.	Introduction.....	1
II.	Patent Owner’s Construction Of “Synchronous Signals” Should Be Adopted If Necessary	2
III.	<i>Kuang</i> And <i>Lys</i> Do Not Disclose Synchronous Signals Under Any Proposed Construction (Grounds 1 And 3)	4
A.	Ground 1 Remains Deficient.....	5
1.	Dr. Schubert Agrees That <i>Kuang</i> ’s Lights Do Not Shut Off at the Same Time	5
2.	Petitioner Admits That <i>Kuang</i> Lacks Separate Synchronous Signals, Because <i>Kuang</i> ’s Disclosure is Limited to Only Control Signals.....	7
B.	Ground 3 Remains Deficient.....	9
1.	Petitioner’s Reply Admits That Ground 3 Does Not Identify Separate “Synchronous Signals” In <i>Lys</i>	9
2.	The Petitioner’s Reply Theory Is Procedurally Late and Substantively Deficient.....	11
IV.	Petitioner’s Sole Basis For Alleging a “Curtain Lamp” In <i>Kuang</i> And <i>Lys</i> Is a New and Belated Claim Interpretation (Grounds 1 And 3)	12
A.	<i>Kuang</i> Lacks a “Curtain Lamp” Under Petitioner’s Original or New Theories (Ground 1)	14
B.	<i>Lys</i> Lacks a “Curtain Lamp” (Ground 3 Claim 1) or a “Second Curtain Lamp” (Ground 3 Claim 8)	17
V.	Petitioner fails to show a “Master Control Unit” in <i>Lys</i> (Ground 3).....	18
VI.	Petitioner has no basis for adding a Transistor to <i>Kuang</i> or <i>Lys</i> (Grounds 2 and 4)	21
VII.	Petitioner’s Reply confirms that <i>Hiroyuki</i> lacks the “Pins” of claim 4 (Grounds 5).....	22

VIII.	Dr. Lebby’s Reasons Why <i>Hiroyuki</i> Fails to Disclose a Signal Processor are Unrebutted (Ground 6).....	23
IX.	There Is No Reason To Add a Microcontroller to <i>Hiroyuki</i> (Ground 6)	24
X.	Conclusion	25

TABLE OF AUTHORITIES

Page(s)

Cases

<i>Dickinson & Co. v. Tyco Healthcare Grp., LP</i> , 616 F.3d 1249 (Fed. Cir. 2010)	4, 8
<i>Super Interconnect Techs. LLC v. Huawei Device Co.</i> , Case No. 2:18-CV-462, 14-16 (E.D. Tex. Jan. 5, 2020)	4

I. INTRODUCTION

All claims should be upheld as patentable, because the Petitioner's Reply, including its newfound theories, confirms Petitioner's unplausible claim interpretations and deficient and misconstrued prior art teachings. The Board narrowly instituted review based on two claims and only a single ground, applying a preliminary construction of "synchronous signals" before receiving Patent Owner's claim construction briefing. Every other ground was found deficient at institution. Patent Owner's Response (Paper 14) addressed the construction of "synchronous signals" and explained why Petitioner fails to establish unpatentability of any claim under any reasonable construction or proper interpretation of the claims.

Petitioner tries to fill glaring holes in the Petition with unreasonable claim interpretations and invalidity theories that disregard the claim language. Petitioner attempts to broaden the meaning of "curtain lamp" far beyond the Petition's interpretation as being one or more *strings of lights*. Petitioner cannot identify any prior art teaching of both control and synchronous signals required by the claims and instead resorts to arguing one signal type as meeting both. Petitioner's new Reply arguments and expert testimony are procedurally improper and also fail to establish

unpatentability of any claim. The following table further details why each of the petitioned grounds must fail.

Ground	Claim(s)	Petitioner Cannot Prevail Because:
1	<u>1</u> , 2	1. <i>Kuang</i> lacks a “curtain lamp” 2. <i>Kuang</i> lacks “synchronous signals”
3	<u>1</u> , 2, <u>8</u>	1. <i>Lys</i> lacks a “curtain lamp” or “second curtain lamp” 2. <i>Lys</i> lacks a “master control unit” 3. <i>Lys</i> lacks “synchronous signals”
2, 4	3	1. There is no reason to add a transistor to <i>Kuang</i> or <i>Lys</i> 2. See also Ground 1 and Ground 3 reasons.
5	<u>4</u>	1. <i>Hiroyuki</i> lacks “pins”
6	5, 6, <u>8</u>	1. <i>Hiroyuki</i> lacks a “signal processor” 2. There is no reason to add a microcontroller to <i>Hiroyuki</i> 3. See also Ground 5 reason.

II. PATENT OWNER’S CONSTRUCTION OF “SYNCHRONOUS SIGNALS” SHOULD BE ADOPTED IF NECESSARY

Should the Board find construction of “synchronous signals” necessary, the proper construction in the context of the ’546 patent is “signals related to activities governed by synchronized timing,” and Petitioner’s Reply fails to establish otherwise.

Patent Owner's proposed construction relied upon the same Microsoft Computer Dictionary definition of “synchronous” cited by the Board in its

Institution Decision. Ex. 3001 (first cited in Paper 11 at 44). Ex. 3001 states “[i]n computer transmissions, [synchronous is] a reference to activity governed by a clock or by synchronized timing.” Petitioner does not articulate why Patent Owner’s construction is technically wrong. For example, Petitioner criticizes Patent Owner for “importing limitations (i.e., ‘synchronized timing’) from a dictionary,” while ignoring that Petitioner similarly imports the dictionary limitation “at the same time.” *See* Paper 17 at 2.

Dr. Schubert’s exclusion of “synchronized timing” from the construction of “synchronous signals” has no basis, and his only reasoning was a subjective belief. In his Reply Declaration, he opined that “synchronized timing” should be omitted because it is “a different form of” the claim term “synchronous.” Ex. 1010, ¶ 10. When asked at his deposition about the relationship between “synchronous” and “synchronized timing,” he admitted that events occurring “at the same time” may relate to “synchronized timing,” especially in computer transmissions. Ex. 2005, 56:16-57:9. Patent Owner’s construction is on point: the claim elements reciting “synchronous signals” involve a “transmission line” sending signals between master and slave control units, and thus the claims discuss “synchronous signals” in the context of computer transmissions. Therefore, any construction of “synchronous signals” should reflect the complete, consistent definition in Ex. 3001.

Finally, Petitioner's Reply does not refute Patent Owner's position that "control signals" and "synchronous signals" in 1[D] should be interpreted as two types of signals. These are distinct elements of 1[D] and should be treated as such. *Dickinson & Co. v. Tyco Healthcare Grp., LP*, 616 F.3d 1249, 1254 (Fed. Cir. 2010) (citing *Gaus v. Conair Corp.*, 363 F.3d 1284, 1288 (Fed. Cir. 2004)). Indeed, courts have construed different signals recited in the same claim as distinct types of signals. *See Super Interconnect Techs. LLC v. Huawei Device Co.*, Case No. 2:18-CV-462, 14-16 (E.D. Tex. Jan. 5, 2020) (construing "control signal" as distinct from "data signal."). Nothing in the '546 patent changes the presumption that "control signals" and "synchronous signals" are distinct, and Dr. Schubert acknowledged that the '546 patent describes two distinct signals and provides no examples of control signals that are also synchronous signals. *See* Ex. 1010, ¶¶ 32-33.

The Board should adopt Patent Owner's proposed construction of "synchronous signals" as "signals related to activities governed by synchronized timing" if the Board finds that formal construction is necessary.

III. KUANG AND LYS DO NOT DISCLOSE SYNCHRONOUS SIGNALS UNDER ANY PROPOSED CONSTRUCTION (GROUNDS 1 AND 3)

Kuang and *Lys* fail to disclose both signals related to activities occurring "at the same time" (Petitioner's construction) and signals related to activities governed

by synchronized timing (Patent Owner’s construction), let alone synchronous signals that are different from control signals. Paper 14, 19-29.

A. Ground 1 Remains Deficient

1. Dr. Schubert Agrees That *Kuang*’s Lights Do Not Shut Off at the Same Time

Patent Owner’s expert, Dr. Lebby, explained and diagramed how *Kuang*’s “master light shutoff command” propagates from slave node to slave node, and concluded that *Kuang*’s propagation scheme would introduce time delays causing *Kuang*’s lights to shut off at *different times*, and not be *governed by synchronized timing*. See Ex. 2001, ¶¶ 75-80; Paper 14, 20-24. Petitioner and Dr. Schubert admit that *Kuang*’s signal transmission is subject to “propagation delays,” and do not dispute Dr. Lebby’s explanation and diagram of how *Kuang*’s shutoff command signal propagates. Paper 17 at 7-9; Ex. 2005 (Schubert Deposition) at 71:9-74:22.

Petitioner’s Reply also concedes that *Kuang* discloses a signal propagating from one lighting unit to the next and admits the time delays. Paper 17 at 8 (citing Ex. 1010 at ¶¶ 25-26). Dr. Schubert rationalizes that the delays would be “short” and “not noticeable to a human observer.” But the claim language offers no such characterization, and Dr. Schubert’s theory without any support, effectively concedes that *Kuang*’s lights do not shut off “at the same time” under Petitioner’s construction of “synchronous signals.”

To fix what the prior art fails to disclose, Dr. Schubert theorizes about how fast signals can travel relative to the speed of light, to illustrate how short the propagation delays *could* be. *See* Paper 17 at 8. But Dr. Schubert's algebra finds no support in *Kuang* or any other record evidence. Dr. Schubert's explanation also exposes uncertainties of when activities will occur in *Kuang*'s lighting units – including when *Kuang*'s ceiling lights would shut off in response to a master shutoff command, confirming that *Kuang* cannot disclose activities happening *at the same time* under Petitioner's construction, or *governed by synchronized timing* under Patent Owner's construction.

Importantly, Dr. Schubert's Reply Declaration appears premised on the flawed assumption that signals would travel nonstop to all lighting units in *Kuang*. *See* Ex. 2001, ¶¶ 25-26. However, *Kuang* discloses propagating commands to each slave node 223 *sequentially*, with each receiving slave node determining whether to propagate to subsequent slave nodes 223. Ex. 1004, [0034] (“[c]ommands or inquiries need not be propagated if the targeted slave node 223 receives the command or inquiry and responds thereto.”). At his deposition, Dr. Schubert agreed that the shutoff command signal would propagate from slave node to slave node, in a sequence. Ex. 2005 at 72:3-74:22. Therefore, *Kuang* discloses each slave node 223 processing the propagated signal to determine whether to continue propagating to other slave nodes 223, introducing more time delays between ceiling lights.

Petitioner's Reply attempts to draw parallels between the operation of the '546 patent embodiments and the propagation delays in *Kuang*. Paper 17 at 9. Citing Dr. Schubert, Petitioner states "[i]t is simply impossible for the propagation delay to be zero." Paper 17 at 8 (citing Ex. 1010 ¶ 27). But the potential for propagation delays in signal transmissions underscores the benefits of the "synchronous signals" in the '546 patent claims, and the reasons for Patent Owner's construction of "signals related to activities governed by synchronized timing." Dr. Lebby explained that transmitting signals related to synchronized timing is desirable for controlling individual lights "in a time-coordinated manner, which allows for patterns of lights and colors, as well as moving / animated lights, and other decorative types of illumination." Ex. 2001, ¶¶ 57-58. Indeed, synchronized timing provided by the synchronous signals in the '546 patent would ensure that activities would be synchronized across different devices despite any transmission propagation delays of the control signals. Dr. Lebby's testimony on these points remains unrebutted.

2. Petitioner Admits That *Kuang* Lacks Separate Synchronous Signals, Because *Kuang*'s Disclosure is Limited to Only Control Signals

Ground 1 of the Petition cites only a single type of signal for both the "control signals" and the "synchronous signals" of element 1[D], and Petitioner's Reply confirms as much. Paper 17 at 10. Although Patent Owner does not dispute that there could be signals involving control and synchronization, the canons of claim

construction nevertheless require two types of signals to meet the control signals and the synchronous signals of 1[D]. *See Dickinson*, 616 F.3d at 1254. Ground 1 violates this foundational claim construction principle.

Nothing in the '546 patent specification alters the presumption that “control signals” and “synchronous signals” should be separate elements. Petitioner acknowledges that the specification recites “control signals” and “synchronous signals” *separately*, and argues that “the only ‘signals’ explicitly described in the '546 patent specification are control signals.” Petitioner’s Reply identifies control signals that do not involve timing or other synchronous aspects. Paper 17 at 10-11, citing Ex. 1001 at 3:38-4:3, 6:7-10. Therefore, Petitioner’s Reply supports the presumption that 1[D] requires two signal types to meet the claimed “control signals” and “synchronous signals.”

Petitioner’s Reply doubles down on arguing that a single shutoff command in *Kuang* meets the different signal types recited in 1[D]. Paper 17 at 10. In addition to failing to identify separate “synchronous signals” in *Kuang*, Petitioner has no basis for saying that *Kuang*’s single shutoff command causes the bus ceiling lights to all shut off *at the same time* or *governed by synchronized timing*. Instead, the cited portions of *Kuang* all involve sending commands to individual LEDs or LED groups, which are simply examples of control signals sent to one or more lights without regard to what time the command will be executed. *See* Paper 17 at 11-12. Even if

Kuang's shutoff command can be sent to multiple lighting units, there is no temporal or synchronous aspect of this command either expressly disclosed or inherent in *Kuang*. Petitioner and Dr. Schubert merely *assume* that group control “means that the control signals include synchronous information,” but there is no showing of events occurring *at the same time* or in a synchronous fashion. Dr. Lebby already debunked these assumptions, and his testimony remains unrebutted. *See* Ex. 2001 at ¶¶ 75-81.

The Board should find claims 1 and 2 patentable over Ground 1.

B. Ground 3 Remains Deficient

1. Petitioner's Reply Admits That Ground 3 Does Not Identify Separate “Synchronous Signals” In *Lys*

Petitioner admits it did not identify different signals in *Lys* for the claimed control and synchronous signals. Paper 17 at 13. Instead, Petitioner relies again on its faulty position that the same signal meets both claimed signals, and brushes off the Petition's failure to map *Lys* to all elements of 1[D] as “irrelevant.” *Id.* These positions violate the claim construction principles discussed above.

Petitioner's arguments regarding synchronizing pool lights with other pool devices do not cure the Ground's deficiencies. Petitioner now alleges that *Lys* “requires synchronous signals” to change pool light colors when a pool heater or blower turns on. Paper 17 at 14 (internal quotations omitted). This inherency-type

argument does not demonstrate the elements of inherency or resolve issues Patent Owner raised in its Response: identification of control signals sent between a light and another pool device does not demonstrate both the “control signals” *and* the “synchronous signals” in *Lys*. See Paper 14 at 26-28; Ex. 2001, ¶¶ 83, 87.

Petitioner wrongly asserts that Dr. Schubert’s theory of “synchronous data paths” for sending “mode” or “option” control signals in *Lys* Figure 4A is undisputed, but the opposite is true. See Paper 17 at 15. Petitioner alleged that a data signal 136 in *Lys* is “transmitted synchronously” to multiple light sources, without establishing that data signal 136 must be transmitted synchronously, and without establishing that *Lys* discloses both control signals and synchronous signals. Petitioner also has not established that data signal 136 results in any activities occurring at the same time or being governed by synchronized timing. Dr. Lebby addressed this theory and explained why nothing in the cited portions of *Lys* expressly or inherently requires the *simultaneous transmission* of signals, refuting any suggestion of inherency by Petitioner. Ex. 2001, ¶¶ 83-86, 88.

Finally, Dr. Schubert asserts in his Reply Report – without any evidence – that “there is no effect on complexity and/or computing power when addressing light sources individually or collectively,” but at his deposition he acknowledged he is “not an expert in computer transmissions.” Ex. 2005 at 60:12-61:9. Moreover, Dr. Schubert’s contention about complexity and computing power for addressing light

sources does not resolve the larger issue that there is no showing of control *and* synchronous signals, either by express disclosure or inherency in *Lys*.

2. The Petitioner's Reply Theory Is Procedurally Late and Substantively Deficient

Petitioner raises an entirely new theory applying *Lys* to 1[D]. Paper 17 at 14. Petitioner's Reply cites to *Lys* 19:29-32 for the first time in this proceeding, for its disclosure of "independently controllable light sources" that "may be synchronized without being necessarily coupled to a network." Paper 17 at 14. *Lys* characterizes this disclosure as "another embodiment of the invention," and this other embodiment was never discussed in the Petition. Indeed, Petitioner never relied on this "other embodiment" in *Lys* before, and did not set forth any obviousness analysis combining *Lys*'s embodiments. This new theory is also deficient on the merits: Petitioner and Dr. Schubert do not explain how this other embodiment of *Lys* – having independently-controllable light sources not coupled to a data network – would include a "slave control unit [that] is controlled by the master control unit" or a "transmission line [that] is used to transmit control signals and synchronous signals," as recited in 1[D]. Petitioner's new theory based on "independent light sources" in *Lys* is therefore procedurally late and substantively deficient.

IV. PETITIONER’S SOLE BASIS FOR ALLEGING A “CURTAIN LAMP” IN *KUANG* AND *LYS* IS A NEW AND BELATED CLAIM INTERPRETATION (GROUNDS 1 AND 3)

Patent Owner’s Response explained why *Kuang* and *Lys* fail to disclose a “curtain lamp” in Grounds 1 and 3, because the Petition did not show “one or more light strings” under Petitioner’s own interpretation. Paper 14 at 12-19.

In a final effort to salvage Grounds 1 and 3, Dr. Schubert raises an *entirely new* claim interpretation that “a light string” in the ’546 patent “may consist of only one LED,” citing a sentence in the ’546 patent that was never cited before. Ex. 1010, ¶¶ 13, 18, 49; Paper 17 at 3, citing Ex. 1001 at 6:15-20. Dr. Schubert’s original declaration asserted – several times – that a “curtain lamp” is “commonly understood to be one or more light strings,” Paper 1 at 8, 25, 38, 51, 72, and he did not broaden his interpretation of “curtain lamp” to be a single LED. Only in the eleventh hour of this proceeding did Dr. Schubert and Petitioner reveal this attempted “gotcha” by interpreting a single LED of a single light string as a “curtain lamp.” This nonsensical argument is unsupported by a proper reading of the ’546 patent, and should be disregarded as procedurally improper and factually incorrect.

There is no excuse for the omission of the “single-LED” interpretation from Dr. Schubert’s original report. At his deposition, Dr. Schubert testified that he began working on his original declaration as early as four months before executing it in October 2023, spent potentially 60+ hours preparing his original declaration, read

the '546 patent “completely, from the first page to the last page,” and he consulted the specification to determine the plain and ordinary meaning of the claim terms. Ex. 2005 at 22:18-27:7. Despite such thorough review of the '546 patent and meticulous preparation of his original declaration, Dr. Schubert never once interpreted a single LED as meeting the claimed “light string” or “curtain lamp.” On the contrary, Dr. Schubert’s original declaration repeatedly asserts that multiple LEDs in *Kuang* or *Lys* constitute a “curtain lamp” of “one or more light strings.” See Ex. 1003, ¶¶ 34, 37, 48, 61, 79, 96, 122.

Dr. Schubert’s “single-LED” interpretation is also wrong. The '546 patent never describes, illustrates, or suggests that a “curtain lamp” could be just a single LED. The newly-cited passage of the '546 patent recites:

The light-emitting diode light string **30** mentioned above includes a plurality of light-emitting diodes. However, the light-emitting diode light string **30** could include single light-emitting diode. It is called the driving apparatus for light-emitting diode curtain lamp with single light-emitting diode in one light-emitting diode string of the present invention.

Ex. 1001, 6:15-20. Here, the '546 patent mentions that one light string 30 could “include single light-emitting diode.” The next sentence gives this embodiment a special name: “[i]t is called the driving apparatus for light-emitting diode curtain lamp with single light-emitting diode in one light-emitting diode string of the present

invention.” Neither in this passage, nor anywhere else, does the ’546 patent say that the *entire curtain lamp* could constitute a single LED.

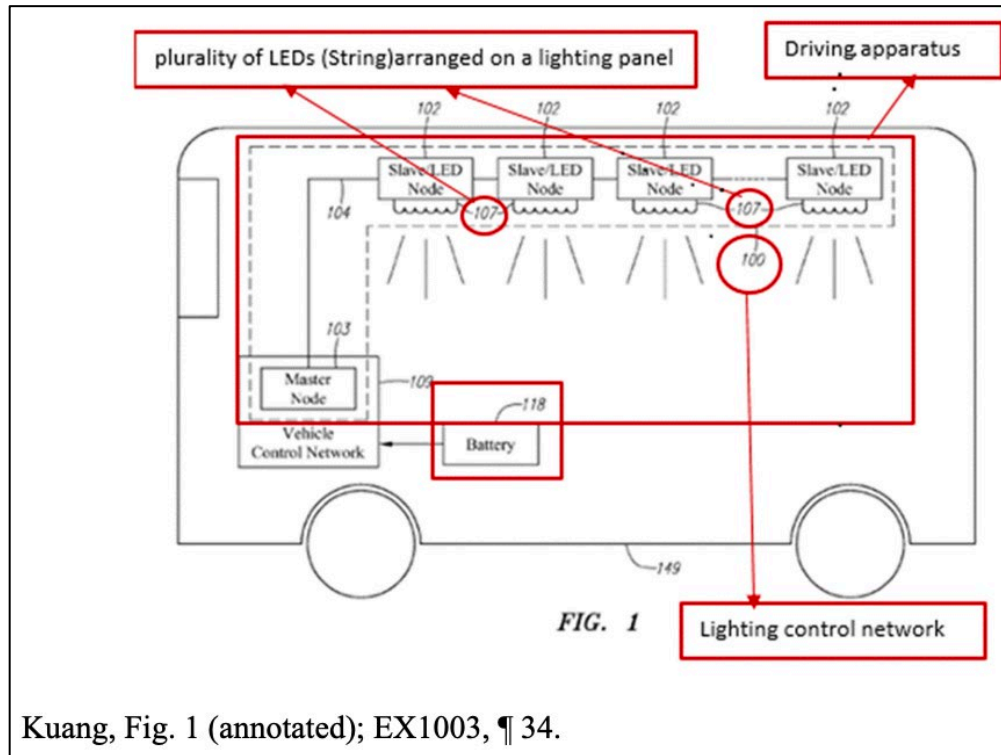
Every circuit diagram of a curtain lamp in the ’546 patent shows multiple LEDs arranged in strings. Dr. Schubert agreed at his deposition that Figs. 7 and 8 show circuit diagrams with multiple LEDs. Dr. Schubert also noted that Fig. 7 – a circuit diagram of a curtain lamp with multiple LEDs – is described in the ’546 patent as showing “the driving apparatus for light-emitting diode curtain lamp with single light-emitting diode in one light-emitting diode string of the present invention.” *See* Ex. 2005 at 83:9-89:13, discussing Ex. 1001, Fig. 7, 2:34-36, 6:21-23. Therefore, every disclosure of a “curtain lamp” in the ’546 patent has multiple LEDs, even if the ’546 patent mentions that a light string of the curtain lamp could have one LED.

At bottom, there is no basis for Petitioner or Dr. Schubert to assert that a single LED constitutes the claimed “curtain lamp,” and this new claim interpretation should be disregarded as both late and wrong.

A. *Kuang* Lacks a “Curtain Lamp” Under Petitioner’s Original or New Theories (Ground 1)

Petitioner’s mapping of *Kuang* to the “curtain lamp” element has been a moving target. The Petition unambiguously interpreted the claims as requiring one or more light strings with a plurality of lights. In addressing 1[Pre], the Petition

attempted to shoehorn *Kuang*'s bus lighting panels into the scope of the claimed "curtain lamp," labeling Figure 1 with "plurality of LEDs (String)":

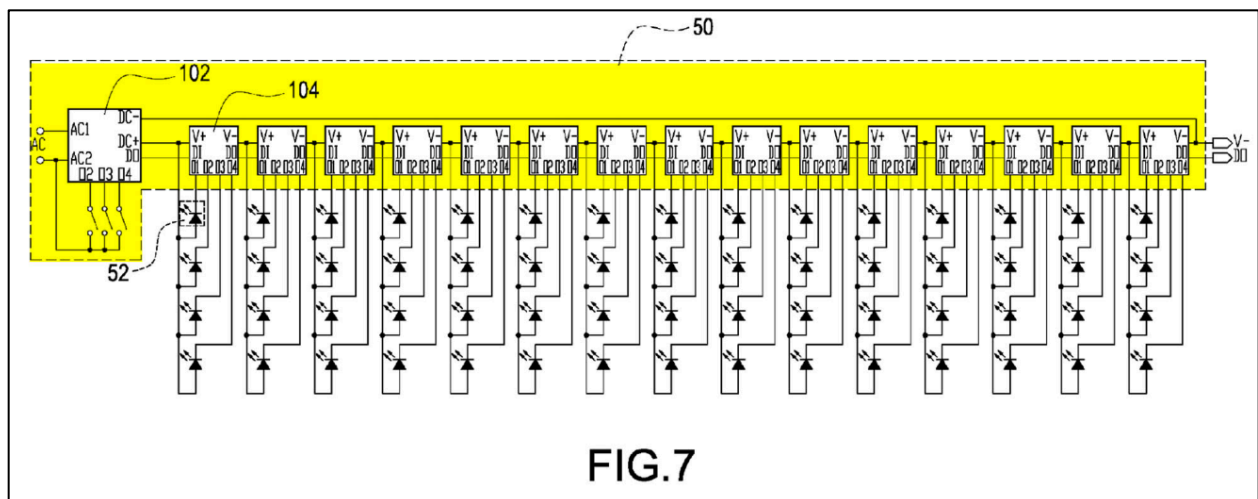


Paper 1 at 6-7.

Petitioner's Reply abandons the Petition's application of *Kuang*. Petitioner now asserts that various LED units 274 constitute a "string of LEDs," Paper 17 at 3-4, but the newly-cited Figure 2A of *Kuang* illustrates LED units that are individually connected to slave nodes, and does not illustrate a *string of LEDs* as Petitioner asserts. Aside from this new theory, Petitioner relies heavily on Dr. Schubert's tardy interpretation of "light string" as being a single LED. Paper 17 at 2-3, citing Ex. 1010. Petitioner makes no attempt to explain why the Petition's ground should

prevail *but for* the new theory that a “curtain lamp” or “light string” in the ’546 patent could be just one LED. *See* Paper 17 at 3-5.

Petitioner and Dr. Schubert also try, but fail, to draw parallels between the LEDs in *Kuang* and the ’546 patent. For example, Petitioner asserts that “[l]ike Kuang, the ‘string’ of LEDs disclosed in the ’546 patent is only illustrated in schematics.” Paper 17, at 4; Ex. 1010 ¶ 16. In making this assertion, Petitioner and Dr. Schubert allege that reference number 50 in the ’546 patent is a “light-emitting diode string.” Paper 17 at 5 (discussing Fig. 7 of EX. 1001, reproduced below):



Ex. 1001 Fig. 7 (as colored in Paper 17 at 5); *see also* Ex. 1010, ¶ 16. In fact, the specification states that item 50 is the “*driving apparatus* for light-emitting diode curtain lamp with single light-emitting diode in one light-emitting diode string 50.” Put more concisely, item 50 refers to the *driving apparatus* including master control unit 102 and slave control units 104. After reviewing Figure 7 and the description of

items 50 and 52 in the '546 patent, Dr. Schubert agreed that reference number 50 encircles the driving apparatus, and agreed that the circuit diagrams illustrate strings of LEDs 52. Ex. 2005, 83:9-89:13. Therefore, the Petitioner's Reply fails to draw parallels between *Kuang* and the '546 patent.

B. *Lys* Lacks a “Curtain Lamp” (Ground 3 Claim 1) or a “Second Curtain Lamp” (Ground 3 Claim 8)

Patent Owner's Response explained why the Petition failed to establish that *Lys* discloses the “curtain lamp” of 1[Pre] or 8[Pre], or the “second curtain lamp” of 8[D]. Paper 14 at 17-19, 32-33. Petitioner's Reply abandons the Petition grounds again, and doubles down on Dr. Schubert's new position that a single LED meets the claimed “curtain lamp” even though none of the circuit diagrams in the '546 patent shows a single-LED curtain lamp. Paper 17 at 5-6. This claim interpretation and Petitioner's belated reliance on it should be rejected as procedurally and factually improper as explained above.

Second, Petitioner continues to cite a sentence in *Lys* describing LED chip packaging types, but mistakes the sentence as disclosing a wide range of LED lighting device types. Paper 17 at 6, citing Ex. 1008, 33:18-36. Dr. Lebby's un rebutted testimony explained that this disclosure of chip packaging types in *Lys* is irrelevant to the claim limitation at issue. *See* Ex. 2001, ¶¶ 59-61; Paper 14 at 12.

Sitting at his deposition, Dr. Schubert also confirmed Dr. Lebby's position that "packaging" in *Lys* refers to LED *chip packaging*. Ex. 2005 at 78:5-81:19.

Third, Petitioner says that "a POSITA would have understood *Lys* to disclose a string of LEDs (labeled 24A-24D) to satisfy the 'curtain lamp' limitation." Paper 17 at 6. This mapping of *Lys* is ambiguous, at best. For example, Petitioner does not explain whether each of pool light sources 24A-24D constitutes four individual "strings of lights," or whether the collection of pool light sources 24A-24D is a "string of lights." Petitioner also never articulates how either mapping of *Lys* to 1[Pre] would meet the other claim 1 limitations, such as "at least a slave control unit electrically connected to the master control unit and the light-emitting diode light string" of 1[B]. Finally, if Petitioner has interpreted the collection of light sources 24A-24D in *Lys* as a "curtain lamp," then there remains no showing of a "second curtain lamp" as required in 8[D]. At bottom, Ground 3 remains deficient with respect to at least 1[Pre], 8[Pre], and 8[D].

V. PETITIONER FAILS TO SHOW A "MASTER CONTROL UNIT" IN *LYS* (GROUND 3)

The Petition originally asserted that a "remote or local user interface" in *Lys* constitutes the claimed "master control unit." Paper 1 at 25, citing Ex. 1008 at 14:17-29. Patent Owner's Response explained why *Lys*'s "local user interface 43" and "remote user interface 56" cited in the Petition do not meet the "master control unit"

of 1[A]. Paper 14 at 29-32. In response, Petitioner abandons its original ground and asserts two new and different mappings of *Lys* to 1[A]: Petitioner's Reply now alleges that a controller 34 or a central controller 134 in *Lys* constitutes the "master control unit" of 1[A]. Paper 17 at 16. Both new theories are late and wrong.

Petitioner's first new theory maps controller 34 to the "master control unit" of 1[A], directly contradicting the Petition's mapping of controller 34 to the "slave control unit" of 1[B]. *See* Paper 1 at 29 ("controllers 34A-34D function as claimed 'slave control units'"). The Petition instead mapped "*a local user interface 43*" in *Lys* to the "master control unit . . . including a microcontroller" of 1[A], and never asserted that controller 34 is part of *Lys*'s master control unit. *See* Paper 1, at 25-26 (emphasis original). Switching *Lys*'s controller 34 from the "slave control unit" of 1[B] to the "master control unit" of 1[A] not only contradicts the Petition but raises several questions as to which other components in *Lys* – if any – would constitute the other challenged claim elements. This remapping is late and deficient.

The second new theory maps *Lys*'s "central controller 134" to the "master control unit" – a position never raised in the Petition's discussion of 1[A]. The Petition addressed 1[A] by referring only to Figs. 1, 2, 3, and 6, which *Lys* states are all directed to "one embodiment." Ex. 1008, 3:57-67, 4:15-18. In discussing the central controller 134, Petitioner's Reply cites only to *Lys* Fig. 4A, a figure that *Lys* says illustrates "*another embodiment*" that was not cited in the Petition for 1[A]. *See*

Ex. 1008, 4:4-7. Petitioner did not rely on this “other embodiment” in *Lys* before, or set forth any obviousness analysis combining *Lys*’s embodiments. Even if the Board entertained this remapping, the Reply makes no attempt to explain how *Lys*’s central controller 134 constitutes a “master control unit electrically connected to [a] direct current power source, including: a microcontroller; and a voltage regulator electrically connected to the microcontroller,” as recited in 1[A]. This remapping is also late and deficient.

Lastly, Petitioner attempts to revive its Petition ground with reasons why the selectors 60A-60D (i.e., buttons) of *Lys*’s remote user interface 56 include a “voltage regulator” as required in the claimed “master control unit.” Paper 17 at 17. Dr. Schubert speculates that because *Lys*’s selectors 60A-60D can select colors, they include voltage regulators. *Id.*; Ex. 1010, ¶ 47. This speculation is completely untethered from the hardware and operation of selectors 60A-60D disclosed in *Lys* and is refuted by *Lys*. Selectors 60A-60D are selectors on a remote user interface 56 (a remote control). *See* Paper 1 at 27; Ex. 1008 19:61-20:4. Remote user interface 56 sends control signals 64 to a controller 34, which “selects the appropriate pre-programmed illumination program” and generates “control signals 36 to control the light source 24 in a predetermined manner.” Ex. 1008, 20:31-42. Therefore, any voltage regulation causing an LED to change color occurs at the controller 34 or light source 24 in *Lys*, not by remote control selectors 60A-60D.

**VI. PETITIONER HAS NO BASIS FOR ADDING A TRANSISTOR TO
KUANG OR *LYS* (GROUNDS 2 AND 4)**

In Grounds 2 and 4 addressing claim 3, the Petition proposed modifying *Kuang* or *Lys* to add a transistor from *Debevec*, a reference the Patent Office applied during examination and allowed claim 3 over. *See* Paper 14 at 7, discussing Ex. 1002 at 71 (“Allowable Subject Matter”). Dr. Lebby explained that Petitioner could not show any motivations for modifying *Kuang* or *Lys*, because both references already disclosed the “electronic switch or valve” functionality Petitioner proposed adding via *Debevec*’s transistor. Ex. 2001, ¶¶ 98-110; Paper 14 at 34-40.

Abandoning its own Petition ground again, Petitioner raised an entirely different invalidity theory purportedly adopting Dr. Lebby’s discussion of the functionality in *Kuang* and *Lys*. Paper 17 at 18-20. However, Dr. Lebby never agreed that *Kuang* or *Lys* discloses a “slave control unit includ[ing] *a transistor electrically connected to the signal processor*” as recited in claim 3. Merely adopting Dr. Lebby’s discussion of *functionality* does not meet Petitioner’s burden of showing that *Kuang* or *Lys* discloses the claimed *hardware*, or satisfy Petitioner’s burden to establish obviousness of adding the transistor Petitioner previously admitted is missing from both references.

The Petitioner’s Reply cites to multiple extrinsic documents discussing aspects of transistors in other contexts, but these documents do not establish that

Kuang or *Lys* includes the claimed configuration with a transistor or establish obviousness of adding one to *Kuang* or *Lys*. See Paper 17, at 19-20. Petitioner's new theory is yet another unsuccessful attempt to repair its deficient Petition grounds.

VII. PETITIONER'S REPLY CONFIRMS THAT *HIROYUKI* LACKS THE "PINS" OF CLAIM 4 (GROUNDS 5)

The Board should maintain its preliminary finding that *Hiroyuki*'s mention of "terminals" does not meet the claimed "pins." Petitioner's Reply cites multiple dictionary definitions of "terminal" and "pin" and argues that because a pin can be a type of a terminal, then *Hiroyuki*'s terminals meet the claimed pins. See Paper 17, at 21-22. This argument fails on at least two principles: 1) there is no basis for the disclosure of "terminals" in *Hiroyuki* to meet the "pins" in claim 4; and 2) the presence of "terminal" and "pin" in claim 4 requires that the words be afforded *different* meanings, whereas Petitioner tries to equate these distinct claim terms.

Dr. Schubert's testimony and the evidence of record confirm that *Hiroyuki*'s "terminals" do not meet the claimed "pins." Patent Owner's Response noted that Dr. Schubert has testified in this proceeding and in another denied proceeding that a "pin" would have been understood to a POSITA as being "pointed." See Ex. 1003, ¶ 100 ("[a] 'pin' can be understood as a *pointed* terminal"); see also IPR2024-00157, Ex. 1003 ¶ 44 (Dr. Schubert opining that "a 'pin' is a terminal having a pointed shape"). Petitioner also cites a dictionary definition of "pin" as "a short, pointed

wire.” Ex. 1017 at 1600. The record confirms that “pin” requires more than *Hiroyuki*’s reference of “terminals.” See Paper 14 at 40-44.

VIII. DR. LEBBY’S REASONS WHY *HIROYUKI* FAILS TO DISCLOSE A SIGNAL PROCESSOR ARE UNREBUTTED (GROUND 6)

Hiroyuki’s transistor-resistor “filter” circuit does not meet the “signal processor” of claim 8. See Paper 14 at 44-48; see also Ex. 2001, ¶¶ 118-124. Nearly all of Dr. Lebbby’s explanation on this issue remains unchallenged. For example, Petitioner has no response to Dr. Lebbby’s explanation that the ’546 patent discloses a signal processor *in addition to* a transistor-resistor combination akin to *Hiroyuki*’s transistor-resistor circuit, and that the “signal processor” in the ’546 patent outputs a signal that drives a transistor. Ex. 2001, ¶¶ 122-123; see also Paper 14 at 46-48, discussing Ex. 1001, Fig. 6. Petitioner also has no response to Dr. Lebbby’s explanation that the “signal” provided by the claimed “signal processor” in the ’546 patent differs from *Hiroyuki*’s power signal provided by the cited constant current circuit 72. Ex. 2001, ¶ 123; Paper 14 at 47-48.

In addition to avoiding Patent Owner’s arguments, Petitioner ignores the structural terms of the claim and focuses on functionality over the claimed structure. Petitioner’s Reply fails to reconcile how *Hiroyuki*’s transistor-resistor constitutes the claimed “processor,” whereas in other grounds Petitioner points to a micro-controller for the claimed “signal processor.” See Paper 1 at 19, 42 (citing a “micro-

controller” or “microprocessor”). Petitioner’s focus on likening voltage filtering to “signal process[ing]” still fails to establish that *Hiroyuki* discloses the *structure* of claim 8. *See* Paper 17 at 23-24. The Board should maintain its initial finding that Ground 6 failed to establish unpatentability of claim 8.

**IX. THERE IS NO REASON TO ADD A MICROCONTROLLER TO
HIROYUKI (GROUND 6)**

The Petition failed to establish obviousness of adding *Kuang*’s microcontroller to *Hiroyuki*. Paper 14, 48-51. Petitioner’s Reply amounts to a Band Aid on a broken leg. *See* Ex Paper 17, at 25-26. Dr. Schubert’s new testimony about features that could be added to *Hiroyuki*’s device with a microcontroller still fails to set forth a complete and proper obviousness analysis. For example, Petitioner and Dr. Schubert still cannot identify any *deficiency or drawback* in *Hiroyuki* that would warrant adding a microcontroller and reconfiguring *Hiroyuki*’s device to incorporate new components. Instead, they allege that adding a microcontroller would allow for reprogramming, provide “advanced functionalities,” “tune lighting parameters,” and add “the ability to individually and collectively address the LED[s].” Paper 17, at 25-26; Ex. 1010, ¶ 68. Petitioner does not dispute that adding a microcontroller would add complexity, size, and cost to *Hiroyuki*’s already-complete device, and microcontroller programming/reprogramming would also add cost and complexity. These are all changes that *Hiroyuki* endeavors to avoid; indeed, *Hiroyuki* states that

its illumination apparatus is designed to be of “smaller size, thinner and lower cost.” Ex. 1007, Abstract, [0009], [0011], [0022]-[0026]. *See* Paper 14 at 49-50; Ex. 2001 at ¶ 129.

Finally, Petitioner and Dr. Schubert neglect to explain reasonable expectation of success in adding *Kuang*’s bus ceiling light microcontroller to *Hiroyuki*’s small, low-cost, and thin lighting device. Dr. Schubert alleges that adding a microcontroller “is predictable and has a high associated probability of success” without any support or elaboration. Ex. 1010 ¶ 68; *see also* Paper 17, at 26. Patent Owner’s Response emphasized Petitioner’s failure to explain how a POSITA would have modified *Hiroyuki*, Paper 14, at 48-51; and Petitioner’s Reply makes no attempt to address the Petition’s deficiencies. For this additional reason, the Board should continue to find Ground 6 deficient.

X. CONCLUSION

Because Petitioner fails to establish unpatentability, misinterprets the claim terms, and misconstrues the limited, deficient prior art teachings, all challenged claims should be upheld as patentable for at least these reasons, those detailed above, and as articulated in Patent Owner’s Response.

Respectfully submitted,

Dated: December 16, 2024

By: /Ming-Tao Yang/
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CERTIFICATE OF COMPLIANCE

The undersigned hereby certifies that the foregoing **PATENT OWNER'S SUR-REPLY** contains 5,562 words, excluding those portions identified in 37 C.F.R. § 42.24(a), as measured by the word-processing system used to prepare this paper.

Dated: December 16, 2024

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Lead Counsel for Patent Owner

CERTIFICATE OF SERVICE

The undersigned hereby certifies that copies of the foregoing **PATENT OWNER'S SUR-REPLY** was served on December 16, 2024, via e-mail directed to counsel of record for the Petitioner at the following:

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