UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

POWER INTEGRATIONS, INC.
Petitioner

v.

SEMICONDUCTOR COMPONENTS INDUSTRIES, LLC,
Patent Owner

Case IPR2017-01329
Patent No. 9,049,764

PATENT OWNER'S NOTICE OF APPEAL

Pursuant to 35 U.S.C. § 142 and 37 C.F.R. § 90.2(a), Patent Owner Fairchild Semiconductor Corporation ("Patent Owner" and successor-in-interest with respect to U.S. Patent No. 9,049,764) and Semiconductor Components Industries, LLC (former owner and predecessor-in-interest with respect to U.S. Patent No. 9,049,764) hereby appeal to the United States Court of Appeals for the Federal Circuit from the Patent Trial and Appeal Board's ("Board") Final Written Decision entered on November 7, 2018 (Paper 33), and from all other underlying orders, decisions, rulings and opinions that are adverse to Patent Owner, including, without limitation, those within the Decision on Institution of Inter Partes Review entered on November 8, 2017 (Paper 13).

On December 19, 2018, Patent Owner filed updated Mandatory Notices notifying the Board that, effective November 28, 2018, Semiconductor Components Industries, LLC assigned its rights to U.S. Patent No. 9,049,764, to Fairchild Semiconductor Corporation. Paper 34. Patent Owner requests that the Board change the caption of IPR2017-01329 to indicate that Fairchild Semiconductor Corporation is the Patent Owner.

In accordance with 37 C.F.R. § 90.2(a)(3)(ii), Patent Owner indicates that the issues on appeal include, but are not limited to: (1) the Board's failure to identify, within the asserted references and combination(s), all elements of any challenged claim; (2) the Board's claim constructions or failure to construe any

terms; (3) the Board's failure to identify a sufficient reason to combine the teachings of different references in the asserted combination; and (4) any findings or determinations supporting or related to the aforementioned issues as well as other issues decided adversely to Patent Owner in any order, decisions, rulings, or opinions.

Simultaneous with this submission, a copy of the Notice of Appeal is being filed electronically with the Patent Trial and Appeal Board. In addition, a copy of this Notice of Appeal, along with the required docketing fees, are being electronically filed with the Clerk's Office for the United States Court of Appeals for the Federal Circuit.

Respectfully submitted,

Date: January 9, 2019

/s/ *Roger Fulghum*, Reg. No. 39,678

Roger Fulghum
Reg. No. 39,678
BAKER BOTTS L.L.P.
One Shell Plaza
910 Louisiana Street
Houston, Texas 77002-4995

Brian W. Oaks (Reg. No. 44,981)
Brett J. Thompsen (Reg. No. 69,985)
Nick Schuneman (Reg. 62,088)
Jennifer Nall (Reg. 57,053)
BAKER BOTTS L.L.P.
98 San Jacinto Blvd., Suite 1500
Austin, Texas 78701

ATTORNEYS FOR PATENT OWNER, FAIRCHILD SEMICONDUCTOR CORPORATION and SEMICONDUCTOR COMPONENTS INDUSTRIES, LLC

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e)(4), the undersigned certifies that on January 9, 2019, a complete and entire copy of this **PATENT OWNER'S NOTICE OF APPEAL** was served on Petitioner via electronic mail at the following correspondence addresses:

John C. Phillips (phillips@fr.com)

Neil A. Warren (warren@fr.com)

IPR10256-0041IP2@fr.com

PTABInbound@fr.com.

I hereby certify that, in addition to being filed electronically through the Board's E2E System, the original version of the foregoing Notice of Appeal, was filed by hand on January 9, 2019, with the Director of the United States Patent and Trademark Office, at the following address:

Director of the United States Patent and Trademark Office
c/o Office of the General Counsel
Madison Building East, 1 OB20
600 Dulany Street
Alexandria, VA 22314-5793

I hereby certify that on January 9, 2019, a true and correct copy of the foregoing Notice of Appeal, along with a copy of the Institution Decision and Final Written Decision, was filed electronically with the Clerk's Office of the United States Court of Appeals for the Federal Circuit, at the following address:

United States Court of Appeals for the Federal Circuit
717 Madison Place, N.W., Suite 401
Washington, DC 20005

/s/ Roger Fulghum
Roger Fulghum
BAKER BOTTS L.L.P.
One Shell Plaza,
910 Louisiana Street
Houston, Texas 77002-4995
Tel. (713) 229-1234
Fax (713) 229-1522

Trials@uspto.gov
571-272-7822

Paper No. 33
Date Entered: November 7, 2018

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

POWER INTEGRATIONS, INC.,
Petitioner

v.

SEMICONDUCTOR COMPONENTS INDUSTRIES, LLC
Patent Owner

Case IPR2017-01329
Patent 9,049,764 B2

Before BRIAN J. McNAMARA, JOHN F. HORVATH, and KAMRAN JIVANI, *Administrative Patent Judges*.

McNAMARA, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and
37C.F.R. § 42.73

BACKGROUND

On November 8, 2017, we instituted an *inter partes* review of claims 16–18 and 21 (the "challenged claims") of U.S. Patent No. 9,049,764 B2 ("the '764 patent"). Paper 13 ("Dec. to Inst.").[1] Patent Owner filed a Patent Owner Response (Paper 18, "PO Resp.") and Petitioner filed a Petitioner Reply (Paper 19, "Pet. Reply"). Patent Owner also filed a Motion to Exclude the Declaration of Petitioner's expert Mr. William Bohannon, (Ex. 1008, "Bohannon Decl.") and the Reply Declaration of Mr. William Bohannon (Exhibit 1015, "Bohannon Reply Decl."). *See* Paper 23, "Mot. To Exclude." Petitioner filed an Opposition to Patent Owner's Motion to Exclude (Paper 26, "Opp. To Mot. To Exclude") and Patent Owner filed a Reply (Paper 28, "Reply to Opp. To Mot. To Exclude"). A transcript of an oral hearing held on July 19, 2018 (Paper 32, "Hrg. Tr.") has been entered into the record.

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. §318(a). We base our decision on the preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d).

Having reviewed the arguments of the parties and the supporting evidence, we conclude that Petitioner has demonstrated by a preponderance of the evidence that the challenged claims are unpatentable.

[1] As noted in our Decision to Institute, as a result of Patent Owner's disclaimer of claims 1–15, 22, and 23, only Petitioner's challenge to claims 16–18 and 21 as obvious over Yang '089 and Yang '824 are before us. Thus, we instituted *inter partes* review on all challenged claims not disclaimed by Patent Owner.

THE '764 PATENT (EXHIBIT 1001)

The '764 patent discloses an LED driver with a programmable input that can be used for dimming control. Ex. 1001, 1:34–36. The drive circuit has a controller that generates a switching signal coupled to switch a magnetic device for generating an output current to drive a plurality of LEDs. Ex. 1001, Abstract. The switching signal is modulated in response to a current-control signal regulated by the programmable input signal to regulate the output current, which is correlated to the current-control signal. *Id.*

Figure 1 of the '764 patent is an embodiment of an LED drive circuit according to the invention. Ex. 1001, 2:5–7. Figure 1 of the '764 patent is shown below.

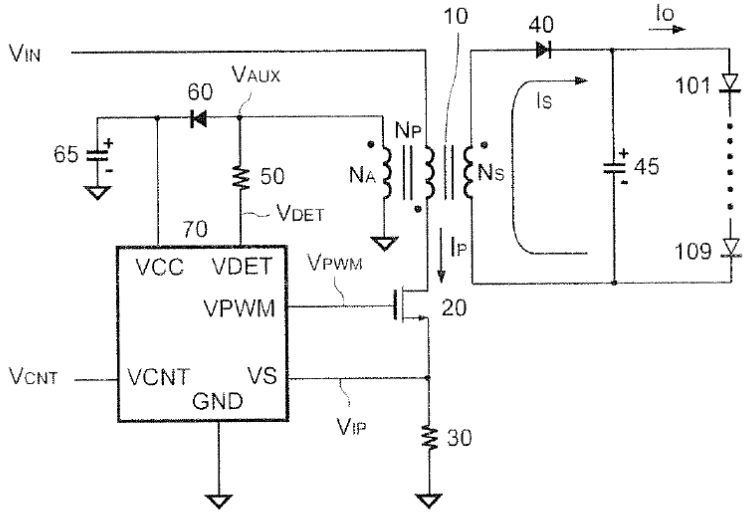

FIG. 1

Figure 1 of the '764 patent

Although the '764 patent discusses the general operation of this circuit (*id.* at 2:24–67), U.S. Patent 6,977,824 B1 (Ex. 1003, "Yang '824") cited as

a reference in Petitioner's challenges, includes a more detailed discussion of the same Figure 1, except for the presence of control signal input terminal VCNT and LEDs 101–109 as the load in Figure 1 of the '764 patent. *See* Ex. 1003, Fig. 1, 2:17–3:54. The '764 patent indicates "[t]he detail[ed] description of the primary-side controlled regulator can be found in [the] prior art" '824 patent. Ex. 1001, 3:24–27. For convenience, where appropriate, we refer to the descriptions in either or both the '764 and '824 patents to illustrate the operation of the circuit depicted in Figure 1 of the '764 patent.

As shown in Figure 1 of the '764 patent, transformer 10 has auxiliary winding N_A, primary winding N_P, and a secondary winding N_S. Ex. 1003, 2:19–21. One terminal of the primary winding is coupled to receive input voltage V_{IN} and the other is coupled to power transistor 20 that is utilized to switch transformer 10. Ex. 1001, 2:29–33. One terminal of the secondary winding connects to rectifier 40. *Id.* at 2:33–35. Filter capacitor 45 is coupled between rectifier 40 and the other terminal of the secondary winding. *Id.* at 2:35–37. Series connected LEDs 101–109 are connected in parallel to capacitor 45. *Id.* at 2:37–39.

In order to regulate output current I_O and output voltage V_O, control circuit 70 generates a switching signal V_{PWM} at terminal VPWM to switch transformer 10 by switching transistor 20. Ex. 1001, 2:43–45; Ex. 1003, 2:21–24. When switching signal V_{PWM} is high, primary side switching current I_P is generated. Ex. 1003, 2:27–28. The peak value of I_P depends upon input voltage V_{IN}, the inductance L_P of primary winding N_P, and the time the switching signal is on, T_{ON}. *Id.* at 2:28–39. When switching signal V_{PWM} drops to low, transistor 20 turns off and energy stored in transformer

10 is delivered to the secondary side of transformer 10 through rectifier 40 and to the load (i.e., LEDs 101–109 in the '764 patent). *Id.* at 2:40–43, 3:26–28. The secondary side switching current I_S is determined by the primary side switching current I_P and the winding turns of transformer 10. *Id.* at 3:27–40. In the circuit, the peak secondary current I_S depends upon V_O, the forward voltage drop across rectifier diode 40 (V_F), the inductance L_S of secondary winding (N_S), and the discharging time of the secondary side switching current I_S. *Id.* at 2:43–55. A reflected voltage V_{AUX} generated at auxiliary winding N_A decreases as secondary switching current I_S falls to zero. *Id.* at 2:56–3:7. Voltage detect terminal VDET is coupled to auxiliary winding N_A via resistor 50 to detect reflected voltage $V_{AUX,}$ which charges capacitor 65 via rectifier 60 to provide power to control circuit 70 at terminal VCC. Ex. 1001, 2:46–54; Ex. 1003, 3:45–49. Current-sense resistor 30, coupled between the source of transistor 20 and ground, converts primary side switching current I_P to switching current signal V_{IP} to provide a current-sense input at terminal VS. Ex. 1001, 2:55–58; Ex. 1003, 3:49–54. Input terminal VCNT receives programmable signal V_{CNT} to control switching current I_P and output current I_O. Ex. 1001, 2:65–67.

Figure 2 of the '764 patent illustrates another preferred embodiment of the LED drive circuit in which one end of the primary winding N_P of transformer 10 is coupled to receive input voltage V_{IN}. Ex. 1001, 2:8–9. V_{IN} is AC voltage V_{AC} rectified by bridge rectifier 80 and capacitor 89. *Id.* at 3:2–7. In the embodiment of Figure 2, programmable signal V_{CNT} is generated from AC voltage V_{AC} through diodes 81 and 82, voltage divider resistors 85 and 86 and filter capacitor 87. *Id.* at 3:9–20.

Figure 3 below illustrates a controller according to the invention. Ex. 1001, 2:10–11.

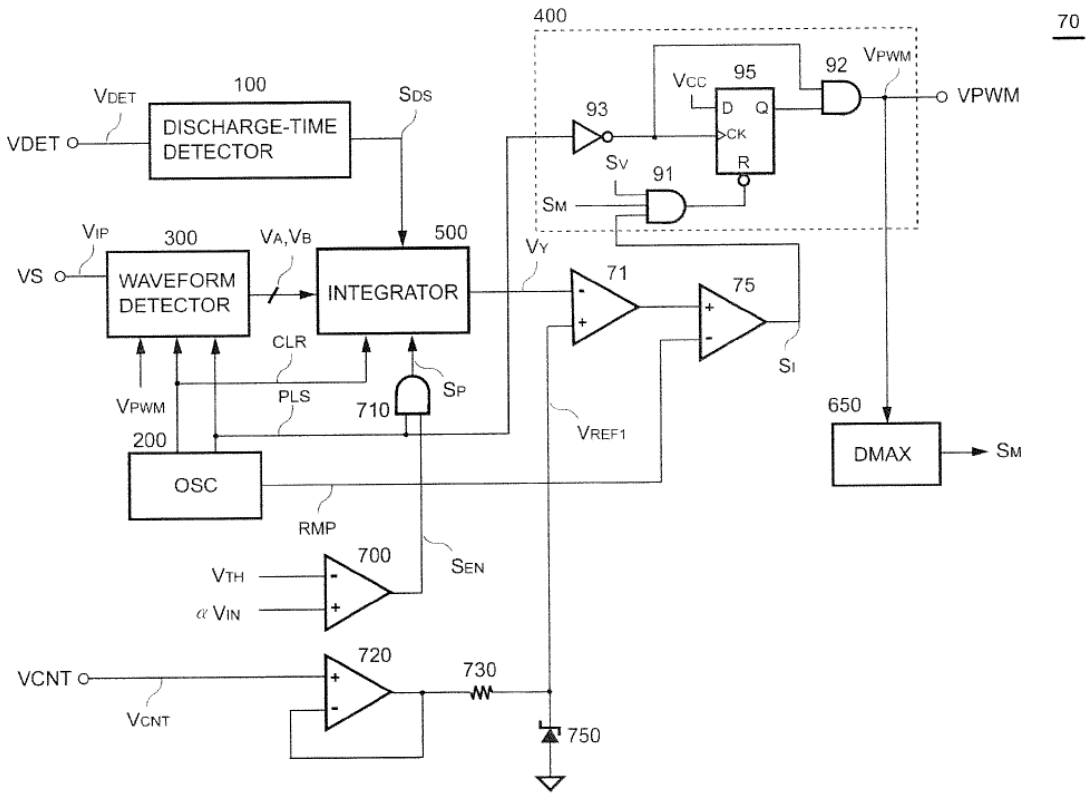

FIG. 3

Figure 3 of the '764 patent

As shown in Figure 3, controller 70 includes discharge time detector 100, oscillator 200, waveform detector 300, PWM circuit 400, integrator 500, maximum duty cycle circuit 650, comparator 700, buffer amplifier 720 and error amplifier 71. Oscillator 200 generates pulse signal PLS coupled to circuit 400 to determine the switching frequency of V_{PWM}. *Id.* at 3:42–44. In PWM circuit 400 signal V_{PWM} at controller terminal VPWM is the Q output of D flip-flop 95 that is clocked to the state of V_{CC} by the inversion of signal PLS (through inverter 93) from oscillator 200. *Id.* at 4:7–18. Using AND gate 91, D flip-flop 95 is reset to shorten the pulse width of output

signal V_{PWM} to thereby regulate output voltage V_O and output current I_O, based on output voltage control signal S_V, maximum duty cycle signal S_M (generated by maximum duty cycle circuit 650 to maintain duty cycle below 50%), and current control signal S_I. *Id.* at 4:18–36.

Signal V_{PWM} from PWM circuit 400 and signal PLS from oscillator 200 are also provided to waveform detector 300. *Id.* at 3:31–33. Waveform detector 300 also receives a clear (CLR) signal from oscillator 200. *Id.* Waveform detector 300 generates current waveform signals V_A and V_B, used by integrator 500, by sampling current input signal V_{IP} through current sense terminal VS. *Id.* at 3:28–31. At terminal VDET of the controller, discharge time detector 100 receives voltage V_{DET} via auxiliary winding N_A to detect the discharge time of secondary side switching current I_S, which is proportional to primary side switching current I_P. *Id.* at 3:33–38. Discharge time detector 100 generates discharge time signal S_{DS}, whose pulse-width is correlated to the discharge time of secondary side switching current I_S. *Id.* at 3:38–41. Secondary side switching current I_S also is correlated to output current I_O. *Id.* at 3:41–42.

Integrator 500, with a time constant correlated to switching period T of V_{PWM}, generates current signal V_Y by integrating average current signal I_{AVG}, produced in response to current waveform signals V_A and V_B as shown in Figure 4, with discharge time signal S_{DS}, whose pulse width as noted above is correlated to the discharge time of I_S. *Id.* at 3:48–53. Therefore, current signal V_Y is related to output current I_O. *Id.* at 3:53–54.

V_Y forms the negative input to error amplifier 71, whose other input is signal V_{REF1}. Ex. 1001, 3:55–59. Error amplifier 71 amplifies current signal V_Y and provides a loop gain for output current control. *Id.* at 3:59–60.

Signal V_{CNT}, supplied at controller terminal VCNT, is supplied to the positive input of unity gain feedback buffer amplifier 720, whose output is supplied to the positive input of error amplifier 71 through resistor 730 to control reference signal V_{REF1} of the current loop of controller 70. *Id.* at 4:54–67. V_{REF1} is clamped to a maximum by reference voltage device 750 (e.g., a Zener diode). *Id.* at 4:59–61.

Error amplifier 71 provides the positive input to comparator 75. *Id.* at 3:63–67. The negative input to comparator 75 is ramp signal RMP from oscillator 200. *Id.* The output of comparator 75 generates current control signal S_I that (together with S_V and S_M) resets D flip-flop 95 as explained above, and thereby controls the pulse width of V_{PWM}. The programmable signal V_{CNT} thus regulates current control signal S_I by controlling the reference signal V_{REF1} of a current-loop that is formed by detecting switching current I_P to modulate the pulse width of switching signal V_{PWM}. *Id.* at 4:2–6, 4:62–65. Switching signal V_{PWM} is thus modulated in response to reference signal V_{REF1} of the controller's current loop, via current control signal S_I, such that the level of output current I_O is correlated to reference signal V_{REF1} controlled by V_{CNT}. *Id.* at 4:67–5:6.

In the embodiment of Figure 6, which uses many of the elements of the embodiment of Figure 3, programmable signal V_{CNT} at input terminal VCNT is coupled to voltage to current converter 800 that generates programmable current I_{CNT}. *Id.* at 7:5–7. Programmable current I_{CNT} is coupled to current sense terminal VS through buffer amplifier 780 and resistor 790 to modulate current input signal V_{IP}, such that programmable signal V_{CNT} modulates current input signal V_{IP}. *Id.* at 7:5–18. As in Figure 3, current input signal V_{IP} (now modulated by V_{CNT}), which is correlated to

switching current I_P of offline transformer 10, is coupled to generate current control signal S_I that controls switching signal V_{PWM}, so that output current I_O is correlated to current control signal S_I. *Id.* at 7:18–25.

ILLUSTRATIVE CLAIM

Claim 16 is illustrative of the claims before us.

> 16. A LED drive circuit comprising:
> a controller, generating a switching signal coupled to switch a magnetic device for generating an output current to drive at least a LED (Light Emitting Diode);
> an input circuit, receiving a programmable signal correlated to an input of the LED drive circuit to generate a programmable current, wherein the programmable current is coupled to control a current input signal which is correlated to a switching circuit of the magnetic device; and
> a comparison circuit, comparing a signal sourced from an oscillator and a voltage potential generated by a current control loop for generating a current-control signal;
> wherein the switching signal is controlled in response to the current-control signal for regulating the output current, and a level of the output current is correlated to the current-control signal.

GROUNDS OF INSTITUTION

In our Decision to Institute, we instituted trial on the following challenges to patentability:

Claims 16–18 and 21 as obvious under 35 U.S.C. § 103(a) over the combination of Yang '089[2] and Yang '824.[3]

[2] U.S. Patent No. 7,245,089 B2 issued July 17, 2007 (Ex. 1004).
[3] U.S. Patent No. 6,977,824 B1 issued Dec. 20, 2005 (Ex. 1003).

CLAIM CONSTRUCTION

Programmable Signal

In our Decision to Institute, we applied the ordinary and customary meaning to the terms not construed. We applied the broadest reasonable interpretation to the term "programmable signal." Dec. to Inst. 11–12. We agreed with Petitioner that "programmable signal" is not limited by the '764 patent to any particular programming or mechanism of programming, and the term is not limited to one of a current or voltage. Thus, to the extent a construction was required, we adopted Petitioner's proposal, and construed "programmable signal" to mean *a selectable or potentially variable voltage or current signal*.

Patent Owner contends that our construction is overly broad by reading out the programmable limitation, because all signals are potentially variable. PO Resp. 6. Petitioner responds that Patent Owner's argument is not persuasive because a "programmable signal," i.e., one that could be programmed to change over time, is distinguished from a constant signal, i.e., one that may not change over time. Pet. Reply 6. Petitioner notes that the only explicit discussion of a programmable signal in the specification states "programmable signal V_{CNT} is generated at the input terminal V_{CNT} in response to the AC input VAC [of the LED drive circuit]." *Id.* at 6–7 (citing Ex. 1001, 3:8–10), *see also* 4:54–5:6 (programmable signal V_{CNT} generated at input terminal VCNT coupled to regulate current-control signal S_I of controller 70 through controlling the reference signal V_{REF1} of a current-loop), 7:6–25 (programmable signal V_{CNT} generated at input terminal V_{CNT} is coupled to modulate the current input signal V_{IP} that is coupled to

generate current control signal S_I and is correlated to switching current I_P of offline transformer 10 and programmable signal V_{CNT}).

Patent Owner further argues that "the meaning of 'programmable signal' itself is not relevant to the parties' dispute" and "to the extent there is a relevant claim scope issue, it relates to the relationship between the programmable signal and the 'input of the LED drive circuit' to which it is correlated." PO Resp. 6. Arguing that the claimed "programmable signal" and the claimed "'input of the LED drive circuit' are two distinct elements," Patent Owner proposes that we construe "input to the LED drive circuit" as "an input distinct from the 'programmable signal' that is correlated to it." *Id.* at 6–7. Patent Owner does not propose a specific definition of either term.

In support of its position, Patent Owner argues that: (i) claim 16 lists the programmable signal and the input to the LED drive circuit separately (*id.* at 7–8), and (ii) the Specification of the '764 patent shows "programmable signal" V_{CNT} is correlated to a different signal, i.e., V_{AC} shown in Patent Owner's annotated Figure 2 (*id.* at 8–9). Patent Owner does not propose limiting "programmable signal" to V_{CNT} developed from V_{AC} in the embodiment shown in Figure 2.

Patent Owner argues that construing the "input of the LED drive circuit" to be distinct from the "programmable signal" is important because Petitioner fails to identify an "input of the LED drive circuit" that is correlated to either of the two signals Petitioner alleges to be "programmable signals," i.e., control voltage V_{CNT} and reflected signal V_D of Yang '089. *Id.* at 7. Petitioner responds that the meaning of "programmable signal" clearly is in controversy and is relevant to the issues before us because Patent

Owner contends that V_D and V_{CNT} are not programmable signals. Pet. Reply 6–7 (citing PO Resp. 4).

In the context of the '764 patent, Patent Owner does not argue V_{CNT} is not a programmable signal—Patent Owner explicitly states that V_{CNT} in the '764 patent is a programmable signal (correlated to V_{AC}), as discussed above. *See* Prelim. Resp. 8–9. The '764 patent makes numerous references to "programmable signal V_{CNT}" as discussed above.

Patent Owner argues that the signal V_{CNT} Petitioner identifies in a different, but closely related document, i.e., the Yang '089 reference, is not the "programmable signal" recited in claim 16 of the '764 patent. PO Resp. 4. Patent Owner argues that neither V_{CNT} in the Yang '089 reference nor V_D in the Yang '089 reference is the claimed "programmable signal" because in Yang '089 V_{CNT} and V_D are not correlated to any input of the LED drive circuit, and the input circuit identified by Petitioner does not receive V_D. PO Resp. 4. Thus, Patent Owner asserts that the "programmable signal" V_{CNT} in the '764 patent is not the signal V_{CNT} in Yang '089.

Although Yang '089 does not use the term "programmable signal," Petitioner emphasizes that Yang '089 states "[a] resistor connected from the input terminal IN to ground and/*or control voltage V_{CNT} connected to the input terminal IN will program the value of the time delay T_D*" and that "T_D is programmed to control [the] value of the LED current and the brightness of the LEDs." Pet. 48; Ex. 1004, 3:20–21, 4:16–18 (emphasis added).

In consideration of the above, we recognize a programmable signal can be selected to be constant or variable over time. Therefore, in this Decision, we apply the same construction applied in the Decision to Institute, i.e., we construe "programmable signal" to mean *a selectable or*

potentially variable voltage or current signal. We address whether the combination of the references discloses a correlation between the claimed "programmable signal" and the claimed "input of the LED drive circuit" in our analysis of the combination of Yang '089 and Yang '824 that appears later in this Decision.

Programmable Current

Patent Owner proposes that we construe "programmable current" to be a current that is different from the "switching current" and different from the "output current." PO Resp. 10. Patent Owner does not propose any other construction. Patent Owner argues that the '764 patent Specification "describes the 'programmable current I_{CNT}' as a current that is coupled to 'current-sense terminal VS' of controller 70," and that the "current I_{CNT} is coupled to control current input signal V_{IP} by modulating V_{IP}," as shown in Patent Owner's annotated version of Figure 6. PO Resp. 12. Patent Owner notes that, in contrast, Figure 1 of the '764 patent shows output current I_O on the secondary side of the circuit. *Id*. at 11.

Petitioner argues that the claims do not require the programmable current to be different from the output current. Pet. Reply 9–10. According to Petitioner, I_O in the '764 patent is a programmable current because its level is programmatically controlled by current control signal S_I. *Id*. at 10 (citing Ex. 1001, 5:2–3 ("[T]he level of the output current I_O is correlated to the current-control signal S_I")).

More importantly, Petitioner argues that the distinction proposed by Patent Owner between the programmable current and the output current "does not bear on the combination proposed by Petitioner." Pet. Reply 9. Notwithstanding its argument that the programmable current and switching

current are different from the output current, it is not clear that Patent Owner proposes we construe the programmable current to be a specific current described in the '764 patent. We discuss this issue further in our analysis of claim 16 later in this Decision.

ANALYSIS OF PRIOR ART CHALLENGES

Yang '824

Petitioner argues that the controller of the '764 patent's LED drive circuit is taught by Yang '824. Pet. Reply 1 (citing Ex. 1001, 3:24–27, "The detail[ed] description of the primary side controller regulator can be found in a prior art 'Control circuit for controlling output current at the primary- side of a power converter' U.S. Patent 6,977,824"). Petitioner cites Yang '824 as disclosing a primary side regulator and control circuit 70 that is similar to controller 70 disclosed in the '764 patent, with the notable exception that terminal VCNT of controller 70 of the '764 patent is not present in the controller of Yang '824. Pet. 36–37 (comparing Fig. 1 of Yang '824 with Fig. 1 of the '764 patent). Petitioner contends that both the '764 patent and Yang '824 disclose the same internal connections for the current sense terminal VS coupled to waveform detector 300, VDET (receiving V_{DET} from auxiliary winding N_A) coupled to discharge time detector 100, and integrator 500, coupled to operational amplifier 71. *Id*. at 38–39. The current loop shown in the detailed schematic of the controller in Figure 4 of Yang '824 differs from that shown in Figure 3 of the '764 patent. In both Figures, the current loops receive V_{REF1} as an input to operational amplifier 71. However, in the '764 patent, V_{REF1} is generated by the clamped output of buffer amplifier 720 in response to control signal V_{CNT} applied at terminal VCNT. *Id.* at 39. Petitioner states:

> the current control loop shown in Yang '824 for generating switching signal VPWM is the same as is shown in the '764 patent absent the disclosure in the '764 patent related to using the programmable input signal V_{CNT} to control V_{REF1}. In both patents, "[t]he current control loop controls the magnitude of the primary side switching current I_P in response to the reference voltage V_{REF1}." Ex. 1003 at 4:16-18; *see also* Ex. 1001 ("The current control loop controls the magnitude of the switching current I_P in response to the reference signal V_{REF1}.").

Id.

Yang '089

Petitioner asserts that Yang '089 teaches the presence of control signal input terminal VCNT and LEDs – the only features missing from Yang '824. Pet. Reply 2. Petitioner contends that Yang '089 teaches a programmable, switching LED driver in which the input terminal IN is developed to program the brightness of the LED. *Id*. Petitioner cites Yang '089 as disclosing a switching LED driver with a programmable input for controlling LED current. Pet. 10 (citing Ex.1004, 1:6–8, 20–23, 52–53). Figure 3 of Yang '089 illustrates control circuit 100 receiving at terminal IN control voltage V_{CNT} to program the brightness of LEDs 20–25 using switch 70 to control the current through the LEDs. *Id*. at 11; Ex. 1004, Fig. 3. As shown in Figure 3, V_G at the GATE output of controller 100 controls the state of switch 70. When turned ON, switch 70 generates a current in LEDs 20–25. Current in switch 70 is detected by controller 100 using current sense resistor 75 that provides signal V_S on the SENSE terminal of controller 100 when current flows in switch 70. Switch 70 controls LED current and brightness by turning OFF once the LED current exceeds a "first threshold" and turning ON again after a programmable delay time T_D once the energy of the inductor is fully discharged. *Id*. at 12–13 (citing Ex. 1004,

1:65–2:8, 3:20–22). Petitioner further notes that Yang '089 discloses that the "first threshold" is varied in response to the reflected signal (V_D) of the inductor, whose value shows the LED forward voltage that is correlated to LED temperature. *Id.* at 11–12 (citing Ex. 1004, 2:3–8). In this way, the LED current can be programmed to compensate for temperature related chromaticity and luminosity variations. Ex. 1004, 2:6–8.

Motivation to Combine the Teachings of Yang '824 and Yang '089

Petitioner contends that a person of ordinary skill would have been motivated to combine the programmable LED driver of Yang '089 with the current loop disclosed in Yang '824 to generate the signal that switches the transistor switch. Pet. 40–41. Yang '089 controls the current on the primary side on the magnetic device and uses that controlled primary side current to drive the LEDs. Ex. 1004, Fig. 3. Yang '824 also controls the current on the primary side of the magnetic device (i.e., transformer 10), but provides the output current to the LEDs on the secondary side of the magnetic device. Ex. 1003, Fig. 1. Specifically, "[t]he secondary side switching current I_S is determined by the primary side switching current I_P and the winding turns of the transformer **10**." *Id.* at 3:28–30. Petitioner argues that the primary side regulator of Yang '824 provides safety enhancing galvanic isolation and that Yang '824 states "it is desirable to provide a control circuit for controlling output current of the power converter at the primary side of the power converter." *Id.* at 40 (citing Ex. 1003, 1:18–20). Thus, Petitioner asserts that it would have been desirable to make a primary side controller for controlling LEDs with a programmable input by combining the teachings of Yang '824 and Yang '089. *Id.* (citing Bohannon Decl., Ex. 1008 ¶¶ 101, 105). According to Petitioner, using a programmable input such as that

disclosed in Yang '089 to modulate the output current of the switching signal of the controller, as shown in Yang '824, uses a known technique to modify a known controller and yields predictable results. *Id.* at 41.

Patent Owner does not contend explicitly that a person of ordinary skill would not have been motivated to combine the teachings of Yang '089 and Yang '824. Instead, Patent Owner contends that the combination, as argued by Petitioner, does not render claims 16–18 and 21 of the '764 patent obvious because: (i) the asserted combination does not include the programmable current (PO Resp. 19–35), (ii) the proposed combination does not include an input circuit (*id.* at 35–41), and (iii) the asserted combination does not include the claimed programmable signal (*id.* at 41–46). We address Patent Owner's contentions in the context of the individual claim elements below.

Claim 16

Claim 16 recites an LED drive circuit having (i) a controller, (ii) an input circuit, and (iii) a comparison circuit. Claim 16 does not recite specific structure for any of these elements. Instead, claim 16 recites inputs to and outputs of the controller, input circuit, and comparison circuit and includes "wherein clauses" that recite certain functions of these elements and couplings and correlations between certain signals.

The controller in claim 16 generates a switching signal. The switching signal is coupled to switch a magnetic device. The magnetic device is for generating an output current to drive at least an LED. Claim 16 does not limit the structure of the controller, does not limit the structure of the magnetic device, and does not limit the output current to a primary side or secondary side current.

We are persuaded by the Petition's assertion that controller 100 and magnetic device 50 in Yang '089, and controller 70 and magnetic device 10 in Yang '824 disclose an LED drive circuit having a controller that generates a switching signal to switch a magnetic device to generate an output current to drive the LED circuit, as recited in the preamble and "controller" limitation of claim 16. Pet. 45–47.

Turning to the "input circuit," Patent Owner argues that "Petitioner has not shown that this element is present in the proposed combination." PO Resp. 35. According to Patent Owner, Mr. Bohannon's testimony concerning a circuit that receives an input "is insufficient to show that the specific input circuitry satisfying the requirements of Claim 16 is necessarily present in Yang '089." *Id.* at 39. Patent Owner's arguments on this point are not persuasive. As we discussed above, claim 16 does not recite any specific structure of the claimed "input circuit." Patent Owner acknowledges this fact by stating "[a]s recited in Claim 16, the term 'input circuit' is capable of both receiving a programmable signal and generating a programmable current." *Id.* at 36 (citing Ex. 1001, 9:16–23). Although Patent Owner cites "one embodiment" of the '764 patent that illustrates a schematic of a voltage-to-current converter (*id.*), the input circuit of claim 16 is not limited to that or any other specific embodiment. In order to cite the combined teachings of Yang '089 and Yang '824, it was only necessary for Petitioner to demonstrate that the combination teaches an input circuit that meets the limitations of the claims. As Petitioner points out, signal V_D in Yang '089, when input to a terminal marked VD, "is used as an input inside control circuit 100 to regulate the current-control signal output by second control circuit 115." Pet. Reply 20 (citing Pet. 49). Thus, Yang '089

discloses an "input circuit." We address below whether the "input circuit" of Yang '089 receives the type of input signal required by claim 16.

The input circuit recited in claim 16 receives a "programmable signal." The "programmable signal" the input circuit receives is "correlated to an input of the LED drive circuit." The correlation between the programmable signal and the input of the LED drive circuit implies that the input of the LED drive circuit is itself a signal. In its claim construction arguments, Patent Owner argues that in the '764 patent the programmable signal is V_{CNT} and is distinct from the input to the LED drive circuit. PO Resp. 5–10. Patent Owner identifies V_{AC} in Figure 2 as the input of the LED drive circuit to which the programmable signal is correlated. PO Resp. 8–9 (citing Ex. 1001, 3:5–18 as "explaining the correlation between the AC input and programmable signal via diodes 81 and 82, resistors 85 and 86, and capacitor 87"); *see also id.* at 43–44.

The Specification describes Figure 2 as "another embodiment" different from that of Figure 1. Ex. 1001, 2:8–9, 3:1–20 (describing the embodiment of Figure 2 as one in which signal V_{CNT} is generated in response to AC input voltage V_{AC}). Claim 16 does not limit the physical characteristics of the programmable signal or the physical characteristics of the signal that is the input of the LED drive circuit, and does not specify how the signals are correlated.

The Petition cites Yang '089 as disclosing an input circuit receiving two control voltages, i.e., first and second control voltages V_{CNT} and V_D, respectively. Pet. 48. In Yang '089 V_{CNT} is applied to terminal IN to program the LED brightness by generating signal INH that controls the state of V_G (the signal on the gate of transistor switch 70) to program the delay

time T_D that switch 70 remains off. *Id.* at 48–49; Ex. 1001, 4:12–18. The amount of time switch 70 is on and off controls the current in the LEDs and, consequently, their brightness. In Yang '089 LED temperature can be detected from reflected signal V_D and further used for programming LED current. Ex. 1004, 5:55–56.

Patent Owner emphasizes that Petitioner does not identify explicitly a "programmable signal" that is "correlated to an input of the LED drive circuit." Patent Owner contends that Petitioner has not identified in the combination of Yang '089 and Yang '824 the claimed "input of the LED drive circuit." Petitioner responds that an input is an inherent feature of a circuit. Pet. Reply 5, 17–21. Petitioner's arguments are drawn to physical input circuitry. Pet. Reply 17. According to Petitioner "[a]n input signal to the control circuit must necessarily be received by some type of input circuitry." *Id.* (citing Ex. 1015, Hass Reply Decl. ¶ 48). Petitioner further states "[t]hose signals are received by circuitry in order to modulate the control signal of the programmable LED drive circuit." *Id.* (citing Ex. 1004, 4:7–28).

Patent Owner argues that Yang '089 is silent about the origin of the control voltage V_{CNT} and that Petitioner has not identified any particular input to which it alleges control voltage V_{CNT} of Yang '089 is correlated. PO Resp. 44–45. The embodiments shown in the figures of the '764 patent, except for the embodiment in Figure 2, also are silent about the origin of V_{CNT}. For example, the description of Figure 1 of the '764 patent states only that "input terminal VCNT receives a programmable signal V_{CNT} to control the switching current I_P and the output current I_O." Ex. 1001, 2:65–67. V_{CNT} is not shown to be correlated to any signal in Figure 1. Only in its

discussion of Figure 2 does the '764 patent describe V_{CNT} as related to any particular signal, i.e., V_{AC}. The discussion of Figure 2 states that "the programmable signal V_{CNT} is generated at the input terminal VCNT in response to the AC input V_{AC} of the LED drive circuit." Ex. 1001, 3:1–20. We note, however, that Patent Owner does not argue claim 16 of the '764 patent is restricted to the embodiment in Figure 2.

V_{CNT} in Yang '089 is input to terminal IN to program the brightness of the LED by programming delay time T_D. PO Resp. 44 (citing Pet. 48–49). In Yang '089, there is no clear correlation between the value of V_{CNT} and the input of the LED drive circuit. Although delay T_D is a function of the value of V_{CNT}, V_{CNT} in Yang '089 appears to be a function of the desired LED brightness, independent of an input of the LED drive circuit. Although Petitioner explains that V_{CNT} is programmable and that claim 16 does not recite how the programmable signal is generated, as is the case with all but the embodiment of Figure 2 of the '764 patent, it remains unclear how V_{CNT} in Yang '089 is correlated to an input of the LED drive circuit. Pet. Reply 22–24.

Thus, to the extent that claim 16 is limited to the embodiment in Figure 2, it is unclear that Petitioner has shown V_{CNT} is correlated to an input of the LED drive circuit. However, our inquiry does not end with V_{CNT}. Petitioner also argues that signal V_D in Yang '089 is correlated to an input of the LED drive circuit. Pet. 49; Pet. Reply 13.

As its name implies, reflected voltage V_D in Yang '089 is correlated to an input of the LED drive circuit—it is correlated to LED temperature that is, necessarily, correlated to the input of the LED drive circuit.

See Ex. 1004, 2:55–67. Yang '089 discloses using LED temperature, as indicated by reflected signal V_D to control LED current. Ex. 1004, 5:52–56.

We are not persuaded by Patent Owner's argument that V_D is not received by the alleged input circuit. PO Resp. 41–42. Patent Owner cites the deposition testimony of Petitioner's expert Mr. Bohannon about a wire or connection between the terminal IN and delay circuit 200 within controller 100 of Yang '089 as receiving V_{CNT} but not receiving V_D. PO Resp. 41–42. The input circuit limitation of claim 16 recites only that the input circuit receives a "programmable signal" that is "correlated to an input of the LED drive circuit." Claim 16 does not recite any specific input to the LED drive circuit. Patent Owner expressly states "in Figure 5 of Yang '089 signal V_D is input to a different terminal." *Id.* at 42. We agree with Petitioner that, because claim 16 recites only that the input circuit receives a programmable signal correlated to an input of the LED drive circuit, V_D of Yang '089 discloses this limitation.

The input circuit recited in claim 16 also generates a programmable current. The programmable current is coupled to control a current input signal. The current input is correlated to a switching current of the magnetic device. Claim 16 does not limit the physical characteristics of the current input signal or the switching current of the magnetic device and does not specify where the switching current of the magnetic device is measured.

The Petition states that a person of ordinary skill "would have been motivated to apply the teachings of Yang '089 to modify Yang '824 to include a programmable signal." Pet. 51 (citing Ex. 1008 Bohannon Decl. ¶ 126) (emphasis added). The Petition states that "[w]ith such a modification, the output current I_O of Yang '824 would be a programmable

current coupled to control the current-input signal V_{IP} based on the switching current." *Id.* (emphasis added). Thus, Petitioner argues that, after modifying Yang '824 to incorporate the separate programmable control signal V_{CNT} of Yang '089, as well as the programmable signal V_D that compensates for LED temperature changes, the output current I_O of the combination is a programmable output current, just as I_O is a programmable output current in the '764 patent.

Patent Owner contends that Petitioner asserts in the combination of Yang '824 and Yang '089 the output current I_O of Yang '824 is both the claimed output current and the claimed programmable current. PO Resp. 22–23 (arguing Petitioner only identified a single current within each Yang reference as both the programmable and the output current of claim 16). According to Patent Owner "[i]f the combination is to include separate programmable and output currents, it must therefore include at least two different LED currents." *Id.* at 23 (citing Ex. 2008, Holberg Decl., ¶¶ 58–65). According to Patent Owner, "the asserted combination includes only a single set of LEDs and, thus, only a single LED current." *Id.*

Patent Owner's analysis fails because the objective of the combination is to drive only one set of LEDs. In Yang '089 the LEDs are driven by a current on the primary side, and in Yang '824, the LEDs are driven by a current on the secondary side. Petitioner combines the teachings of the references to use the control voltage in Yang '089, where the programmable current is on the primary side, as part of the LED driver disclosed in Yang '824, where the output current that drives the LEDs is on the secondary side. Patent Owner's attempt to create a strawman with more than a single set of

LEDs is contrary to the teachings of the references and the combination proposed by Petitioner.

Petitioner contends that the language of claim 16 does not preclude the output current and the programmable current from being the same. Pet. Reply 9 (citing Ex. 1015, Bohannon Decl. ¶¶ 31–32). Nevertheless, Petitioner refutes Patent Owner's argument, stating that it did not identify the programmable current and the output current as the same current in the combination of Yang '089 and Yang '824. Pet. Reply 12–17. Petitioner's annotated version of Figure 3 of Yang '089 identifies the primary side current that drives the LEDs in Yang '089 as a "programmable current" whose programming is based on control voltage V_{CNT} and reflected voltage V_D. Pet. 50; Pet. Reply 4. Petitioner's annotated version of Figure 1 of Yang '824 identifies secondary side current I_O as the "output current." Pet. 51; Pet. Reply 4.

As Patent Owner acknowledges, the Petition states:

> "[a] POSITA would have been motivated to apply the teachings of Yang '089 regarding the benefits of using a programmable input for programming the LED current to improve the primary-side regulator for controlling output current disclosed in Yang '824. More specifically, the programmable signals in Yang '089 are used to adjust the current of the LEDs by modulating the switching of the main power switch."

PO Resp. 25; Pet. 40–41. Petitioner thus contends that the asserted combination improves the regulator described in Yang '824, where the output current is on the secondary side, by applying to Yang '824 the teachings of Yang '089 where the programmable current, i.e., the LED current, is on the primary side. Pet. 50–51. As the programmable current and output current are not on the same side of the magnetic device in

Petitioner's asserted combination, the programmable current and output current are not the same.

The '764 patent acknowledges that the detailed description of its primary side controlled regulator can be found in Yang '824. Ex. 1001, 3:21–27. In Yang '824, the primary side switching current I_P is converted to primary side switching current signal V_{IP} by current sense resistor 30. Ex. 1003, 3:33–34, 4:34–36. This is also true in the '764 patent. Ex. 1001, 2:54–58. In Yang '824, a current control loop is formed from detecting the primary side switching current I_P to modulate the pulse width of switching signal V_{PWM}. The current control loop controls the magnitude of primary side switching current I_P in response to reference voltage V_{REF1}. Ex. 1003, 4:14–24. The same is true in the '764 patent. Ex. 1001, 4:2–6. In Yang '824, waveform detector 300 detects the primary side switching current signal V_{IP} and generates current-waveform signals V_A and V_B that are provided to integrator 500, such that integrated signal V_X is proportional to the power converter's output current I_O. Ex. 1003, 4:34–5:6. In the '764 patent, waveform detector 300 detects the switching current I_P and generates current-waveform signals V_A and V_B by sampling current input signal V_{IP} through current sense terminal VS, and the secondary switching current I_s is proportional to the switching current I_P. Ex. 1001, 3:28–38. Output current I_O is correlated to secondary switching current I_s, and is therefore also proportional to the switching current I_P. *Id.* at 3:40–42.

The '764 patent discusses programmable current I_{CNT} in the context of the embodiment in Figure 6, although Patent Owner does not argue claim 16

is limited to the embodiment in Figure 6.[4] Ex. 1001, 6:66–67, 7:6–7. Referring to the embodiments in Figures 6 and 7, the '764 patent describes programmable current I_{CNT} as: (i) generated from programmable signal V_{CNT} by voltage to current converter 800 (*id.* at 7:5–7), (ii) the current output from the drain terminal of transistor 833 (*id.* at 7:54–56, discussing a preferred embodiment of voltage-to-current converter 800) and (iii) the current coupled to the current sense terminal VS shown in Figure 1 via amplifier 780 and resistor 790 shown in Figure 6 (*see id.* at 7:12–25).

The difference between the current control loop in the '764 patent and Yang '824 is the absence of terminal VCNT in Yang '824. In Yang '824 the current control loop detects the primary side switching current I_P to modulate the pulse width of switching signal V_{PWM} and controls the magnitude of the primary side switching current I_P in response to V_{REF1}. Ex. 1003, 4:7–18. Current loop signal S_I is supplied to an AND gate to achieve output current control by shortening the pulse width of V_{PWM}. *Id.* at 5:33–59. As a result, secondary side current I_S is a ratio of the primary switching current and output current I_O is regulated. *Id.* at 4:18–33. In the '764 patent, V_{CNT} is coupled to regulate the current-control signal S_I of controller 70 through controlling reference signal V_{REF1} of the current loop; switching signal V_{PWM} is modulated in response; and output current I_O is correlated to S_I, so that V_{PWM} is modulated in response to reference signal

[4] Patent Owner does not contend that claim 16 is limited to any particular embodiment. As previously discussed, Patent Owner does not argue that claim 16 is limited to the embodiment having the input circuit shown in Figure 2. The embodiment in Figure 6 does not include the input circuit of Figure 2.

V_{REF1} and the output current I_O is correlated to the changing reference signal V_{REF1}. Ex. 1001, 4:62–5:6, Fig. 3.

Petitioner cites Yang '089 as disclosing applying V_{CNT} to the IN terminal of the controller and reflected voltage V_D to another terminal of the controller to program the sensed LED current. As discussed above, Petitioner identifies as a programmable current the LED current in Yang '089 that is also the switching transistor current sensed by resistor 75. Pet. 50; Pet. Reply 13; *see* Ex. 1003, 2:47–49 ("switch **70** is connected in series with LEDs **20**~**25** and the first winding N**1** of the inductor **50** for controlling the LED current. The LED current is further converted to a current signal Vs coupled to a control circuit **100** via a resistor **75**").

Petitioner explains that in Yang '089 a current flows through LEDs 20–25 that is programmable based on V_{CNT} and V_D because V_{CNT} and V_D generate a signal inside controller block 100 that programmatically controls the pulse width of signal V_G that turns the transistor switch on and off. Pet. Reply 13 (citing Pet. 50; Ex. 1015, Bohannon Reply Decl. ¶ 42).

As discussed above, the objective of the '764 patent, Yang '824, and Yang '089 is to control the output current in the LEDs. Only after modifying Yang '824 to account for Yang '089 is output current I_O in Yang '824 a programmable output current coupled to control current-input signal V_{IP} based on the primary side switching current I_P, i.e., a current that is not the same as the output current I_O. *Id.* at 14 (citing Dec. to Inst., 20); Pet. 51.

We agree with Petitioner that Patent Owner ignores Yang '089's teaching of using a programmable current that is not necessarily the output current of Yang '824. Pet. Reply 14. Petitioner emphasizes that its expert, Mr. Bohannon, did not testify the output current of Yang '824 is both the

claimed output current and programmable current, but instead testified that if modified with the teaching of Yang '089, the combination of Yang '824 and Yang '089 results in an output current that is programmable, just as I_O is programmable in the '764 patent. *Id.* (citing Ex. 1015, Bohannon Decl., ¶¶ 42–44). Petitioner's argument is consistent with the fact that the objective of the '764 patent and the combination of the references is the same—to produce an output current on the secondary side of a transformer to drive the LEDs as programmed by a programmable signal.

The comparison circuit compares a signal sourced from an oscillator and a voltage potential generated by a current-control loop. The comparison circuit generates a current-control signal. Claim 16 does not limit the signal sourced from the oscillator and does not limit the structure of the current control loop or the voltage generated by it. Petitioner cites control circuit 115 shown in Figure 5 of Yang '089 as disclosing this feature. Pet. 52–53. Petitioner contends that control circuit 115 in Yang '089 compares a ramping signal V_S, generated from the current through the switch, and a voltage reference V_R, generated by a current loop for generating a current control signal. Pet. 52–53 (citing Ex. 1004, 3:39–56). Petitioner argues that "[t]he only difference between the claimed structure and the structure of Yang '089 is that the claim recites the comparison circuit is coupled to 'a signal from an oscillator.'" Pet. 53. Petitioner cites the testimony of William K. Bohannon for the proposition that, to a person of ordinary skill, substitution of a ramping switch control in Yang '089 (i.e., ramping signal V_S) for an oscillator signal is a well-known design choice in pulse switch modulation (PWM) controllers, as is further shown in Yang '824. *Id.* at 53–54 (citing Ex. 1008, Bohannon Decl. ¶ 129). For example, Petitioner states

Figure 4 of Yang '824 discloses comparator 75 comparing signal RMP derived from oscillator 200 with the output of op-amp 71, which Petitioner identifies as the output of "a current-control loop for generating a current-control signal ("S_I")." *Id*. at 54. Patent Owner does not dispute Petitioner's assertion. We are persuaded that Petitioner has demonstrated the combination of Yang '089 and Yang '824 discloses this claim element.

The switching signal (generated by the controller) is controlled in response to the current-control signal (generated by the comparison circuit) to regulate the output current (generated by the magnetic device). The level of the output current (generated by the magnetic device) is correlated to the current-control signal (generated by the comparison circuit's current-control loop). Petitioner notes that in Figure 5 of Yang '089 switching signal V_G that controls the state of switch transistor 70 in Figure 3 is the Q output of R-S flip-flop 140. Pet. 56. Petitioner identifies the output of comparison circuit 115, which provides the reset input to R-S flip-flop 140, as a current control signal. *Id.* Thus, Petitioner argues that Yang '089 discloses switching control signal V_G is controlled in response to a current control signal, i.e., the output of control circuit 115, to regulate the output current to the LEDs and that the level of the output current is correlated to the current-control signal. *Id.* (citing Ex. 1004, 3:26–38, 51–55). Petitioner points out that, in a similar manner in Yang '824, switching signal V_{PWM} is controlled in response to current-control signal S_I, produced by comparison circuit 75, to regulate an output current correlated to the current-control signal. *Id.* at 57. Patent Owner does not address explicitly Petitioner's contentions concerning this feature. We are persuaded that Petitioner has demonstrated

that the combination of Yang '089 and Yang '824 discloses this claim element.

In consideration of the above, we are persuaded that Petitioner has demonstrated the combination of Yang '089 and Yang '824 discloses to one of ordinary skill all the elements recited in claim 16.

Claim 17

Claim 17 depends from claim 16 and recites that the voltage potential (generated by a current control loop) is generated in response to the programmable current. Petitioner cites V_R shown in Figure 5 of Yang '089 as disclosing this feature. Pet. 58–59. Patent Owner does not respond explicitly to Petitioner's contentions concerning claim 17.

In Yang '089, reflected voltage V_D is used to generate first threshold signal V_R, which is then compared to current input signal V_S developed across resistor 75, indicating the current in the LEDs. Ex. 1004, Figs. 3, 5. Yang '089, Yang '824, and the '764 patent all regulate output current by controlling the current in the primary winding. In Yang '089, the regulated primary winding current is used to drive the LEDs directly. In Yang '824 and the '764 patent, the output current that drives the LEDs is tapped from the secondary winding of a transformer. Ex. 1003, Fig. 3, 4:18–20; Ex. 1001, Fig. 3. In Yang '824 a current control loop is formed from detecting primary side switching current I_P, which is detected as current input signal V_{IP} developed across resistor 30, to modulate the pulse width of switching signal V_{PWM} to control the magnitude of switching current I_P in response to V_{REF1}. Ex. 1003, 4:7–18. The current loop in the '764 patent is similar to that of Yang '824, except that in the '764 patent, V_{CNT} is provided to buffer amplifier 720 to establish the value of V_{REF1}. As discussed above,

in Yang '089, V_{CNT} is used to introduce delay T_D to control the value of the LED current, while V_R is varied in response to the reflected signal of transformer 50 to determine the average value of the LED current, so that the average LED current is controlled as a constant despite variations in the inductance of transformer 50. Ex. 1004, 3:9–22, 29–33. Thus, in Yang '824 and the '764 patent, the current loop is used with a reference voltage to control the switching current, and in Yang '089 V_R, which is set by the sampled reflected signal V_D is used for the same purpose. On this record, we are persuaded that Petitioner has demonstrated that the limitations of claim 17 are disclosed by the combination of Yang '089 and Yang '824.

Claim 18

Claim 18 depends from claim 16 and recites that the voltage potential is responsive to the current input signal. Petitioner cites Yang '824 as disclosing that the voltage potential, i.e., the output of operational amplifier 71, is generated in response to the current input signal, i.e., primary side switching current signal I_P. Pet. 60–61 (citing Ex. 1003, Fig. 4, 3:55–4:18, 5:49–59). Patent Owner does not respond to Petitioner's contentions.

Petitioner identifies V_R in Yang '089 as corresponding to the claimed voltage and the output of operational amplifier 71 in Yang '824 as corresponding to the claimed voltage. *Id.* at 59, 61. Yang '824 discloses that "switching control circuit includes an operational amplifier **71** and a reference voltage V_{REF1} developing an error amplifier for output current control" whose output is provided to "comparator **75** associated with a PWM circuit **400**" and that "[t]he error amplifier amplifies the integrated signal V_X and provides loop gain for output current control" that "controls the magnitude of primary side switching current I_P in response to the reference

voltage V_{REF1}." Ex. 1003, 4:7–18. Thus, on the current record, we are persuaded that Petitioner has demonstrated the combination of Yang '089 and Yang '824 disclose the elements of claim 18.

Claim 21

Claim 21 depends from claim 16 and recites that the controller is a primary side controller that is coupled to switch a primary winding of the magnetic device. Petitioner cites its challenge to patentability of claim 16 as discussing how the references disclose this feature. Pet. 62. As discussed extensively above, we are persuaded that Petitioner has demonstrated Yang '089 and Yang '824 disclose a primary side controller of the output current in the LEDs.

MOTION TO EXCLUDE

Patent Owner moves to exclude the entire testimony of Petitioner's expert, including his declarations (Exhibits 1008 and 1015), arguing that William Bohannon "lacks at least the requisite educational background and further because he also lacks the requisite work experience, he cannot qualify as a POSITA, much less an expert." Reply to Opp. To Mot. To Exclude 1. Patent Owner notes that Mr. Bohannon defined a person of ordinary skill as one with a degree, or its equivalent, in electrical engineering or physics and two years of practical experience working with switching regulators and analog/mixed signal circuit design, or an equivalent combination of academic study and work experience. *Id.* at 1–2 (citing Ex. 1008 ¶ 32; Pet. 8). According to Patent Owner, Mr. Bohannon does not meet his self-identified criteria because he did not earn a B.S. degree, or its equivalent, in electrical engineering or physics (and has not undertaken an equivalent course of study, particularly for purposes of complicated mixed

signal circuits at issue in this proceeding), and does not have the requisite work experience in designing analog/mixed signal circuits. *Id.* at 2–3.

Petitioner opposes Patent Owner's Motion to Exclude, noting the denial of a similar motion to exclude Mr. Bohannon's testimony filed by Patent Owner in a proceeding concerning similar switch mode power converter technology. Opp. To Mot. To Exclude 2–3 (citing *ON Semiconductor Corp. v. Power Integrations, Inc.*, Case IPR2016-00809 (PTAB Sept. 22, 2017) (Final Written Decision, Paper 67), at 62). Although Patent Owner argues that the record concerning Mr. Bohannon's background has evolved in this proceeding[5] (Reply to Opp. To Mot. To Exclude 1), Petitioner argues that Patent Owner's current Motion to Exclude repeats Patent Owner's prior contentions concerning Mr. Bohannon's degree in mathematics with additional physics coursework and his experience. Opp. To Mot. To Exclude 3.

Petitioner emphasizes that there is no requirement for expert knowledge to be obtained in school rather than from industry experience and that in his role as Chief Scientist at Computer Accessories, Mr. Bohannon worked on "'buck and boost'" converters, that at Manx Research Mr. Bohannon studied all available power supply architectures, and that at Edge Semiconductors, Planet ATE, and ATE Engines, Mr. Bohannon was responsible for the development of power supplies and power supply control

[5] Mr. Bohannon testified that, although he has worked as an expert on switching power supplies in other cases, his deposition in this proceeding was his first deposition on the subject. Ex. 2009, Transcript of Deposition of William Bohannon, ("Bohannon Dep. Tr.") 6:14–20.

ICs used in testing devices. *Id.* at 6, *see* Ex. 1015 Bohannon Reply Decl. ¶¶ 8–12.

Noting that Petitioner does not dispute Mr. Bohannon's academic record fails to comport with his definition of a person of ordinary skill, Patent Owner argues that, although Mr. Bohannon "worked for companies that developed power supplies during the course of his career," he "never designed a switch mode power supply" and has "never published on the design of switching regulators." Mot. To Exclude 4–5; Reply to Opp. To Mot. To Exclude 1, 3. In particular, Patent Owner contends that Mr. Bohannon's work experience on design reviews for power supplies, and building switching regulators on design boards using parts he selected, is insufficient to qualify him as an expert under FRE 702. Reply to Opp. To Mot. To Exclude 3.

Patent Owner's arguments do not persuade us that we should exclude Mr. Bohannon's testimony. There need not be a perfect match between the expert's qualifications and the patent at issue. *See SEB S.A. v. Montgomery Ward & Co.*, 594 F.3d 1360, 1373 (Fed. Cir. 2010). It is not necessary for Mr. Bohannon to demonstrate that he spent the bulk of his career designing power supplies. Indeed, to testify as an expert under FRE 702, a person need not be one of ordinary skill, but may be "'qualified in the pertinent art.'" *See B/E Aerospace, Inc. v. MAG Aerospace Indus. LLC*, Case IPR2014-01513 (PTAB March 18, 2016) slip op. at 13–14 (Final Written Decision) (sustaining consideration of testimony of expert witness that lacked hands-on experience with the claimed subject matter). We agree with Petitioner that Mr. Bohannon's experience over 25 years, including his work on "buck and boost" converters and flyback power supplies provides him

sufficient experience and knowledge of the claimed subject matter for his opinion to remain of record. Indeed, although the academic background of Patent Owner's expert, Dr. Holberg, is extensive, his CV and declaration state only that he has "experience with the technology described in the '764 Patent" including various electrical components and circuits involved (resistors, transformers, switching circuit). Ex. 2001 ¶ 8. Patent Owner's expert, Dr. Holberg, states that he has designed high frequency synthesizers for hard-disk read-channel applications and started a company where he designed A/D converters, and other circuits, but does not state explicitly that he designed power supplies. *Id.* ¶ 11.

We further note that neither expert's testimony has been a significant factor in determining the outcome of this proceeding. Our citations to Mr. Bohannon's testimony mostly concern Patent Owner's criticism of Mr. Bohannon's testimony in the Patent Owner Response. For example, Petitioner points out that Patent Owner's discussion of the "input circuit" limitation in claim 16, alleging that Mr. Bohannon did not appreciate the difference between a wire and a circuit with buffers and other circuit elements, takes Mr. Bohannon's testimony out of the context of the combination of the references. Opp. To Mot. To Exclude 4–5. Policy considerations for excluding expert testimony, such as those implemented by the gatekeeping framework established by the Supreme Court in *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579 (1993), are less compelling in bench proceedings such as *inter partes* reviews than in jury trials. *See, e.g.*, *Volk v. United States*, 57 F. Supp. 2d 888, 896 n.5 (N.D. Cal. 1999); *In re Bay Area Material Handling, Inc.*, No. C 95-1163 VRW, 1995 WL 729300,

at *6 (N.D. Cal. Dec. 4, 1995). In the context of this proceeding, we can assess adequately each expert's testimony and assign it appropriate weight.

Having weighed the evidence and arguments presented, we deny Patent Owner's Motion to Exclude the testimony of Petitioner's expert.

CONCLUSION

Having reviewed all the evidence presented and the arguments of the parties, we conclude that Petitioner has demonstrated by a preponderance of the evidence that all the challenged claims, i.e., claims 16–18 and 21, are obvious under 35 U.S.C. § 103(a) over the combination of Yang '089 and Yang '824.

ORDER

In consideration of the above, it is

ORDERED that claims 16–18 and 21 of the '764 patent are unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude is DENIED; and

FURTHER ORDERED, that because this is a final written decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

PETITIONER:

Neil A. Warren
John C. Phillips
FISH & RICHARDSON P.C.
warren@fr.com
phillips@fr.com
IPR10256-0041IP2@fr.com
PTABInbound@fr.com

PATENT OWNER:

Roger Fulghum
Brian W. Oaks
Brett Thompsen
Nick Schuneman
Jennifer Nall
BAKER BOTTS L.L.P.
roger.fulghum@bakerbotts.com
brian.oaks@bakerbotts.com
brett.thompsen@bakerbotts.com
nick.schuneman@bakerbotts.com
jennifer.nall@bakerbotts.com

Trials@uspto.gov
571-272-7822

Paper 13
Date Entered: November 8, 2017

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

POWER INTEGRATIONS INC.,
Petitioner,

v.

SEMICONDUCTOR COMPONENTS INDUSTRIES, LLC,
Patent Owner.

Case IPR2017-01329
Patent 9,049,764 B2

Before BRIAN J. McNAMARA, JOHN HORVATH, and KAMRAN JIVANI, *Administrative Patent Judges.*

McNAMARA, *Administrative Patent Judge*.

DECISION
Institution of *Inter Partes* Review
37 C.F.R. § 42.108

BACKGROUND

Power Integrations Inc. ("Petitioner") filed a petition, Paper 2 ("Pet."), to institute an *inter partes* review of claims 1, 4–6, 9–18, and 21–23 (the "challenged claims") of U.S. Patent No. 9,049,764 B2 ("the '764 patent"). 35 U.S.C. § 311. Semiconductor Components Industries, LLC ("Patent Owner") timely filed a Preliminary Response, Paper 10 ("Prelim. Resp."), contending that the petition should be denied as to at least independent claim 16 and claims 17–18 and 21, which depend from claim 16. Prelim. Resp. 1, 21. The Patent Owner Preliminary Response does not address the remaining challenged claims. Patent Owner notes that in re-issue application 15/455,272, amendments have been proposed to challenged independent claims 1, 6, 10, 13, and 22. *Id.* at 2. On October 26, 2017, Patent Owner filed a copy of its disclaimer of claims 1–15, 22, and 23 of the '764 patent, executed on October 24, 2017, rendering the challenges to these claims moot. Ex. 2004. Petitioner's challenges to claims 16–18 and 21 remain pending.

We have authority under 37 C.F.R. § 42.4(a) and 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted unless the information presented in the Petition "shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." Having considered the arguments and the associated evidence presented in the Petition and the Preliminary Response, for the reasons described below, we institute *inter partes* review of claims 16–18 and 21.

REAL PARTIES IN INTEREST

Petitioner identifies itself as the sole real party-in-interest. Pet. 1.

PENDING LITIGATION

The Petition states that the '764 patent is asserted in the following litigation: *Power Integrations, Inc. v. Fairchild Semiconductor International, Inc. et al.*, 3:15-cv-04854-MMC, (N.D. Cal. 2016). *Id.*

THE '764 PATENT (EXHIBIT 1001)

The '764 patent discloses an LED driver with a programmable input that can be used for dimming control. Ex. 1001, 1:34–36. The drive circuit has a controller that generates a switching signal coupled to switch a magnetic device for generating an output current to drive a plurality of LEDs. Ex. 1001, Abstract. The switching signal is modulated in response to a current-control signal regulated by the programmable input signal to regulate the output current, which is correlated to the current-control signal. *Id.*

Figure 1 of the '764 patent is an embodiment of an LED drive circuit according to the invention. Ex. 1001, 2:5–7. Although the '764 patent discusses the general operation of this circuit (*id*. 2:24–67), U.S. Patent 6,977,824 ("the '824 patent") cited as a reference in Petitioner's challenges, includes a more detailed discussion of the same Figure 1, except for the presence of control signal input terminal V_{CNT} and LEDs 101–109 as the load in Figure 1 of the '764 patent. Ex. 1001, 3:24–27. *See* Ex. 1003, Fig. 1, 2:17–3:54. Figure 1 of the '764 patent is shown below.

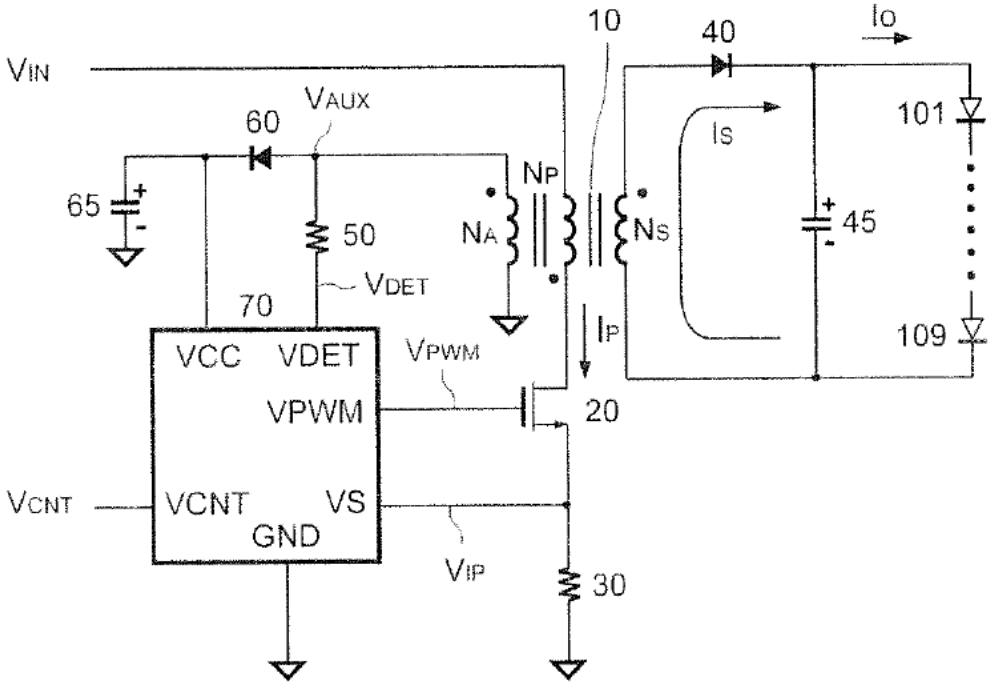

FIG. 1

Figure 1 of the ’764 patent

As shown in Figure 1, transformer 10 has auxiliary winding N_A, primary winding N_P, and a secondary winding N_S. Ex. 1003, 2:19–21. One terminal of the primary winding is coupled to receive input voltage V_{IN} and the other is coupled to power transistor 20 that is utilized to switch online transformer 10. Ex. 1001, 2:29–33. One terminal of the secondary winding connects to rectifier 40. *Id.* at 2:33–35. Filter capacitor 45 is coupled between rectifier 40 and the other terminal of the secondary winding. *Id.* at 2:35–37. Series connects LEDs 101–109 are connected in parallel to capacitor 45. *Id.* at 2:37–39.

In order to regulate output current I_O and output voltage V_O, control circuit 70 generates a switching signal V_{PWM} at terminal VPWM to switch

transformer 10 by switching transistor 20. Ex. 1001, 2:43–45; Ex. 1003, 2:21–24. When switching signal V_{PWM} is high, primary side switching current I_P is generated. Ex. 1003, 2:27–28. The peak value of I_P depends upon input voltage V_{IN}, the inductance L_P of primary winding N_P, and the time the switching signal is on, T_{ON}. *Id.* at 2:28–39. When switching signal V_{PWM} drops to low, transistor 20 turns off and energy stored in transformer 10 is delivered to the secondary side of transformer 10 through rectifier 40 and the load, i.e., LEDs 101–109. *Id.* at 2:40–43, 3:26–28. The secondary side switching current is determined by the primary side switching current I_P and the winding turns of transformer 10. *Id*. at 3:27–40. In the circuit, the peak secondary current I_S depends upon V_O, the forward voltage drop across rectifier diode 40 (V_F), the inductance L_S of secondary winding (N_S), and the discharging time of the secondary side switching current I_S. *Id.* at 2:43–55. A reflected voltage V_{AUX} generated at auxiliary winding N_A decreases as secondary switching current I_S falls to zero. *Id*. 2:56–3:7. Voltage detect terminal VDET is coupled to auxiliary winding N_A via resistor 50 to detect reflected voltage V_{AUX} and charge capacitor 65 via rectifier 60 to provide signal V_{DET} that is correlated to V_{AUX} to power control circuit 70 at terminal VCC. Ex. 1001, 2:46–54, Ex. 1003, 3:45–49. Current-sense resistor 30 coupled between the source of transistor 20 and ground converts primary side switching current I_P to switching current signal V_{IP} to provide a current-sense input at terminal VS. Ex. 1001, 2:55–58, Ex. 1003, 3:49–54. Input terminal VCNT receives programmable signal V_{CNT} to control switching current I_P and output current I_O. Ex. 1001, 2:65–67.

Figure 2 illustrates the controller of circuit of Figure 1 with the primary winding N_P of transformer 10 coupled to receive input voltage V_{IN}.

V_{IN} is AC voltage V_{AC} rectified by bridge rectifier 80 and capacitor 89. Ex. 1001, 3:2–7. Programmable signal V_{CNT} is generated from AC voltage V_{AC} through diodes 81 and 82, voltage divider resistors 85 and 86 and filter capacitor 87. *Id.* at 3:9–20.

Figure 3 below illustrates a controller according to the invention. Ex. 1001, 2:10–11.

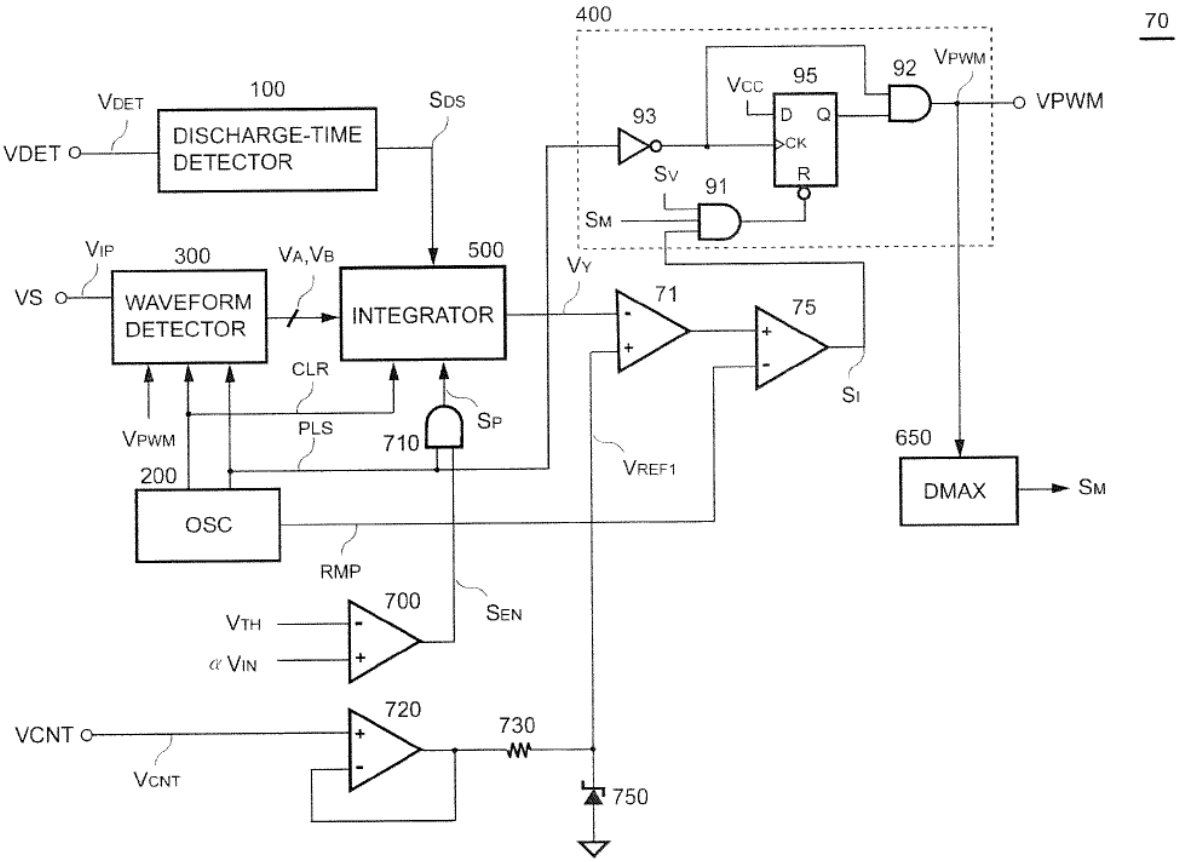

FIG. 3

Figure 3 of the ’764 patent

As shown in Figure 3, controller 70 includes discharge time detector 100, oscillator 200, waveform detector 300, PWM circuit 400, integrator 500, maximum duty cycle circuit 650, comparator 700, buffer amplifier 720 and error amplifier 71. Oscillator 200 generates pulse signal PLS coupled to

circuit 400 to determine the switching frequency of V_{PWM}. *Id.* at 3:42–44. In PWM circuit 400 signal V_{PWM} at controller terminal VPWM is the Q output of D flip-flop 95 that is clocked to the state of V_{CC} by the inversion of signal PLS (through inverter 93) from oscillator 200. *Id.* at 4:7–18. Using AND gate 91, D flip-flop 95 is reset by output voltage control signal S_V, maximum duty cycle signal S_M (generated by maximum duty cycle circuit 650 to maintain duty cycle below 50%), or current control signal S_I, that shortens the pulse width of output signal $V_{PWM,}$ so as to regulate output voltage V_O and output current I_O. *Id.* at 4:18–36.

Signal V_{PWM} from PWM circuit 400 and signal PLS from oscillator 200 are also provided to waveform detector 300. Waveform detector 300 also receives a clear (CLR) signal from oscillator 200. Waveform detector 300 generates current waveform signals V_A and V_B, used by integrator 500, by sampling current input signal V_{IP} through current sense terminal VS. *Id.* at 3:28–31. At terminal VDET of the controller, discharge time detector 100 receives voltage V_{DET} via auxiliary winding N_A to detect the discharge time of secondary side switching current I_S, which is proportional to primary side switching current $I_{P.}$ *Id.* at 3:33–38. Discharge time detector 100 generates discharge time signal S_{DS}, which is correlated to secondary side switching current I_S. *Id.* at 3:38–41 Secondary side switching current I_S also is correlated to output current I_O. *Id.* at 3:41–42.

Integrator 500 with a time constant correlated to switching period T of V_{PWM} generates current signal V_Y by integrating average current signal $I_{AV,}$ produced in response to current waveform signals V_A and V_B as shown in Figure 4, with discharge time signal S_{DS}, whose pulse width as noted above

is correlated to I_S. *Id.* at 3:48–53. Therefore, current signal V_Y is related to output current I_O. *Id.* at 3:53–54.

V_Y forms the negative input to error amplifier 71, whose other input is signal V_{REF1}. Error amplifier 71 amplifies current signal V_Y and provides a loop gain for output current control. Ex. 1001, 3:55–60. Signal V_{CNT} supplied at controller terminal VCNT is supplied to the positive input of unity gain feedback buffer amplifier 720, whose output is supplied to the positive input of error amplifier 71 through resistor 730 to control reference signal V_{REF1} of the current loop of controller 70. *Id.* at 4:54–67. V_{REF1} is clamped to a maximum by reference voltage device 750 (e.g., a Zener diode). *Id.* at 4:59–61.

Error amplifier 71 provides the positive input to comparator 75. The negative input to comparator 75 is ramp signal RMP from oscillator 200. A current control loop is formed from detecting switching current I_P to modulate the pulse width of switching signal V_{PWM}, i.e., the current control loop controls the magnitude of switching current I_P in response to reference signal V_{REF1}. *Id.* 4:2–6. The output of comparator 75 generates current control signal S_I that (together with S_V and S_M) resets D flip-flop 95 and thereby controls the pulse width of V_{PWM}, thus modulating V_{PWM} in response to reference signal V_{REF1} of the controller's current loop, such that the level of output current I_O is correlated to reference signal V_{REF1} controlled by V_{CNT}. *Id*. at 4:62–5:6.

In the embodiment of Figure 6, which uses many of the elements of the embodiment of Figure 3, programmable signal V_{CNT} at input terminal VCNT is coupled to voltage to current converter 800. Voltage to current converter 800 generates programmable current I_{CNT}. Programmable current

I_{CNT} is coupled to current sense terminal VS through buffer amplifier 780 and resistor 790 to modulate current input signal V_{IP}, such that programmable signal V_{CNT} modulates current input signal V_{IP}. Ex. 1001, 7:5–18. As in Figure 3, current input signal V_{IP} (now modulated by V_{CNT}), which is correlated to switching current I_P of offline transformer 10, is coupled to generate current control signal S_I that controls switching signal V_{PWM}, so that output current I_O is correlated to current control signal S_I. *Id.* at 7:18–25.

ILLUSTRATIVE CLAIM

Claim 16 is illustrative of the claims before us.

16. A LED drive circuit comprising:
a controller, generating a switching signal coupled to switch a magnetic device for generating an output current to drive at least a LED (Light Emitting Diode);
an input circuit, receiving a programmable signal correlated to an input of the LED drive circuit to generate a programmable current, wherein the programmable current is coupled to control a current input signal which is correlated to a switching circuit of the magnetic device; and
a comparison circuit, comparing a signal sourced from an oscillator and a voltage potential generated by a current control loop for generating a current-control signal;
wherein the switching signal is controlled in response to the current-control signal for regulating the output current, and a level of the output current is correlated to the current control signal.

ART CITED IN PETITIONER'S CHALLENGES

Petitioner cites the following references in its challenges to patentability:

Reference	Designation	Exhibit No.
U.S. Patent No. 6,977,824 B1 issued Dec. 20, 2005	Yang '824	Ex. 1003
U.S. Patent No. 7,245,089 B2 issued Jul. 17, 2007	Yang '089	Ex. 1004
U.S. Patent Appl. Publ. 2008/0170420 A1	Yang '420	Ex. 1007

CHALLENGES ASSERTED IN PETITION

Claims	Statutory Basis	Challenge
1, 6, 10, 13, and 14	35 U.S.C. S 102(b)	Anticipated by Yang '089
4, 11, 15–18, and 21–23	35 U.S.C. § 103(a)	Obvious over Yang '089 and Yang '824
5, 9, 12	35 U.S.C. § 103(a)	Obvious over Yang'089, Yang'824, and 'Yang '420

As discussed above, as a result of Patent Owner's disclaimer of claims 1–15, 22 and 23, only Petitioner's challenge to claims 16–18 and 21 as obvious over Yang '089 and Yang '824 are before us.

LEVEL OF ORDINARY SKILL

Petitioner identifies a person of ordinary skill in the art of developing and implementing switching regulators and their control circuits as one having "at least a B.S. degree, or its equivalent, in electrical engineering or

physics and approximately two years of practical experience working with switching regulators and analog/mixed signal circuit design, or an equivalent combination of academic study and work experience." Ex. 1008, Declaration of William K. Bohannon ("Bohannan Decl.") ¶ 32. The Patent Owner Preliminary Response does not address Petitioner's description of a person of ordinary skill, and for purposes of this Decision, we apply Petitioner's definition of the level of ordinary skill.

CLAIM CONSTRUCTION

We interpret claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs. LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016). In applying a broadest reasonable construction, claim terms generally are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Any special definition for a claim term must be set forth in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

Programmable Signal

Petitioner proposes that the broadest reasonable construction of the term "programmable signal" as used in the claims of the '764 patent is "a selectable or potentially variable voltage or current signal." Pet. 8 (citing Ex. 1008, Bohannan Decl. ¶¶ 34–35). Pointing out that the specification's only example of a "programmable signal" is the statement at column 3, lines 8–10 that "the programmable signal VCNT is generated at the input terminal VCNT in response to AC input VAC," Petitioner argues that the scope of

programmable signal must encompass at least a variable or selectable signal that could be a voltage or a current. Pet. 9. Petitioner also argues that the claim term must be broader than a mere signal generated from the AC input because dependent claim 3 specifically recites that "the programmable signal is generated in response to an AC input of the LED circuit." *Id.* Petitioner emphasizes that the claim limitations do not imply any specific content or that any human input is needed to render the signal programmable. *Id.* at 8–9.

Patent Owner contends that Petitioner's proposed construction is not the broadest reasonable construction and is inconsistent with the intrinsic record, although Patent Owner does not cite any part of the intrinsic record. Prelim. Resp. 2. Instead, Patent Owner contends that we need not construe "programmable signal" because the construction of this term is irrelevant to Petitioner's failures that Patent Owner identifies in its Preliminary Response. *Id.*

For purposes of institution, we agree with Petitioner that "programmable signal" is not limited by the '764 patent to any particular programming or mechanism of programming and the term is not limited to one of a current or voltage. Thus, to the extent a construction is required, we adopt Petitioner's proposal and construe "programmable signal" to mean *a selectable or potentially variable voltage or current signal*.

ANALYSIS OF PETITIONER'S PRIOR ART CHALLENGES

A claim is unpatentable under 35 U.S.C. § 102 if a prior art reference discloses every limitation of the claimed invention, either explicitly or inherently. *Glaxo Inc. v. Novopharm Ltd.*, 52 F.3d 1043, 1047 (Fed. Cir.

1995); *see MEHL/Biophile Int'l Corp. v. Milgraum,* 192 F.3d 1362, 1365 (Fed. Cir. 1999) ("To anticipate a claim, a prior art reference must disclose every limitation of the claimed invention . . .;" any limitation not explicitly taught must be inherently taught and would be so understood by a person experienced in the field); *In re Baxter Travenol Labs.*, 952 F.2d 388, 390 (Fed. Cir. 1991) (the dispositive question is "whether one skilled in the art would reasonably understand or infer" that a reference teaches or discloses all of the elements of the claimed invention).

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc*., 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Yang '089

Petitioner cites Yang '089 as disclosing a switching LED driver with a programmable input for controlling LED current. Pet. 10 (citing Ex.1004, 1:6–8, 20–23, 52–53. Figure 3 of Yang '089 illustrates control circuit 100 receiving at terminal IN control voltage V_{CNT} to program the brightness of LEDs 20–25 using switch 70 to control the current through the LEDs. *Id*. at 11; Ex. 1004, Fig. 3. As shown in Figure 3, V_G at the GATE output of controller 100 controls the state of switch 70. When turned ON, switch 70

generates a current in LEDs 20–25. Switch 70 controls LED current and brightness by turning OFF once the LED current exceeds a "first threshold" and turning ON again after a programmable delay time T_D once the energy of the inductor is fully discharged. *Id.* at 12–13 (citing Ex. 1004, 1:65–2:8, 3:20–22). Petitioner further notes that Yang '089 discloses that the "first threshold" is varied in response to the reflected signal (V_D) of the inductor, whose value shows the LED forward voltage that is correlated to LED temperature. *Id.* at 11–12 (citing Ex. 1004, 2:3–8). In this way, the LED current can be programmed to compensate for temperature related chromaticity and luminosity variations. Ex. 1004, 2:6–8.

Yang '824

Petitioner cites Yang '824 as disclosing a primary side regulator and control circuit 70 that is similar to that disclosed in the '764 patent, with the notable exception that terminal VCNT of controller 70 of the '764 patent is not present in the controller of Yang '824. Pet. 36–37 (comparing Fig. 1 of Yang '824 with Fig. 1 of the '764 patent). Petitioner contends that both the '764 patent and Yang '824 disclose the same internal connections for the current sense terminal VS coupled to waveform detector 300, VDET (receiving V_{DET} from auxiliary winding N_A) coupled to discharge time detector 100, and integrator 500, coupled to operational amplifier 71. *Id*. at 38–39. The current loop shown in the detailed schematic of the controller in Figure 4 of Yang '824 differs from that shown in Figure 3 of the '764 patent in which V_{REF1} applied to operational amplifier 71 is generated by the clamped output of buffer amplifier 720 in response to control signal V_{CNT} applied at terminal VCNT. *Id.* at 39. Petitioner states

> The current control loop shown in Yang '824 for generating switching signal VPWM is the same as is shown in the '764

> patent absent the disclosure in the '764 patent related to using the programmable input signal VCNT to control VREF1. In both patents, "[t]he current control loop controls the magnitude of the primary side switching current IP in response to the reference voltage VREF1." Ex. 1003 at 4:16-18; *see also* Ex. 1001 ("The current control loop controls the magnitude of the switching current IP in response to the reference signal VREF1.").

Id.

Motivation to Combine Yang '089 and Yang '824

As discussed above, Yang '089 discloses an LED driver in which a controller, responsive to a programmable input $V_{CNT,}$ provides a switching signal to a transistor switch to control LED current through a magnetic device. Petitioner contends that a person of ordinary skill would have been motivated to combine the programmable LED driver of Yang '089 with the current loop disclosed in Yang '824 to generate the signal that switches the transistor switch. Pet. 40–41. Yang '089 controls the current on the primary side on the magnetic device and uses that controlled primary side current to drive the LEDs. Ex. 1004, Fig. 3. Yang '824 also controls the current on the primary side of the magnetic device, but provides the output current to the LEDs on the secondary side of the magnetic device. Ex. 1003, Fig. 1. Specifically, "[t]he secondary side switching current I_S is determined by the primary side switching current I_P and the winding turns of the transformer 10." *Id.* at 3:28–30. Petitioner argues that the primary side regulator of Yang '824 provides safety enhancing galvanic isolation and that Yang '824 states "it is desirable to provide a control circuit for controlling output current of the power converter at the primary side of the power converter." *Id.* at 40 (citing Ex. 1004, 1:12–20). Thus, Petitioner asserts that it would have been desirable to make a primary side controller for controlling LEDs

with a programmable input by combining the teachings of Yang '824 and Yang '089. *Id*. (citing Bohannan Decl., Ex. 1008 ¶¶ 101, 105). According to Petitioner, using a programmable input such as that disclosed in Yang '089 to modulate the output current of the switching signal of the controller, as shown in Yang '824, uses a known technique to modify a known controller and yields predictable results. *Id*. at 41.

Patent Owner responds to Petitioner's contention in the context of the "programmable signal" limitations of independent claim 16. Claim 16 recites an input circuit that receives a programmable signal correlated to an input of the LED drive circuit to generate a programmable current that is coupled to control a current input signal correlated to a switching current of the magnetic device. Patent Owner contends that Petitioner has not specified how the references are to be combined, i.e., how a person of ordinary skill would modify the controller in Yang '824 to use either the programmable signal V_{CNT} or the adjustment of threshold voltage V_{TH} in Yang '089. Prelim. Resp. 6–7. Patent Owner further contends that, other than general improvement allegations, Petitioner has not provided a motivation or reason why a person of ordinary skill would make such a combination. *Id.* at 8.

Patent Owner's argument disputing the motivation to combine Yang '089 and Yang '824 is not persuasive. Referring to Figure 4, Yang '824 states

> A switching control circuit includes an operational amplifier 71 and a reference voltage V_{REF1} developing an error amplifier for output current control. . . . The error amplifier amplifies the integrated signal V_X and provides a loop gain for output current control. A current control loop is formed from detecting the primary side switching current I_P to modulating the pulse width

> of the switching signal V_{PWM}. The current control loop controls the magnitude of the primary side switching current IP in response to reference voltage V_{REF1}.
>
> Ex. 1003, 4:7–18.

The relevant difference between Figure 4 of Yang '824 and Figure 3 of the '764 patent is that the V_{REF1} signal input to error amplifier 71 in the '764 patent is shown as responsive to signal V_{CNT} applied at terminal VCNT. Yang '824 is silent as to V_{REF1} and does not include a VCNT terminal. The VCNT terminal in Yang '089 is provided for the same purpose as the current control loop in Yang '824, i.e., to modulate the pulse width of the switching signal applied to the gate of the switching transistor (using V_{PWM} in the '764 patent and V_G in Yang '089).

Thus, on the present record, we agree with Petitioner that a person of ordinary skill would have been motivated to apply the teachings of Yang '089 to the circuit disclosed in Yang '824 to modulate the signal at the gate of the switching transistor.

The Elements of Claim 16

The preamble of claim 16 recites "A LED drive circuit." Although Petitioner contends the preamble is not limiting, Petitioner cites Yang '089 as disclosing a light emission diode driver. Pet. 45 (citing, Ex. 1004, 1:6–8, 2:41–42).

Petitioner identifies as claim element 16(a) the limitation that recites "a controller generating a switching signal coupled to switch a magnetic device for generating an output current to drive at least a LED (Light Emitting Diode)." Referencing Figure 3 of Yang '089, Petitioner notes control circuit 100 generates a switching signal coupled to switch magnetic device 50 for generating an output current to drive LEDs 20–25. Pet. 45–46.

Noting that a person of ordinary skill would have been motivated to use the teachings of Yang '089 to add current programmability to Yang '824, Petitioner cites Figure 1 of Yang '824 as disclosing control circuit 70 generating a switching signal coupled to switch transformer 10 for generating a regulated output current I_O. *Id.* at 47. The Patent Owner Preliminary Response is silent as to claim element 16(a). On the current record, we are persuaded that, for purposes of institution, Petitioner has demonstrated that the combination of Yang '089 and Yang '824 discloses claim element 16(a).

Petitioner identifies as claim element 16(b) the limitation that recites "an input circuit, receiving a programmable signal correlated to an input of the LED drive circuit to generate a programmable current, wherein the programmable current is coupled to control a current input signal which is correlated to a switching circuit of the magnetic device." Petitioner cites Yang '089 as disclosing an input circuit that receives programmable signal V_{CNT} that is used to control V_G that determines the state of switch 70 to control the value of the LED current and thereby the brightness of the LEDs. *Id.* at 48–49 (citing Ex. 1004, 3:20–22, 59–66, 4:12–18). Specifically, Yang '089 discloses V_{CNT} applied at input terminal IN of the controller routed to delay circuit 200. Delay circuit 200 is programmed to introduce time delay T_D to provide an inverted version of signal INH to AND gate 180 to disable control signal V_G (the output of flip-flop 140 that controls the switching transistor) during delay time period T_D, thereby controlling the current in the LEDs. Ex. 1004, 3:55–60, Fig. 5.

Petitioner further notes that Yang '089 also discloses that reflected signal V_D provides another programmable signal that regulates the output

current to control LED luminosity and chromaticity. Pet. 49 (citing Ex. 1004, 2:4–8). Reflected signal V_D is produced by the reflected signal of inductor 50. Ex. 1004, 3:44–46. LED temperature can be determined accurately using V_D, so that the LED current can be programmed for chromaticy and luminosity of the LED. *Id.* at 5:52–56.

Citing the identification of output current I_O of Yang '824 as an output current on page 47 of the Petition and as "programmable current" at page 51 of the Petition, Patent Owner contends that Petitioner alleges a single current in the asserted combination of Yang '824 and Yang '089 is both the programmable current and the output current recited in claim 16. Prelim, Resp. 9–14. Patent Owner argues that the "programmable current" and "output current" are two distinct elements of claim 16. *Id.* at 10. Citing Figures 1 and 6, Patent Owner argues that the '764 patent discloses output current I_O to the LEDs generated via diode 40 by the secondary coil of magnetic device and separate programmable current I_{CNT} generated from V_{CNT} via voltage to current converter 800. *Id.* at 11–13. Patent Owner acknowledges that "Petitioner's argument regarding the motivation to combine, modifies the Yang '824 circuit with just one concept from Yang '089—the 'programmable signal.'" *Id.* at 16. Patent Owner argues that "the Petition also seems to suggest in other places that the LED current in Yang '089 Figure 3 could alternatively be the 'programmable current' of claim 16." *Id.*

We are not persuaded by Patent Owner's argument that Petitioner alleges a single current is both the programmable current and the output current. The passage on page 51 of the Petition references section V.B.ii beginning on page 39 of the Petition. That section of the Petition discusses

the motivation to combine the teaching in Yang '089 of a separate programmable control signal V_{CNT} with the circuit arrangement in Yang '824, where I_O is the output current at the secondary of the transformer shown in both Yang '824 and the '764 patent. The Petition explicitly states that a person of ordinary skill "would have been motivated to apply the teachings of Yang '089 to modify Yang '824 to include a programmable signal." Pet. 51 (citing Ex. 1008 Bohannan Decl. ¶ 126) (emphasis added). The Petition states that "[w]ith such a modification, the output current I_O of Yang '824 would be a programmable current coupled to control the current-input signal V_{IP} based on the switching current." *Id* (emphasis added). Thus, Petitioner argues that, after modifying Yang '824 to incorporate the separate programmable control signal V_{CNT} of 'Yang 089, as well as the programmable current that compensates for LED temperature changes, the output current I_O of the combination is a programmable output current, just as I_O is a programmable output current in the '764 patent.

Patent Owner's further contentions that I_O of Yang '824 is not coupled to control a current input signal, as required of the programmable current in claim 16 is premised on Patent Owner's assertion that Petitioner alleges I_O of Yang '089 is both the programmable current and the output current of claim 16. Prelim. Resp. 15–16. As discussed above, based on Petitioner's combination of Yang '089 and Yang '824, we are not persuaded by Patent Owner's argument that Petitioner makes such an assertion.

We also are unpersuaded by Patent Owner's argument that Petitioner has not specified which of the two alleged programmable signals of Yang '089 it proposes to combine with Yang '824. Prelim. Resp. 7. In Yang '089, Yang '824 and the '764 patent, the current in the primary coil is

controlled by turning on and off a transistor switch, whose gate is connected to the output of a flip-flop. Ex. 1004, Figs. 3, 5; Ex. 1003, Figs. 1, 4; Ex. 1001, Figs. 1, 3. The Petition states "Yang '089 discloses an input circuit, receiving a programmable signal ('control voltage V_{CNT}' or 'reflected voltage V_D') correlated to an input of the LED drive circuit to generate a programmable current ('LED current')." Pet. 48. The Petition then explains how V_{CNT} in Yang '089, is used by delay circuit 200 to generate INH to control the state of control signal V_G to thereby control the current flowing through the LEDs, i.e., with a transistor switch controlled by V_G in the same manner as V_{PWM} controls a transistor switch to regulate the current flowing in the LEDs in the '764 patent. Pet. 49. Petitioner also notes that Yang '089 discloses using V_D to regulate the LED current to control luminosity and chrominance. *Id.* Yang '089 employs a current loop to implement this capability. Ex. 1004, 3:39–55, 3:60–4:5, 4:63–5:57. Petitioner's recognition of multiple mechanisms that control the output current to the LEDs in Yang '089 does not negate Petitioner's reliance on Yang '089 to disclose "[c]ontrol voltage V_{CNT} is input to terminal IN and is used to program brightness of the LED by programming the delay time T_D that switch 70 remains off." *Id.* at 48–49 (citing Ex. 1004, 4:12–18).

Patent Owner also argues the principle that where a claim lists elements separately, the implication of the claim language is that the claim elements are distinct components of the patented invention. Prelim. Resp. 11 (citing *Becton, Dickinson & Co. v. Tyco Healthcare Grp., LP*, 616 F.3d 1249, 1254 (Fed. Cir. 2010)) (quoting *Gaus v. Conair Corp*., 363 F.3d 1284, 1288 (Fed. Cir. 2004)); *HTC Corp. v. Cellular Commc'ns. Equip., LLC.*, 2016-1858, 2017 WL 3016954, at *3 (Fed. Cir. July 17, 2017) (non-

precedential). In *Becton, Dickenson*, for purposes of determining literal infringement, the court construed a spring means connected to a hinged arm as distinct components, 616 F.3d at 1254–5; in *Gaus*, for purposes of determining infringement under the doctrine of equivalents, the court construed probe networks to be separate from an independent operating unit, 363 F.3d at 1288; and in *HTC v. Cellular Commc'ns*, the court affirmed the PTAB's determination that a claimed diverting unit diverting application program generated messages destined for a communications network to a controlling entity recited separate diverting unit and controlling entity structures, i.e., separate components performed the diverting and controlling functions, 2017 WL 3011695, 3.

In this case, however, the issue is not one of claim construction. Petitioner cites the delay circuit and current loop in Yang '089 and the current loop in Yang '824 as teaching how the current on the primary side of the transformer can be used to control the output current that drives the LEDs. The LEDs are driven by the primary current in Yang '089, but in Yang '824 the output current that drives the LEDs is derived from the primary current and tapped off the secondary of the transformer. Thus, we are not persuaded by Patent Owner's argument that in the combination of Yang '089 and Yang '824, Petitioner asserts that the claimed programmable current is the same as the claimed output current. On the present record we are persuaded for purposes of institution that Petitioner has shown the combination of Yang '089 and Yang '824 discloses claim element 16(b).

Petitioner identifies as claim element 16(c) the limitation that recites "a comparison circuit, comparing a signal sourced from an oscillator and a voltage potential generated by a current control loop for generating a

current-control signal." Petitioner cites control circuit 115 shown in Figure 5 of Yang '089 as disclosing this feature. Pet. 52–53. Petitioner contends that the second control circuit 115 in Yang '089 compares a ramping signal V_S generated from the current through the switch and a voltage reference V_R generated by a current loop for generating a current control signal. Pet. 52–53 (citing Ex. 1004, 3:39–56). Petitioner argues that "the only difference between the claimed structure and the structure of Yang '089 is that the claim recites the comparison circuit is coupled to 'a signal from an oscillator.'" Pet. 53. Petitioner cites the testimony of William K. Bohannan for the proposition that, to a person of ordinary skill, substitution of a ramping switch control in Yang '089 for an oscillator signal is a well-known design choice in pulse switch modulation (PWM) controllers, as is further shown in Yang '824. *Id.* at 53–54 (citing Ex. 1008, Bohannan Decl. ¶ 129). Patent Owner does not dispute Petitioner's assertion. On the current record, we are persuaded for purposes of institution that Petitioner has demonstrated the combination of Yang '089 and Yang '824 discloses claim element 16(c).

Petitioner identifies as claim element 16(d) the limitation that recites wherein "the switching signal is controlled in response to the current-control signal for regulating the output current, and a level of the output current is correlated to the current control signal." Petitioner notes that in Figure 5 of Yang '089 switching signal V_G that controls the state of switch transistor 70 in Figure 3 is the Q output of R-S flip-flop 140. Pet. 56. Petitioner identifies the output of comparison circuit 115, which provides the reset input to R-S flip-flop 140, as a current control signal. *Id.* Thus, Petitioner argues that Yang '089 discloses switching control signal V_G is controlled in response to a current control signal, i.e., the output of control circuit 115, to

regulate the output current to the LEDs and that the level of the output current is correlated to the current-control signal. Pet. 56 (citing Ex. 1004, 3:26–38, 51–55). Petitioner points out that in a similar manner in Yang '824, switching signal V_{PWM} is controlled in response to current-control signal S_I to regulate an output current correlated to the current-control signal. *Id.* at 57. Patent Owner does not address Petitioner's contentions concerning this feature. On the present record, we are persuaded that for purposes of institution Petitioner has demonstrated that the combination of Yang '089 and Yang '824 discloses claim element 16(d).

Thus, on the present record, we are persuaded that for purposes of institution Petitioner has demonstrated that the combination of Yang '089 and Yang '824 discloses the elements of claim 16.

Claim 17

Claim 17 depends from claim 16 and recites that the voltage potential (generated by a current control loop) is generated in response to the programmable current. Petitioner cites V_R shown in Figure 5 of Yang'089 as disclosing this feature. Pet. 58–59. Patent Owner does not respond to Petitioner's contentions concerning claim 17.

In Yang '089 reflected voltage V_D is used to generate first threshold signal V_R, which is then compared to current input signal V_S developed across resistor 75, indicating the current in the LEDs. Ex. 1004, Figs. 3, 5. Yang '089, Yang '824 and the '764 patent all regulate output current by controlling the current in the primary winding. In Yang '089 the regulated primary winding current is used to drive the LEDs directly. In Yang '824 and the '764 patent, the output current that drives the LEDs is tapped from the secondary winding. Ex. 1003, Fig. 3, 4:18–20; Ex. 1001, Fig. 3. In

Yang '824 a current control loop is formed from detecting primary side switching current I_P to modulate the pulse width of switching signal V_{PWM} to control the magnitude of switching current I_P in response to V_{REF1}. Ex. 1003, 4:7–18. The current loop in the '764 patent is similar to that of Yang '824, except that in the '764 patent, V_{CNT} is provided to buffer amplifier 720 to establish the value of V_{REF1}. As discussed above, in Yang '089, V_{CNT} is used to introduce delay T_D to control the value of the LED current, while V_R is varied in response to the reflected signal of inductor 50 to determine the average value of the LED current, so that the average LED current is controlled as a constant despite variations in the inductance of inductor 50. Ex. 1004, 3:9–22, 29–33. Thus, in Yang '824 and the '764 patent, the current loop is used with a reference voltage to control the switching current, and in Yang '089 V_R, which is set by the sampled reflected signal V_D is used for the same purpose. On the current record we are persuaded for purposes of institution that Petitioner has demonstrated that the limitations of claim 17 are disclosed by the combination of Yang '089 and Yang '824.

Claim 18

Claim 18 depends from claim 16 and recites that the voltage potential is responsive to the current input signal. Petitioner cites Yang '824 as disclosing that the voltage potential, i.e., the output of operational amplifier 71, is generated in response to the current input signal, i.e., primary side switching current signal I_P. Pet. 60–61 (citing Ex. 1003, Fig. 4, 3:55–4:18, 5:49–59). Patent Owner does not respond to Petitioner's contentions. We note that Petitioner identifies V_R in Yang '089 as corresponding to the claimed voltage and the output of operational amplifier 71 in Yang '824 as corresponding to the claimed voltage. *Id.* at 59, 61. Yang '824 discloses

that "switching control circuit includes an operational amplifier 71 and reference voltage V_{REF1} developing an error amplifier for output current control" whose output is provided to "comparator 75 associated with PWM circuit 400" and that "the error amplifier amplifies the integrated signal V_X and provides loop gain for current control" that "controls the magnitude of primary side switching current I_P in response to the reference voltage V_{REF1}." Ex. 1003, 4:7–18. Thus, on the current record, we are persuaded that for purposes of institution, that Petitioner has demonstrated the combination of Yang '089 and Yang '824 disclose the elements of claim 18.

Claim 21

Claim 21 depends from claim 16 and recites that the controller is a primary side controller that is coupled to switch a primary winding of the magnetic device. Petitioner cites its challenge to patentablity of claim 16 as discussing how the references disclose this feature. Pet. 62. As discussed extensively above, on the present record we are persuaded for purposes of institution that Petitioner has demonstrated Yang '089 and Yang '824 disclose a primary side controller of the output current in the LEDs.

SUMMARY

For the reasons discussed above, we are persuaded that Petitioner has demonstrated a reason to combine Yang '089 and Yang '824 and that the combination of these references discloses all the limitations of claims 16–18 and 21. Therefore, on the current record, we are persuaded that Petitioner has demonstrated a reasonable likelihood it will succeed on its challenges to the patentability of claims 16–18 and 21 as obvious over the combination of Yang '089 and Yang '824.

ORDER

In consideration of the foregoing, it is hereby:

ORDERED that pursuant to 35 U.S.C. § 314(a) an *inter partes* review of the '764 patent is hereby instituted, commencing on the entry date of this Order, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial.

FURTHER ORDERED that the trial is limited to the following grounds and no other grounds are authorized:

Claims 16–18 and 21 as obvious under 35 U.S.C. § 103(a) over the combination of Yang '089 and Yang '824;

FURTHER ORDERED that the trial will be conducted in accordance with the accompanying Scheduling Order. In the event that an initial conference call has been requested or scheduled, the parties are directed to the Office Trial Practice Guide, 77 Fed. Reg. 48756, 48765–66 (Aug. 14, 2012), for guidance in preparing for the initial conference call, and should come prepared to discuss any proposed changes to the scheduling order entered herewith and any motions the parties anticipate filing during the trial.

PETITIONER:

Neil Warren
John Phillips
FISH & RICHARDSON P.C.
warren@fr.com
phillips@fr.com

PATENT OWNER

Roger Fulghum
Brian W. Oaks
Brett J. Thompsen
Nick Schuneman
Jennifer Nall
BAKER BOTTS L.L.P
roger.fulghum@bakerbotts.com
brian.oaks@bakerbotts.com
brett.thompsen@bakerbotts.com
nick.schuneman@bakerbotts.com
jennifer.nall@bakerbotts.com