UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SEMICONDUCTOR COMPONENTS INDUSTRIES, LLC d/b/a
ON SEMICONDUCTOR
Petitioner

v.

POWER INTEGRATIONS, INC.
Patent Owner

Case No. Unassigned
Patent 8,077,483

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,077,483

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I. INTRODUCTION

Semiconductor Components Industries, LLC d/b/a ON Semiconductor ("ON Semiconductor" or "Petitioner") requests *inter partes* review ("IPR") under 35 U.S.C. §§ 311–319 and 37 C.F.R. § 42.100 *et seq*. of Claims 1-3 and 7 of U.S. Patent No. 8,077,483 ("'483 Patent").

Petitioner asserts that there is a reasonable likelihood that the challenged claims are unpatentable and requests review of, and cancellation of, the challenged claims under 35 U.S.C. §§ 102 and 103.

II. MANDATORY NOTICES, STANDING, AND FEES

A. Mandatory Notices

Real Party in Interest: The real parties in interest are: (i) ON Semiconductor Corporation, (ii) Semiconductor Components Industries, LLC, doing business as ON Semiconductor, and (iii) Fairchild Semiconductor International, Inc., (iv) Fairchild Semiconductor Corporation, (v) Fairchild (Taiwan) Corporation, and (vi) System-General Corporation.

Related Matters: The '483 Patent is involved in a pending lawsuit entitled *ON Semiconductor Corp., et al. v. Power Integrations, Inc.*, No. 17-cv-247-LPS-CJB (D. Del.) ("Delaware Litigation"). Petitioner was first served with pleadings including the '483 Patent in the Delaware Litigation as part of Patent Owner's counterclaims in Patent Owner's Answer and Counterclaims to Plaintiff's First

Amended Complaint (Ex. 1009), served on September 29, 2017. Among the claims challenged herein, Claims 1 and 7 are at issue in the Delaware Litigation, while Claims 2 and 3 are *not* at issue in the Delaware Litigation. *See* Ex. 1012.

This Petition for IPR is being filed concurrently with an additional petition for IPR against different claims (i.e., Claims 6, 8, 9, 12, and 13) of the '483 Patent, as well as two Petitions for IPR against U.S. Patent No. 8,773,871 ("the '871 Patent"). The '871 Patent is a continuation and claims benefit to the application of the '483 Patent. In addition, Petitioner is concurrently filing Petitions for IPR for two other patents held by Patent Owner (i.e., U.S. Patents Nos. 6,456,475 and 6,337,788). Further, Petitioner previously filed petitions for IPR against other patents held by Patent Owner, including the following IPRs which are still pending: IPR2018-00160 (instituted 5-22-2018); IPR2018-00165 (instituted 5-18-2018); IPR2018-00166 (instituted 5-18-2018). In addition, Petitioner previously filed petitions for IPR against other patents held by Patent Owner, including the following IPRs which have been decided, and/or are on appeal: IPR2016-00809 (FWD issued 9-22-2017); IPR2016-00995 (FWD issued 10-15-2017); IPR2016-01589 (FWD issued 2-14-2018); IPR2016-01590 (FWD issued 2-8-2018); IPR2016-01592 (FWD issued 2-8-2018); IPR2016-01594 (FWD issued 2-14-2018); IPR2016-01595 (FWD issued 2-14-2018); IPR2016-01597 (FWD issued 1-25-2018); IPR2016-01600 (FWD issued 2-14-2018).

Lead Counsel: Lead Counsel is Roger Fulghum (Reg. 39,678) and Back-up Counsel are Brian Oaks (Reg. 44,981), Nick Schuneman (Reg. 62,088), and Brett Thompsen (Reg. 69,985), each of Baker Botts L.L.P.

Service Information: Baker Botts L.L.P., One Shell Plaza, 910 Louisiana Street, Houston, Texas 77002-4995; Tel. (713) 229-1234; Fax (713) 229-1522. Petitioner consents to service by electronic mail at: ONSemi_483IPR@bakerbotts.com. A Power of Attorney is filed concurrently herewith under 37 C.F.R. § 42.10(b).

B. Certification of Grounds for Standing

Petitioner certifies that the ’483 Patent is available for IPR. Petitioner is not barred or estopped from requesting IPR of the ’483 Patent.

C. Fees

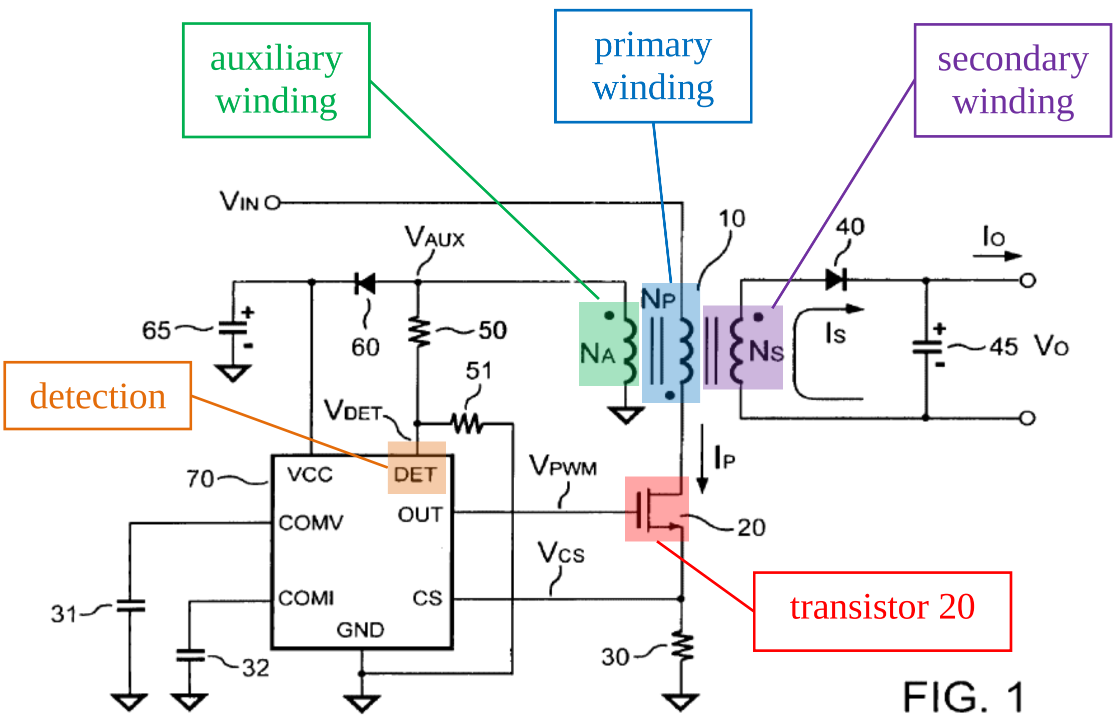
The Office is authorized to charge any fees that become due in connection with this Petition to Deposit Account No. 02-0384.

III. OVERVIEW OF THE ’483 PATENT

A. Background of the Technology

The ’483 Patent relates to switching power converters. Ex. 1001, Abstract. Such devices convert a first voltage (e.g., from a wall socket) to a second voltage to power an electronic device. *Id.*, 1:25-35. The ’483 Patent describes and claims a class of switching power converters that use the auxiliary winding of a transformer to detect information relevant to the control of the converter. But, as described by the background materials below, use of an auxiliary winding in switching power converters was well-known prior to the ’483 Patent. Ex. 1002, ¶ 33.

One example of a switching power converter that uses an auxiliary winding is provided by U.S. Patent 7,016,204 to Ta-Yung Yang et al. (“Yang”). Ex. 1006.



Id., Fig. 1 (annotations added). Yang’s power converter includes transistor 20 coupled to transformer 10. *Id.* The transistor is turned on and off by a switching signal “V_{PWM}” to regulate how much energy is transferred from the input (V_{IN}) to the output (V_O) of the power converter. *Id.*, 2:34:40, Fig. 1.

When V_{PWM} goes high to turn on transistor 20, a current (I_P) flows from V_{IN}, through the primary winding N_P of transformer 10, and through transistor 20 and resistor 30 to ground. *Id.*, 2:41-43, Figs. 1-2. As the primary-side current I_P flows, the magnetic energy stored in transformer 10 builds. Then, when V_{PWM} goes low to turn off transistor 20, the magnetic energy stored in transformer 10 induces a secondary-side current I_S through the secondary winding N_S. *Id.*, 2:54-59, Figs. 1-2. The magnetic energy stored in transformer 10 is therefore transferred to the output by the secondary-side current I_S. Ex. 1002, ¶¶ 34-36.

As shown in Figure 1 of Yang, transformer 10 also includes auxiliary winding N_A. Because auxiliary winding N_A is magnetically coupled to the primary winding N_P and secondary winding N_S, auxiliary winding N_A "reflects" activity on the primary and secondary windings. Ex. 1002, ¶ 37. For example, when the secondary-side current I_S flows in the secondary side during the off-time of the primary-side switch, the auxiliary winding reflects the voltage present at the secondary winding.[1] Ex. 1006, 3:4-15. This voltage at the secondary winding is

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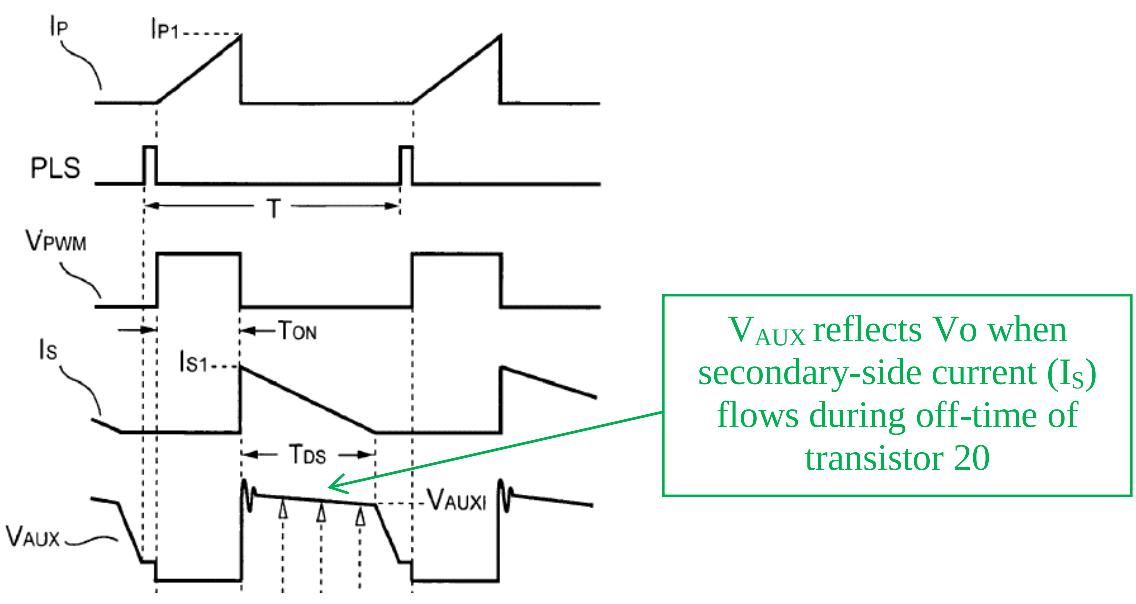
[1] The auxiliary winding reflects the voltage present at the secondary winding only during the portion of the off-time that current is flowing in the secondary side. *See* Ex. 1006, Fig. 2. Thus, when discussing herein the auxiliary winding's reflection of the voltage during the off-time of the power switch, the Petition is referring to the portion of the off-time when current flows through the secondary winding.

equal to the output voltage (V_O) plus the forward voltage drop (V_F) of rectifier 40. Thus, the reflected voltage produced by the auxiliary winding equals the output voltage (V_O) plus the forward voltage drop (V_F) of rectifier 40, multiplied by the winding ratio of the auxiliary and secondary windings:

$$V_{AUX} = \frac{T_{NA}}{T_{NS}} \times (V_O + V_F)$$

Id., 3:10 (Equation 3); Ex. 1002, ¶¶ 38-39.

Figure 2 of Yang illustrates this reflected voltage (V_{AUX}) produced on the auxiliary winding when the secondary-side current (I_S) flows:



Ex. 1006, Fig. 2 (excerpt) (annotations added).

The auxiliary winding's reflected voltage can be used for multiple purposes. Ex. 1002, ¶¶ 40-44. As shown in Figure 1 of Yang, V_{AUX} charges capacitor 65 via rectifier 60 to supply power for the internal circuitry of controller 70. Ex. 1006, 3:51-52, Fig. 1. In addition, V_{AUX} feeds information regarding output voltage V_O back to controller 70 via the DET pin. *See id.*, 3:36-50, 4:5-8, Fig. 1. In turn, controller 70 uses the feedback information to determine the pulse width of switching signal V_{PWM}, thereby controlling the flow of energy from the input V_{IN} to the output V_O of the converter. *See id.*, 4:5-38; Ex. 1002, ¶ 40.

Prior to the '483 Patent, it was well known in the art that different functions could be performed based on the reflected voltage present at the auxiliary winding of a switching converter. As described by Yang, it was known that the reflection of the output voltage on the auxiliary winding could be used as feedback for regulating the output voltage. Ex. 1006, 3:4-50, 4:5-8. It was also recognized that the reflection of the output voltage could be used to detect various fault conditions at the output of the power converter, such as a short circuit fault condition (*see* Ex. 1015, 4:30-36; Ex. 1016, 3:26-63, Fig. 1) or an output over voltage fault condition (Ex. 1007, ¶ 0023; Ex. 1004, 3:58-67). *See also* Ex. 1002, ¶¶ 41-44.

B. The Purported Advancement of the '483 Patent

Figure 1 of the '483 Patent illustrates a flyback-type power converter with a transformer that has an auxiliary winding:

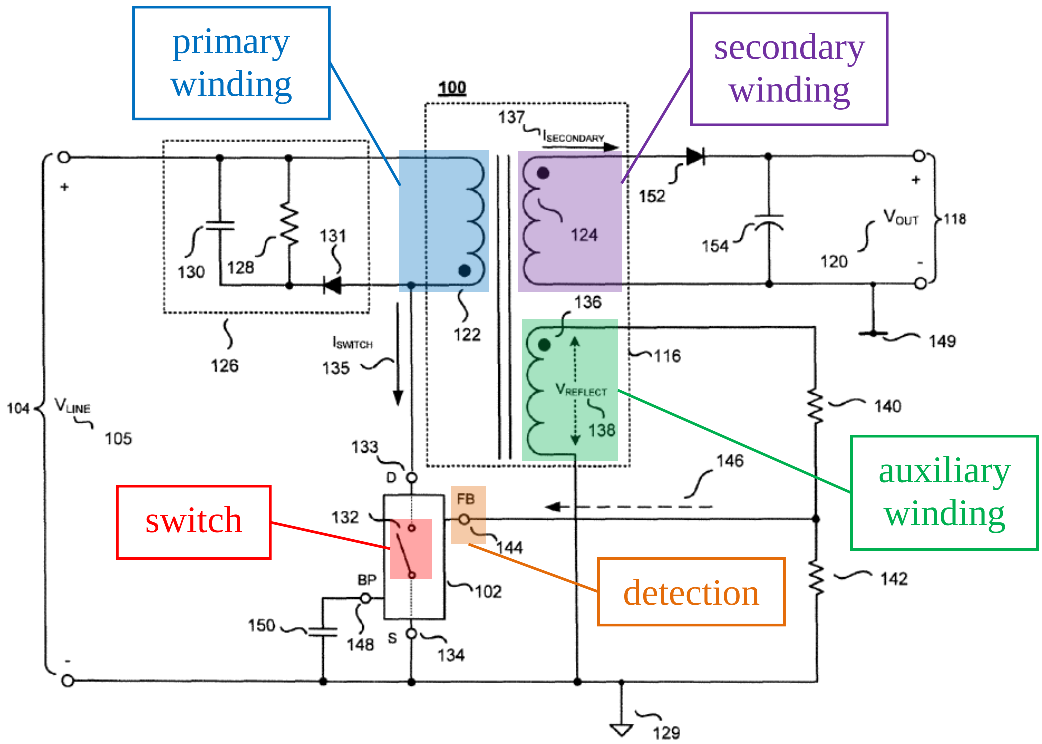
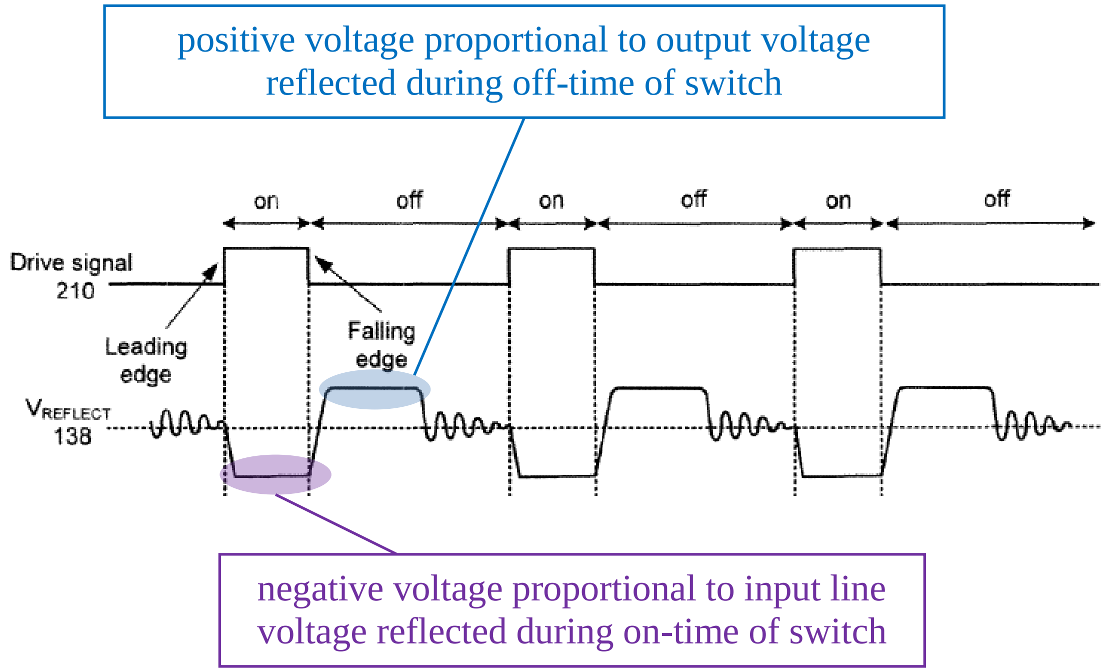


FIG. 1

Ex. 1001, Fig. 1 (annotations added); *see also id.*, 3:5-10; Ex. 1002, ¶ 45.

The ’483 Patent purports to improve upon known switching power converters by using the auxiliary winding to detect the input voltage (also referred to as the “line” voltage) in addition to the output voltage. Ex. 1001, 2:52-55, 3:48-60. The ’483 Patent explains that the “reflected voltage $V_{REFLECT}$” at the auxiliary winding is “representative of output voltage V_{OUT} 120 during at least a portion of the time when the power switch 132 is off.” *Id.*, 3:55-60. The ’483 Patent further explains that the “reflected voltage $V_{REFLECT}$” is also “representative of an input line voltage V_{LINE} 105 during at least a portion of the time of when the power switch 132 is on.” *Id.*; *see also id.*, 3:60-4:10.



Id., Fig. 4 (excerpt) (annotations added)[2]; Ex. 1002, ¶ 46.

However, the reflection of both the output voltage and the input line voltage on the auxiliary winding at different times during the switching cycle is merely the result of the magnetic coupling between the different windings of the transformer. In other words, it is the magnetic coupling of the auxiliary winding in the flyback architecture that *dictates* the voltage that is reflected by the auxiliary winding during the on-time and off-time of the power switch. Ex. 1002, ¶¶ 47-48. As explained above, the auxiliary winding reflects the voltage present on the

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[2] The reflection of the line voltage is negative due to the opposing orientation of the windings in a flyback-type converter, as shown by the orientation of the dots on the individual windings in Figure 1 of the '483 Patent. Ex. 1002, ¶ 47.

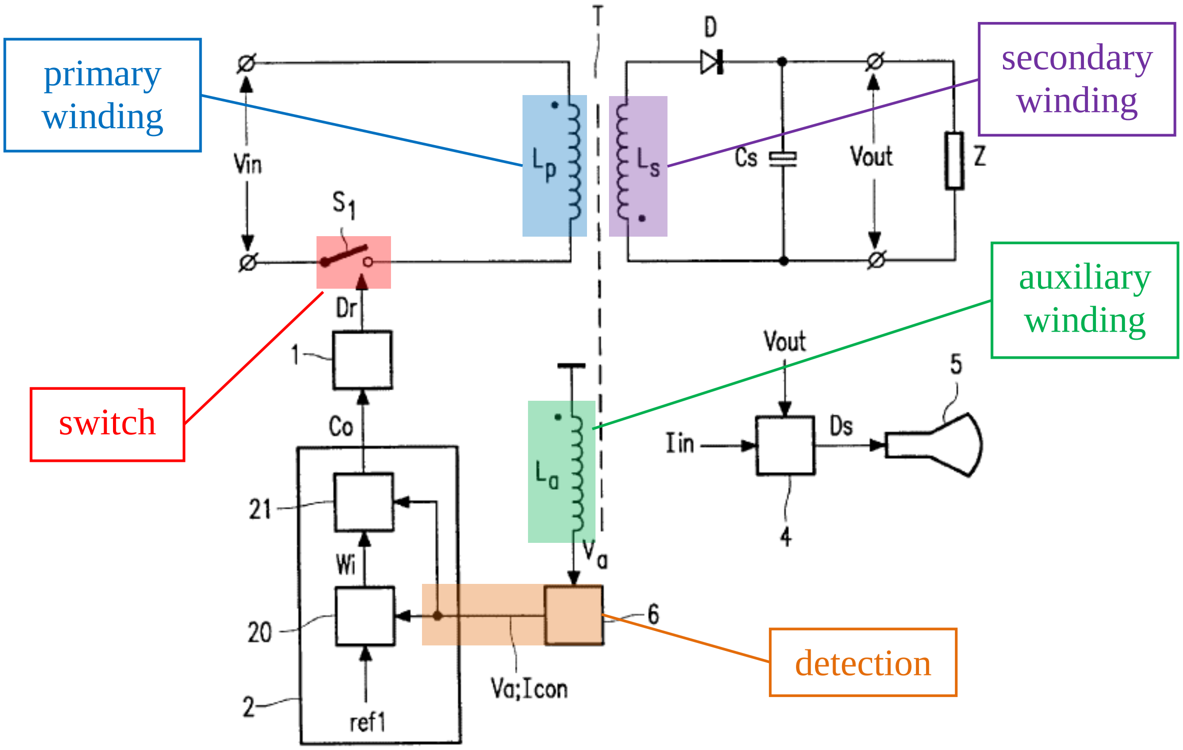
secondary winding (i.e., V_{OUT} plus the voltage drop of the rectifier) when current flows through the secondary side (i.e., during off-time of the switch). Ex. 1006, 3:4-15. The auxiliary winding likewise reflects the voltage present on the primary winding (i.e., the input line voltage) when current flows through the primary side (i.e., during the on-time of the switch). Ex. 1002, ¶ 48.

Thus, the purported invention of the '483 Patent is based on nothing more than the recognition of how an auxiliary winding naturally responds during the on-time and off-time of the switch due to the physical relationship (i.e., the magnetic coupling) between the auxiliary winding and the other windings, which exists in every flyback-type power converter with an auxiliary winding. Ex. 1002, ¶ 49.

C. Characteristics of Auxiliary Windings Were Well Known in the Art

Multiple prior art references (including prior art in the invalidity grounds relied upon herein) recognize and describe the relationship between the auxiliary winding and the primary and secondary windings. Ex. 1002, ¶¶ 50-54.

One example is U.S. Patent 5,831,839 ("Pansier"), which issued on November 3, 1998, over eight years before to the claimed priority date of the '483 Patent. Ex. 1008. Like the '483 Patent, Pansier discloses a flyback-type switching power converter with an auxiliary winding:



Ex. 1008, Fig. 1 (annotations added); Ex. 1002, ¶ 50.

Pansier explains that, during the off-time of the switch, the auxiliary winding voltage Va "is equal to the DC output voltage Vout multiplied by the transformation ratio between the auxiliary winding La and the secondary winding Ls." Ex. 1008, 7:45-50, Fig. 3.[3] On the other hand, "auxiliary winding voltage Va has a negative value Vneg" during the on-time of the switch, "which equals the input voltage Vi multiplied by the transformation ratio between the auxiliary winding La and the primary winding Lp." *Id.*, 7:31-37.

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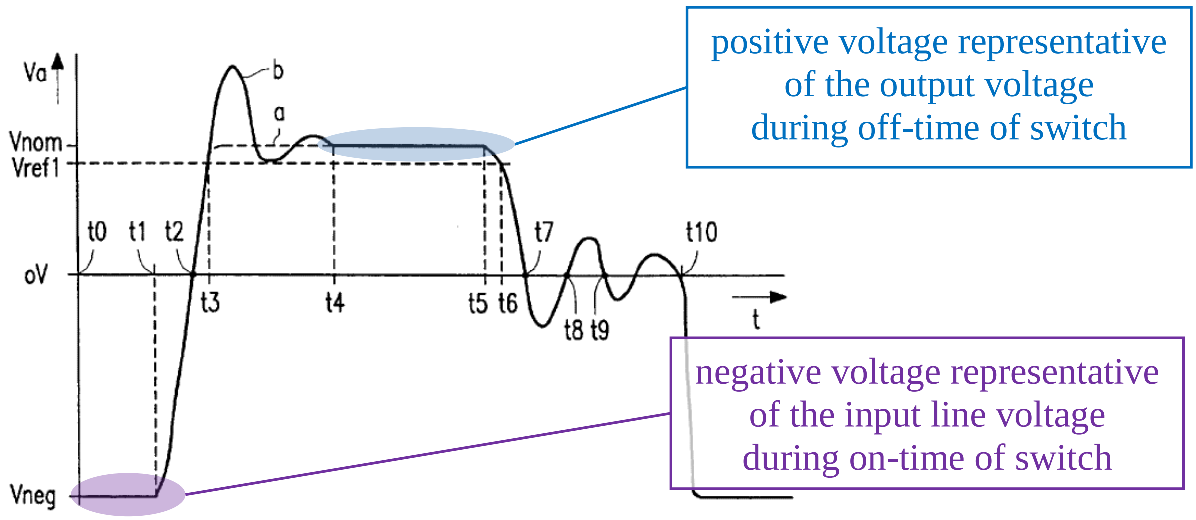
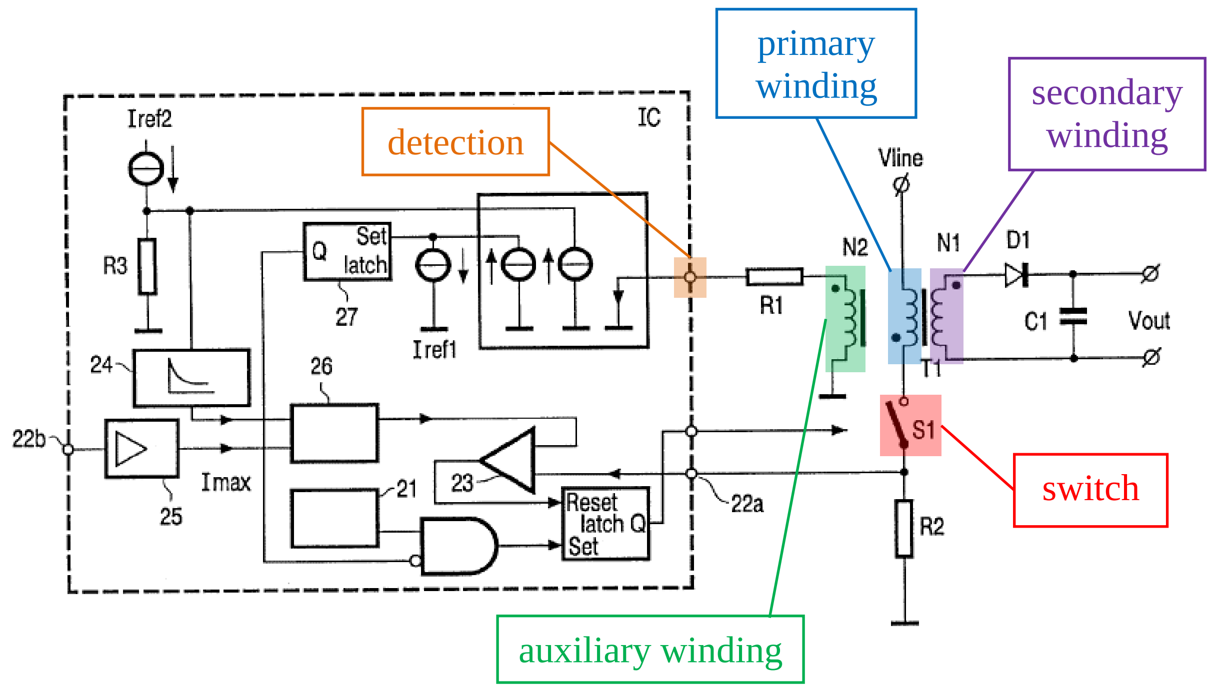
[3] *See also* Ex. 1008, 7:45-64 (explaining temporary overshoot of Va before settling to value representing output voltage).

Like Figure 4 of the '483 Patent, Figure 3 of Pansier illustrates the reflection at the auxiliary winding of both the output voltage (Vout) and input line voltage (Vi) at different times of the switching cycle:



Id., Fig. 3 (annotations added); Ex. 1002, ¶¶ 51-52.

Another example is U.S. Patent 6,542,386 ("Mobers"), which issued on April 1, 2003. Ex. 1004. Like Pansier, Mobers discloses a switching power converter with an auxiliary winding:



Id., Fig. 7 (annotations added); Ex. 1002, ¶¶ 53-54. Mobers explains that by monitoring the auxiliary winding in a time-phased way, "not only V_{out} can be monitored …, but also V_{line} can be monitored." Ex. 1004, 5:5-10. Specifically, "information relating to the output voltage V_{out} will be present" on the auxiliary winding during the off-time of the switch, whereas "information relating to V_{line} will be present" on the auxiliary winding during the on-time of the switch. *Id.*, 5:50-53.

D. Examination History

During prosecution of the '483 Patent, Patent Owner distinguished the purported invention by arguing that the prior art "fails to disclose '*a sensor coupled to receive a signal from* ***a single terminal*** *of the controller' where the* *signal represents both **a line input voltage*** during the on time and ***an output voltage*** during the off time of a power converter." Ex. 1010, 31 (bold and italics emphases in original). For example, Patent Owner argued that the Yamada and Uruno references received the line input voltage information and the output voltage information from separate terminals, not a single terminal. *Id.*, 30-31. Patent Owner also distinguished the Balakrishnan '161 reference because a diode in the path of the identified terminal blocked that terminal from receiving a signal representing the line input voltage during the on-time. *Id.*, 13.

Thus, Patent Owner emphasized that the distinguishing feature of the '483 Patent was the single terminal coupled to receive a signal representative of both the input and output voltage. But as described above, an auxiliary winding of a flyback switching power converter naturally reflects both the input and output voltage at different times during the switching cycle due to the physical properties of the transformer. *See, e.g.*, Ex. 1008, 7:31-43, Fig. 3; Ex. 1004, 5:11-14, 5:50-53. Thus, in the absence of a diode that blocks either the positive swing (representing the output voltage) or the negative swing (representing the input line voltage) of the signal from the auxiliary winding, a signal received from an auxiliary winding via a single terminal of the controller will represent both the input and the output voltage. Ex. 1002, ¶¶ 55-56.

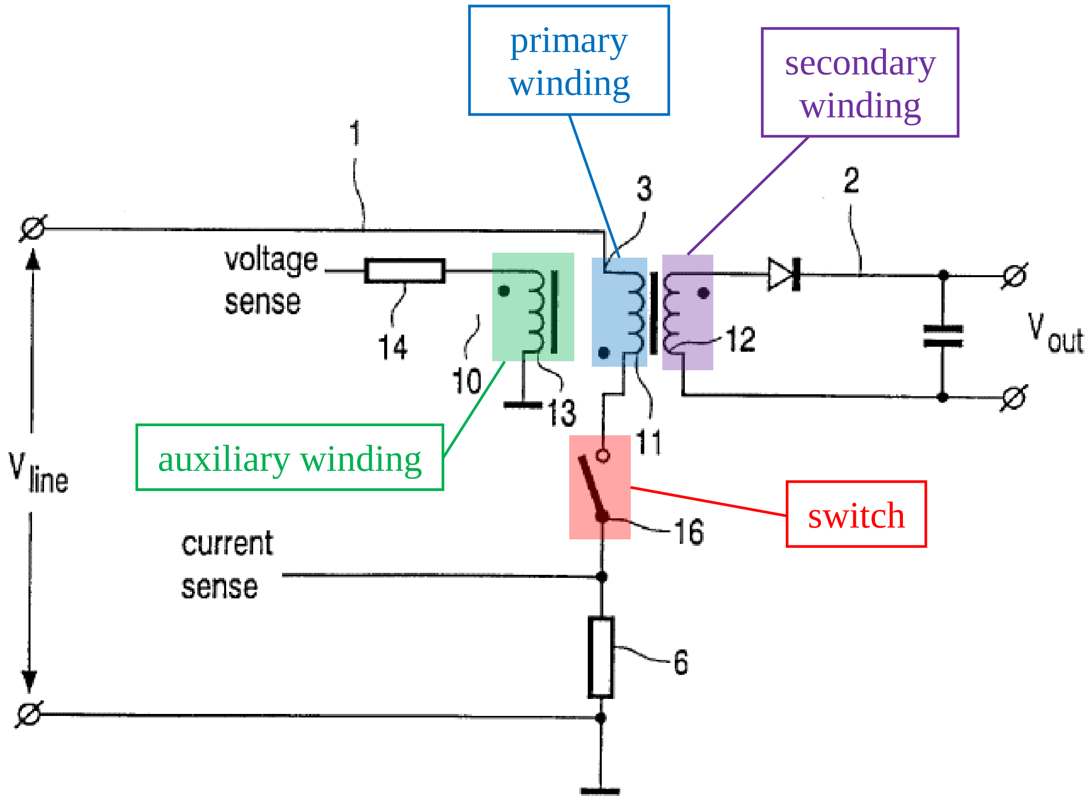
The prior art relied on in the grounds below was not considered during examination of the ’483 Patent. Nonetheless, the prior art describes a single terminal coupled to an auxiliary winding in a flyback-type power supply, which receives a signal representative of both the output voltage and the input line voltage at different times during the switching cycle. The prior art therefore discloses and suggests what Patent Owner had previously identified as the distinguishing element of the ’483 Patent. And as shown in Section VI below, the prior art also discloses and suggests every other element of the challenged claims.

IV. SUMMARY OF PRIOR ART

A. Mobers

U.S. Patent 6,542,386 to Mobers et al. (“Mobers”) issued on April 1, 2003. Ex. 1004. The ’483 Patent was filed on March 28, 2008 and claims priority to a provisional application filed on April 6, 2007. Ex. 1001. Mobers is therefore prior art to the ’483 Patent under at least 35 U.S.C. § 102(b). Mobers was not considered by the Patent Office during examination of the ’483 Patent. *See* Ex. 1001, 1-2 (References Cited).

Mobers discloses a switching power converter that utilizes a transformer with an auxiliary winding, which is referred to by Mobers as a “control winding.” Ex. 1004, 4:1-28, Fig. 6. Figure 6 illustrates certain components of the switching power converter:



Id., Fig. 6 (annotations added); Ex. 1002, ¶ 58. For flyback-type switching power converters like the one shown in Figure 6 of Mobers, the current through the primary winding builds up when the switch is turned on. Ex. 1004, 1:45-48, Fig. 3. As the primary-side current builds, the magnetic energy stored in the transformer also builds. Ex. 1002, ¶ 58. When the switch is turned off, the magnetic energy stored in the transformer is transferred to the output via a current produced by the transformer's secondary winding. Ex. 1004, 1:58-64; Ex. 1002, ¶ 58.

As described above in Section III.A-C, the auxiliary winding in a flyback-type switching power converter (i) reflects the voltage across the primary winding (indicative of input line voltage) when current flows through the primary side, and

(ii) reflects the voltage across the secondary winding (indicative of the output voltage) when current flows through the secondary side. Ex. 1002, ¶ 59. Mobers recognizes this relationship and, with reference to Figure 6, explains: "When a current flows in either of windings 11 or 12, a current will also be induced in regulation circuit 10. The voltage generated across control winding 13 is related to V_{line} or V_{out} … ." Ex. 1004, 4:52-55; *see also id.*, 5:50-53 ("[T]he information relating to V_{line} will be present on the control winding N2 during the primary stroke, whereas information relating to the output voltage V_{out} will be present during the secondary stroke.").

Mobers also discloses a technique for how to detect the V_{line} or V_{out} information provided by control winding 13 in Figure 6. Specifically, Mobers clamps the voltage on the left side of resistor 14 in Figure 6 to a fixed potential. *Id.*, 4:29-36. When a voltage (indicative of either V_{line} or V_{out}) is generated on the other side of resistor 14 by the control winding, the voltage potential across the resistor causes a current to flow. *Id.* During the on-time of the switch, the current through the resistor is:

$$I_r = \frac{kV_{line}}{R},$$

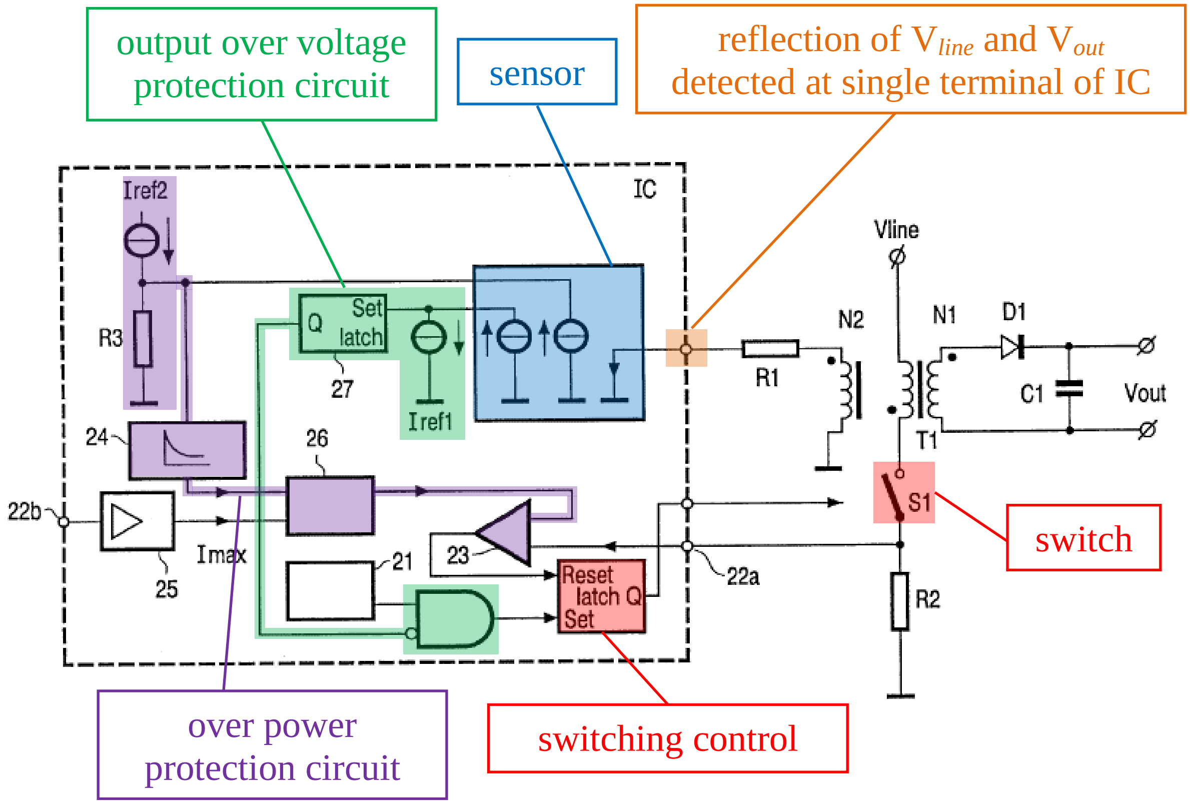
where *R* equals the resistor value and *k* is the winding ratio of the control winding to the primary winding. *Id.*, 4:54-65 (equation 2); *see also id.*, 4:12-20. And during the off-time of the switch, the current through the resistor is:

$$I_r = \frac{mV_{out}}{R}.$$

where *R* equals the resistor value and *m* is the winding ratio of the control winding to the secondary winding. *Id.*, 4:66-5:5 (equation 3); *see also id.*, 4:21-28; Ex. 1002, ¶ 60.

During the on-time of the switch, the control winding reflects a negative voltage indicative of V_{line}. Ex. 1002, ¶ 61. Thus, the current through resistor 14 in Figure 6 during the on-time of the switch is a "negative" current, i.e., a current flowing toward the control winding. Ex. 1004, 5:14-19. On the other hand, the control winding reflects a positive voltage indicative of V_{out} during off-time of the switch. Ex. 1002, ¶ 62. Thus, the current through resistor 14 in Figure 6 during the off-time of the switch is a "positive" current, i.e., a current flowing away from the control winding. Ex. 1004, 5:14-19.

Building on the explanation of the control winding shown in Figure 6, Mobers illustrates in Figure 7 how an integrated circuit (IC) controller utilizes the V_{line} and V_{out} information provided by control winding N2. Ex. 1004, Fig. 7; Ex. 1002, ¶¶ 62-66.



Id., Fig. 7 (annotations added); Ex. 1002, ¶ 62.

For example, Mobers utilizes the output voltage information to implement output over voltage protection. Ex. 1004, 5:56-62. As shown in Figure 7, the sensor monitors the current from resistor R1, which represents either V_{out} or V_{line}. The sensor mirrors the current representative of V_{out} for comparison to a reference "Iref1." Ex. 1004, Fig. 7. If the current signal representing V_{out} exceeds "Iref1," then an output over voltage condition is detected and latch 27 is set. *See id.* In turn, the output of latch 27 causes a logic gate to block pulses from oscillator 21 to the switching control latch, which therefore blocks the switching control latch from turning on the switch. *See id.*, Fig. 7, 5:57-62 ("If it is determined that V_{out} comes above a predetermined level a latch is set in circuit 27. This latch prevents switch S1 from switching on again so as to shut down the switched-mode power supply in case of an over voltage being present on the output terminals.”). *See also* Ex. 1002, ¶ 63; Ex. 1014, 28, 33 (explaining logic gates).

Mobers also utilizes the input line voltage information to implement an over power protection. Ex. 1004, 3:60-62, 5:26-45. As explained below, the over power protection scheme limits the on-time of the switch when the input line voltage V_{line} is high to prevent too much power from being transferred from the input to the output. Ex. 1002, ¶¶ 64-66.

Figure 7 of Mobers illustrates that a pulse from oscillator 21 sets the switching control latch to turn on switch S1 during each switching cycle (assuming no output over voltage fault condition). Ex. 1004, 5:27-28, Fig. 7. Comparator 23 resets the switching control latch to turn off switch S1 when the voltage across resistor R2 (which represents the current through switch S1 and resistor R2) exceeds a threshold. *See id.*, 5:28-33, Fig. 7. The threshold for comparator 23 is set by minimum circuit 26. *Id.*, 5:48-50, Fig. 7. During normal conditions, minimum circuit 26 passes the feedback signal from error amplifier 25 to comparator 23. *See id.*, 5:46-50, Fig. 7. This forms what is known in the art as a current mode control loop, whereby the switch is turned off during each cycle when the current through the power switch reaches a threshold that is based on feedback from the output voltage. Ex. 1013, 16-18; Ex. 1002, ¶ 64.

However, when the input line voltage is high, the over power protection system intervenes by limiting the peak current set point as a function of the input line voltage. Minimum circuit 26 passes the smaller of the two thresholds provided by error amplifier 25 and curve circuit 24. *See* Ex. 1004, 5:46-48, Fig. 7. As depicted by the curve inside curve circuit 24 in Figure 7, curve circuit 24 outputs a lower threshold value at higher input line voltages. *Id.*, 5:38-45, Fig. 7. When the signal from curve circuit 24 is less than the feedback signal from error amplifier 25, minimum circuit 26 passes the threshold from curve circuit 24 to comparator 23. *See id.*, 5:46-50, Fig. 7. This limits the peak current through switch S1 as a function of the input line voltage, thereby preventing the amount of power passed to the output from exceeding a maximum safe level. *Id.*, 5:46-50, Fig. 7; *see also id.*, Abstract, 1:5-13, 2:50-53, 3:60-62; Ex. 1002, ¶¶ 65-66.

Notably, Mobers explains that the "advantage" of its detection scheme is that both V_{out} and V_{line} are detected "via the same existing pin on the integrated circuit." *Id.*, 5:20-25; *see also id.*, 2:56-61, 3:14-20. The advantages of detecting both the output voltage and the input line voltage via a single terminal of an IC were therefore known well before the '483 Patent. Ex. 1002, ¶ 67.

B. Reinhard

U.S. Patent Application Publication 2005/0254268 ("Reinhard") was filed on February 11, 2005 and published on November 17, 2005. Ex. 1007. Reinhard is therefore prior art to the ’483 Patent under at least 35 U.S.C. § 102(b). Reinhard was not considered by the Patent Office during examination of the ’483 Patent. *See* Ex. 1001, 1-2 (References Cited).

Reinhard discloses a switching power converter that utilizes a transformer with an auxiliary winding. Ex. 1007, ¶ 0001 (“[T]he present invention relates to a control circuit in a primary-control switched mode power supply unit, which comprises a primary switch and a transformer with an auxiliary winding.” (emphasis added)).

Figure 1 of Reinhard illustrates components of the controller circuit of the switching power converter:

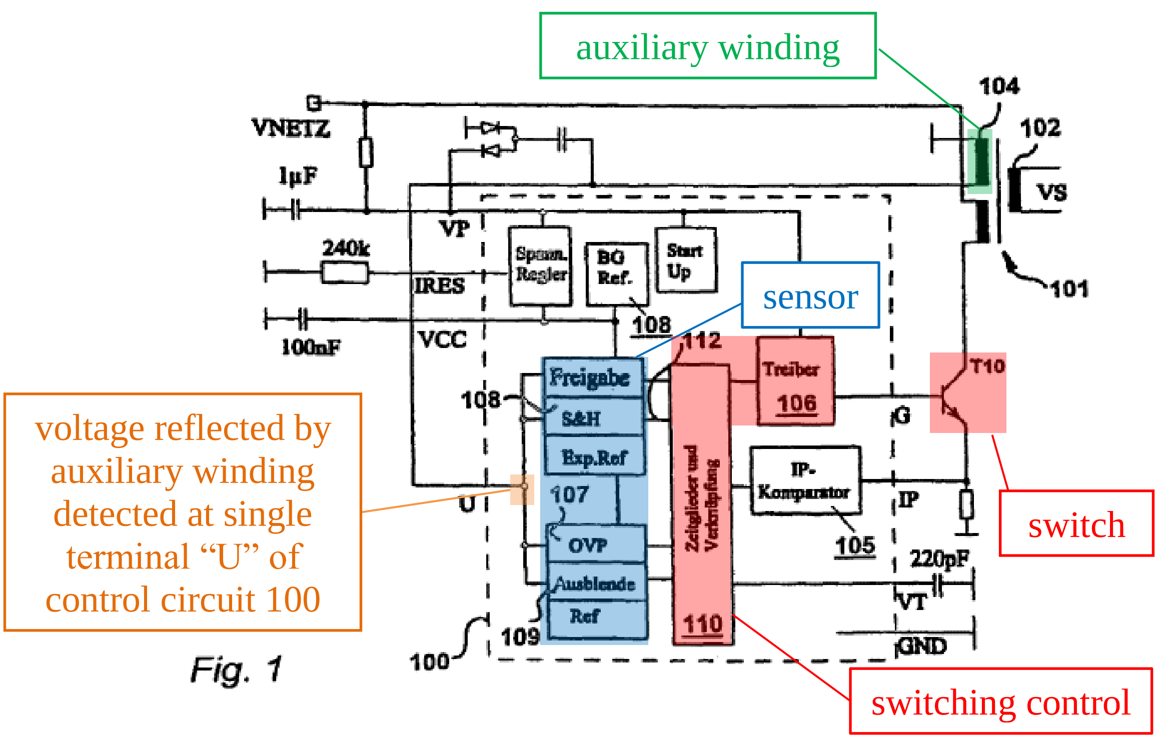


Fig. 1

Ex. 1007, Fig. 1 (annotations added); Ex. 1002, ¶¶ 68. As shown in Figure 1, Reinhard includes a sensor coupled to receive a signal from the auxiliary winding via the "U" terminal of control circuit 100. *See* Ex. 1007, Fig. 1.

Reinhard's sensor includes sample and hold circuit 108, which samples the voltage value at the auxiliary winding during the off-time of switch T10 to detect the output voltage. *Id.*, ¶ 0022, Fig. 1. The detected output voltage is, in turn, used by Reinhard as the feedback for regulating the output voltage of the power supply. Ex. 1007, ¶¶ 0022, 0043; *see also* Ex. 1002, ¶ 71.

Reinhard's sensor also detects the different voltages reflected by the auxiliary winding at different times during the switching cycle to implement various protection features. Ex. 1002, ¶ 72. Reinhard's sensor includes, for example, "an over-voltage protection [OVP] comparator 107 and a gating comparator 109, which are both supplied with the voltage that is induced at the auxiliary winding 104." Ex. 1007, ¶ 0023.

The over-voltage protection circuitry detects an over voltage fault condition at the output of the power converter based on the positive voltage reflected by the auxiliary winding during the off-time of power switch T10. *See* Ex. 1007, ¶ 0023 ("OVP comparator 107 detects positive voltages above the control region, switches off the driver 106 for the duration of a gating time and thus prevents the occurring of over-voltages."); *see also id.*, Fig. 4; Ex. 1002, ¶ 72.

In addition, gating comparator 109 detects the negative voltage reflected at the auxiliary winding during the on-time of switch T10. Ex. 1007, ¶ 0023, Fig. 4. And as explained above in Section III, such a negative voltage reflected by the auxiliary winding during the on-time of the switch is representative of the input line voltage due to the physical characteristics (i.e., the magnetic coupling) of transformer 101. *See supra* Sections III.B-C. Gating comparator 109 detects this negative voltage swing to confirm proper connection of the auxiliary winding (*see id.*, Abstract), and "triggers the blind-out time for the driver when a negative voltage pulse is missing" (*id.*, ¶ 0023).

In sum, Reinhard uses both the positive voltage (representative of the output voltage) reflected by the auxiliary winding during the off-time of the switch, and the negative voltage (representative of the input voltage) reflected by the auxiliary winding during the on-time of the switch, to regulate the output of the power supply and implement various protection features. Ex. 1002, ¶¶ 69-72.

V. CLAIM CONSTRUCTION

In the Delaware Litigation, neither Petitioner nor Patent Owner raised a claim construction issue involving the '483 Patent for the District Court to resolve. *See* Ex. 1011. Petitioner maintains that all terms should be given their plain and ordinary meaning. But, Petitioner provides some explanation below with respect to the "switching control" elements in Claim 1 of the '483 Patent, in light of Patent

Owner's application of that language in its infringement contentions in the related Delaware Litigation. Petitioner also provides explanation regarding the plain and ordinary meaning of the requirement that the "signal" recited in Claim 1 must "represent" the output voltage and the line input voltage. Ex. 1002, ¶ 74.

A. "switching control" elements

Claim element 1[a] recites "a switching control that switches a power switch to regulate an output of the power converter." Ex. 1001. Claim element 1[d] then adds that "the switching control is responsive to the sensor." *Id.* However, the plain language of Claim 1 does not require any particular output parameter to be regulated (e.g., voltage, current, power, etc.). Moreover, Claim 1 does not link any particular form of regulation with the manner in which "the switching control is responsive to the sensor."

Patent Owner applied a similarly broad view of the switching control in its infringement contentions served on Petitioner on January 5, 2018 in the Delaware Litigation. For example, with respect to the alleged infringing device, Patent Owner merely pointed to the control of the switch for claim element 1[a].[4] Ex. 1012, 2 (citing the "Driver Output" to the gate of the power switch and the "standard current mode architecture where the switch-off event is dictated by the

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[4] The claim elements labeled 1[a] and 1[d] herein are respectively labeled 1[b] and 1[e] in Patent Owner's infringement contentions. *See* Ex. 1012, 2, 5-6.

peak current setpoint").

In any event, prior art relied upon below discloses a similar switching control as the products that Patent Owner accused of infringement in the Delaware Litigation. As explained in Section VI.A.1 for claim element 1[a], Mobers implements what is known as a current mode architecture whereby the switch is turned off during each cycle when the switch current reaches a peak current setpoint. *Compare* Ex. 1004, 5:26-33; *and* Ex. 1012, 2. And as explained in Section VI.A.1 for claim element 1[d], Mobers includes an over power protection circuit that adjusts the peak current threshold in response to information from the sensor relating to the input line voltage. *Compare* Ex. 1004, 5:34-50; *and* Ex. 1012, 5-6.

In sum, Petitioner maintains that no specific construction is required for this term. But if Patent Owner chooses to propose a construction in this IPR, Petitioner contends that any construction of the "switching control" limitations should be consistent with Patent Owner's broad interpretation of that limitation as applied in its infringement contentions in the Delaware Litigation. *See* Ex. 1002, ¶¶ 75-76.

B. "to represent" (Claim 1)

Claim 1 recites a sensor that is coupled to receive "a signal." Claim 1 then separately recites characteristics of the signal: "the signal from the single terminal to represent a line input voltage of the power converter during at least a portion of an on time of the power switch, the signal from the single terminal to represent an output voltage of the power converter during at least a portion of an off time of the power switch." Ex. 1001, Claim 1.

Petitioner submits that the language regarding what "the signal" must "represent" requires no construction and should be given its plain and ordinary meaning. Consistent with the plain meaning of the claims, the "to represent" language defines characteristics of the recited "signal." However, the "to represent" phrase does ***not*** limit the operation of the separately recited sensor or any other structure recited in Claim 1. In other words, there is no requirement in the "to represent" phrase that limits whether or how the sensor responds to the information represented by the signal at different times during the switching cycle. *See* Ex. 1002, ¶¶ 77-79.

Where Patent Owner intended to define actions taken by the sensor and/or other recited structures in the claims based on the information represented by the recited "signal," Patent Owner did so expressly. For example, Claim 14 requires the sensor "to *sample* the signal from the terminal" and "to *generate* a sample output voltage signal." Ex. 1001, Claim 14. By contrast, there is no definition in Claim 1 with respect to any action the sensor must take in response to the recited signal that the sensor receives from the single terminal.

Lastly, there was no disclaimer of claim scope during prosecution that would limit whether or how the recited structures in Claim 1 respond to the various information represented by the recited "signal." During prosecution, Patent Owner distinguished three references on the basis that these references did not disclose a terminal that received a signal that represented both output voltage and the line input voltage of the power converter at the specified different times. In a Response dated February 4, 2011, Patent Owner distinguished U.S. Patent Nos. 6,842,353 (Yamada) and 7,551,462 (Uruno) on the basis that both references receive different signals representing the input and output voltage at different terminals. Ex. 1010, 30-31. In a later Response to Office Action dated May 27, 2011, Patent Owner distinguished U.S. Patent No. 6,233,161 (Balakrishnan) on the basis that the diode in the path of the identified terminal blocked that terminal from receiving a signal representing the line input voltage during the on-time. Ex. 1010, 13; Ex. 1002, ¶¶ 80-81.

Importantly, Patent Owner's arguments during examination relate to what the ***signal*** received from a single terminal ***represents***, not how any of the separately recited structures respond to that signal. Thus, there was no clear and unmistakable disclaimer in the prosecution history that would require the separately recited structures in Claim 1 to respond to the information represented by the recited "signal" in any particular manner.

VI. THERE IS A REASONABLE LIKELIHOOD THAT THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. Ground 1: Mobers Anticipates Claims 1 and 7 Under 35 U.S.C. § 102

Mobers discloses each element of Claims 1 and 7 and thus anticipates each of these claims under 35 U.S.C. § 102. Ex. 1002, ¶ 82.

1. Claim 1

Claim 1[pre]: "A controller for a power converter, comprising:"

Mobers discloses a controller for a power converter. "The switched-mode power supply … may … comprise a control circuit for controlling the controllable current switching means." Ex. 1004, 3:6-11 (emphasis added). The PWM control circuit is specifically shown in Figure 7:

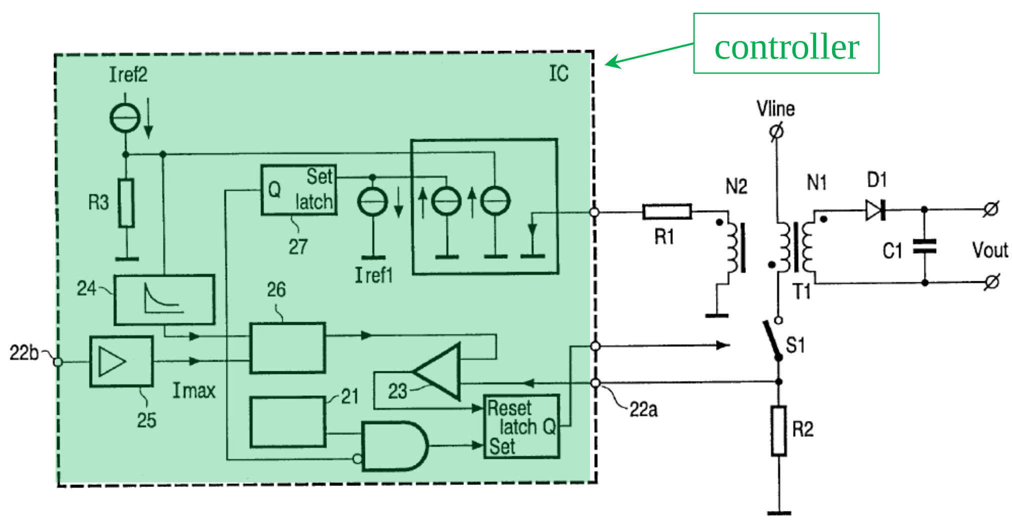


FIG. 7

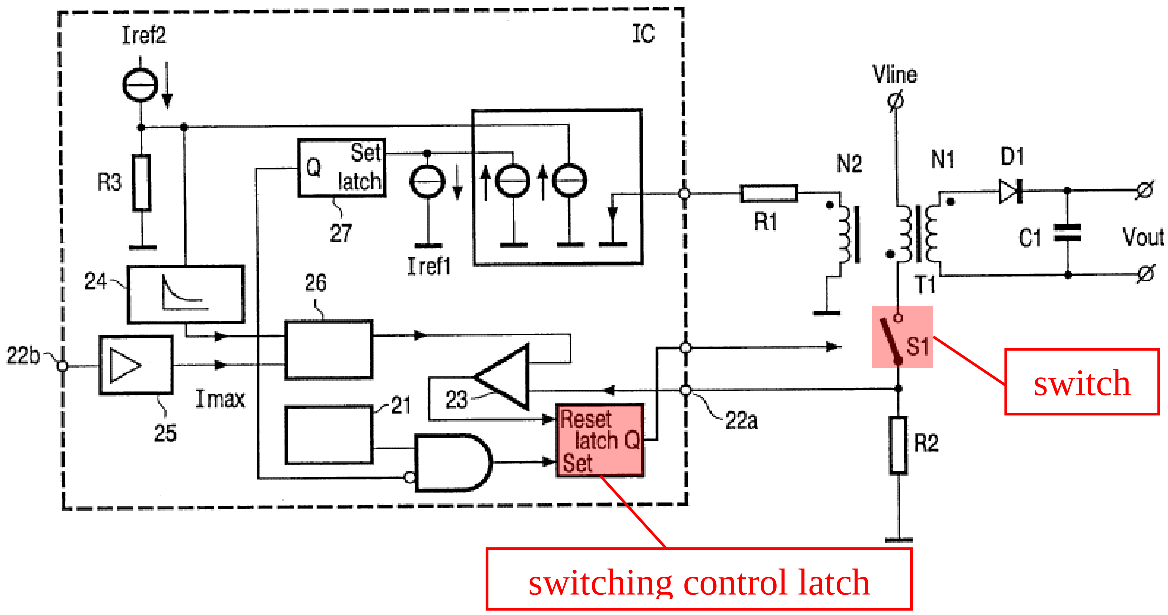
Ex. 1004, Fig. 7 (annotations added); *see also id.*, 5:26-33. Accordingly, Mobers discloses each element of the preamble of Claim 1.[5] Ex. 1002, ¶ 83.

1[pre]. A controller for a power converter, comprising:	Ex. 1004, 3:6-12: "The switched-mode power supply according to the first aspect of the present invention may further comprise a control circuit for controlling the controllable current switching means. The control circuit may comprise a PWM-circuit operating the switch at a frequency between 25-250 kHz. The control circuit typically response to a control signal from the third winding." Ex. 1004, 5:26-29: "Referring now to FIG. 7, the switch S1 is controlled by a PWM signal from a PWM circuit. The switch is switched on by the set signal from the oscillator 21. The switch is switched off if a certain peak current through S1 is sensed.." *See also* Ex. 1004, 5:20-25, 5:34-62, 5:63-6:3; Figs. 6-8, Claims 1, 3, 5, 6.

Claim 1[a]: "a switching control that switches a power switch to regulate an output of the power converter; and;"

Mobers discloses a latch (i.e., a switching control) that controls switch S1 (i.e., a power switch) to regulate V_{out} (i.e., an output of the power converter). As explained with reference to Figure 6, the output voltage (V_{out}) of the switched power supply is controlled by regulating the conduction time of the switch, and thereby the amount of energy that is transferred from the primary side to the secondary side of the converter. Ex. 1004, 4:37-51; *see also id.*, 1:36-54. In turn, Figure 7 illustrates the switching control latch inside the controller circuit that turns the power switch on and off:

[5] The preamble of Claim 1 is not limiting, but is nonetheless disclosed by Mobers.



Id., Fig. 7 (annotations added); Ex. 1002, ¶ 84.

The internal circuitry of Mobers, including the switching control latch, implements what is known in the art as current mode control, whereby the switch is turned off during each cycle when the switch current reaches a peak current threshold:

> [T]he switch S1 is controlled by a PWM signal from a PWM circuit. The switch is switched on by the set signal from the oscillator 21. The switch is switched off if a certain peak current through S1 is sensed. As previously mentioned, the peak current through S1 is sensed by sensing the voltage generated across R2. This sensed voltage is provided through pin 22a. As soon as the comparator 23 trips, S1 is switched off.

Ex. 1004, 5:26-33.

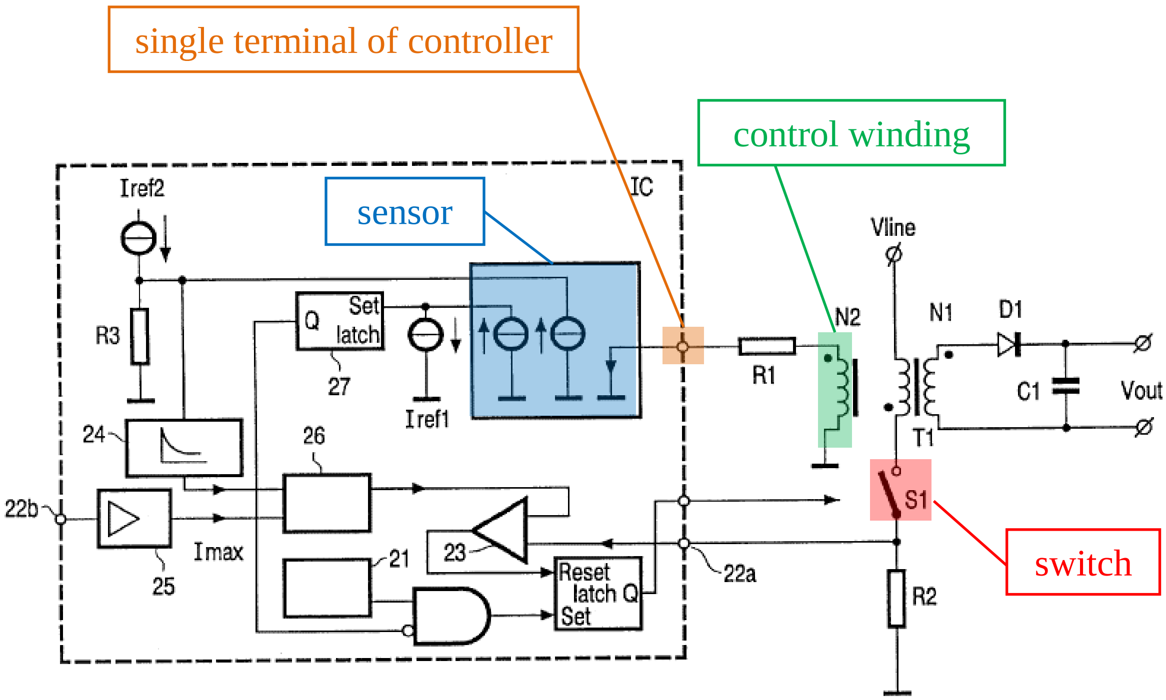
In sum, the PWM circuitry in Mobers (including the switching control latch shown in Figure 7), switches the power switch S1 to regulate V_{out}. Accordingly, Mobers discloses each limitation of claim element 1[a]. Ex. 1002, ¶¶ 84-86.

[1a] a switching control that switches a power switch to regulate an output of the power converter; and	Ex. 1004, 5:26-33: "Referring now to FIG. 7, the switch S1 is controlled by a PWM signal from a PWM circuit. The switch is switched on by the set signal from the oscillator 21. The switch is switched off if a certain peak current through S1 is sensed. As previously mentioned, the peak current through S1 is sensed by sensing the voltage generated across R2. This sensed voltage is provided through pin 22a. As soon as the comparator 23 trips, S1 is switched off." Ex. 1004, 5:34-37: "Besides the input signal from 22a, also a signal from the over power protection circuit is used to determine the peak current through S1 and R2. For this purpose the information relating to V_{line} is used." Ex. 1004, 5:46-48: "The information from the over power protection circuit can reduce the peak current if the output signal is lower than the signal from the error amplifier 25 on pin 22b." Ex. 1004, 4:37-51: "The output voltage of the switched power supply, V_{out}, is controlled by controlling the current in the primary circuit I_p. I_p is controlled by operating switch 16 in a time phased way using a driving circuit (not shown [in Fig. 6]). I_p is sensed by measuring the voltage generated across resistor 5. The measured voltage is used as a control signal to the gate driving circuit (not shown [in Fig. 6]), which—in response the control signal—controls the conduction time of switch 16. Upon switching switch 16 on I_p starts to build up in the primary circuit 1. When I_p reaches a predetermined level, switch 16 is turned off. After switching switch 16 off the energy stored in transformer 3 is transferred to the secondary circuit 2. This energy transfer induces a current Is in the secondary circuit 2."

	See also Ex. 1004, Abstract, Figs. 1-4 and 6-8, 1:36-65, 3:6-32, 5:34-62, Claims 1, 3, 8-11.

Claim 1[b]: "a sensor coupled to receive a signal from a single terminal of the controller,"

As shown in Figure 7, Mobers discloses a sensor coupled to receive a signal from a single terminal of the controller:



Ex. 1004, Fig. 7 (annotations added); Ex. 1002, ¶ 87. Mobers explains that the controller typically responds "to a control signal from the third winding" (i.e., control winding N2). *Id.*, 3:11-12. "Preferably, the control signal relates to the input voltage to the power supply in the first period of time. In the second period of time the control signal relates to the output voltage of the power supply." *Id.*, 3:14-17. And because "a plurality of information is provided via the same control signal the control circuit may receive that information via a *single input pin*." *Id.*, 3:18-20 (emphasis added).

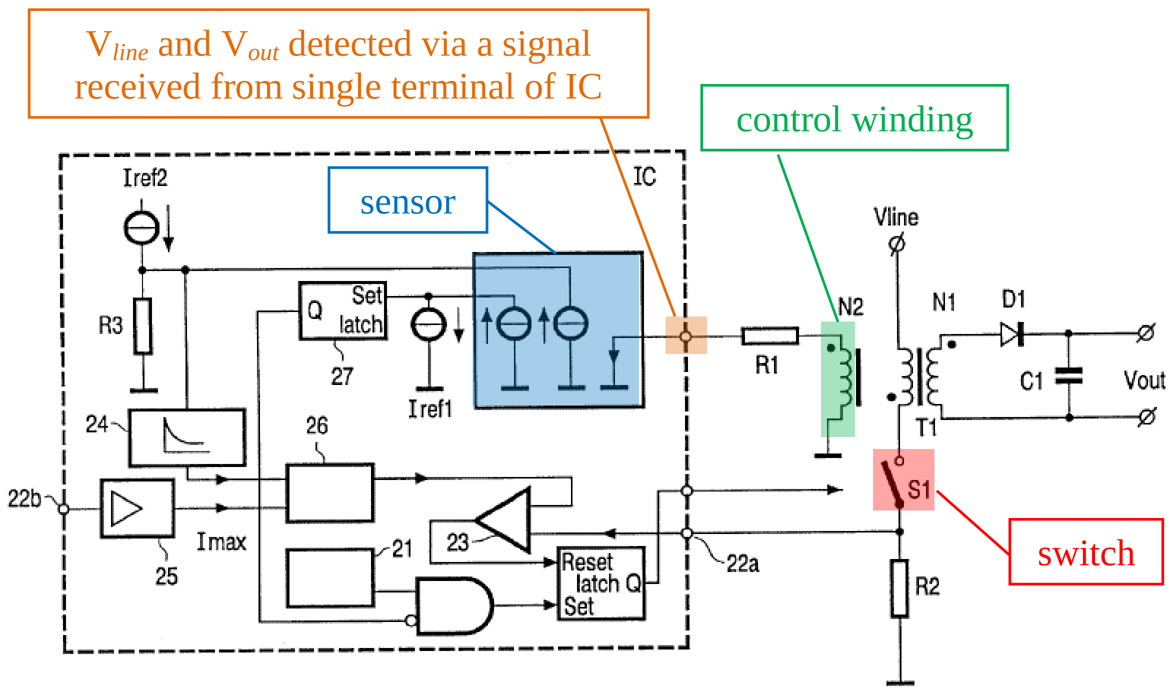
Accordingly, Mobers discloses each limitation of claim element 1[b]. Ex. 1002, ¶¶ 87-88.

[1b] a sensor coupled to receive a signal from a single terminal of the controller,	Ex. 1004, 5:50-55: "As previously mentioned the information relating to V_{line} will be present on the control winding N2 during the primary stroke, whereas information relating to the output voltage V_{out} will be present during the secondary stroke. Therefore, the very <u>same pin on the IC</u> can be used for obtaining both types of information." (emphasis added). Ex. 1004, 3:18-20: "Since a plurality of information is provided via the same control signal the control circuit may receive that information via a <u>single input pin</u>." (emphasis added). Ex. 1004, 5:20-25: "It is an advantage of the present invention that the information obtained during the primary and secondary strokes are provided via the <u>same existing pin</u> on the integrated circuit receiving and processing the information thereby avoiding the additional external components as suggested in the prior art." (emphasis added). Ex. 1004, Claim 5: "A switched-mode power regulator according to claim 3, wherein the control signal from the monitoring means is received by the control circuit via a <u>single input pin</u>." (emphasis added). *See also* Ex. 1004, Abstract, 1:5-13, 2:56-61, 3:1-17, 4:29-36, 4:52-5:4, 5:6-19, 5:63-6:3, Claims 1, 3, 4, 6, 10, Figures 6-8.

<u>Claim 1[c]: "the signal from the single terminal to represent a line input voltage of the power converter during at least a portion of an on time of the power switch, the signal from the single terminal to represent an output voltage of the</u>

power converter during at least a portion of an off time of the power switch,"

As shown in Figure 7 of Mobers, the sensor is coupled to receive, from a single terminal of the "IC," the signal that is generated by control winding N2 and resistor R1:



Ex. 1004, Fig. 7 (annotations added); Ex. 1002, ¶ 89.

The signal received by the sensor from resistor R1, via the single terminal of the controller, represents (i) the input line voltage (V_{line}) of the power converter during the on-time of switch S1, and (ii) the output voltage (V_{out}) of the power converter during at least a portion of the off-time of switch S1. *See* Ex. 1004, 5:50-55; Ex. 1002, ¶ 90.

As described in Section IV.A, Mobers discloses how V_{line} and V_{out} are represented by the signal that the sensor receives from the resistor (e.g., resistor R1 in Figure 7) coupled to the control winding. Specifically, Mobers clamps the voltage on the left side of the resistor to a fixed potential. Ex. 1004, 4:29-36, Figs. 6-7; *see also id.*, 5:63-6:3, Fig. 8; Ex. 1002, ¶ 91. When a voltage is generated by the control winding (indicative of either V_{line} or V_{out}) on the other side of the resistor, the voltage potential across the resistor causes a current to flow. *Id.* During the on-time of the switch (i.e., when V_{line} is reflected on the control winding), the current through the resistor is:

$$I_r = \frac{kV_{line}}{R},$$

where *R* equals the resistor value and *k* is the winding ratio of the control winding to the primary winding. *Id.*, 4:54-65 (equation 2); *see also id.*, 4:12-20. And during the off-time of the switch (i.e., when V_{out} is reflected on the control winding), the current through the resistor is:

$$I_r = \frac{mV_{out}}{R}.$$

where *R* equals the resistor value and *m* is the winding ratio of the control winding to the secondary winding. *Id.*, 4:66-5:5 (equation 3); *see also id.*, 4:21-28.

Because the control winding reflects a negative voltage indicative of V_{line}

during the on-time of the switch (Ex. 1002, ¶ 92), the current through resistor 14 in Figure 6 during the on-time of the switch is a "negative" current, i.e., a current flowing toward the control winding (Ex. 1004, 5:14-19). On the other hand, because the control winding reflects a positive voltage indicative of V_{out} during off-time of the switch (Ex. 1002, ¶ 92), the current through resistor 14 in Figure 6 during the off-time of the switch is a "positive" current, i.e., a current flowing away from the control winding (Ex. 1004, 5:14-19).

In sum, the signal received by the sensor represents both the input line voltage V_{line} and the output voltage V_{out} during different times of the switching cycle as required by claim element 1[c]. Accordingly, Mobers discloses each limitation of claim element 1[c]. Ex. 1002, ¶¶ 89-93.

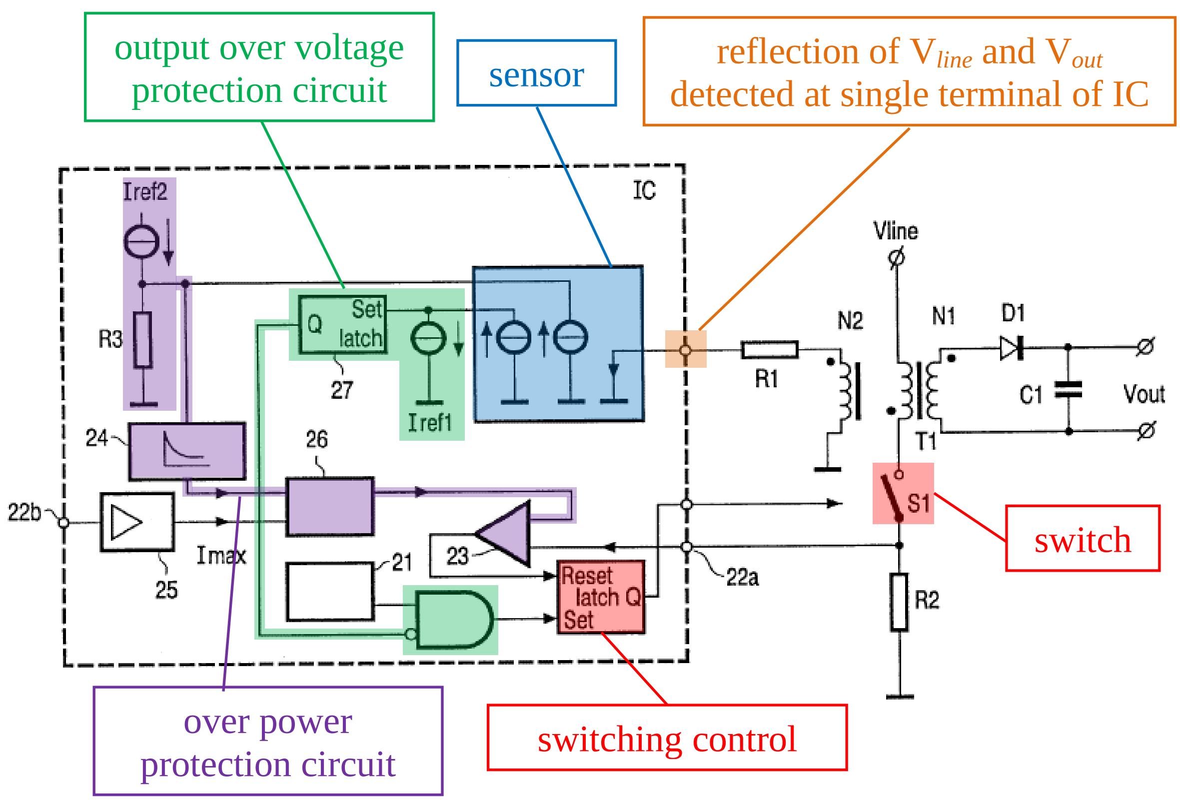
[1c] the signal from the single terminal to represent a line input voltage of the power converter during at least a portion of an on time of the power switch, the signal from the single terminal to represent an output voltage of the power converter	*See* citations for claim element 1[b]. Ex. 1004, 3:11-17: "The control circuit typically response to a control signal from the third winding. This control signal may comprise a [sic] information relating to the performance or status of the switched mode power supply. <u>Preferably, the control signal relates to the input voltage to the power supply in the first period of time. In the second period of time the control signal relates to the output voltage of the power supply</u>." (emphasis added). Ex. 5:50-53: "As previously mentioned the information relating to V_{line} will be present on the control winding N2 during the primary stroke, whereas information relating to the output voltage V_{out} will be present during the secondary stroke. Therefore, the very same pin on the IC can be used for obtaining both types of information." Ex. 1004, 4:29-36: "One end of the control winding 13 is

during at least a portion of an off time of the power switch,	connected to ground whereas the other and of the control winding is connected to resistor 14. By clamping the left side of resistor 14 to a fixed potential a current will flow through resistor 14 when this potential is different from the voltage generated across control winding 13. By measuring the current flowing through resistor 14 the voltage generated across the control winding 13 can be determined." Ex. 1004, 4:52-5:5: "When a current flows in either of windings 11 or 12, a current will also be induced in regulation circuit 10. The voltage generated across control winding 13 is related to V_{line} or V_{out} according to ratios k and m, respectively. A sensing circuit (not shown) measures the current flowing through resistor 14. Thus, knowing the value of resistor 14, V_{line} and V_{out} can be monitored. If the resistor 14 has resistance R, the current in the regulation circuit 10, I_r, is related to V_{line} during t_{on} in the following way $I_r = \frac{kV_{line}}{R}$, (2) whereas, during t_{off}, the current is related to V_{out} in the following way $I_r = \frac{mV_{out}}{R}$. (3) " Ex. 5:5-10: "Hence by monitoring the voltage in control winding 13 in a time phased way, not only V_{out} can be monitored in order to provide over voltage protection in the secondary circuit 2, but also V_{line} can be monitored in order to provide over power protection by operating the gate driving circuit in an appropriate way." Ex. 1004, Claim 6: "A switched mode power regulator according to claim 1, further comprising an integrated circuit (IC) having a single pin for receiving both information relating to an input voltage to the primary circuit in a first period of time in which energy is stored in the energy storing device (3) and information relating to an output voltage from the secondary circuit in a second period of time in which energy is

	released from the energy device (3)." Ex. 1004, Claim 10: "A method according to claim 9, wherein the monitoring circuit provides a control signal in response a measured level of the input and output voltages, said control signal relating to the input voltage in the first period of time, and said control signal relating to the output voltage in the second period of time." *See also* citations to Mobers in Section IV.A. *See also* Ex. 1004, Abstract, 1:5-13, 3:60-67, 5:14-19, 5:20-25, 5:56-57.

Claim 1[d]: "wherein the switching control is responsive to the sensor."

As shown in Figure 7 of Mobers, the switching control latch is responsive to the sensor via both the over power protection circuit and the output over voltage protection circuit:



Id., Fig. 7 (annotations added); *see also id.*, 5:26-62; Ex. 1002, ¶ 94.

The switching control latch shown in Figure 7 controls switch S1. *See* Ex. 1004, 5:26-62. And as explained below, the output over voltage protection circuit determines whether to allow the switching control latch to turn on switch S1 based on V_{out} information from the sensor.

During operation, the switch is turned on when a set signal from oscillator 21 sets the switching control latch. *See id.*, 5:27-28, Fig. 7. However, if the level of V_{out} detected by the sensor during the off-time of the switch exceeds a predetermined level, the over voltage protection latch sends a fault signal to the logic gate located between oscillator 21 and the switching control latch. *See id.*, 5:57-62, Fig. 7; Ex. 1002, ¶ 96. When the fault signal is asserted, the logic gate blocks set signals that would otherwise be transmitted from oscillator 21 to the switching control latch, thereby preventing switch S1 from being turned on during subsequent switching cycles. Ex. 1004, 5:59-62; Ex. 1002, ¶ 96.

In addition, the output power protection circuit may determine when switching control latch turns off switch S1 during a given switching cycle based on V_{line} information from the sensor. Ex. 1002, ¶ 97. As shown in Figure 7, the current through switch S1 is monitored by comparator 23, which is coupled to sense resistor R2. Ex. 1004, 5:30-31, Fig. 7. Comparator 23 resets the switching control latch to turn off switch S1 when the voltage across sense resistor R2 (which represents the current through switch S1 and resistor R2) exceeds a peak current threshold. *See id.*, 5:28-33, Fig. 7. And, as described in Mobers, the over power protection circuit adjusts the peak current threshold provided by minimum circuit 21 based on information from the sensor relating to V_{line}. *Id.*, 5:34-50, Fig. 7; Ex. 1002, ¶ 97.

Specifically, curve circuit 24 processes the input line voltage information from the sensor and passes a threshold level to minimum circuit 26. Ex. 1004, 5:34-45. When the signal from curve circuit 24 is less than the feedback signal from error amplifier 25, minimum circuit 26 passes the threshold from curve circuit 24 to comparator 23. *See id.*, 5:46-50, Fig. 7. This limits the peak current through switch S1 during the on-time of a given switching cycle as a function of the input line voltage, thereby limiting the amount of power passed from the input to the output of the power converter. *Id.*, 5:46-50, Fig. 7; *see also id.*, Abstract, 1:5-13, 2:50-53, 3:60-62; Ex. 1002, ¶ 98.

Accordingly, the switching control in Mobers is responsive to the sensor via both the output over voltage protection circuit and the over power protection circuit. Mobers therefore discloses each limitation of claim element 1[d]. Ex. 1002, ¶¶ 94-99.

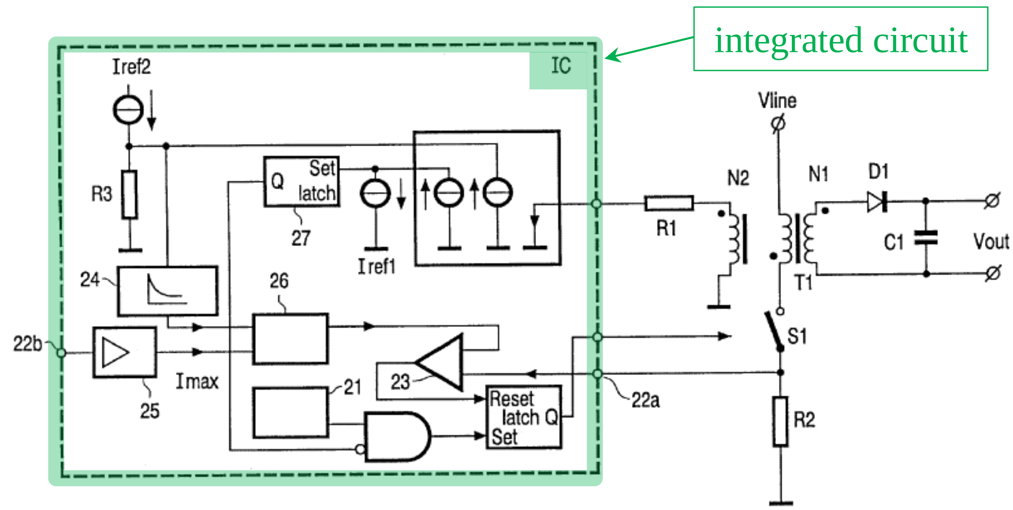
[1d] wherein the switching control is responsive to the sensor.	*See* citations for claim elements 1[a]-[b]. Ex. 1004, 3:6-17: "The switched-mode power supply according to the first aspect of the present invention may further comprise a control circuit for controlling the controllable current switching means. The control circuit may comprise a PWM-circuit operating the switch at a frequency between 25-250 kHz. The control circuit typically response to a control signal from the third winding. This control signal may comprise a information relating to the performance or status of the switched mode power supply. Preferably, the control signal relates to the input voltage to the power supply in the first period of time. In the second period of time the control signal relates to the output voltage of the power supply." Ex. 1004, 5:5-10: "Hence by monitoring the voltage in control winding 13 in a time phased way, not only V_{out} can be monitored in order to provide over voltage protection in the secondary circuit 2, but also V_{line} can be monitored in order to provide over power protection by operating the gate driving circuit in an appropriate way." Ex. 1004, 3:60-67: "This control winding forms part of an over power protection system by providing information relating to the line voltage V_{line}. Additionally, the control winding forms part of an over voltage protection system by monitoring the output voltage V_{out} of the switched-mode power supply. As it will be explained in further details below, the sensing of V_{line} and the monitoring of V_{out} is performed in a time phased way." Ex. 1004, 5:26-62: "Referring now to FIG. 7, the switch S1 is controlled by a PWM signal from a PWM circuit. The switch is switched on by the set signal from the oscillator 21. The switch is switched off if a certain peak current through S1 is sensed. As previously mentioned, the peak current through S1 is sensed by sensing the voltage generated across R2. This sensed voltage is provided through pin 22a. As soon as the comparator 23 trips, S1 is switched off. Besides the input signal from 22a, also a signal from the over power protection circuit is used to determine the peak current through S1 and R2. For this purpose the information relating to V_{line} is used. This information is retrieved from the control

	winding N2 of the transformer. The V_{line} information is processed in the 'curve' circuit 24. The processor is a multiplier that transforms the input signal into the square root of the signal. The square root is taken, because for this system the optimum compensation will be made. Alternatively, a linear function will also do, but then the maximum output power still has quite some V_{line} dependence. The information from the over power protection circuit can reduce the peak current if the output signal is lower than the signal from the error amplifier 25 on pin 22 b. The magnitude of both signals is sensed by the minimum (min.) circuit 26. As previously mentioned the information relating to V_{line} will be present on the control winding N2 during the primary stroke, whereas information relating to the output voltage V_{out} will be present during the secondary stroke. Therefore, the very same pin on the IC can be used for obtaining both types of information. As previously mentioned, information relating to V_{out} is available during the secondary stroke. If it is determined that V_{out} comes above a predetermined level a latch is set in circuit 27. This latch prevents switch S1 from switching on again so as to shut down the switched-mode power supply in case of an over voltage being present on the output terminals." *See also* Ex. 1004, 1:5-13, 2:51-55, 4:37-44, 5:20-25, 5:63-6:3, Figs. 6-8, Claims 1, 3, 5-6, 9-11.

2. Claim 7

Claim 7: "The controller of claim 1, wherein the controller is an integrated circuit controller for the power converter."

Mobers explains that the controller of its power converter is advantageously implemented on "an integrated circuit." Ex. 1004, 2:56-59. By integrating both the over voltage and over power protection circuit, "no additional pins on the integrated circuit are needed." *Id.*, 2:59-62. Indeed, Figure 7 illustrates the controller of Mobers integrated on an "IC" (i.e., an integrated circuit):



Ex. 1004, Fig. 7 (annotations added)[6]; Ex. 1002, ¶ 101.

Accordingly, Mobers discloses each limitation of Claim 7. Ex. 1002, ¶¶ 100-102.

7. The controller of claim 1, wherein the controller is an integrated circuit controller for the power converter.	*See* citations for Claim 1. Ex. 1004, 2:56-61: "Advantageously, an <u>integrated circuit</u> is provided with an integrated over voltage and over power protection circuit without the use of additional die demanding external components. A consequence of this is the fact that no additional pins on the <u>integrated circuit</u> are required. Furthermore, external feedback loop/control loops can be avoided." (emphasis added). Ex. 1004, 5:20-25: "It is an advantage of the present

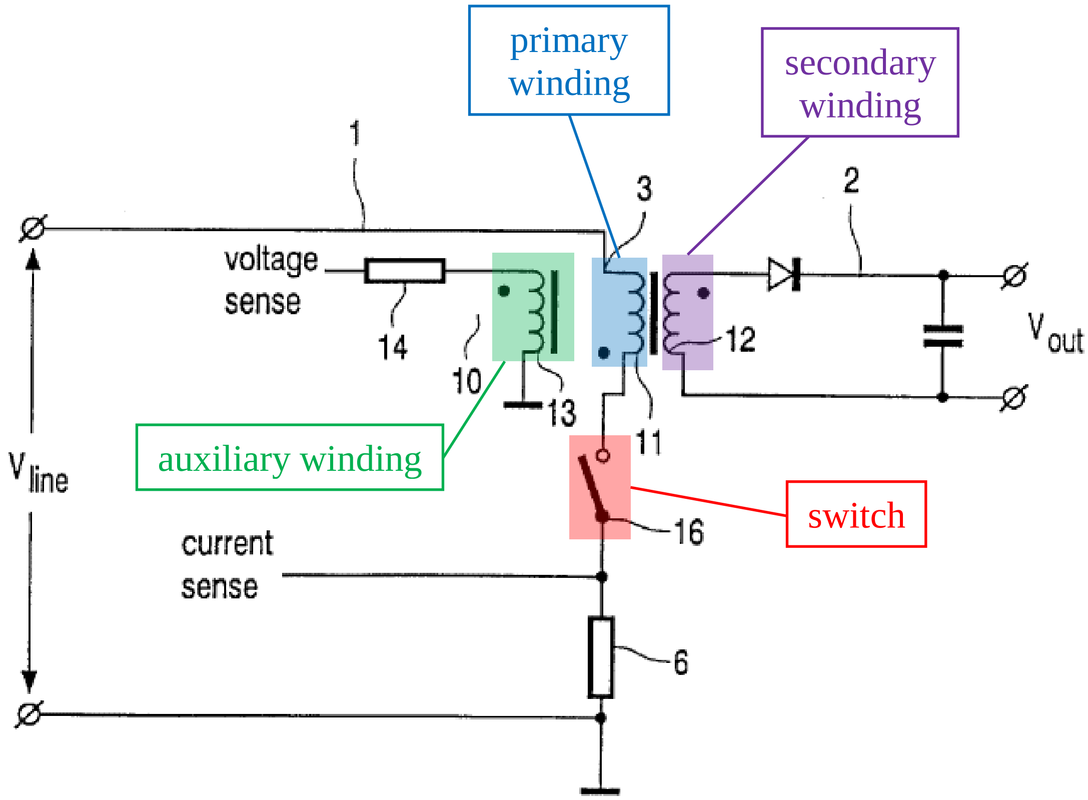
[6] "IC" in Figure 7 of Mobers is a well-known acronym for "integrated circuit." Ex. 1002, ¶ 101; Ex. 1014, 19. Further, Mobers itself identifies "IC" as an acronym for "integrated circuit." Ex. 1004, Claim 6 ("integrated circuit (IC)").

	invention that the information obtained during the primary and secondary strokes are provided via the same existing pin on the integrated circuit receiving and processing the information thereby avoiding the additional external components as suggested in the prior art." (emphasis added). Ex. 1004, Claim 6: "6. A switched mode power regulator according to claim 1, further comprising an integrated circuit (IC) having a single pin for receiving both information relating to an input voltage to the primary circuit in a first period of time in which energy is stored in the energy storing device (3) and information relating to an output voltage from the secondary circuit in a second period of time in which energy is released from the energy device (3)." (emphasis added). *See also* Ex. 1004, 2:30-48, 4:37-44, 5:46-62, 5:63-6:3, Figs. 6-8, Claim 1.

B. Ground 2: Claims 1 and 7 are Obvious Over Mobers Under 35 U.S.C. § 103

Mobers, combined with the knowledge of a person of ordinary skill in the art, discloses and suggests each element of Claims 1 and 7, and thus renders Claims 1 and 7 obvious under 35 U.S.C. § 103. *See* Ex. 1002, ¶¶ 103-107.

Mobers discloses a flyback-type switching power converter that utilizes a transformer with an auxiliary winding, which is referred to by Mobers as a "control winding." Ex. 1004, 4:1-28, Fig. 6. Figure 6 illustrates certain components of the switching power converter:



Ex. 1004, Fig. 6 (annotations added); Ex. 1002, ¶ 104.

In one section, Mobers states that "the control voltage generated across the control winding 13 is related to V_{line} during the conduction time (primary stroke)" (i.e., the on-time of switch 16), and is "related to V_{line} during the non-conduction time (secondary stroke)" (i.e., the off-time of switch 16). Ex. 1004, 5:10-13 (bold emphasis added). This snippet of text refers to "V_{line}" twice. However, Petitioner's expert has identified the second instance of "V_{line}" in column 5, lines 10-13 as a typographical error that should instead be "V_{out}." Ex. 1002, ¶ 105.

As explained in Sections III.A-C, a person of ordinary skill in the art ("POSITA") would understand that an auxiliary winding in a flyback switching power converter naturally reflects the voltage present on the secondary winding (i.e., Vout plus the voltage drop of the rectifier) when current flows through the secondary side (i.e., during off-time of the switch). *See* Ex. 1002, ¶ 106; Ex. 1006, 3:4-15; Ex. 1008, 7:31-43. Moreover, other portions of Mobers clarify that "the information relating to V_{line} will be present on the control winding N2 during the primary stroke, whereas information relating to the output voltage V_{out} will be present during the secondary stroke." Ex. 1004, 5:50-53; *see also id.*, 4:52-5:5.

Thus, regardless of the misstatement in Mobers column 5, lines 10-13, a POSITA would understand that Mobers discloses and suggests the sensing of both the output voltage and the line input voltage via a single terminal of a controller IC at different times during the switching cycle. *See* Ex. 1004, 5:50-53, Figs. 6-7, Ex. 1002, ¶ 107. Moreover, Mobers discloses and suggests every other limitation of Claims 1 and 7 of the '483 Patent according to the mapping provided in Sections VI.A.1-2. Therefore, Mobers renders Claims 1 and 7 obvious to a person of ordinary skill in the art under 35 U.S.C. § 103.

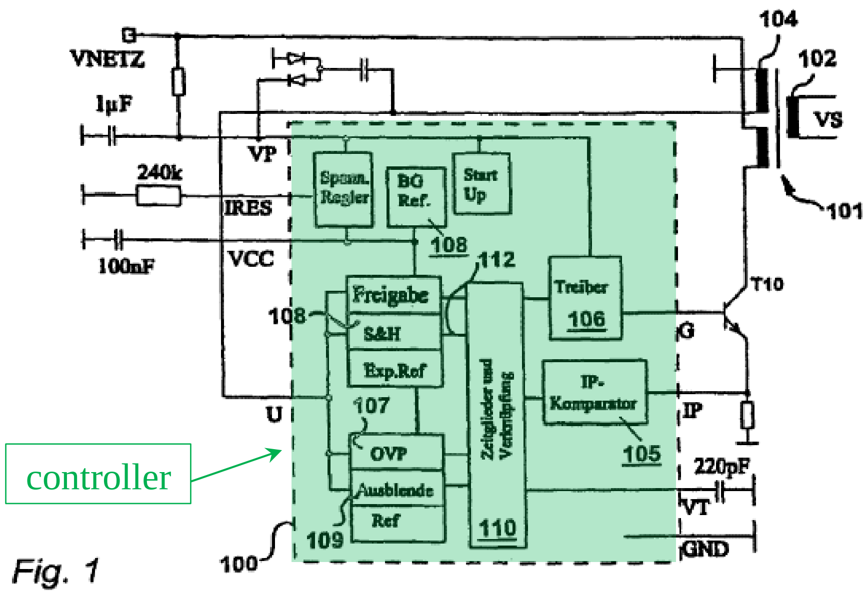
C. Ground 3: Claims 1-3 and 7 are Obvious Over Reinhard Under 35 U.S.C. § 103

Reinhard, combined with the knowledge of a person of ordinary skill in the art, discloses and suggests each element of Claims 1-3 and 7, and thus renders Claims 1-3 and 7 obvious under 35 U.S.C. § 103. Ex. 1002, ¶ 108.

1. Claim 1

1[pre]: "A controller for a power converter, comprising:"

Reinhard discloses a controller for a power converter. "[T]he present invention relates to a control circuit in a primary-control switched mode power supply unit, which comprises a primary switch and a transformer with an auxiliary winding." Ex. 1007, ¶ 0001.



Ex. 1007, Fig. 1 (annotations added); *see also id.*, Abstract, ¶ 0021. Accordingly, Reinhard discloses and suggests each element of the preamble of Claim 1.[7] Ex. 1002, ¶ 109.

1[pre]. A controller for a power	Ex. 1007, ¶ 0021: "Referring now to the drawings and in particular to FIG. 1, a control circuit for controlling the output power of a primary-controlled switch mode power supply unit is shown in its

[7] The preamble of Claim 1 is not limiting, but nonetheless is disclosed by Reinhard.

converter, comprising:	application environment. Such a controller 100 may for instance be implemented as an application specific integrated circuit (ASIC)." *See also* Ex. 1007, Abstract, ¶¶ 0001, 0005, 0007, 0010, 0021, 0022, 0023, 0043, Figs. 1-2, Claims 1-2, 6, 7, 10, 16, and 28.

<u>Claim 1[a]: "a switching control that switches a power switch to regulate an output of the power converter; and;"</u>

Reinhard discloses "timing circuit and interconnection 110" and "driver 106," which collectively form a switching control that switches switch T10 (i.e., a power switch) on and off to regulate an output of the power converter. Ex. 1007, ¶ 0022.

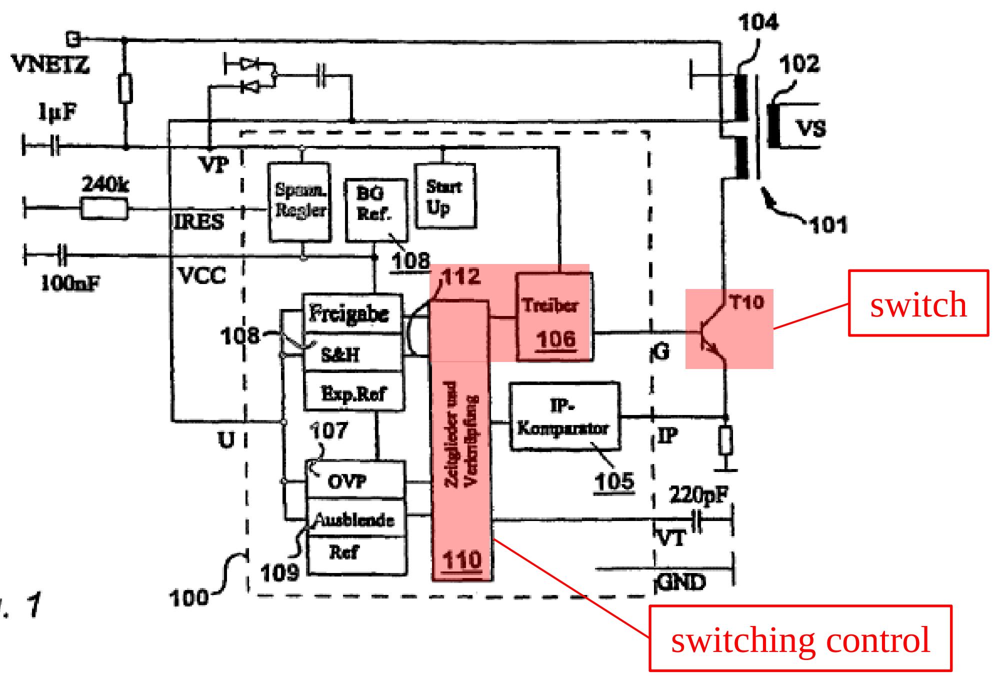


Fig. 1

Id., Fig. 1 (annotations added); Ex. 1002 ¶ 110.

As explained in Reinhard with reference to Figure 1, the output power of the power supply is regulated by controlling the on and off switching of switch T10:

> In particular the positive voltage pulse at the auxiliary winding after the opening of the switch may be used for *controlling the output power of the switched mode power supply* unit. Here the control is performed by means of a corresponding adapting of the *time duration wherein the switch T10 is opened*. The actual controlling of the bipolar transistor T10 is performed via a driver 106.

Id., ¶ 0022 (emphasis added); *see also id.*, ¶¶ 0021-0022, Claim 25, Fig. 1.

Figure 2 of Reinhard further depicts the control circuit 100 of Figure 1 in a power supply that further shows the full output stage. Ex. 1007, ¶¶0015-0016. As shown in Figure 2, the voltage V_S (shown in Figure 1 as the voltage produced by secondary winding 102) is rectified by diode D100 and filtered by capacitor C101 to produce the output of the power converter that is regulated as described above.

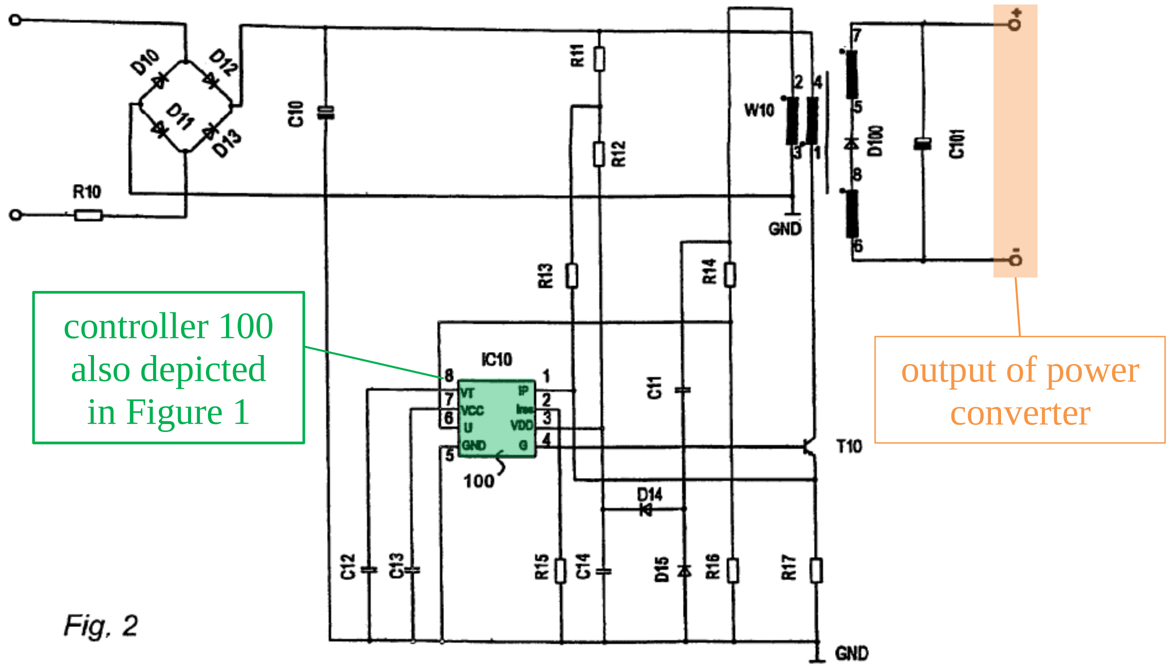


Fig. 2

Id., Fig. 2 (annotations added); Ex. 1002, ¶ 112.

Accordingly, Reinhard discloses and suggests each limitation of claim element 1[a]. Ex. 1002, ¶¶ 110-113.

[1a] a switching control that switches a power switch to regulate an output of the power converter; and	Ex. 1007, ¶ 0021: "Referring now to the drawings and in particular to FIG. 1, a control circuit for controlling the output power of a primary-controlled switch mode power supply unit is shown in its application environment. Such a controller 100 may for instance be implemented as an application specific integrated circuit (ASIC). By means of the control circuit 100 the secondary power of the switched mode power supply unit which is output at the secondary winding 102 is controlled on the primary-side by controlling an electronic switch T10, here a power bipolar transistor." Ex. 1007, ¶ 0022: "In particular the positive voltage pulse at the auxiliary winding after the opening of the switch may be used for controlling the output power of the switched mode power supply unit. Here the control is performed by means of a corresponding adapting of the time duration wherein the

	switch T10 is opened. <u>The actual controlling of the bipolar transistor T10 is performed via a driver 106</u>." (emphasis added). Ex. 1007, ¶ 0043: "Therefore, in an advantageous manner the complete <u>output voltage controlling</u>, including the over-voltage protection, may be integrated into one integrated circuit and no further electronic components are necessary." (emphasis added). Ex. 1007, ¶ 0043: "In a switched mode power supply unit with an <u>output voltage control</u> that samples the voltage at a primary auxiliary winding, an over-voltage protection circuit may be provided as a second control loop or an over-voltage interruption at the same auxiliary winding." Ex. 1007, Claim 25: "wherein the step of adjusting the output power comprises adapting the time period during which the primary-side switch is opened." Ex. 1007, ¶ 0023: "According to the present invention, the control circuit 100 further comprises an over-voltage protection comparator 107 and a gating comparator 109, which are both supplied with the voltage that is induced at the auxiliary winding 104. The OVP comparator 107 detects positive voltages above the control region, switches off the driver 106 for the duration of a gating time and thus prevents the occurring of over-voltages. … The gating comparator 109 detects the negative voltages during the closing of the primary-side switch and also triggers the blind-out time for the driver when a negative voltage pulse is missing." *See also* Ex. 1007, Abstract, ¶¶ 0001, 0005, 0007, 0010, 0012, 0021, 0022, 0023, 0026, 0027, Figs. 1-2, Claims 1-2, 6, 7, 9-10, 13, 16, 28, 30.

<u>Claim 1[b]: "a sensor coupled to receive a signal from a single terminal of the controller,"</u>

Reinhard includes a sensor coupled to receive a signal from the auxiliary winding via the "U" terminal (i.e., a single terminal) of controller 100:

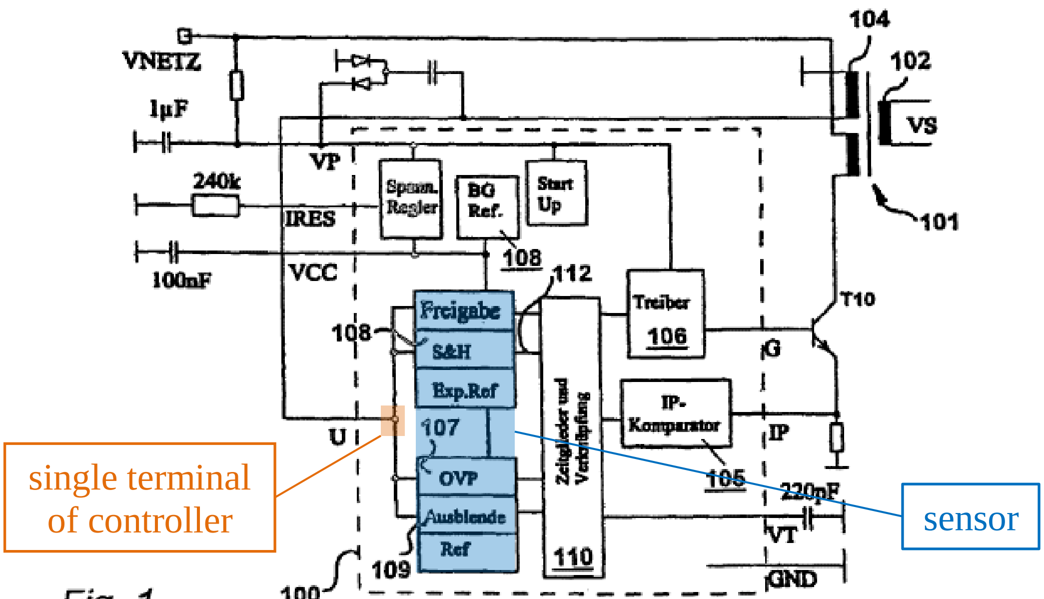


Fig. 1

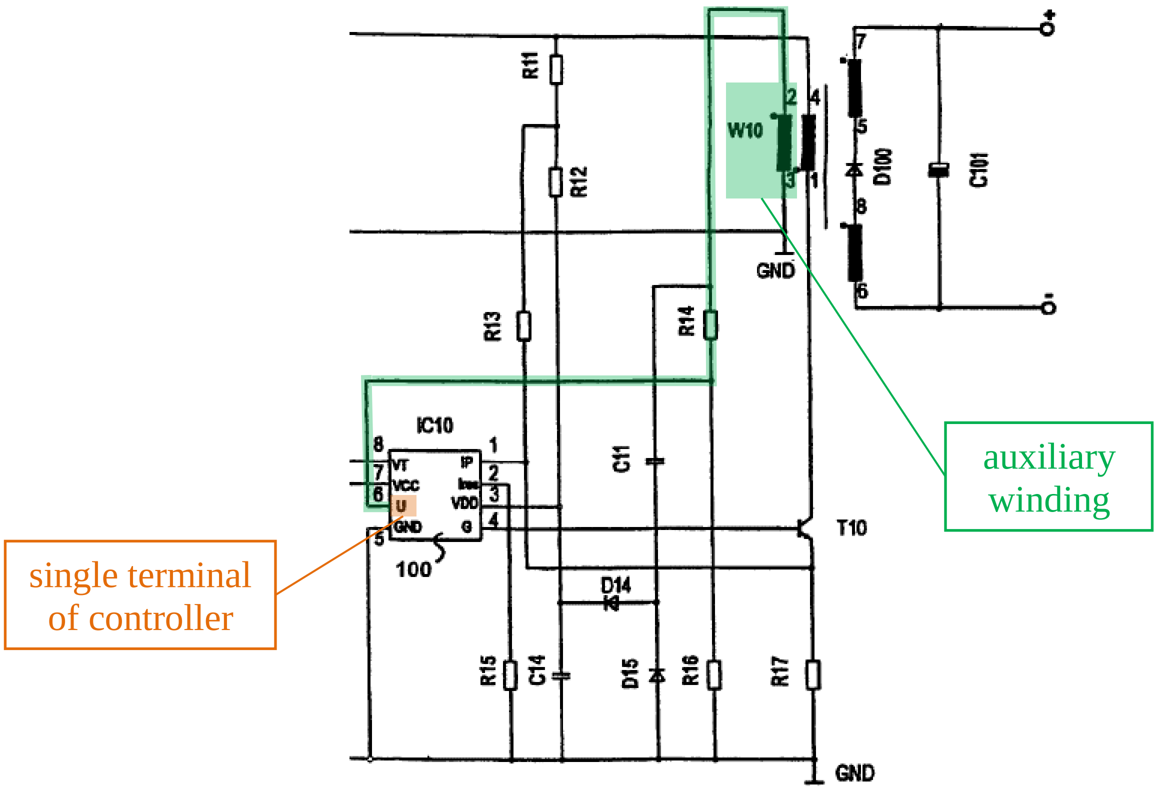
Ex. 1007, Fig. 1 (annotations added); Ex. 1002, ¶ 114.

As described in Section V.B, the plain meaning of the claims requires that the "sensor" be coupled to receive a signal from the single terminal that represents the line input voltage and the output voltage at different times in the switching cycle. There is no requirement in Claim 1, however, regarding whether or how the sensor must respond to the various items of information represented by the signal at different times during the switching cycle. But regardless, Reinhard's sensor is configured to detect and act upon both the positive voltage (representative of the output voltage) during the off-time of the switch, and the negative voltage (representative of the line input voltage) during the on-time of the switch. *See* Ex. 1007, ¶ 0023.

For example, Reinhard's sensor includes sample and hold circuit 108, which samples the positive voltage on the auxiliary winding during the off-time of switch T10 to detect the output voltage. Ex. 1007, ¶ 0022. The sampled voltage is used as feedback for regulating the output of the power supply. *See id.*, ¶¶ 0022, 0043; Ex. 1002, ¶ 116.

Reinhard's sensor also includes "an over-voltage protection [OVP] comparator 107 and a gating comparator 109, which are both supplied with the voltage that is induced at the auxiliary winding 104." Ex. 1007, ¶ 0023. "OVP comparator 107 detects positive voltages" induced on the auxiliary winding during the off-time of switch T10, and "gating comparator 109 detects the negative voltages" induced on the auxiliary winding during the on-time of the switch T10. *Id.*; *see also id.*, Fig. 4.

Figure 2 of Reinhard further depicts the control circuit 100 of Figure 1. Ex. 1007, ¶¶ 0015-0016. And as shown in excerpt of Figure 2 below, the "U" terminal is again shown as a single terminal of control circuit 100 that is coupled to pass a signal from the auxiliary to the sensor inside of control circuit 100:



Id., Fig. 2 (annotations added); Ex. 1002, ¶ 118.

Accordingly, Reinhard discloses and suggests each limitation of claim element 1[b]. Ex. 1002, ¶¶ 115-119.

[1b] a sensor coupled to receive a signal from a single terminal of the controller,	Ex. 1007, ¶ 0023: "According to the present invention, the control circuit 100 further comprises an over-voltage protection comparator 107 and a gating comparator 109, which are both supplied with the voltage that is induced at the auxiliary winding 104. The OVP comparator 107 detects positive voltages above the control region, switches off the driver 106 for the duration of a gating time and thus prevents the occurring of over-voltages. When the auxiliary winding works properly, a negative voltage pulse is induced when the primary-side switch is closed as shown in FIG. 4 in curve 401. If the auxiliary winding 104 is not connected or broken, this negative voltage pulse is missing. The gating comparator 109 detects the negative voltages during the closing of the primary-side switch and also triggers the blind-out time for the driver when a negative voltage pulse is missing." (emphasis

	added). Ex. 1007, ¶ 0022: "In particular the positive voltage pulse at the auxiliary winding after the opening of the switch may be used for controlling the output power of the switched mode power supply unit. … The sample and hold circuit 108 according to the present invention is supplied with a corresponding sample signal 112 from a circuit arrangement contained in the block 'timing circuit and interconnection' 110, when the voltage value at the auxiliary winding has to be sampled and stored." Ex. 1007, ¶ 0043: "In a switched mode power supply unit with an output voltage control that samples the voltage at a primary auxiliary winding, an over-voltage protection circuit may be provided as a second control loop or an over-voltage interruption at the same auxiliary winding." (emphasis added). Ex. 1007, ¶ 0005: "Said control circuit further comprises a sample and hold device for sampling and storing a height of the voltage pulse in response to the sampling signal for generating a controlled variable, and a control unit for comparing the controlled variable with a reference value and for adjusting the output power dependent on the result of this comparison." (emphasis added). *See also* Ex. 1007, Abstract, ¶¶ 0003, 0005, 0007, 0022, 0023, 0027, 0028, 0034, 0043, Claims 1, 27, Figs. 1, 2, 4.

Claim 1[c]: "the signal from the single terminal to represent a line input voltage of the power converter during at least a portion of an on time of the power switch, the signal from the single terminal to represent an output voltage of the power converter during at least a portion of an off time of the power switch,"

Figure 1 of Reinhard illustrates auxiliary winding 104 magnetically coupled to both primary winding 101 and secondary winding 102:

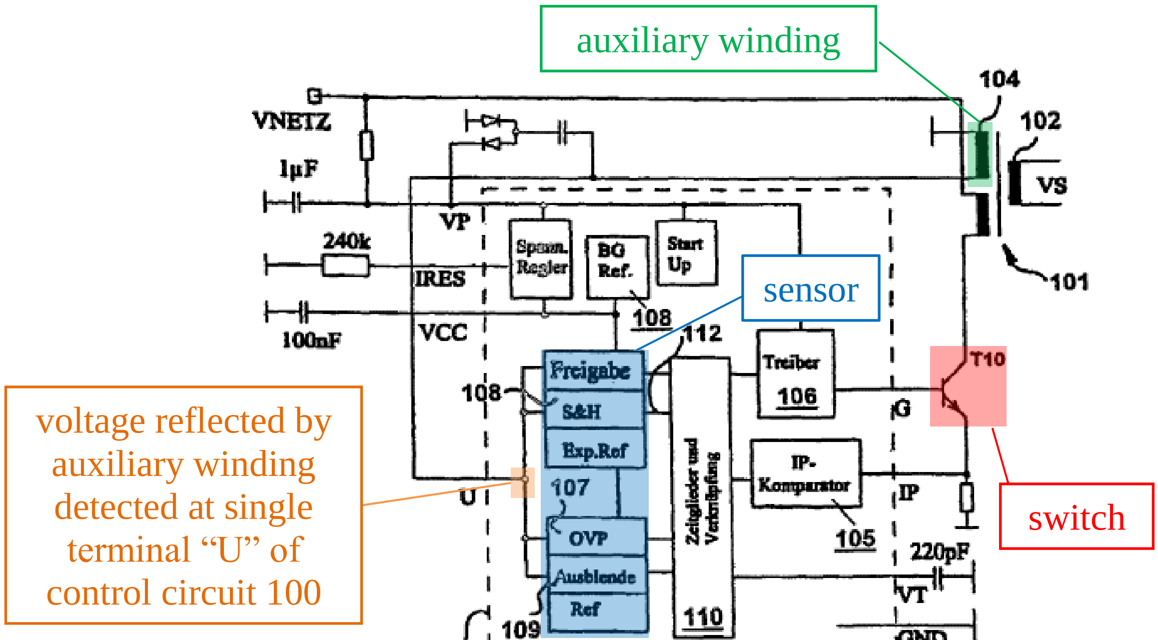
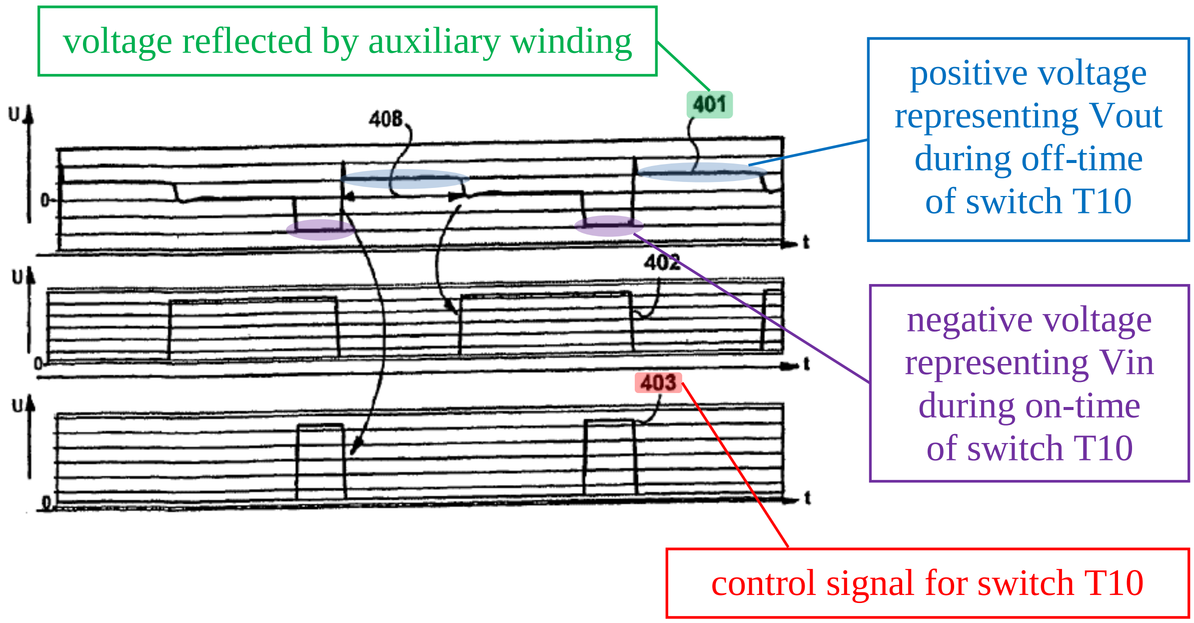


Fig. 1

Ex. 1007, Fig. 1 (annotations added); Ex. 1002, ¶ 120. As described in Section III, a POSITA would understand that the magnetic coupling of the transformer disclosed by Reinhard causes the auxiliary winding to (i) produce a positive voltage representative of the output voltage during at least a portion of the off-time of the switch, and (ii) produce a negative voltage representative of the input line voltage during the on-time of the switch. *See supra* Sections III.A-C; Ex. 1002, ¶ 121.

Consistent with this understanding, Reinhard discloses that the signal received from the auxiliary winding via the "U" terminal of control circuit 100, includes a "positive voltage pulse" during the off-time of switch T10, and a "voltage pulse the negative direction" during the on-time of switch T10. Ex. 1007,

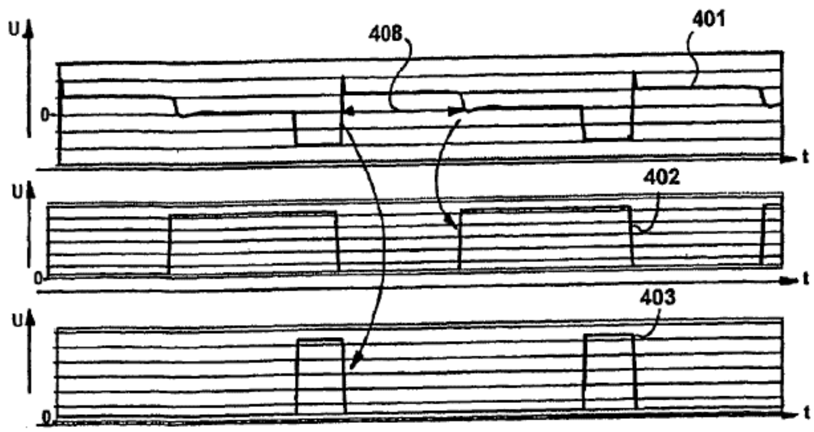
¶ 0021 (emphasis added). Likewise, curve 401 in Figure 4 illustrates "the voltage at the auxiliary winding" that is induced during the on-time and the off-time of power switch T10. Ex. 1007, ¶ 0032.



Id., Fig. 4 (excerpt) (annotations added); Ex. 1002, ¶ 122.

In sum, a POSITA would understand that the positive voltage swing of the signal received via the "U" terminal in Reinhard represents the output voltage of the power converter, while the negative voltage swing of that signal disclosed in Reinhard represents the line input voltage. Ex. 1002, ¶ 123. Therefore, a POSITA would understand Reinhard to disclose and suggest each limitation of claim element 1[c]. Ex. 1002, ¶¶ 120-123.

[1c] the signal from the single terminal to	*See* citations for claim element 1[b]. Ex. 1007, ¶ 0032: "An overview of the time behaviors of the most important voltages (in a qualitative representation) is

represent a line input voltage of the power converter during at least a portion of an on time of the power switch, the signal from the single terminal to represent an output voltage of the power converter during at least a portion of an off time of the power switch,	given in FIG. 4. Here the curve 401 signifies the course of the voltage at the auxiliary winding, the curve 402 the course of the demagnetization detection, the curve 403 the course of the control signal for the primary-side switch T10, the curve 404 the voltage at the first capacitor C1, the curve 405 the voltage at the second capacitor C2 and the curve 406 the sampling signal 112." (emphasis added). Ex. 1007, Fig. 4 (excerpt):  Ex. 1007, ¶ 0021: "As controlled variable here the voltage across an auxiliary winding 104 is used. As can be seen schematically from curve 401 of FIG. 4, a positive voltage pulse is induced within the auxiliary winding after the switch T10 has opened, which exhibits at first an overshoot and then a continuously decaying course. After the duration of the voltage pulse 408 has expired, the voltage at the auxiliary winding decays with a transient oscillation to zero. A voltage pulse in negative direction is induced within the auxiliary winding, when the switch is closed again." (emphasis added). Ex. 1007, ¶ 0023: "According to the present invention, the control circuit 100 further comprises an over-voltage protection comparator 107 and a gating comparator 109, which are both supplied with the voltage that is induced at the auxiliary winding 104. The OVP comparator 107 detects positive voltages above the control region, switches off the driver 106 for the duration of a gating time and thus prevents the occurring of over-voltages. When the auxiliary winding works properly, a negative voltage pulse is induced when the primary-side switch is closed as shown in FIG. 4 in curve 401.

	If the auxiliary winding 104 is not connected or broken, this negative voltage pulse is missing. The gating comparator 109 detects the negative voltages during the closing of the primary-side switch and also triggers the blind-out time for the driver when a negative voltage pulse is missing." (emphasis added). *See supra* Sections III.A-C. *See also* Ex. 1007, Abstract, ¶¶ 0007, 0010, 0022, 0027, 0034, 0043, Figs. 1-2, 4, Claims 1, 2, 6, 7, 8, 10, 13, 16, 25, 28, 30.

Claim 1[d]: "wherein the switching control is responsive to the sensor."

Reinhard's switching control is responsive in multiple ways to circuitry identified above as the sensor.

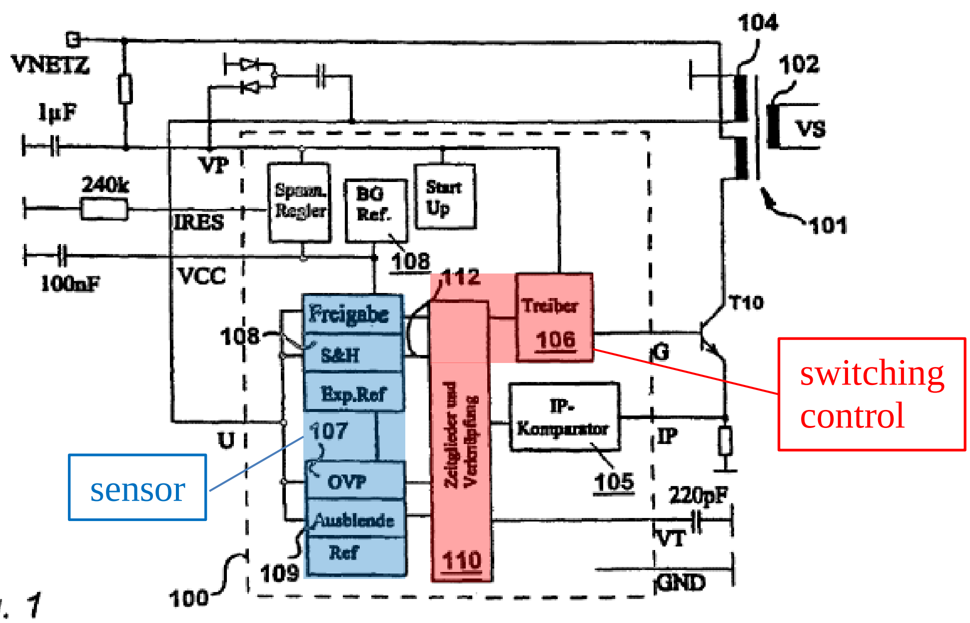


Fig. 1

Id., Fig. 1 (annotations added); Ex. 1002, ¶ 124.

For example, the sample and hold circuit (S&H) 108 within Reinhard's sensor samples the voltage value at the auxiliary winding to detect the output voltage. Ex. 1007, ¶ 0022; Ex. 1002, ¶ 125. The detected output voltage is used to control the switch, thereby regulating the amount of power that is transferred from the input to the output of the power supply. *See* Ex. 1007, ¶ 0022 ("In particular the positive voltage pulse at the auxiliary winding after the opening of the switch may be used for controlling the output power of the switched mode power supply unit. Here the control is performed by means of a corresponding adapting of the time duration wherein the switch T10 is opened."); ¶ 0043 (describing "an output voltage control that samples the voltage at a primary auxiliary winding").

Further, Reinhard's sensor includes "an over-voltage protection [OVP] comparator 107 and a gating comparator 109, which are both supplied with the voltage that is induced at the auxiliary winding 104." Ex. 1007, ¶ 0023. Reinhard's switching control may respond to either one of these sensor components by disabling the drive for switch T10. Ex. 1002, ¶ 126. For example, "OVP comparator 107 detects positive voltages above the control region, switches off the driver 106 for the duration of a gating time and thus prevents the occurring of over-voltages." Ex. 1007, ¶ 0023. Likewise, the "gating comparator 109 detects the negative voltages during the closing of the primary-side switch and also triggers the blind-out time for the driver when a negative voltage pulse is missing." *Id.*

Accordingly, Reinhard discloses and suggests each limitation of claim element 1[d]. Ex. 1002, ¶¶ 124-127.

[1d] wherein the switching control is responsive to the sensor.	*See* citations for claim elements 1[a]-[b]. Ex. 1007, ¶ 0023: "According to the present invention, the control circuit 100 further comprises an over-voltage protection comparator 107 and a gating comparator 109, which are both supplied with the voltage that is induced at the auxiliary winding 104. The <u>OVP comparator 107 detects positive voltages above the control region, switches off the driver 106</u> for the duration of a gating time and thus prevents the occurring of over-voltages. When the auxiliary winding works properly, a negative voltage pulse is induced when the primary-side switch is closed as shown in FIG. 4 in curve 401. If the auxiliary winding 104 is not connected or broken, this negative voltage pulse is missing. The <u>gating comparator 109 detects the negative voltages during the closing of the primary-side switch and also triggers the blind-out time for the driver</u> when a negative voltage pulse is missing." (emphasis added). Ex. 1007, ¶ 0022: "In particular the positive voltage pulse at the auxiliary winding after the opening of the switch may be used for controlling the output power of the switched mode power supply unit. Here the control is performed by means of a corresponding adapting of the time duration wherein the switch T10 is opened. … <u>Further circuit elements for switching on and off the driver 106 are the current and voltage detection with timing circuits and characteristics that describe the control characteristics.</u> Protection functions for over-voltage and over-current are contained as well as a voltage controller and a start-up circuit. The sample and hold circuit 108 according to the present invention is supplied with a corresponding sample signal 112 from a circuit arrangement contained in the block 'timing circuit and interconnection' 110, when the voltage value at the auxiliary winding has to be sampled and stored." (emphasis added). *See also* Ex. 1007, ¶¶ 0005, 0007, 0021, 0023, 0034, 0043, Figs. 1, 2, 4, Claims 1, 6, 7, 10, 13, 16, 25, 28, 30.

2. Claims 2 and 3

2. The controller of claim 1, wherein the sensor is coupled to sample the signal from the single terminal during the portion of the off time of the power switch.

3. The controller of claim 2, wherein the sensor is coupled to delay the sampling of the signal from the single terminal for a first time period after the power switch transitions from the on time to the off time.

As described above for claim element 1[b], Reinhard's sensor includes sample and hold circuit (S&H) 108.[8] Ex. 1007, ¶ 0022. Figure 4 illustrates the timing of the sampling signal 406 that determines when sample and hold circuit 108 samples the auxiliary winding:

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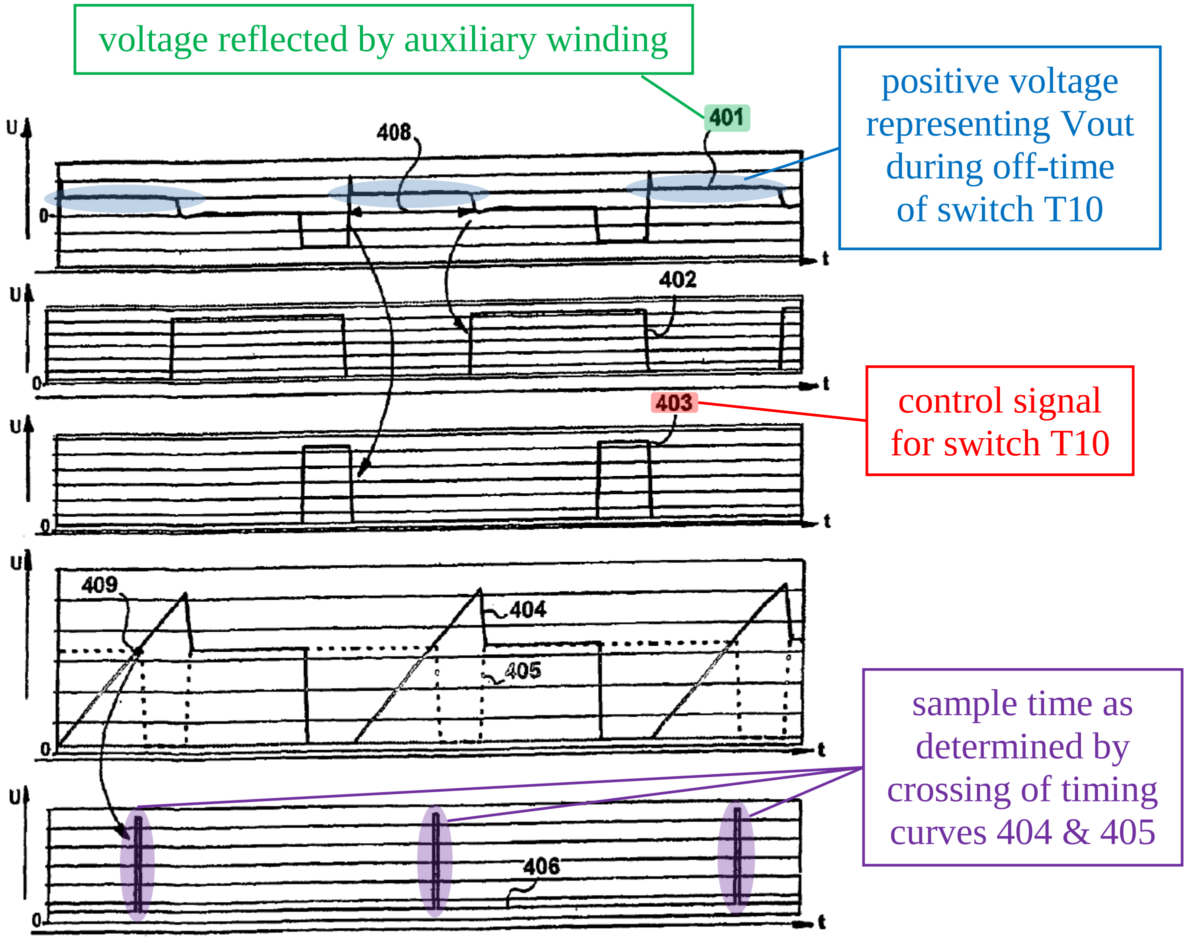
[8] Sample and hold circuits are "common analog building blocks" taught in university level textbooks. Ex. 1005, 14; *see also* Ex. 1014, 20-21, 25-26. Reinhard discloses "sample and hold circuit" (S&H) 108 (*e.g.*, Ex. 1007, ¶¶ 0022, 0030, Fig. 1) and describes a circuit for controlling the timing of the sample signal (*id.*, ¶¶ 0030, 0033, Figs. 3-4). Reinhard's disclosure would therefore enable a POSITA to make a sensor, without undue experimentation, that meets the requirements of Claims 2 and 3 of the '483 Patent. Ex. 1002, ¶ 128.



Ex. 1007, Fig. 4 (annotations added); Ex. 1002, ¶ 129.

In Figure 4, curve 403 illustrates the control signal for switch T10. Ex. 1007, ¶ 0032. Curve 401 illustrates the positive voltage (representing the output voltage) induced on the auxiliary winding during the off-time of switch T10. *Id.* Curves 404 and 405 illustrate the respective voltages of two capacitors that control the timing of the sample signal 406. *Id.*, ¶¶ 0032-0033. As shown in Figure 4, the voltage of curve 404 begins to rise after control signal 403 goes low to turn switch T10 off. *See id.*, Fig. 4. When curve 404 reaches curve

405, sample signal 406 is asserted. *Id.*, ¶ 0033; *see also id.*, ¶ 0030, Fig. 3. Based on the respective sizes of the timing capacitors, the sampling occurs at "about 2/3 of the duration of the voltage pulse 408." *Id.*, ¶ 0033. Thus, the sampling is delayed for a first time period (i.e., 2/3 the width of pulse 408) after the power switch transitions from on to off.

Accordingly, Reinhard discloses and suggests each limitation of Claims 2 and 3. Ex. 1002, ¶¶ 128-131.

Claims 2 and 3	*See* citations for Claim 1. Ex. 1007, ¶ 0022: "The sample and hold circuit 108 according to the present invention is supplied with a corresponding sample signal 112 from a circuit arrangement contained in the block 'timing circuit and interconnection' 110, when the voltage value at the auxiliary winding has to be sampled and stored." Ex. 1007, ¶ 0030: "In the following the operation of the circuit 300 will be described in detail. Immediately <u>after the switching off of the primary-side switch T10</u> the first capacitor C1 is connected via the switch S1 with the constant current source 301 and is charged subsequently. The voltage at the first capacitor C1 is compared by means of the comparator 302 to the voltage of the second capacitor C2. <u>When the voltage at the capacitor C1 reaches the value of the voltage at the second capacitor C2, the comparator 302 outputs the sampling signal 112 to the sample and hold unit 108</u>." (emphasis added). Ex. 1007, ¶ 0032: "Here the curve 401 signifies the course of the voltage at the auxiliary winding, the curve 402 the course of the demagnetization detection, the curve 403 the course of the control signal for the primary-side switch T10, the curve 404 the voltage at the first capacitor C1, the curve 405 the voltage at the second capacitor C2 and the curve 406 the sampling signal 112." Ex. 1007, ¶ 0033: "The curves 404 and 405 show the voltage courses, which are lying over the first capacitor C1 and the second capacitor

	C2, respectively. Here the instance 409, when the both voltage values are equal determines the sampling instance, when the sampling signal 112 as shown in curve 406 is output to the sample and hold circuit. With the capacitor ratios of the capacitors C1 and C2 as chosen here, the sampling signal is chosen at a sampling instance which represents about ⅔ of the duration of the voltage pulse 408, as can be seen from a comparison of curves 401 and 406." (emphasis added). *See also* Ex. 1007, Abstract, ¶¶ 0005, 0006, 0007, 0010, 0028, 0030, 0033, 0034, Figs. 1, 3, 4, Claims 1, 16.

3. Claim 7

Claim 7: "The controller of claim 1, wherein the controller is an integrated circuit controller for the power converter."

Reinhard explains that its "control circuit for controlling the output power of a primary-controlled switch mode power supply" may be "implemented as an application specific integrated circuit (ASIC)." Ex. 1007, ¶ 0021 (emphasis added). Indeed, Reinhard discloses that the complete output voltage control, including the over-voltage protection, may be advantageously "integrated into one integrated circuit and no further electronic components are necessary." Ex. 1007, ¶ 0043. Such integration into one integrated circuit is illustrated by the controller IC10 in Figure 2:

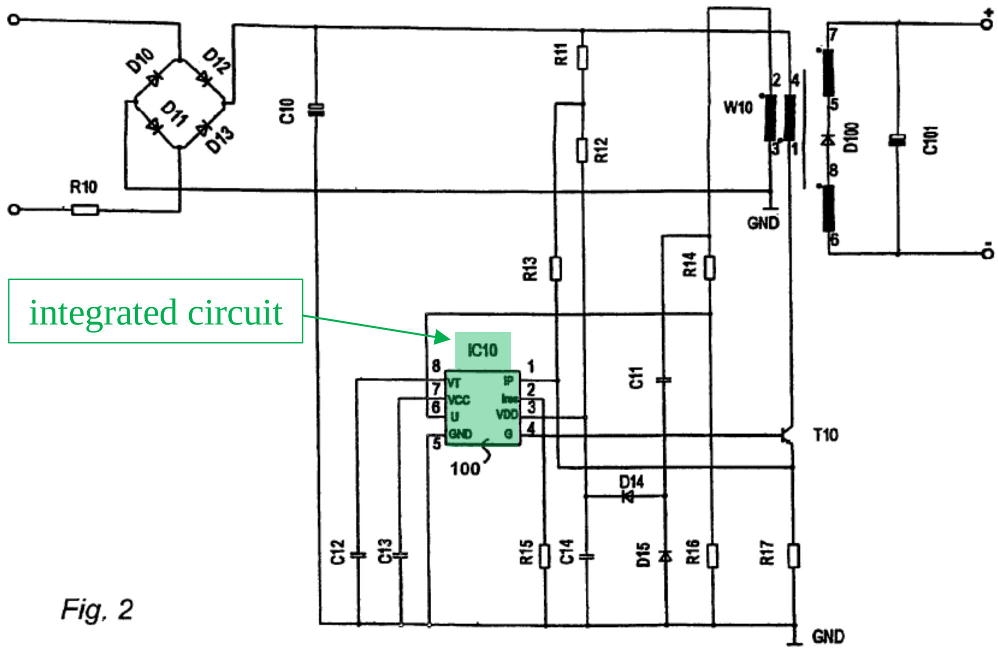


Fig. 2

Ex. 1007, Fig. 2 (annotations added)[9]; Ex. 1002, ¶ 132.

Accordingly, Reinhard discloses and suggests each limitation of Claim 7. Ex. 1002, ¶¶ 132-133.

Claim 7.	*See* citations for Claim 1. Ex. 1007, ¶ 0021: "Referring now to the drawings and in particular to FIG. 1, a control circuit for controlling the output power of a primary-controlled switch mode power supply unit is shown in its application environment. Such a controller 100 may for instance be implemented as an application specific integrated circuit (ASIC)."

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[9] "IC" in Figure 7 of Reinhard is a well-known acronym for "integrated circuit." Ex. 1002, ¶ 132; Ex. 1014, 19. Further, Reinhard itself identifies "IC" as an acronym for "integrated circuit." Ex. 1007, ¶ 0021 ("application specific ***integrated circuit*** (AS***IC***)" (emphasis added)).

	Ex. 1007, ¶ 0043: "Therefore, in an advantageous manner the complete output voltage controlling, including the over-voltage protection, may be <u>integrated into one integrated circuit</u> and no further electronic components are necessary." (emphasis added). Ex. 1007, ¶ 0027: "FIG. 2 shows in the form of a circuit diagram one embodiment of a switched mode power supply unit wherein the control circuit 100 according to the present invention is used." *See also* Ex. 1007, Figs. 1-2, Claim 1.

VII. CONCLUSION

Petitioner respectfully requests that *inter partes* review of the '483 Patent be instituted and that Claims 1-3 and 7 be cancelled as unpatentable under 35 U.S.C. § 318(b).

Respectfully submitted,
BAKER BOTTS L.L.P.

September 28, 2018
Date

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Lead Counsel for Petitioner

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing Petition, exclusive of the exempted portions as provided in 37 C.F.R. § 42.24(a), contains no more than 13694 words and therefore complies with the type-volume limitations of 37 C.F.R. § 42.24(a). The word count was calculated by starting with Microsoft Word's total document word count and subtracting the words for the Table of Contents, the Exhibit List, the Mandatory Notices, the Certificate of Compliance, and the Certificate of Service.

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CERTIFICATE OF SERVICE

In accordance with 37 C.F.R. §§ 42.6(e) and 42.105, the undersigned certifies that on the 28th day of September, 2018, a complete and entire copy of the **PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,077,483** and any accompanying exhibits was served on the patent owner at the correspondence address of record for the subject patent,

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via Express Mail or by means at least as fast and reliable as Express Mail. Additionally, the same were also served upon counsel for the subject patent's owner, Power Integrations, Inc.,

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because that is likely to affect service.

In accordance with § 42.51(b)(1), the undersigned certify that Petitioner is not aware of, and therefore does not provide any "relevant information that is inconsistent with a position advanced by petitioner[]."

September 28, 2018
Date

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