

United States District Court,
D. Massachusetts.

VLT CORPORATION and Vicor Corporation,
Plaintiffs.

v.

UNITRODE CORPORATION,
Defendant.

No. 98-CV-11152-PBS

Jan. 24, 2001.

Owner of patent for electronic power converter sued integrated circuit manufacturer for infringement and inducement to infringe. On cross motions for summary judgment, the District Court, Saris, J., held that: (1) defendant directly infringed patent; (2) "on period" of primary switch, prior to which patent claim called for opening of auxiliary switch, was defined in terms of primary switch's capacity to carry current, rather than time at which voltage across it dropped to zero; and (3) patent was not invalid for indefiniteness or failure to specify best mode.

Motions granted in part and denied in part.

36,098. Infringed.

Robert E. Hillman, Lawrence K. Kolodney, Fish & Richardson, Paul F. Ware, Jr., Douglas C. Doskocil, Daryl L. Wiesen, Goodwin Procter LLP, Boston, MA, for Plaintiffs.

William F. Lee, Dominic E. Massa, Wayne L. Stoner, Hale & Dorr LLP, Paul B. Galvani, Ropes & Gray, Boston, MA, for Defendant.

MEMORANDUM AND ORDER

SARIS, District Judge.

Plaintiffs VLT Corporation and Vicor Corporation (collectively "Vicor") bring this patent infringement action against Unitrode Corporation ("Unitrode") claiming that Unitrode designed and marketed integrated circuits for use in power supply converters which literally infringe Claims 1 and 5 of U.S. Patent No. Re. 36,098 ("the '098 Patent").

Plaintiffs move for partial summary judgment on the grounds that Unitrode has directly infringed the '098 Patent, that it induced four non-parties to infringe the patent, and that the patent is valid. Unitrode has also moved for summary judgment on the grounds that the patent is anticipated by prior art pursuant to 35 U.S.C.

s. 102; that it failed to disclose the best mode contemplated by the inventor for practicing his invention; that it is indefinite; and that there is no evidence that Unitrode's actions resulted in any direct patent infringement by any third parties.

After hearing, the Court **ALLOWS** Vicor's motion for summary judgment on its claim of direct infringement, but **DENIES** its motion on validity because there is disputed evidence concerning the claim of obviousness. The Court **DENIES** Unitrode's motions for summary judgment.

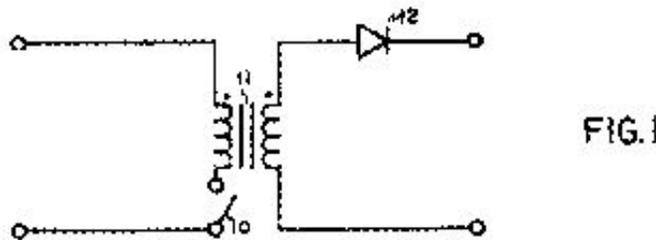
BACKGROUND

The facts that follow are undisputed by the parties, unless otherwise noted:

A. Single ended forward converter technology

The technology at issue is a design for electrical power converters. Power converters function to convert electricity from one voltage to another. The utility of these devices is increasingly evident in many aspects. For example, power converter devices are used to drive personal computers or recharge mobile phone batteries with the electricity from an ordinary household wall plug. A brief review of the relevant electrical power converter technology is necessary to address the competing arguments.

The '098 Patent deals with an improvement on a class of power converters called single-ended forward converters. Figure 1 below, culled from the '098 Patent, illustrates a simplified structure of the single-ended forward converter:



The central element is a transformer **11**, which has primary and secondary windings surrounding a magnetic core. When the switch **10** is closed, current travels from the terminals of the power source that is to be converted (represented by the small circles at the left of Fig. 1) through the primary winding. As current flows through the primary winding, magnetic "flux" builds up in the transformer's magnetic core. At the same time, a current is induced in the secondary winding which travels to the device to be powered. Whether the current and voltage in the secondary winding are higher than those of the primary winding depends on the ratio of turns between the primary and secondary winding. That is, if the secondary winding has one-half the turns of the primary winding, the resulting voltage will be one-half of the voltage from the original power source.

There is, however, a significant operational limitation on converters of this type. As current flows through the converter, the magnetic flux accumulating in the transformer core will begin to reach a potentially

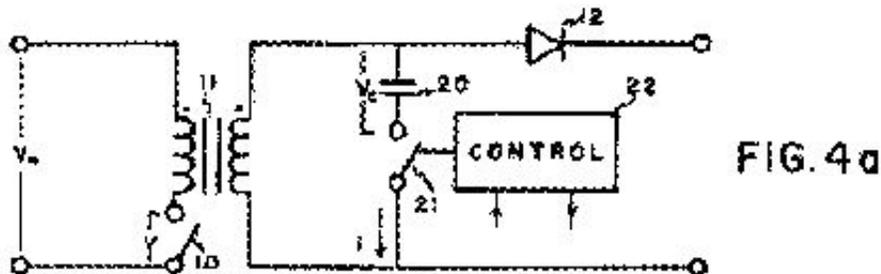
destructive point of "saturation." At some point prior to saturation, the switch **10** must be opened for a period-thus stopping the flow of current-to allow the accumulated flux to reduce. After the flux has reduced, the switch can again be closed to start a new conversion cycle. This process is called "resetting" the transformer core.

The necessity of resetting the core introduces a significant inefficiency into the converter since, during periods of core reset, no power transfer is occurring. In fact, some core reset techniques require the reset intervals to be as long, or longer, than the power transfer intervals. Other techniques cause the magnetic energy associated with flux to be dissipated as heat, rather than to be conserved as useful energy. In addition to being inefficient, the generation of heat is problematic because it requires the converter to be large and bulky to avoid damage to the converter's components resulting from extreme temperatures. This creates an impediment to the goal of miniaturizing the technology.

B. The Vinciarelli invention and the prior art

Dr. Patrizio Vinciarelli ("Vinciarelli"), the president and chairman of Vicor Corporation, devised a solution to the inefficiencies of the single-ended forward converter by creating a core reset technique that increases power transfer intervals and minimizes energy dissipation. Vinciarelli filed his initial patent application for the invention on February 4, 1982. Based on this application, the United States Patent and Trademark Office ("PTO") issued U.S. Patent No. 4,441,146 ("the '146 Patent"). In 1995 Vinciarelli resubmitted the patent to the PTO in a "reissue" proceeding pursuant to 35 U.S.C. s. 251. From that proceeding the PTO issued the '098 Patent, three claims of which are the subject of this suit.

A simple form of the Vinciarelli invention is represented below as Figure 4a from the '098 Patent:



The figure incorporates the elements of the single ended forward converter and adds three new elements. One is a capacitor **20**, an energy storing device. The second is an additional switch **21**, which is "in series" with the capacitor. The third new element, represented simply by a box, is the "control" consisting of a circuit **22** that dictates when the new switch **21** is opened and closed.

During operation, switch **10** (the "primary switch") is closed to initiate the energy conversion cycle. As energy is transferred between the primary and secondary windings, the new switch **21** (the "auxiliary" or "reset" switch) remains open, thereby disconnecting the capacitor from the transformer. When it is time to initiate core reset, the primary switch is opened and the auxiliary switch is closed. The reset process itself takes place in two phases. During the first phase, magnetic flux that has built up during the energy

conversion process flows out of the transformer into the capacitor, reducing the magnetic energy and flux in the core to zero. FN1 During the second phase, energy flows from the capacitor back into the transformer, causing the flux to increase, but with reversed polarity. FN2 Through this process the energy stored in the transformer has been decreased to zero and increased again (albeit from the opposite direction), filling the core with "negative flux." On the next conversion cycle, the core's capacity for magnetic flux buildup has thus been doubled-i.e, the positive flux first neutralizes the negative flux from the previous reset interval (bringing the core to a neutral flux condition) and then builds up to its maximum positive value. The reset mechanism draws the name "magnetizing current mirror" from this back-and-forth flow of magnetizing current. When the reset is complete, the auxiliary switch is opened and the primary switch is closed to start a new conversion cycle. Modern high-frequency power converters repeat this process hundreds of thousands of times per second.

FN1. Some increasingly dusty artifacts of popular culture teach the crucial link between flux and the capacitor. *See, e.g., Back to the Future* (Universal Pictures 1985) (wherein key component of the eccentric Dr. Brown's time travel device is the "flux capacitor"); *Back to the Future II* (Universal Pictures 1989) (same); *Back to the Future III* (Universal Pictures 1990) (same).

FN2. In the annals of pop culture the application of reversed polarity has also proven indispensable in resolving many a knotty situation. *See Ghostbusters* (Columbia Pictures 1985) (wherein the giant marshmallow demon is bested when Ghostbusters "reverse the polarity" on their particle accelerators). *See also Ghostbusters II* (Columbia Pictures 1989); "The Real Ghostbusters" (Columbia Pictures Television 1986); "Slimmer! and the Real Ghostbusters" (Columbia Pictures Television 1988); "Extreme Ghostbusters" (Columbia Pictures Television 1997).

Although Vinciarelli was not aware of it at the time he filed the '146 Patent, the basic contours of his invention described up to this point are the same as core reset techniques embodied in the earlier works of two individuals. In 1981, a short time before Vinciarelli filed the application for the '146 Patent, an engineer named Bruce Carsten ("Carsten") published an article describing the use of current mirror to reset a converter's transformer core. Some actual converters that were designed by Mr. Carsten prior to the Vinciarelli patent application and that incorporated a current mirror mechanism were located during the course of this litigation in a mountaintop shack in Alaska. Also, in 1981 a Soviet engineer named Polikarpov received a Soviet patent that described a similar method of core reset.

C. The switch timing properties

The aspect of the device in dispute here, however, is not the magnetizing current mirror itself; rather, the dispute centers around the timing by which the primary and auxiliary switches open and close. While the ordinary operation of the current mirror's core reset mechanism goes part of the way toward achieving a reset that is non-dissipative in nature, the switches themselves are additional sources of dissipation of energy as heat. That is, these switches act to some degree as capacitors and therefore store energy at various times during the conversion cycle. This characteristic is referred to as a "parasitic capacitance." If a switch is closed and conducting current while this parasitic capacitance is charged with energy, that energy will be dissipated as heat. However, according to Vicor, if a short delay is provided between the opening of the auxiliary switch and the closing of the primary switch, the reversed flow of the magnetizing current can be used to discharge the primary switch's parasitic capacitance without heat dissipation. Neither the Carsten

article nor the Soviet patent describes the use or advantage of such a switch-timing delay. Moreover, the Carsten converters located during this litigation did not exhibit these properties when tested by the parties.

Vicor contends that the limitations of certain claims in the '098 Patent require such a delay and that this delay is the "genius" of the '098 Patent that renders it unanticipated by prior art. Unitrode contends that Vicor has used wishful thinking in an effort to engraft these switch-timing properties onto patent claims that contain no such delay limitations.

D. The marketing of Unitrode chips

Unitrode does not itself sell power supply devices such as the single-ended forward power converter. Rather, Unitrode designs and sells integrated circuits ("chips") for, among other things, incorporation into single-ended forward converters. Unitrode's customers include several large companies that have utilized Unitrode chips in converters with the switch-timing characteristics that, according to Vicor, directly infringe claims of the '098 Patent.

Integrated circuits such as Unitrode's are accompanied by data sheets that contain basic information about the chip, suggested design uses for the chip, and information on the advantages of such suggested uses. In tandem with two of its families of chips, the UCCx580 and UCx714 series, Unitrode created data sheets with information on how to utilize the chip as the control circuit in a current magnetizing mirror converter with the switch-timing properties allegedly patented by Vinciarelli.

The Unitrode data sheets were used as a marketing tool for potential customers. Unitrode distributed the data sheets at sponsored seminars and in books containing collections of other Unitrode data sheets. At the sponsored seminars, Unitrode also gave presentations and distributed articles and other materials that instruct programmers how Unitrode chips could be used in allegedly infringing devices.

Alleged third party infringers attended these seminars. The designer of an accused device for at least one company attended the seminar and received the data sheet. And another alleged third party infringer was found to possess seminar material distributed by Unitrode.

E. The present action

On June 12, 1998, Vicor filed this infringement action against Unitrode, alleging in substance that, due to its active promotion, advice, and instruction for the use of its products in infringing devices, Unitrode is responsible for inducing third parties to infringe claims of the '098 Patent. After a lengthy discovery period, both parties have moved for summary judgment on a variety of claims. Vicor has moved for partial summary judgment that Claims 1 and 5 of '098 Patent are not invalid and that these claims are infringed by Unitrode and certain third parties using Unitrode's chips. FN3 Unitrode disputes Vicor's entitlement to summary judgment, and in addition, seeks summary judgment on the grounds that the '098 Patent is invalid because it is both obvious and anticipated by prior art. Unitrode has also moved for summary judgment on Vicor's claim of inducement of infringement.

FN3. Although Vicor's amended complaint alleges Unitrode has also infringed Claim 3 of the '098 Patent, it has not moved for summary judgment on that basis.

DISCUSSION

A. Summary judgment standard

A motion for summary judgment must be allowed if "the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a judgment as a matter of law." Fed.R.Civ.P. 56(c). In ruling on the motion the Court must "view the facts in the light most favorable to the non-moving party, drawing all reasonable inferences in that party's favor." *Barbour v. Dynamics Research Corp.*, 63 F.3d 32, 36 (1st Cir.1995).

The standards are the same where, as here, both parties have moved for summary judgment. "When facing cross-motions for summary judgment, a court must rule on each motion independently, deciding in each instance whether the moving party has met its burden under Rule 56." *Dan Barclay, Inc. v. Stewart & Stevenson Serv., Inc.*, 761 F.Supp. 194, 197-98 (D.Mass.1991) (citing 10A Charles Alan Wright, Arthur R. Miller and Mary Kay Kane, *Federal Practice and Procedure* s. 2720 (2d ed.1983)).

B. Direct infringement

Unitrode does not appear to dispute that, under 35 U.S.C. s. 271(a), it directly infringed certain claims of the '098 Patent. In 1995 and 1996 a Unitrode employee built and tested two power converter devices that satisfy all of limitations of the claims at issue. Those converters were built in order to test the feasibility of using Unitrode chips in similar devices.

Unitrode does argue that Vicor lacks the evidence necessary to prove direct infringement by any third party device. However, it has introduced no expert evidence to refute plaintiff's expert report which states that the devices of third parties Lucent, Siemens, Artesyn and Magnatek infringe.

C. Anticipation ... that depends on what "ON" is.

[1] [2] Unitrode's first argument for summary judgment in its favor is that Claim 1 of the '098 Patent is invalid for lack of novelty because it reads on the prior art of Carsten. In order for a patent claim to be anticipated by prior art under 35 U.S.C. s. 102, a "device or method, having all of the elements and limitations contained in the claims, [must be] described in a single prior art reference." *ATD Corp. v. Lydall, Inc.*, 159 F.3d 534, 545 (Fed.Cir.1998). The first step in any analysis of invalidity is claim construction, which is an issue of law. *See Rockwell Int'l Corp. v. United States*, 147 F.3d 1358, 1362 (Fed.Cir.1998).

[3] In construing the disputed terms of a claim, "the court should look first to the intrinsic evidence of record, i.e., the patent itself, including the claims, specification and, if in evidence, the prosecution history." *Vitronics Corp. v. Conception, Inc.*, 90 F.3d 1576, 1582 (Fed.Cir.1996) (citing *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed.Cir.1995) (en banc), *aff'd* 517 U.S. 370, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996)). "Such intrinsic evidence is the most significant source of the legally operative meaning of disputed claim language." *Id.*

[4] While the Federal Circuit has "made strong cautionary statements on the proper use of extrinsic evidence" (like expert and inventor testimony, dictionaries and learned treatises), "trial courts generally can hear expert testimony for background and education on the technology implicated by the presented claim construction issues, and trial courts have broad discretion in this regard." *Key Pharmaceuticals v. Hercon*

Laboratories, Inc., 161 F.3d 709, 716 (Fed.Cir.1998). The Court properly relies on expert testimony in cases where the intrinsic evidence (i.e., the patent record) does not resolve the dispute. "What is disapproved of is an attempt to use extrinsic evidence to arrive at a claim construction that is clearly at odds with the claim construction mandated by the claims themselves, the written description, and the prosecution history, in other words, with the written record of the patent." *Id.* Among the extrinsic evidence which the Federal Circuit has sanctioned in interpreting claims are dictionaries and reference books. *EMI Group N. Am., Inc. v. Intel Corp.*, 157 F.3d 887, 892 (Fed.Cir.1998), *cert. denied*, 526 U.S. 1112, 119 S.Ct. 1756, 143 L.Ed.2d 788 (1999).

The construction of a single word or phrase in a patent claim is often the dispositive issue. Attorneys therefore marshal impressive arsenals of legal precedent, technical exegesis, record citations, canons of construction, extrinsic evidence, and—above all—the most clever reasoning to persuade a judge that a word such as "as," "or," or "is" isn't what she thought it might be. Here, the able counsel for Vicor and Unitrode have taken aim at the single word "ON," as the fate of both their arguments ride on its meaning.

On these motions for summary judgment, Claim 1 of the '098 Patent is chiefly at issue.FN4 It reads:

FN4. Claims 3 and 5, dependent claims of Claim 1, are also at issue in Unitrode's motions for summary judgment. Claim 3 reads, "The transformer resetting apparatus of claim 1 wherein said circuitry is connected in parallel with said primary winding." Col. 9, 11. 4-6. And Claim 5 reads, "The transformer resetting apparatus of claim 1 wherein the auxiliary switch is a MOSFET transistor with an integral reverse diode." *Id.* at 11. 11-13. However, both parties agree that the validity of these dependent claims is entirely contingent on the construction given to Claim 1.

In a single ended forward converter in which energy is transferred from a primary winding to a secondary winding of a transformer during the ON period of a primary switch, circuitry for recycling the magnetizing energy stored in said transformer to reset it during the OFF period of said primary switch, comprising:
a storage capacitor;

an auxiliary switch connecting in series with said storage capacitor;

a switch control circuit operating said auxiliary switch in accordance with a control logic such that (a) *said auxiliary switch is opened prior [to] the ON period of said primary switch*, (b) said auxiliary switch remains open throughout the ON period of said primary switch, (c) said auxiliary switch is closed after the ON period of said primary switch.

Col. 8, 11. 52-67 (emphasis added). The important question in construing this language is whether the "ON period" is defined in terms of voltage across the primary switch (Unitrode's proposed construction) or in terms of that switch's capacity to carry current (Vicor's proposed construction). If defined in terms of voltage,FN5 the ON period would begin when the voltage across the switch drops to zero. In a real-life solid state transistor switch, the voltage does not drop to zero the instant current begins to flow across the switch. Indeed, the voltage in such switches will not drop to its lowest until some point in time after the current has begun to flow at its maximum rate. Thus, a voltage-based definition would not necessarily require a switch-timing delay, since Claim 1 could read on a device such as Carsten's in which the auxiliary switch remains engaged while current is flowing through the primary switch.

FN5. In lay terms, voltage is a measure of the electrical force or potential energy across the switch. At oral

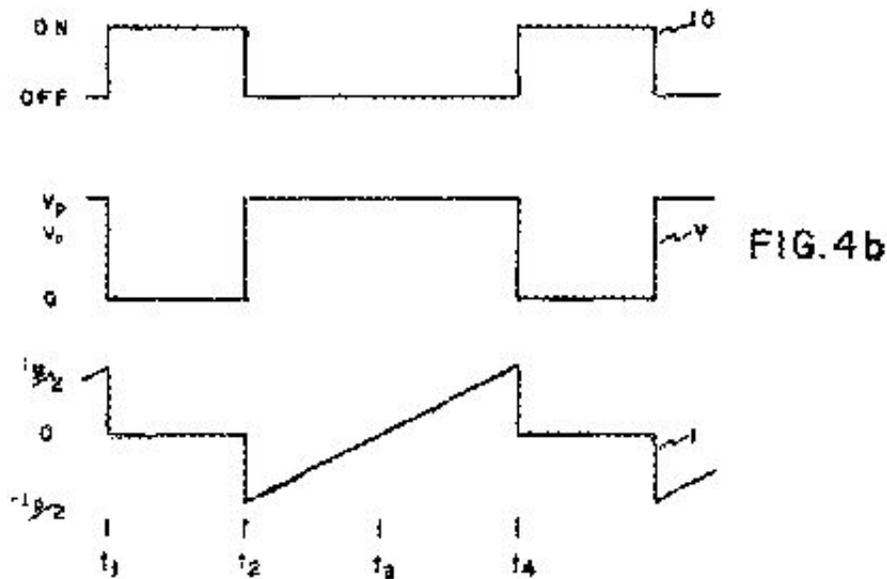
arguments both parties likened voltage to the water pressure inside a water tank, while the current was likened to the flow of water from the tank's faucet.

By contrast, under a current-based definition, the ON period would begin at the moment the primary switch is capable of carrying a current.FN6 Thus defined, Claim 1 would require some period of switch delay between the opening of the auxiliary switch and the flow of current through the primary switch—a novel element unanticipated by prior art.

FN6. There will always be some amount of current "leakage" across a switch that cannot be prevented. Both parties agree, however, that such current leakage should not factor into the Court's claim construction.

1. Unitrode's proposed claim construction

In support of its proposed voltage-based definition of ON, Unitrode places great emphasis on the following Figure 4b from the '098 Patent:



The figure above "considers a sequence of two ON periods separated by an OFF period.... The figure displays, as functions of time, idealized waveforms defining the state of the [primary] switch **10**[and] the voltage **V** across it...." Col. 5, 11. 55-57. Unitrode insists this portion of the specification explicitly defines ON period in terms of voltage. As a result, Unitrode contends that the Court is required to adopt its voltage-based definition of "ON" in construing the patent claims. *See Vitronics*, 90 F.3d at 1582 ("Usually, [the specification] is dispositive; it is the single best guide to the meaning of a single term."). For additional support, Unitrode points to references in the specification where voltage and the state of the primary switch are mentioned in tandem. *See, e.g.*, col. 5, 11. 61-62 ("During [the "ON"] period, the voltage **V** across the primary switch and the current **I** through the auxiliary switch vanish."). As Unitrode points out, the specification and the drawings of the patent never show the current flowing through the primary switch.

[5] To bolster its proposed claim construction Unitrode also relies on the interpretive maxim of claim differentiation. That doctrine, "which is ultimately based on the common sense notion that different words or phrases used in separate claims are presumed to indicate that the claims have different meanings and scope, normally means that limitations stated in dependant claims are not to be read into the independent claim from which they depend." *Karlin Technology, Inc. v. Surgical Dynamics, Inc.*, 177 F.3d 968, 971-72 (Fed.Cir.1999) (citations omitted). While the claim differentiation doctrine is "not a hard and fast rule of construction, it does create a presumption that each claim in a patent has a different scope." *Comark Communications, Inc. v. Harris Corp.*, 156 F.3d 1182, 1187 (Fed.Cir.1998).

Unitrode argues that, by proposing a current-based definition for ON, Vicor is attempting to read into Claim 1 all of the limitations found in unasserted dependent Claims 22, 23 and 24. Claim 22 contains the limitation that the ON period begins "a small delay period after the opening of the auxiliary switch." Col. 10, 11. 1-3. Claim 23 contains the limitation that the small delay period "accommodates charging and discharging of capacitances" in the converter. *Id.* at 11. 4-6. And Claim 24 contains the further limitation that the capacitances "comprise parasitic capacitances." *Id.* at 11. 7-8. According to Unitrode, each of the limitations in these dependent claims would be rendered superfluous by a construction of Claim 1 that would, in effect, require a "small delay" between the opening of the auxiliary switch and initiation of the ON period that would "accommodate the charging and discharging of capacitances" that are "parasitic capacitances."

2. Vicor's proposed claim construction

Vicor argues that Unitrode's voltage-based definition of the ON period is inconsistent with the language and purposes of the '098 Patent and that ON should instead be defined in terms of the point at which the primary switch is enabled to conduct current. In support of this definition, Vicor places great emphasis on the following passage from the specification:

a delay between the opening of the auxiliary switch **21** and the closing of the primary switch **10** represents dead time. For this reason, it is efficient to keep such a delay to a minimum, consistent with the requirement to avoid overlap between switches. However, a small delay is useful to allow the magnetizing current to charge and discharge parasitic capacitances associated with the switches and windings.

Col. 7, 11. 4-11. According to Vicor, the above language explicitly recites the function and purpose of the claimed invention. As such, the construction given to ON period must accord with "a full understanding of what the inventor [] actually invented and intended to envelop with the claim." *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed.Cir.1998) (citing *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 389, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996)).

In Vicor's view, this portion of the specification militates in favor of a current-based definition because it states that the purpose of opening the auxiliary switch "prior" to the closing of the primary switch is to allow the discharge of the switch's parasitic capacitance. By contrast, adopting a voltage-based definition of ON would not require a "delay" or "dead time" between the opening of the auxiliary switch and closing of the primary switch so as to "allow the magnetizing current to charge and discharge parasitic capacitances associated with the switches and windings." Moreover, according to Vicor, adopting a voltage-based definition would violate the patent's requirement to "avoid overlap between switches." If the terms of a claim must be read in accordance with the purpose of the invention, Vicor asserts that a current-based construction of ON is the best way to achieve that goal.

3. The Court's construction

[6] Although the question is close, I conclude that Vicor's interpretation is the better.

To start with, the "ON period" is nowhere defined in terms of either the current or the voltage across the switch. Instead, the specification states: "[a]t time t_1 , the auxiliary switch **21** is opened and the primary switch **10** is closed, initiating the first ON period." Col. 5, 11. 59-60. *See also* col. 4, 11.3-4 (referring to the converter's "ON period" as "when the primary switch is closed.") Thus, the beginning of the ON period is described as the moment the primary switch is "closed." Because the word "closed" is not defined, this definition only moves the analysis a mini-step ahead.

The Court must construe the claim in the context of the whole patent, with analysis rooted in the words of the specification. *See Renishaw*, 158 F.3d at 1250. The current-based definition is consistent with the specification which describes in plain terms that the patent contemplates "dead time" when the reset mechanism is not operational. Col. 7, 11. 4-6. Although "dead time" is not defined in the patent, Mr. Carsten, who is now an expert for Unitrode, agreed in his deposition that "dead time" in the patent is time during which neither switch is carrying current. (*See Vicor Statement of Undisputed Facts ("SUF")* (Docket No. 81), Ex. 10.)

In addition, the text describes the useful properties for allowing such a delay, namely, that the reversed flow of magnetizing current can be used to "discharge the parasitic capacitances of the switches and windings." Col. 7, 11. 10-11. A current-based definition supplies a reading of the claims that preserves this purpose stated in the specification. Mr. Carsten's deposition testimony is consistent with Vicor's definition:

Q. Okay. And what are these multiple interpretations of "ON" and "OFF" that you think are possible?

A. It is on when it has at least close to the lowest possible voltage while carrying conducting current [Unitrode's definition]. Anything in between is a linear operation.

Q. So that's one possible definition?

A. That's one possible meaning of the term. Another possible meaning of the term is that a device is on when it's conducting any current at all above and beyond the normal leakage current.

Q. Which of the two definitions would you say is most relevant to using delays to discharge the parasitic capacitance non-dissipatively?

A. In that context, the definition is closer to the second one where any current at all is a conduction.

(Vicor SUF, Ex. 4.) By contrast, a voltage-based definition would permit the harmful dissipative discharge of the parasitic capacitances when current passes through the primary switch because, by Carsten's own admission during deposition, the primary switch may be carrying its maximum current before the initiation of the "ON period." (*See id.*, Ex. 16.)

Unitrode argues that this Court should not rely on a single passage in the patent that references discharging parasitic capacitance because the patent never states that the process must be non-dissipative. However, it is

immaterial that the text does not specify whether the discharge of the parasitic capacitances is dissipative or non-dissipative in nature. If there is a residual capacitance in the switch and winding, it will ultimately be discharged in one manner or another. It either can be discharged as heat (i.e., dissipatively), or it can be discharged as energy flowing into the transformer core (i.e., non-dissipatively). Only the latter result, however, could be considered "useful" as required by the specification. Col. 7, 11. 4-11.

The specification also asserts a "requirement to avoid overlap between switches." *Id.* at 11. 8-9. The current-based definition of ON would forbid simultaneous conduction of current across the primary and auxiliary switches, making that definition more compatible with this requirement. On the other hand, under Unitrode's definition of ON, current could continue to flow through the primary switch and into the transformer core while the auxiliary switch remains engaged and conducting current. This simultaneous conduction of current would be inconsistent with the requirement to avoid overlap between switches.

The current-based definition is also consistent with the extrinsic evidence, although not mandated by it. "[A]bsent an express definition in the specification of a particular claim term, the words are given their ordinary and accustomed meaning; if it is a term of art, it is given the ordinary and accustomed meaning as understood by those of ordinary skill in the art." *Zelinski v. Brunswick*, 185 F.3d 1311, 1315 (Fed.Cir.1999). Because there is no intrinsic express definition of the word "on" or "closed," the key to the dispute may be the expert testimony on the background of the technology. *See Key Pharmaceuticals*, 161 F.3d at 716. Plaintiff's expert Paul Horowitz, a professor of Physics at Harvard University, conceded in his expert report that the terms "on" and "off" did not have a single accepted meaning in connection with electronic switches. However, he states that there is an ordinary and accustomed meaning for closing a switch: "A 'switch' is a device, such as a relay or transistor, that can be enabled to conduct current, or disabled from conducting current." He noted, "When a switch is enabled to conduct current, the switch is said to be 'closed.' When the switch is enabled to block current (or disabled from conducting current), it is said to be 'open.'" (*Vicor SUF*, Ex. 27, p. 4.) *See Random House Unabridged Dictionary* (2d ed.1993) (defining "switch" to include: "5. Elec. A device for turning on or off or directing an electronic current or for making or breaking a circuit."). Plaintiff's expert Nathan Sokol also opined that in the context of the patent "closed" means "the action which is taken to make the switch do something" and "that action results in the switch being enabled to conduct current." (*Unitrode Aff. of D. Massa* (Docket No. 104), Ex. 2.)

Defendant's expert, Dr. James K. Roberge, a professor of Electrical Engineering at MIT, states: "Transistor switches do not turn on and off instantaneously; they have ON periods and OFF periods and transition states between those two periods." (*Aff. of J. Roberge* (Docket No. 91), para. 12). He relies on a textbook, R. Ralph Benedict, *Electronics for Scientists and Engineers*, 212-214 (1967) to prove his point: "The textbook indicates that the ON period begins when the voltage across the switch falls to a voltage close to zero, even though current has already begun to flow in the switch prior to that time Current can begin to flow in a switch even though the switch is not yet in its ON period." Roberge adds: "Although in some usages, the ON period of a switch is defined in terms of current flow, it is not generally defined as occurring when "an" or "any measurable" current flows, but rather when 90 percent of the saturation or maximum current flow is reached." (*Roberge Aff.*, para. 15; *see also Unitrode Aff. of W. Stoner* (Docket No. 92), Ex. 2 (Vinciarelli stating in deposition, "I guess every device has a transition state between an on and off. That's correct.").)

The Roberge-Horowitz debate highlights the complexity of defining "ON" in the context of transistors which have this transition on-off state. However, because the specification provides that the word "closed" demarcates the start of the "on" period (T_1) it cuts against a voltage based definition because no action is taken at the moment the voltage hits zero. In contrast, an action is taken at the moment the switch is enabled

to carry current.

Although Unitrode's arguments have some persuasive weight, they cannot be sustained when the patent is read as a whole. For several reasons, Figure 4b and the accompanying text cannot be accepted as an explicit voltage-based definition of ON period. First, the waveforms depicted in Figure 4b are idealized, not real waveforms.FN7 The patent recognizes this when it states that "[t]he first ON period is given by the time interval between t_1 and t_1 [referring to Fig. 2b]. During this interval, the voltage V across the switch 10 vanishes...." Col. 1, 11. 59-61; *see also* col. 5, 1. 61-62 ("During this [ON] period, the voltage V across the primary switch and the current I through the auxiliary switch vanish.") Significantly, the patent does not state that voltage drops to zero at t_1 , but only that it vanishes "during" the ON period between t_1 and t_2 . "During" can mean either "throughout the duration of" or "at a point in the course of." *Webster's 9th New Collegiate Dictionary*, p. 289 (1986). It is not defined to mean at the start of. The use of the term "during" suggests that voltage does not drop to zero at t_1 , the start of the ON period.

FN7. This discussion applies to the idealized waveforms in Figure 2b and 3b as well.

Second, these idealized waveforms do not show the real-life details of current flowing across a solid-state transistor. Without some reflection of the reality that voltage across a transistor switch does not drop instantly to zero, the idealized waveforms are equally consistent with both parties' definitions and do not provide the strong guidance urged by Unitrode.

Third, although Unitrode has argued that Figure 4b would be "useless" if it did not serve to define the ON period in terms of voltage across the switch, that simply is not the case. Although the figure does little or nothing to describe the fine switch-timing properties of the invention, it provides a useful illustration of the operation of the magnetizing current mirror as a whole. The '098 Patent can best be understood as a whole document by acknowledging that, in 1981, Dr. Vinciarelli was under the mistaken impression that his patent was the only known manifestation of a magnetizing current mirror device. The thrust of the patent's specification was the description of the core reset mechanism itself, while comparatively minor attention was given to the fine switch-timing properties that are the subject of this suit.

Fourth, the patent explicitly disclaims any relation between Figure 4b and the aspects of the invention dealing with the discharge of the primary switch's parasitic capacitance. *See* col. 5, 11. 44-51 ("neglecting ... parasitic effects including the ones associated with ... the capacitance of non-ideal hardware realizations of the primary switch **10** ..., the operation of the magnetizing current mirror as a reset mechanism is illustrated by an example in 4b."). It is therefore less plausible that the inventor would rely on this figure to define the invention's switch-timing properties.

[7] Finally, Unitrode presses an argument based on claim differentiation for adopting a voltage-based definition for ON period. *See Specialty Composites v. Cabot Corp.*, 845 F.2d 981, 987 (Fed.Cir.1988) (holding "[t]he scope of a particular claim can often be determined on inspection of other claims."). The doctrine of claim differentiation is a presumption, not a hard and fast rule. *See Comark Communications*, 156 F.3d at 1187. And, in some circumstances, if a claim will bear only one interpretation, a certain amount of "similarity [between claims] will have to be tolerated." *Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1538 (Fed.Cir.1991) (quoting *Autogiro Co. of Am. v. United States*, 181 Ct.Cl. 55, 384 F.2d 391, 404 (1967)).

[8] In connection with this argument, Unitrode also emphasizes the statutory mandate that the claims of a reissued patent cannot be broader than the original claims. *See* 35 U.S.C. s. 251. ("No reissued patent shall be granted enlarging the scope of the claims of the original patent unless applied for within two years from the grant of the original patent.") Section 251 is the statutory basis for correction of "error." In *re Weiler*, 790 F.2d 1576, 1579 (Fed.Cir.1986) "The statute is remedial in nature, based on fundamental principles of equity and fairness, and should be construed liberally." *Id.* However, it prohibits broadening reissue claims after two years, whether or not the broader claims are supported in the specification. *See Reiffin v. Microsoft Corp.*, 214 F.3d 1342, 1348 (Fed.Cir.2000) (Newman, J. concurring) (citing, as an example, *Carbide & Carbon Chemicals Co.*, 315 U.S. 668, 62 S.Ct. 839, 86 L.Ed. 1105 (1942)).

By its usage of the word "prior," Claim 1 requires *some* delay between the "ON period" of the auxiliary switch and "ON period" of the primary switch. The claim does not, however, specify the length of delay. Claim 21 and its dependent Claims 22 and 23 require that the switch delay be a *small* delay. Vicor argues that "some delay" is broader than "small delay."

The history of the reissue proceeding is helpful here. The Supplemental Reissue Declaration states:

Applicant also noted that the notion (disclosed and claimed in the '146 patent) of using a switching delay to charge and discharge circuit capacitances did not appear in any of the references until the 1990 Carsten article and that applicant's disclosure of this feature predated Carsten's discovery by at least eight years.

(Massa Aff., Ex. 4, para. 18.) The Interview Summary by the patent examiner states:

Applicant's attorney was informed that the above two references [Carsten and Polikarpov] even if they were earlier art wouldn't anticipate or wouldn't have been obvious over claims 1 and 18, nor do the reference [sic] disclose the switch timing.

(Vicor SUF, Ex. 7.) One wonders, then, why Vicor felt compelled to add the new claims which substantially track the specification in the original patent. In any event, Vicor's argument that the reissued claim (specifying a small delay) is narrower than the original specification (specifying "delay") is strained in the context of this patent where all switching delays are fractions of seconds. However, as I've construed Claim 1 to encompass a current-based definition, the new claim is at worst redundant and certainly not broader than Claim One as construed.

As a back up, Unitrode argues that certain references define the ON period of a switch as commencing when current flow through the switch has reached 90% of its maximum value. This contention was corroborated by the testimony of Vicor's own expert, Professor Horowitz. (Stoner Aff., Ex. 11.) If "ON" were defined this way, the Carsten devices would anticipate the claims. This definition suffers from the same flaws inherent in the voltage-based definition because it does not avoid "overlap between the switches" or provide "dead time."

[9] Two final considerations bolster the Court's current-based claim construction. First, the original Vinciarelli patent underwent a reexamination proceeding in which the PTO upheld the validity of Claim 1 despite the existence of much of the same prior art presented by Unitrode in this proceeding. In such circumstances, the burden on the party seeking invalidity is made even heavier. *See Custom Accessories, Inc. v. Jeffrey-Allan Industries, Inc.*, 807 F.2d 955, 961 (Fed.Cir.1986). Second, due to the patent's presumption of validity under 35 U.S.C. s. 282, any remaining ambiguity should be resolved in favor of

Vicor. *See Modine Mfg. Co. v. U.S. Int'l Trade Comm.*, 75 F.3d 1545, 1557 (Fed.Cir.) ("When claims are amenable to more than one construction, they should when reasonably possible be interpreted so as to preserve their validity."), *cert. denied*, 518 U.S. 1005, 116 S.Ct. 2523, 135 L.Ed.2d 1048 (1996).

In sum, based on the specification, I conclude that Vicor's proposed current-based definition is better because it is consistent with the goal of achieving the non-dissipative discharge of parasitic capacitance. Unitrode's motion for summary judgment on the ground that the patent claims are anticipated by prior art under 35 U.S.C. s. 102 must therefore fail as a matter of law.

D. Obviousness

Unitrode next argues that, even assuming a current-based definition of ON, there remain unresolved issues as to whether the novel aspects of Vinciarelli's invention were obvious innovations in light of the prior art. Vicor argues that, as matter of law, the '098 Patent satisfies the statutory requirement of nonobviousness.

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Obviousness under s. 103 is a legal conclusion based on underlying factual inquiries, including: a) the scope and content of the prior art; b) the level of ordinary skill in the art; c) the differences between the claimed invention and the prior art; and d) objective evidence of nonobviousness. *See Graham v. John Deere Co.*, 383 U.S. 1, 15, 86 S.Ct. 684, 15 L.Ed.2d 545 (1966). The patent retains its statutory presumption of validity throughout the determination of obviousness. *See 35 U.S.C. s. 282*. Thus, the movant must prove the facts underlying an invalidity claim by clear and convincing evidence. *See Rockwell Int'l*, 147 F.3d at 1364. Moreover, when patent claims have been upheld in a reexamination proceeding before the PTO in which the much the same prior art was presented, the burden upon the party asserting invalidation for obviousness is made heavier. *See Custom Accessories*, 807 F.2d at 961.

[12] When making an obviousness analysis based on prior art teachings, reviewing courts must not fall prey to a "hindsight syndrome," reasoning backward from the teaching of the patent itself. *See In re Kotzab*, 217 F.3d 1365, 1369 (Fed.Cir.2000). According to the Federal Circuit, "the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references." *In re Gartside*, 203 F.3d 1305, 1319 (Fed.Cir.2000); *see also B.F. Goodrich Co. v. Aircraft Braking Sys. Corp.*, 72 F.3d 1577, 1582 (Fed.Cir.1996). In other words, something in the prior art, considered as a whole, must "suggest the desirability, and thus the obviousness, of making the combination" of different elements to create the invention. *Fromson v. Advance Offset Plate, Inc.*, 755 F.2d 1549, 1556 (Fed.Cir.1985) (citing *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick*, 730 F.2d 1452, 221 U.S.P.Q. 481, 488 (Fed.Cir.1984)).

[13] In moving for summary judgment, Vicor relies primarily on the deposition testimony of Unitrode's two expert witnesses to demonstrate that, prior to the '098 Patent, there was no motivation for adding a delay between the opening of the auxiliary switch and the conduction of current through the primary switch. Vicor quotes a portion of the sworn testimony of the first expert, Carsten, which indicates that, at the time

Vinciarelli applied for his patent, there was no motivation to include the switch-timing delay in Carsten's original core reset device.FN8 And the sworn testimony of Unitrode's other expert, Professor Roberge, indicates that in 1980 and 1981 the addition of a delay between the opening of the auxiliary switch and the engagement of the primary switch would not have occurred as a design objective to an engineer of ordinary skill in the art.FN9 According to Vicor, these admissions taken together demonstrate that Unitrode cannot establish a violation of the nonobviousness requirement with the support of facts proven by clear and convincing evidence.

FN8. That deposition testimony is as follows:

Q: Let me just make sure I understand. So is it your testimony that you do not believe that a person would have been motivated to put in a delay in your EB18A [power converter design] simply to avoid cross conduction?

A: Correct.

Q: And that the only motivation you can think of [for adding the delay] would have been a desire to achieve nondissipative discharge of parasitic capacitances in the switch timings?

A: No, I said that would not be a motivation in the EB-would not be a significant motivation in the EB18A as designed and for its applications.

(Vicor SUF, Ex. 4.)

FN9. That deposition testimony, reproduced here at some length, is as follows:

Q: So do you believe that back in 198 to '82, it would have been obvious to an engineer of ordinary skill in the art to modify the circuit described in the 1981 Carsten article to introduce at each end of the switching cycle dead time periods during which the controllable current through both switches was reduced to zero?

A: What I really feel is that a practical engineer would have reduced the current-it would have been obvious to apply an appropriate dead time so that the current was reduced to a level where it didn't detrimentally affect the operation of the converter.

I think that in this statement, if we take Vicor's definition where the current is any measurable current or any current above, measurably above leakage current, I think it would have been obvious to a person skilled in the art how to accomplish that.

I guess my personal feeling is that to truly reduce it very, very low would not occur as a design objective to a good engineer, a person skilled in the art, because you don't gain anything by it.

Q: That's back in 1980 to '81?

A: Yeah.

(Vicor SUF, Ex. 5.)

For further support, Vicor has proffered evidence of so-called secondary considerations of patentability. Specifically, Vicor maintains that its power converters enjoy significant commercial success and are widely copied in the industry. Vicor also maintains that Vinciarelli's innovations are recognized in tribute by the articles of Carsten and the seminar materials generated by Unitrode.

In order to demonstrate a genuine dispute on the question of obviousness, Unitrode responds by arguing that Vicor has mischaracterized its experts' testimony and that its experts have offered opinion testimony suggesting that, at the time of the '146 Patent was filed, there was indeed a motivation to add a switch-timing delay to the prior art. With respect to Carsten, Unitrode offers testimony given in the same deposition that, in Unitrode's view, directly contradicts Vicor's characterization of Carsten's testimony. FN10 Also Unitrode points to testimony that the "dead time" that is missing before the primary switch "turn on" transition in the Carsten devices is present in the primary switch "turn off" transition in those devices. Given the inclusion of "dead time" in one of the transitions of the Carsten devices, Unitrode argues that it would have been obvious to one of ordinary skill in the art to include such "dead time" in the other transition to improve the efficiency of the circuit. With respect to Roberge, Unitrode argues that the testimony cited by Vicor, *supra* n. 9, actually supports rather than undermines the contention that there was a motivation to add switch timing delays to the prior art. In addition, Unitrode argues that additional testimony given by Roberge in the same deposition demonstrates the apparent motivation for adding a switch delay. FN11 Although neither of these experts cites the dissipative discharge of the primary switch's parasitic capacitance as a motivation for adding a timing delay, Unitrode stresses that "the motivation ... does not have to be identical to that of the applicant to establish obviousness." In *re Kemps*, 97 F.3d 1427, 1430 (Fed.Cir.1996), *abrogated on other grounds*, *Gartside*, 203 F.3d at 1316. Roberge cites examples of motivations for adding dead time: a desire for higher input voltage, and a higher switching frequency to use MOSFETS as a switching transistor or for higher power levels. (Massa Aff., Ex. 9.)

FN10. That deposition testimony reads as follows:

Q: I understand that. But now we're talking about modification of the EB18A design to produce another design for a single ended forward converter. What motivations would there have been in 1981 to put in delays in some modified version of the EB18A?

A: If they either wanted to go to higher input voltage, to a higher switching frequency, to use MOSFETs as a switching transistor, or to go to higher power levels, any one of which or combination of which would have increased the motivation for putting in that time delay.

(Massa Aff., Ex. 9).

FN11. That deposition testimony, again reproduced at some length, reads:

Q: Do I correctly understand that what you're saying is that it would have been obvious for somebody to get the current flows down so that there was no harmful amount of simultaneous current flow between, in the two switches?

A: It's my feeling that an engineer who was skilled in the art in this time frame would have recognized that the reason that you want to reduce current flow through, simultaneous current flow, is so that you don't lose a significant fraction of efficiency in your converter as a consequence of that.

As I indicated earlier, there are trade-offs. If I have to put more power into operating the circuit that I saved by further reducing this source of loss, I don't do it because that's not a good engineering trade-off.

If I have to, as I may have in 1980, have a fairly complex circuit, and if you look at Carsten's E18 converter, sort of the lower left quadrant of that converter is his control circuitry, there's a lot of hardware in there. And if he's got to double that hardware and ends up with only a .01 percent improvement in efficiency, a good engineer would not make that trade-off.

So what I'm implying here is that a good engineer would reduce-make sure that the current levels were low enough so that they didn't have a significant impact on or detrimental impact on the operation of the converter.

(Massa Aff., Ex.8).

Unitrode's claims of obviousness have certain flaws. First, they are belied by the close temporal relationship between the '098 Patent and the prior art. The Carsten design and Soviet patent that constitute the prior art are both roughly contemporaneous with the filing of the '146 Patent. Both of these prior art reference date back to 1981, while Vinciarelli filed the application for the '146 Patent in early 1982. Neither of the prior art references, however, contains a suggestion that the parasitic capacitance of the switches is a design concern or that a switch timing delay would serve a useful purpose. In fact, regular references to the importance of allowing the non-dissipative discharge of parasitic capacitances only surface in art that post-dates the original Vinciarelli patent. *See, e.g.*, U.S. Patent No. 4,959,764 (Sept. 25, 1990) (citing the '146 Patent); U.S. Patent No. 5,126,931 (June 30, 1992) (same); U.S. Patent No. 5,331,533 (July 19, 1994) (same).

Second, Unitrode has provided no references in any of the prior art that, either in combination or alone, suggest the use of a switch-timing delay in a power converter device. Nor is there a suggestion in the prior art that the parasitic capacitance of the primary switch is an operational concern. *Cf. Litton Sys., Inc. v. Honeywell, Inc.*, 87 F.3d 1559, 1569 (Fed.Cir.1996) (stating absence of reference in prior art is "telling in an obviousness determination."), *vacated by* 520 U.S. 1111, 117 S.Ct. 1240, 137 L.Ed.2d 323 (1997), *reinstated in relevant part by* 140 F.3d 1449 (Fed.Cir.1998).

Nonetheless, the deposition testimony of Carsten and Roberge creates a disputed issue of fact on the claim of obviousness. These experts claim that there were other motives to reduce current levels by adding "dead time" and that it would have been obvious to a good engineer how to accomplish that goal. Based on the limited snippets of expert testimony presented to me, I cannot conclude as a matter of law that the expert testimony, despite the flaws, is insufficient to surmount the clear and convincing evidence barrier.

Therefore, as a matter of law, Unitrode squeaks by the summary judgment bar on its claim of invalidity for obviousness under 35 U.S.C. s. 103.

E. Indefiniteness

Unitrode next argues that Vicor is not entitled to summary judgment on Unitrode's claim of invalidity for indefiniteness under 35 U.S.C. s. 112, para. 2. The gravamen of Unitrode's indefiniteness argument is that the identification of a "switch control circuit" in the claims is a means-plus-function limitation for which Vicor has failed to provide a corresponding structure.

Under 35 U.S.C. s. 112, para. 6, "[a]n element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." In other words, a patentee may enjoy the convenience of defining the structure for performing a particular function generically through the use of a means-plus-function

expression. *See Kemco Sales, Inc. v. Control Papers Co., Inc.*, 208 F.3d 1352, 1360 (Fed.Cir.2000). However, in a quid pro quo for that convenience, the patentee must disclose a specific structure corresponding to that means in the specification. *See id.* "If a patentee fails to satisfy the bargain because of a failure to disclose adequate structure, the claim will be rendered invalid as indefinite under [35 U.S.C. s. 112, para. 2]." FN12 *Id.* at 1360-61 (citing *In re Donaldson*, 16 F.3d 1189, 1195 (Fed.Cir.1994) (en banc)).

FN12. Under 35 U.S.C. s. 112, para. 2, the "specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." A claim is generally considered indefinite if one skilled in the art would not understand the scope of the claim when read in light of the specification. *See North Am. Vaccine, Inc. v. American Cyanamid Co.*, 7 F.3d 1571, 1579-80 (Fed.Cir.1993), *cert. denied*, 511 U.S. 1069, 114 S.Ct. 1645, 128 L.Ed.2d 365 (1994).

[14] In order to answer this question, the Court must first assure itself that a means-plus-function claim limitation is at issue. *See id.* at 1361. Where the claim limitation at issue does not contain the word "means," the Court applies a presumption that s. 112, para. 6 has not been invoked. *See id.* The party seeking invalidation may rebut the presumption by offering evidence that the claim limitation does not recite a sufficiently definite structure to perform the claimed function. *See id.*

[15] [16] Whether the language of the claim is in means-plus-function format is a matter of claim construction and, thus, a matter of law. *See id.* at 1360 (citing *Personalized Media Communications, LLC v. Int'l Trade Commission*, 161 F.3d 696, 702 (Fed.Cir.1998)). The party seeking invalidation bears the burden of proving the facts in support of a violation of the definiteness requirement by clear and convincing evidence. *See Advanced Cardiovascular Systems, Inc. v. Scimed Life Systems*, 96 F.Supp.2d 1006, 1019 (N.D.Cal.2000) (citing *Al- Site Corp. v. VSI Int'l, Inc.*, 174 F.3d 1308, 1323 (Fed.Cir.1999)).

[17] In moving for summary judgment, Vicor stresses at the outset that the "switch control circuit" limitation does not contain the word "means." It must therefore be presumed that the limitation is not expressed in means-plus-function terms. Vicor also points to the deposition testimony from both of Unitrode's experts indicating that there are common structural elements to any "switch control circuit" and that such a circuit was standard circuitry that was commonly used among those of ordinary skill in the art of power supply electronics.

In response, Unitrode's only proffer on the issue of indefiniteness is a single answer from the deposition testimony of Dr. Vinciarelli FN13 and a citation to an unpublished decision from the Northern District of California. FN14

FN13. The deposition testimony is as follows:

Q: Is it a fair statement that in your reset patent the control circuit is defined in terms of the functions it performs as opposed to the circuitry or structures that perform those functions?

A: Yes, I think that's fair. The functions are defined. Specific implementation is left to the reader.

(Massa Aff., Ex. 15.)

FN14. As its first line of argument, Unitrode urges the Court not to consider Vicor's indefiniteness arguments at the summary judgment phase. However, once Vicor has moved for summary judgment,

Unitrode cannot simply defer its obligation to proffer evidence demonstrating a material issue of fact for trial. "When a motion for summary judgment is made and supported as provided in [Rule 56], an adverse party ... must set forth specific facts showing that there is a genuine issue for trial. If the party does not so respond, summary judgment, if appropriate, shall be entered against the adverse party." Fed.R.Civ.P. 56(e).

Plus, as a question of law for the Court, the definiteness determination is well suited for disposition at summary judgment. This is especially so where, as here, the party opposing summary judgment makes no claim that it possesses additional evidence that could be offered at a *Markman* hearing or at trial. The testimony from Vinciarelli that the "switch control circuit" is "defined in terms of the functions it performs" does not suffice to transform the term into a means-plus-function limitation. Since devices are often given names that describe their function, "the fact that a particular mechanism ... is defined in functional terms is not sufficient to convert a claim element containing that term into a 'means for performing a specified function'...." *Greenberg v. Ethicon*, 91 F.3d 1580, 1583 (Fed.Cir.1996). The important inquiry is whether the term conveys "to one knowledgeable in the art a variety of structures known" by that term. *Personalized Media*, 161 F.3d at 705. Unitrode has offered no evidence to contradict statements indicating that, in the parlance of power supply engineering, the term "switch control circuit" identifies a variety of specific structures known by those of ordinary skill in the art.

Nor is Unitrode's indefiniteness argument greatly advanced by the unpublished decision of *Linear Tech. Corp. v. Impala Linear Corp.*, No. C 98-1727 (N.D. Cal. June 9, 1999). In that case, a district court held that the term "circuitry" did not recite sufficient structure to avoid application s. 112, para. 6. *See id.*, slip op. at 3. That case is distinguishable because the only reference to structure (i.e., "control circuit") appeared in the preamble. Here, in contrast, the claim itself refers to the "switch control circuit." Moreover, the conclusion reached by that court falls distinctly in the minority. *Cf., e.g., Harmonic Design, Inc. v. Hunter Douglas, Inc.*, 88 F.Supp.2d 1102, 1105 (C.D.Cal.2000) (term "electronic circuit" is a structural limitation not subject to s. 112, para. 6); *Nilssen v. Motorola*, 80 F.Supp.2d 921, 935 (N.D.Ill.2000) (same with regard to "rectifier circuitry" and "rectifying and filtering circuitry"); *Database Excelleration Systems, Inc. v. Imperial Technology, Inc.*, 48 U.S.P.Q.2d 1533, 1537 (N.D.Cal.1998) (same with regard to "control circuit"); *CellNet Data Sys., Inc. v. Itron, Inc.*, 17 F.Supp.2d 1100, 1109 (same with regard to "circuit means"); *Nilssen v. Magnetek, Inc.*, No. 98 C 2229, 1999 WL 982966, at (N.D.Ill. Oct. 26, 1999) (same with regard to "inverter circuit").

Unitrode has failed to rebut the inference that, since the term "switch control circuit" does not employ the word "means," it is presumed to be a structural, rather than functional, limitation. More importantly, Unitrode has offered no evidence to support its position on the key question of an indefiniteness inquiry, namely, whether one skilled in the art would have understood the scope of the limitations of the patent claims. The only evidence offered on this question suggests precisely the opposite. Therefore, Vicor has established as a matter of law that the '098 Patent satisfies the definiteness requirement of s. 112, para. 2.

F. Best mode

Unitrode has moved for summary judgment on the basis that the '098 Patent is invalid by virtue of the inventor's failure to disclose the best mode for practicing his invention. At the same time, Vicor argues Unitrode's invalidity claim must fail because the '098 Patent satisfies the statutory best mode requirement as a matter of law.

Under 35 U.S.C. s. 112, para. 1, a patent specification must "set forth the best mode contemplated by the

inventor of carrying out his invention." The well established purpose of the best mode requirement is to restrain inventors from applying for a patent while at the same time concealing from the public preferred embodiments of their inventions which they have in fact conceived. *See Spectra-Physics, Inc. v. Coherent, Inc.*, 827 F.2d 1524, 1532 (Fed.Cir.), *cert. denied*, 484 U.S. 954, 108 S.Ct. 346, 98 L.Ed.2d 372 (1987).

The best mode requirement focuses on a two-prong inquiry. First, the factfinder must determine whether, at the time of filing the application, the inventor possessed a best mode for practicing the invention. *See Eli Lilly & Co. v. Barr Labs., Inc.*, 222 F.3d 973, 980 (Fed.Cir.2000) (citing *Fonar Corp. v. General Elec. Co.*, 107 F.3d 1543, 1548 (Fed.Cir.), *cert. denied*, 522 U.S. 908, 118 S.Ct. 266, 139 L.Ed.2d 192 (1997)). Second, the factfinder must determine whether the written description adequately disclosed the best mode such that one reasonably skilled in the art could practice it. *See id.* at 981, 118 S.Ct. 266 (citing *Fonar*, 107 F.3d at 1548). Assessing the adequacy of the disclosure "is largely an objective inquiry that depends upon the scope of the claimed invention and the level of skill in the art." *U.S. Gypsum Co. v. Nat'l Gypsum Co.*, 74 F.3d 1209, 1213 (Fed.Cir.1996) (quoting *Chemcast Corp. v. Arco Indus. Corp.*, 913 F.2d 923, 928 (Fed.Cir.1990)). "A best mode violation may occur if the disclosure of the best mode is so objectively inadequate as to effectively conceal the best mode from the public." *Id.* at 1215.

[18] Since the key inquiry under the best mode requirement is the concealment-either intentional or accidental-of the preferred method of practicing the invention, the inventor is not required to specify "which of his embodiments he considers his best mode...." *Randomex, Inc. v. Scopus Corp.*, 849 F.2d 585, 589 (Fed.Cir.1988) (quoting *Ernsthausen v. Nakayama*, 1985 WL 71768, 1 U.S.P.Q.2d 1539, 1549 (Bd.Pat.App & Interf.1985)). Indeed, he may even disclose that method indiscriminately with other, less preferred, methods. *See id.* The best mode requirement will be satisfied unless one skilled in the art "simply could not divine" the preferred method of practicing the invention. *Chemcast*, 913 F.2d at 929.

Because the patent retains a presumption of validity under s. 282, the party claiming invalidity must establish violation of the best mode requirement by evidence that is clear and convincing. *See Nobelpharma AB v. Implant Innovations, Inc.*, 141 F.3d 1059, 1064 (Fed.Cir.), *cert. denied*, 525 U.S. 876, 119 S.Ct. 178, 142 L.Ed.2d 145 (1998).

There is no dispute between the parties that Dr. Vinciarelli had a preferred method for practicing the invention at the time he filed the '146 Patent. The '098 Patent states that the primary and auxiliary switches should be solid state switches. *See col. 1, 11. 18-22.* Vinciarelli preferred the use of a particular kind of solid-state transistor, a MOSFET, as the primary switch. A MOSFET, also known as a HEXFET, is one of two types of transistors that could be used in the invention. The other type of transistor is a bipolar junction transistor.

Vicor argues that Vinciarelli's preference for using a MOSFET was adequately disclosed by a reference in a discussion of the prior art to an article entitled "A Universal 100 KHz Power Supply Using a Single HEXFET." Col. 2, 11.44-49. Vicor argues further that this disclosure sufficiently communicated the use of a MOSFET as the primary switch to those skilled in the art because the focus of Vinciarelli's invention was the current mirror apparatus comprised of the auxiliary switch, capacitor, and switch control circuit, rather than the existing element of a primary switch. To illustrate, Vicor points out that the current magnetizing mirror in the patent is shown as building upon the prior embodiment of a simple single-ended forward converter that incorporates a MOSFET as the primary (and only) switch. To bolster its position, Vicor offers the testimony of Unitrode's expert Carsten to the effect that one skilled in the art would read the patent to suggest the use of a MOSFET for the primary switch.FN15

FN15. That testimony reads as follows:

Q: So you'll agree, then, that a person of skill in the art reading this patent would have known based on reading the patent that a MOSFET was one of the ways to implement the primary switch in the invention described in Claim 1, right?

A: By implication that they referred to another article, yes.

Q: Well, would there have been any doubt in a person's mind upon reading this that a MOSFET was one of the ways to implement the primary switch in the invention described in the patent?

A: The patent says through its reference to another article that that is one of the types of switches that can be used, yes.

Q: And it's clear to you that that's the case?

A: Okay, if you point it out that way, yes.

(Vicor SUF, Ex. 4 (objections omitted).)

In response, Unitrode argues that, for various reasons, the citation to the article is an inadequate disclosure of a preferred method. First, it insists that, by including the reference in a discussion of prior art, a reader is actually dissuaded from using a MOSFET because the subsequent teaching of the patent is that prior attempts at core reset mechanism were inefficient. Second, because specifications of the patent suggests a preference for using a MOSFET as the *auxiliary* switch, the relative silence indicates no similar preference with respect to the *primary* switch. *See* col. 6, 11. 55-57 ("MOSFET transistors [are] natural candidates to implement the functions of [the auxiliary] switch **21**"). And third, Unitrode offers the deposition testimony of Vicor's expert Paul Horowitz that indicates that a MOSFET was never directly disclosed for use as the primary switch.FN16

FN16. That deposition testimony reads as follows:

Q: Does the 098 Patent ever say the primary switch should be a MOSFET transistor?

A: It never explicitly says those words; however, as I mentioned before, the one reference that contains technology for a primary switch happens to be a MOSFET.

Q: We'll discuss that later. Does the 098 Patent ever say the primary switch could be a MOSFET transistor?

A: Again, I'll say indirectly yes. Directly, no.

(Unitrode's First Aff. of D. Massa (Docket No. 96), Ex. 7.)

[19] Unitrode's proffer is simply not enough to win the day on a claim for which Unitrode bears the high burden of proof by clear and convincing evidence. Vicor has demonstrated that the use of a MOSFET (or HEXFET) was disclosed in relation to the primary switch. It is true that the use of the MOSFET as a primary switch was only disclosed in the context of the prior art depicted in Figure 3a of the patent. Nonetheless, the patent contained nothing that would teach away from the use of the MOSFET as a primary switch in the invention. This is particularly true since the MOSFET was expressly disclosed in connection with the auxiliary switch. Though the patent does not flag the best mode, Unitrode has presented no evidence that the disclosure of a MOSFET in the patent is insufficient to instruct one skilled in the art how to practice the inventor's preferred method. Unitrode cannot meet its burden of proving by clear and convincing evidence that Unitrode's disclosure of a MOSFET as the primary switch was so objectively inadequate as to conceal the inventor's preference.

G. Inducement of infringement

Lastly, Unitrode has moved for summary judgment on Vicor's claims of inducement of infringement under 35 U.S.C. s. 271(b) (providing that "[w]hoever actively induces infringement of a patent shall be liable as an infringer.") On this account, Unitrode contends that Vicor has not produced the sort of evidence that would allow an inducement claim to survive.

Vicor claims that Unitrode, fully aware of the Vinciarelli patent, conducted an extensive campaign to encourage the use of its integrated circuits (chips) in infringing single-ended forward converters through data sheets and marketing activities, and that third parties like Lucent, Artesyn, Magnetek and Siemens, purchased the chips and utilized them in the infringing manner as instructed by Unitrode.

1. Evidence of reliance

[20] Unitrode first argues that, in order to survive summary judgment, Vicor must adduce direct evidence that designers of infringing devices relied upon the information in the data sheets or advertising materials accompanying the Unitrode chips. Otherwise, argues Unitrode, Vicor would be able to impose liability on Unitrode for the actions of third parties who may have depended entirely on other sources of information to design the infringing devices.

However, there is no requirement under s. 271(b) that the causation element of inducement be proven by direct evidence of reliance. That fact, like any other fact, may be demonstrated though circumstantial, rather than direct, evidence. *See* *Moleculon Research Corp. v. CBS, Inc.*, 793 F.2d 1261, 1272 (Fed.Cir.1986) ("If [the defendant] is arguing that proof of inducing infringement requires *direct*, as opposed to *circumstantial evidence*, we must disagree. It is hornbook law that direct evidence of a fact is not necessary.") (emphasis in original), *cert. denied*, 479 U.S. 1030, 107 S.Ct. 875, 93 L.Ed.2d 829 (1987). *See also* *Biacore, AB v. Thermo Bioanalysis Corp.*, 79 F.Supp.2d 422, 458-59 (D.Del.1999) (circumstantial evidence held sufficient to establish claim of inducement); *Mickowski v. Visi-Trak Corp.*, 36 F.Supp.2d 171, 180 (S.D.N.Y.1999) (same), *aff'd*, 230 F.3d 1379 (Fed.Cir.2000); *Haworth, Inc. v. Herman Miller, Inc.*, 1994 WL 832016, 37 U.S.P.Q.2d 1080, 1088 (W.D.Mich.1994) (same). Indeed, "[c]ircumstantial evidence is not only sufficient, but may also be more certain, satisfying and persuasive than direct evidence." *Moleculon Research*, 793 F.2d at 1272 (quoting *Michalic v. Cleveland Tankers, Inc.*, 364 U.S. 325, 330, 81 S.Ct. 6, 5 L.Ed.2d 20 (1960)).

The cases on which Unitrode relies do not dictate a contrary result. Each of these cases stands for the simple proposition that, in order to be liable under s. 271(b), a defendant must have taken some knowingly calculated action that induces infringement by a third party. *See, e.g.*, *Black & Decker, Inc. v. Catalina Lighting, Inc.*, 953 F.Supp. 134, 140-41 (E.D.Va.1997); *Clinical Dynamics Corp. v. Dynatech Nevada, Inc.*, 30 U.S.P.Q.2d 1969, 1971 (D.Mass.1994). Based on that standard, the court in *Black & Decker* held that a defendant cannot be held liable solely for failing to prevent a third party from infringing once the defendant learned of the infringed patent. *See* 953 F.Supp. at 140-41. Similarly, the court in *Clinical Dynamics* allowed summary judgment against the plaintiff because it failed to provide evidence that the defendant corporation had taken any affirmative actions through a separate and independent subsidiary corporation that would constitute inducement. *See* 30 U.S.P.Q.2d at 1971. There is no suggestion in either case that inducement under s. 271(b) may be proven only by direct evidence. Although the court in *Clinical Dynamics* states that inducement cannot be shown by "hypothesis" or "conjecture," *see id.*, that is a far cry from requiring proof of inducement by direct evidence alone.

[21] At this stage, Vicor has adduced sufficient (albeit circumstantial) evidence creating a genuine dispute of

fact. There is evidence in the record that the data sheets provided by Unitrode specifically recommend and instruct the reader to incorporate Unitrode chips into an infringing device. In addition, Vicor has offered evidence through its expert that the designers must rely on the data sheets accompanying the chips because the data sheets contain information that is necessary to proper use of the chip.

There is also evidence that Unitrode actively markets its chips specifically-though not exclusively-for incorporation into infringing devices. This marketing is achieved through sponsoring seminars and through the distribution of data sheets and other "cookbook" materials, all of which tout the advantage of using the chips in infringing devices and provide detailed description of how use of the chips in such devices may be achieved. At least two infringing third parties Artesyn and Lucent attended these seminars.

This evidence, if believed, would support a reasonable inference that Unitrode actively induced infringement on the part of third parties.

2. Evidence of control

[22] As an alternative grounds for summary judgment on the inducement claim, Unitrode argues that it cannot be liable for inducement where it has not exercised control over the third party infringers. In other words, Unitrode insists that it must have some control over the design, manufacture, or marketing of infringing devices in order to be held liable under s. 271(b).

It is true that, in some cases, liability for inducement under s. 271(b) has been imposed on a defendant who exercises some degree of direct control over third-party infringers. *See, e.g.,* Water Technologies Corp. v. Calco, Ltd., 850 F.2d 660, 669 (Fed.Cir.) (defendant who assisted in the design of infringing device and exerted control over manufacture devices held liable under s. 271(b)), *cert. denied*, 488 U.S. 968, 109 S.Ct. 498, 102 L.Ed.2d 534 (1988). Such cases, however, cannot be read to define the outer limits of liability for active inducement to infringe. In fact, it is a textbook violation of s. 271(b) where, as it has been argued here, "a defendant selling products capable of either innocent or infringing use provides through labels, advertising or other sales methods instructions and directions as to the infringing use." 5 David S. Chisum, *Chisum on Patents* s. 17.04[4][f], at 17-82 & n. 19 (2000) (collecting cases). *See also* Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus., Inc., 145 F.3d 1303, 1307-11 (Fed.Cir.1998) (upholding judgment of inducement against manufacturer who, by advertising and instruction, encouraged third parties to use its products in infringing processes).

Upon examination, the cases cited by Unitrode cannot be read to support its restrictive view of inducement under s. 271(b). For example, in *Hewlett-Packard Co. v. Bausch & Lomb, Inc.* 909 F.2d 1464 (Fed.Cir.1990), the court merely held that active inducement under s. 271(b) requires "actual intent to cause the acts which cause the which constitute" infringement. *Id.* at 1469. Thus, the defendant's lack of control over the alleged third party infringer in that case was relevant only to the defendant's intent to induce infringement. *See id.* ("it is clear that [the defendant] was merely interested in divesting itself of [a division of its company] at the highest possible price. [The defendant] had no interest in what the purchaser did ... and certainly not care whether [the purchaser] ... continued to make [the infringing device]"). Such was also the case in *Water Technologies Corp.*, where the defendant's control over the third-party was used to demonstrate by circumstance that the defendant acted with the required intent. *See* 850 F.2d at 669. Here, Unitrode makes no claim that its actions with respect to the marketing of its chips were not intentional. Nor does Unitrode argue that it acted without knowledge of the existence of the '098 Patent. Thus, no evidence of control over an infringing third party would be necessary to demonstrate the element of intent under s.

271(b).

[23] The plaintiff may demonstrate inducement to infringe by showing that Unitrode, through its marketing and advertising, induced infringement on the part of specific third parties by providing them with instructions and directions for the use of its chips in infringing. By that standard, Vicor has adduced evidence that raises triable issues of fact on its claim for active inducement. Unitrode's motion for summary judgment on this claim must, therefore, be denied.

ORDER

For the reasons stated above, Vicor's Motion for Partial Summary Judgment (Docket No. 80) is ***ALLOWED*** regarding the claim of direct infringement by Unitrode and some third parties. The Court ***ALLOWS*** Vicor's motion for summary judgment on the defenses that the claims are anticipated, indefinite and invalid for failing to disclose the best mode. The Court ***DENIES*** Vicor's motion for summary judgment with respect to the defense of obviousness. Unitrode's Motion for Summary Judgment of Patent Validity Under 35 U.S.C. s. 102 (Docket No. 86), Motion for Summary Judgment of Invalidity for Failure to Disclose the Best Mode (Docket No. 94), and Motion for Partial Summary Judgment of No Inducement of Infringement (Docket No. 97) are each ***DENIED***.

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