IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

POWER INTEGRATIONS, INC., a Delaware corporation,	:	
Plaintiff,	:	
v.	:	C.A. No. 04-1371-JJF
FAIRCHILD SEMICONDUCTOR INTERNATIONAL, INC., a Delaware corporation, and FAIRCHILD SEMICONDUCTOR CORPORATION, a Delaware corporation,	:	
Defendants.	:	

William J. Marsden, Jr., Esquire and Sean P. Hayes, Esquire of FISH & RICHARDSON P.C., Wilmington, Delaware.
Of Counsel: Frank E. Scherkenbach, Esquire of FISH & RICHARDSON P.C., Boston, Massachusetts.
Howard G. Pollack, Esquire and Michael R. Headley, Esquire of FISH & RICHARDSON P.C., Redwood City, California.
Attorneys for Plaintiff.

Steven J. Balick, Esquire and John G. Day, Esquire of ASHBY & GEDDES, Wilmington, Delaware.
Of Counsel: G. Hopkins Guy, III, Esquire; Vickie L. Freeman, Esquire; Bas de Blank, Esquire and Brian H. VanderZanden, Esquire of ORRICK, HERRINGTON & SUTCLIFFE LLP, Menlo Park, California.
Attorneys for Defendants.

MEMORANDUM OPINION

March 31, 2006
Wilmington, Delaware

Farnan, District Judge.

This action was brought by Plaintiff, Power Integrations, Inc. ("Power Integrations") against Defendants Fairchild Semiconductor International, Inc. and Fairchild Semiconductor Corporation (collectively "Fairchild") alleging willful infringement of United States Patent Nos. 4,811,075 (the "'075 patent"), 6,107,851 (the "'851 patent"), 6,229,366 (the "'366 patent"), 6,249,876 (the "'876 patent"). The parties briefed their respective positions on claim construction, and the Court conducted a Markman hearing on the disputed terms in the asserted patents. This Memorandum Opinion presents the Court's construction of the disputed terms.

BACKGROUND

The patents-in-suit generally relate to integrated circuit devices used in power supplies and can be broken down into two categories. The first type of technology which is exemplified in the '075 patent relates to the physical structure of a high voltage metal-oxide semiconductor ("MOS") transistor device. The MOS transistor device described in the '075 patent incorporates a top layer, referred to as the "p-top" layer," in the "extended drain region" of the device. This technology seeks to provide more efficient high voltage MOS transistors and improved ability to incorporate the high voltage structure into a device having low-voltage circuits on the same integrated circuit chip.

According to Power Integrations the technology of the '075 patent created the basis for Power Integrations to form as a company and allowed Power Integrations to provide the first commercially viable, "fully integrated" integrated circuit device for use in controlling switch mode power supplies.

The second type of technology is exemplified in the '366, '851 and '876 patents (collectively referred to as the "circuit patents") and relates to the circuit design associated with the integrated power supply controllers made by Power Integrations. The circuit patents relate to circuit structures within the integrated circuit devices that provide functions which are useful to the overall power supply design into which the chips are incorporated. The circuit patents specifically relate to two types of functions, "frequency jitter" and "integrated soft start." According to Power Integrations, the frequency jitter technology allows power supply designers to reduce peak electromagnetic interference ("EMI") so that electronic products can meet government standards set for EMI using smaller, less complicated and less expensive components than that which was available in the prior art. The integrated soft start technology seeks to solve problems associated with starting up a power supply, including limiting the inrush of currents at start up.

DISCUSSION

I. The Legal Principles of Claim Construction

Claim construction is a question of law. Markman v. Westview Instruments, Inc., 52 F.3d 967, 977-78 (Fed. Cir. 1995), aff'd, 517 U.S. 370, 388-90 (1996). When construing the claims of a patent, a court considers the literal language of the claim, the patent specification and the prosecution history. Markman, 52 F.3d at 979. Of these sources, the specification is considered the single best guide for discerning the meaning of a claim. Phillips v. AWH Corporation, 415 F.3d 1303, 1312-1317 (Fed. Cir. 2005).

A court may consider extrinsic evidence, including expert and inventor testimony, dictionaries, and learned treatises, in order to assist it in understanding the underlying technology, the meaning of terms to one skilled in the art and how the invention works. Phillips, 415 F.3d at 318-319; Markman, 52 F.3d at 979-80 (citations omitted). However, extrinsic evidence is considered less reliable and less useful in claim construction than the patent and its prosecution history. Phillips, 415 F.3d at 318-319 (discussing "flaws" inherent in extrinsic evidence and noting that extrinsic evidence "is unlikely to result in a reliable interpretation of a patent claim scope unless considered in the context of intrinsic evidence").

In addition to these fundamental claim construction principles, a court should also interpret the language in a claim by applying the ordinary and accustomed meaning of the words in the claim. Envirotech Corp. v. Al George, Inc., 730 F.2d 753, 759 (Fed. Cir. 1984). If the patent inventor clearly supplies a different meaning; however, then the claim should be interpreted according to the meaning supplied by the inventor. Markman, 52 F.3d at 980 (noting that patentee is free to be his own lexicographer, but emphasizing that any special definitions given to words must be clearly set forth in patent). If possible, claims should be construed to uphold validity. In re Yamamoto, 740 F.2d 1569, 1571 & n.* (Fed. Cir. 1984) (citations omitted).

II. The Meaning Of The Disputed Terms of the Asserted Patents

A. The Disputed Terms In The '075 Patent

All the disputed terms of the '075 patent are contained in independent claim 1 of the '075 patent. In full, claim 1 of the '075 patent recites:

> 1. A high voltage MOS transistor comprising:
>
> a semiconductor substrate of a first conductivity type having a surface;
>
> a pair of laterally spaced pockets of semiconductor material of a second conductivity type within the substrate and adjoining the substrate surface,
>
> a source contact connected to one pocket,
>
> a drain contact connected to the other pocket,

> an extended drain region of the second conductivity type extending laterally each way from the drain contact pocket to surface-adjoining positions,
>
> a surface adjoining layer of material of the first conductivity type on top of an intermediate portion of the extended drain region between the drain contact pocket and the surface adjoining positions,
>
> said top layer of material and said substrate being subject to application of a reverse-bias voltage,
>
> an insulating layer on the surface of the substrate and covering at least that portion between the source contact pocket and the nearest surface adjoining position of the extended drain region, and
>
> a gate electrode on the insulating layer and electronically isolated form the substrate region thereunder which forms a channel laterally between the source contact pocket and the nearest surface-adjoining position of the extended drain region, said gate electrode controlling by field-effect the flow of current thereunder through the channel.

('075 patent, col. 6, ll. 54 - col. 7, ll. 12).

1. **DMOS**

A central part of the parties' dispute focuses on the meaning of the term "DMOS." Although this term is not found in the asserted claims of the '075 patent, Fairchild contends that the construction of this term is important, because Power Integrations disclaimed DMOS structures during the prosecution of the '075 patent.

In its Opening Claim Construction Brief, Fairchild contends that "DMOS" means "double-diffused MOS." In its Answering Claim Construction Brief, Fairchild elaborates that DMOS means "a MOS structure in which the source pocket is formed entirely within a channel region of more heavily doped semiconductor material (commonly referred to as a "body" region) that is formed within the substrate." (D.I. 166 at 5). Fairchild further contends that the term "DMOS" is not restricted to any particular process for making the DMOS structure.

In response, Power Integrations acknowledges the importance of the construction of the term "DMOS" to Fairchild's arguments, but contends that this term should not be defined by the Court in the context of claim construction because the term "DMOS" is not found anywhere in the '075 patent. According to Power Integrations the DMOS issue pertains to equivalence and estoppel arguments. (D.I. 164 at 2). Power Integrations urges the Court to decline from importing a DMOS limitation into the terms of the '075 patent and requests the Court to defer ruling on whether the scope of the disclaimer made by Power Integrations during the prosecution of the patent has any impact on this case.

In the alternative, Power Integrations contends that the Court should construe the term "DMOS" to mean "a device formed by successive diffusions of different materials through the same opening in an insulating or mask layer." (D.I. 152 at 27).

Power Integrations goes on to explain more specifically, that the double diffusion process was used to form the channel and source contact regions of the transistor by successively diffusing material made of different conductivity types. According to Power Integrations, it was important that this diffusing process was done through the same opening in the insulated layer to allow the edges of the different regions to be controlled with precision, a process known as self-aligning. The result of this process is a transistor with a very short channel length which could be accurately controlled. Power Integrations contends that the term "DMOS" has been broadened since the time of the prosecution of the '075 patent to encompass all electrically asymmetrical transistors including those whose characteristics of the channel region are determined by a separate diffusion step. Power Integrations contends that this broad construction should not be adopted by the Court, because it embraces later-developed technology which was not known at the time of the prosecution of the '075 patent. (D.I. 152 at 29; D.I. 164 at 3-5).

As the parties note, the term "DMOS" is not found in the asserted claims of the '075 patent. Because "DMOS" is not a claim term, the Court concludes that its meaning is not properly considered in the context of claim construction. Accordingly, the Court declines to provide a construction for the term "DMOS" in the context of its Markman rulings and will defer construction

of this term until such time as the Court is presented with the equivalence and/or estoppel issues involving this term.[1]

2. **MOS transistor**

It appears to the Court that the parties agree that the term "MOS transistor" means "a metal-oxide-semiconductor transistor." (D.I. 152 at 30; D.I. 156 at 7). The parties' primary dispute with respect to this claim is whether the claim's recitation of an "MOS transistor" excludes a "DMOS" transistor, which in turn implicates the question of what a "DMOS" transistor encompasses. Accordingly, the Court will defer commenting on whether the term "MOS transistor" excludes "DMOS" and define the term "MOS transistor" for purposes of claim construction as "a metal oxide transistor."

3. **substrate**

The parties also do not dispute that "substrate" means "the physical material on which a transistor or microcircuit is fabricated." (D.I. 152 at 30; D.I. 156 at 8). Rather, the parties' dispute what it means for the "pockets" and "channel" to

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[1] Prosecution history estoppel is a question of law; however, equivalence is a question of fact. Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 344 F.3d 1359, 1367 (Fed. Cir. 2003). As such, it may well be that resolution of the "DMOS" debate in its entirety will require the Court to have a complete factual record. Accordingly, for this additional reason, the Court declines to rule on the meaning of the term "DMOS" in the context of the purely legal question of claim construction.

be "within the substrate."[2] This debate implicates the DMOS issue, and therefore, the Court will defer providing a more specific construction for the term "substrate" than that which has been agreed to by the parties, until such time as the DMOS issue is properly before the Court.

4. a pair of laterally spaced pockets of semiconductor material of a second conductivity type within the substrate

It appears to the Court that the parties do not dispute that the phrase "a pair of laterally spaced pockets of semiconductor material of a second conductivity type within the substrate" means "two laterally spaced pockets of semiconductor material of the opposite conductivity type from the substrate." (D.I. 152 at 31; D.I. 156 at 10). However, the parties dispute whether the phrase "within the substrate" means that the pockets must be within the un-doped wafer and not within a well-region. The parties also dispute whether Power Integrations disclaimed reading this element on a DMOS transistor.

Based on the parties' claim construction briefing, the Court understands that both of the aforementioned claim construction disputes relate to the DMOS coverage issue. For the reasons discussed in the context of the other DMOS-related terms, the Court will defer providing a construction of the disputed phrase

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[2] References to the "pockets" and "channel" are made in other portions of claim 1 of the '075 patent discussed infra.

beyond that which has been agreed to by the parties.

5. **a surface adjoining layer of material of the first conductivity type on top of an intermediate portion of the extended drain region between the drain contact pocket and the surface-adjoining positions**

Fairchild contends that "a surface adjoining layer of material of the first conductivity type on top of an intermediate portion of the extended drain region between the drain contact pocket and the surface-adjoining positions" means "a layer of material the same conductivity as the substrate above a portion of the extended drain region and between the drain contact pocket and each of the surface adjoining positions of the extended drain region. Power Integrations disclaimed reading this element on a DMOS transistor." (D.I. 156 at 11). Fairchild further acknowledges in its Opening Brief, that the parties do not substantially disagree as to how this phrase should be construed, but that their disagreement again centers on whether DMOS has been disclaimed by Power Integrations.

Power Integrations contends that this phrase does not require construction, because the meaning of its individual words is clear and the image conjured by these words can be easily understood by a jury by referencing Figure 1 of the '075 patent. In the event the Court chooses to construe this phrase, Power Integrations advocates the following construction: "a layer of material of the same conductivity type as the substrate located

on top of a portion of the extended drain region between the drain contact pocket and surface adjoining positions of the extended drain region." (D.I. 152 at 33-34). Power Integrations contends that Fairchild's use of the term "above" is an attempt to introduce an ambiguity into the claim language, and that its construction more closely tracks the claim language. Power Integrations also disagrees with Fairchild that this phrase excludes all applications to devices that may be referred to as DMOS transistors.

Reviewing the claim language in the context of the specification, the Court agrees with Power Integrations that the meaning of this element is clear and further construction by the Court is not warranted. To the extent that the parties dispute whether Power Integrations disclaimed reading this element on a DMOS transistor, the Court will defer resolution of that issue for the reasons discussed above.

6. **said top layer of material**

Power Integrations contends that the meaning of the term "said top layer of material" is clear and that it should not be construed. To the extent that a construction is required, Power Integrations contends that the phrase is appropriately construed by reference to the preceding clause as the "surface adjoining layer." (D.I. 152 at 33; D.I. 164 at 8).

Fairchild contends that the phrase "said top layer of

material" lacks an antecedent basis, and therefore it cannot be construed. Fairchild contends that Power Integrations' proposed construction is incorrect, because "surface adjoining layer" is already part of the claims. (D.I. 156 at 13).

The Court disagrees with Fairchild that the terms "said top layer of material" lacks an antecedent basis and cannot be construed. In the Court's view, it is clear that "said top layer of material" refers to the "surface adjoining layer" discussed in the preceding paragraph.[3] Accordingly, the Court concludes that construction of this phrase beyond its plain meaning when read in the context of the claim is not required, and therefore, the Court will not provide a construction for this phrase.

7. **being subject to application of a reverse-bias voltage**

Fairchild contends that ths phrase "being subject to application of a reverse-bias voltage" means "experiencing a bias voltage applied to a semiconductor junction with polarity that permits little or no current to flow." (D.I. 156 at 13). Fairchild contends that the specification does not require the "top layer" or the "surface adjoining layer" to be connected to the ground.

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[3] Indeed, Fairchild itself refers to the "top layer or "surface adjoining layer" in its argument related to "reverse bias voltage" (D.I. 166 at 19), which further supports the Court's conclusion that the phrase "said top layer of material" is easily understood in the context of the claim language as referring to the "surface adjoining layer."

Power Integrations contends that "reverse bias voltage" means "a voltage applied across a rectifying junction with a polarity that provides a high-resistance path." Power Integrations further contends that a proper construction of this phrase means that "the surface adjoining layer of material and the substrate recited in the claims are connected in some way to 'ground.'" (D.I. 152 at 34). Stated another way, Power Integrations contends that the top layer and the substrate are connected together, and thus grounded.

Reviewing the claim language in light of the specification of the '075 patent, the Court concludes that the term "reverse bias voltage" means "a voltage applied across a rectifying junction with a polarity that provides a high-resistance path." Indeed, it does not appear to the Court that the parties substantially dispute that this defintion of the term is the more technically accurate definition. (D.I. 166 at 19; D.I. 152 at 34). Rather, the parties' disagreement centers on the issue of whether "reverse bias voltage" requires the surface adjoining layer of material and the substrate recited in the claim to be connected to the ground. The specification of the '075 patent clearly states that the "top layer is either connected to the substrate or left floating." '075 patent, col. 2, ll. 61-63. Accordingly, the Court concludes that the patent does not provide for a grounding limitation, and therefore, the Court concludes

that "reverse bias voltage" means "a voltage applied across a rectifying junction with a polarity that provides a high-resistance path."

8. **substrate region thereunder which forms a channel**

Fairchild contends that the "substrate region thereunder which forms a channel" means "a channel is formed laterally in the substrate between the source contact pocket and the nearest surface adjoining position of the extended drain region." (D.I. 156 at 12). Fairchild also contends that Power Integrations disclaimed reading this element on a DMOS transistor.

Power Integrations contends that this phrase should be afforded its plain meaning and refers to the physical location of the channel as being formed underneath the gate region. More specifically, Power Integrations contends that "the channel is formed underneath the insulated gate in the substrate which can include, for example, being formed in a well or otherwise doped region located underneath the gate." (D.I. 152 at 35). Power Integrations also states that the "channel" of a transistor is "a well known term that refers to the region in which the electrical charge flows when the transistor is active." (D.I. 152 at 34-35).

Fairchild does not dispute the definition of "channel" provided by Power Integrations; however, the parties do not specifically ask the Court to construe the term "channel" and

their claim construction disputes do not focus on the meaning of the term "channel" itself. Accordingly, the Court will not provide further construction of the word "channel." As for the location of the channel, the Court further concludes that the phrase does not require further construction by the Court, as it is clear from the claim language that the channel is between the source contact pocket and the nearest surface adjoining position of the extended drain region.

The parties' primary dispute with respect to this phrase again focuses on whether Power Integrations disclaimed reading this element on a DMOS transistor. In this regard, it appears to the Court that the DMOS issue is also related to whether the channel is formed in well material or otherwise doped material beneath the insulated gate as argued by Power Integrations. For the reasons discussed in the context of the other DMOS-related terms, the Court will defer ruling on the question of whether Power Integrations disclaimed reading this claim element on a DMOS transistor.

B. The Disputed Terms In The '876 Patent

Power Integrations has asserted claims 1, 17 and 19 of the '876 patent against Fairchild. Accordingly, the Court will proceed to construe the disputed terms found in those claims.

1. Claim 1

Claim 1 of the '876 patent recites:

> 1. A digital frequency jittering circuit for varying the switching frequency of a power supply, comprising:
>
> an oscillator for generating a signal having a switching frequency, the oscillator having a control input for varying the switching frequency;
>
> a digital analog converter coupled to the control input for varying the switching frequency; and
>
> a counter coupled to the output of the oscillator and to the digital to analog converter, the counter causing the digital to analog converter to adjust the control input and to vary the switching frequency.

('876 patent, col. 8, ll. 41-52).

a. **frequency jittering**

Power Integrations contends that the term "frequency jittering" means "varying the switching frequency of a switch mode power supply about a target frequency in order to reduce electromagnetic interference." (D.I. 152 at 6). Power Integrations also contends that the "jittering" or variation in the frequency signal must be controlled and predetermined. Stated another way, Power Integrations requests the Court to construe the term "frequency jittering" to mean "a controlled and predetermined change or variation in the frequency of a signal." (D.I. 152 at 8).

Fairchild contends that the Court should decline to construe the term "frequency jittering," because it appears in the preamble of the claim and is not a limitation on the claim. (D.I. 166 at 34-35). Rather, Fairchild contends that the term "frequency jittering" in the preamble only states the purpose of the invention, and gives no meaning to the claim. However, if the Court chooses to construe the term "frequency jittering," Fairchild contends that the term means "varying the frequency of operation of the pulse width modulated switch by varying the oscillation frequency of the oscillator." (D.I. 156 at 33). Fairchild contends that the term should not be limited to "controlled and predetermined" changes or variations, because the preferred embodiment should not be used to limit the claim.

Reviewing the disputed term in light of the claim language and the specification[4], the Court concludes that the term "frequency jittering" means "varying the switching frequency of a switch mode power supply about a target frequency in order to reduce electromagnetic interference." The Court further agrees with Power Integrations that changes or variations in the frequency of the signal must be controlled and predetermined to achieve the purpose of the claimed invention.[5]

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[4] The specification of the '851 patent was incorporated by reference into the specification of the '876 patent.

[5] In concluding that the term "frequency jittering" requires construction, the Court further concludes that while the

Fairchild's proposed construction for the term "frequency jittering" is derived from the following sentence in the "Background of the Invention" section of the '851 patent:

> Varying the frequency of operation of the pulse width modulated switch by varying the oscillation frequency of the oscillator is referred to as frequency jitter.

('851 patent, col. 3, l. 28-30). In the context of the invention as a whole, however, the Court reads this sentence to be a generic description of "frequency jitter" and not a definition of the "frequency jittering" described in the '876 patent. The '876 patent specifically describes the purpose of the invention as "deviat[ing] or jitter[ing] the switching frequency of the switched mode power supply oscillator within a narrow range to reduce EMI noise by spreading the energy over a wider frequency range than the bandwidth measured by the EMI test equipment." ('876 patent, Abstract) (emphasis added). As the Court understands the technology, the express purpose of the invention, namely the reduction of EMI noise, cannot be achieved if the jittering is not controlled and predetermined. In this regard, the specification further explains the advantages of the claimed

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term "frequency jittering" is found in the preamble, it is a term which gives meaning to the claim and defines the invention. The invention is not just a "circuit" but a "digital frequency jittering circuit." Reading the patent as a whole, the Court is persuaded that this language is not mere introductory language, but language which is meant to define the invention and limit the claim. See In re Paulsen, 30 F.3d 1475, 1479 (concluding that term "computer" used in preamble was a claim limitation that gave life and meaning to the claims).

invention in reducing EMI over the prior art are due to the fixed and controlled manner of the frequency jittering:

> pulse width modulated switch 262 may also have frequency jitter functionality. That is, the switching frequency of the pulse width modulated switch 262 varies according to an internal frequency variation signal. This has an advantage over the frequency jitter operation of FIG. 1 [the prior art] in that the frequency range of the presently preferred pulse width modulated switch 262 is known and fixed, and is not subject to the line voltage or load magnitude variations.

('851 patent, col. 6, ll. 11-17) (emphasis added). Accordingly, the Court concludes that Fairchild's construction is overly broad and inconsistent with the specification, when it is read in the context of the claimed invention.

b. **coupled**

Fairchild contends that the term "coupled" should be given its plain and ordinary meaning. Specifically, Fairchild contends that "two circuits are coupled when they are configured such that signals pass from one to the other." (D.I. 152 at 10). Fairchild contends that Power Integrations' construction of this term seeks to imply a requirement that the connection be a direct connection, or a connection without any intermediate circuit elements. Fairchild contends that such a construction is inappropriate and is driven by Power Integrations' concern that the claims may be found invalid in light of the prior art.

Power Integrations contends that "two circuits are coupled when they are connected such that voltage, current, or control

signals pass from one to another." (D.I. 152 at 10; D.I. 164 at 17-18). According to Power Integrations its construction of the term "coupled" does not require a direct connection as Fairchild contends. Rather, Power Integrations contends that its construction reflects more accurately the nature of the coupling recited in the patent, because the recited coupling is present "for the purposes of control (i.e. 'digital to analog converter coupled to the control input for varying the switching frequency' and 'counter coupled to the . . . digital to analog converter, the counter causing the digital to analog converter to adjust . . .'" (D.I. 152 at 10).

Construing the term "coupled" in light of the claim language and specification, the Court concludes that "two circuits are coupled when they are connected such that voltage, current or control signals pass from one to another." In reaching this determination, the Court concludes that Fairchild's construction is overly broad and generic and fails to consider the term "coupled" in the context of the invention. In the Court's view, its construction of the term "coupled" is consistent with the claim language and the context of the specification which describes the purpose for which various parts of the claimed invention are coupled. ('876 patent, claim 1, col. 8, ll. 48-49, 50-52). However, the Court's construction of the term "coupled" should not be read to imply or necessitate a direct connection,

as the Court does not read the patent to require a direct connection or to preclude the use of intermediate circuit elements.

2. Claim 17

Claim 17 of the '876 patent recites:

> A method for generating a switching frequency in a power conversion system, comprising:
>
> generating a primary voltage;
>
> cycling one or more secondary voltage sources to generate a secondary voltage which varies over time; and
>
> combining the secondary voltage with the primary voltage to be received at a control input of a voltage-controlled oscillator for generating a switching frequency which is varied over time.

('876 patent, col. 9, ll. 36-45).

a. **primary voltage**

It appears to the Court that both Fairchild and Power Integrations agree that a "primary voltage" means a "base or initial voltage." (D.I. 152 at 11; D.I. 166 at 37). However, Fairchild contends that the primary voltage must, by definition, be generated by the primary voltage source. Fairchild contends that the voltages and voltage sources must be considered together, because the voltage must be generated from some source. Fairchild contends that a construction which ignores the source blurs the distinction between the primary and secondary voltages, because the claim describes the secondary voltage as being

generated from a secondary voltage source. Thus, Fairchild maintains that the primary voltage cannot come from the secondary voltage source as Power Integrations suggests.

Power Integrations contends that any claim limitations with respect to how the secondary voltage is generated should not be imported into the meaning of the term "primary voltage." Power Integrations contends that nothing in the patent limits the primary voltage to a voltage generated solely by a primary voltage source. (D.I. 152 at 11-12; D.I. 164 at 18-19).

Reviewing the disputed term in light of the claim language and the specification, the Court concludes that the term "primary voltage" means "a base or initial voltage" and that the term should not be defined by reference to the source from which it may be generated. Neither the claim language nor the specification describe how the primary voltage source is generated, and therefore, the Court declines to construe the term to require a distinct source.

b. **secondary voltage**

Fairchild contends that a "secondary voltage" means "a voltage generated by the secondary voltage source." (D.I. 156 at 36). In advancing this claim construction, Fairchild specifically argues that the "secondary voltage sources are additional voltage sources which are distinct from the primary voltage source."

In response, Power Integrations contends that a "secondary voltage" means "a subsequent or additional voltage." In advancing this construction, Power Integrations also refers to the definition of secondary voltage source. Power Integrations contends that, in accordance with its plain meaning, a "voltage source" means a "source of voltage," and the term "secondary" means something that comes second or subsequent. Thus, Power Integrations maintains that a "secondary voltage source" means "one or more voltage sources used to generate the secondary voltage," and therefore, secondary voltage means "subsequent or additional voltage." (D.I. 152 at 12-13).

Reviewing the claim language and the specification, the Court concludes that the term secondary voltage means "subsequent or additional voltage." While the claim language does require the secondary voltage to be generated by the secondary voltage source, there is no requirement that the secondary voltage source be distinct from the source of the primary voltage as discussed previously. Further, in the Court's view, identification of the voltage source for the secondary voltage is not a necessary part of defining the claim, because the source of the secondary voltage is clearly recited in the claim language. Accordingly, the Court construes "secondary voltage" to mean "a subsequent or additional voltage."

c. **cycling**

Although Power Integrations requests the Court to construe the term "cycling," it appears to the Court that the parties have since reached an agreement that the term cycling means "using in a repeating sequence or a pattern." (D.I. 152 at 13; D.I. 166 at 37, n.19). Accordingly, further construction by the Court of this term is not warranted.

d. **combining**

Fairchild contends that the term "combining" should be construed to mean "adding together from two or more different sources." (D.I. 156 at 37-38). Power Integrations contends that this term does not require construction, and should be subject to its plain English-language interpretation. To the extent construction is required, Power Integrations contends that the term "combining" means "adding together" and that different sources are not required as Fairchild contends. (D.I. 152 at 13).

In light of the Court's construction of the terms "primary voltage" and "secondary voltage" the Court agrees with Power Integrations that the term "combining" should not be construed as requiring different sources. Fairchild contends that the plain meaning of this term necessarily requires different sources, however, even the dictionary does not define the term "combine" by reference to a particular source. See Webster's Ninth New

Collegiate Dictionary 262 (9th ed. 1988). Accordingly, the Court will construe the term "combining" consistent with its plain meaning such that the term "combining" means "adding together."

3. Claim 19 - **supplemental voltage**

Claim 19 of the patent depends from claim 17. Claim 19 recites:

> 19. The method of claim 17 wherein the primary voltage is V and each of the secondary voltage sources generates a supplemental voltage lower than V, further comprising passing the supplemental voltage to the voltage-controlled oscillator.

('876 patent, col. 9, ll. 48-52).

The only term requiring construction in claim 19 is the term "supplemental voltage." Fairchild contends that "supplemental voltage" means "voltage other than the primary or secondary voltage." Fairchild contends that each claim term must have meaning and therefore, the supplemental voltage must be a third voltage which is distinct from the primary and secondary voltages. (D.I. 156 at 37).

In response, Power Integrations contends that the term "supplemental voltage" does not require construction. Power Integrations contends that Fairchild's construction is inconsistent with the language of claim 17 and 19, because according to the plain language of claim 17, "one or more secondary voltage sources, together, generate **a** secondary voltage." (D.I. 152 at 14) (emphasis in original). Power

Integrations also contends that the plain language of claim 19 indicates that each secondary source itself generates a supplemental voltage whose magnitude is lower than V, the magnitude of the primary voltage. Thus, the secondary voltage is the total of the supplemental voltages, each generated by one secondary voltage source. In this regard, Power Integrations contends that it is incorrect to construe supplemental voltage as something other than secondary voltage, as Fairchild contends. To the extent construction of this phrase is required, Power Integrations contends that the phrase should be construed as "a voltage in addition to the primary voltage." (D.I. 152 at 14).

Reviewing the disputed term in the context of the claim language and the specification, the Court agrees with the construction proposed by Power Integrations. Reading claim 17 and 19 together, the Court is persuaded that the secondary voltage is the total of the supplemental voltages which are each generated by one secondary voltage source. Thus, the Court construes the term "supplemental voltage" to mean "a voltage in addition to the primary voltage."

C. The Disputed Terms of The '366 Patent and The '851 Patents

1. Claim 1 of the '366 patent

Claim 1 of the '366 patent provides:

1. A pulse width modulated switch comprising:

a first terminal;

a second terminal;

a switch comprising a control input, the switch allowing a signal to be transmitted between said first terminal and said second terminal according to a drive signal provided at said control input;

an oscillator that provides a maximum duty cycle signal comprising an on-state and an off-state;

a drive circuit that provides said drive signal according to said maximum duty cycle signal; and

a soft start circuit that provides a signal instructing said drive circuit to disable said drive signal during at least a portion of said on-state of said maximum duty cycle.

('366 patent, col. 12, ll. 23-37).

a. **maximum duty cycle signal comprising an on-state and an off-state**

Although Power Integrations requests the Court to construe the phrase "maximum duty cycle signal comprising an on-state and an off-state," it appears to the Court that the parties have since reached a stipulation with respect to the meaning of this phrase. (D.I. 156 at Exh. A). Accordingly, further intervention by the Court with respect to this issue is not warranted.

b. **soft start circuit**

The parties' dispute with respect to the term "soft start circuit" is whether the term "soft start circuit" should be construed as a means-plus-function limitation in accordance with 35 U.S.C. § 112, ¶ 6, and if so, what are the appropriate

corresponding structures. The parties do not dispute that the functions of the various soft start circuits set forth in each of the claims in which the term "soft start circuit" appears should be construed in accordance with their plain language meaning. (D.I. 152 at 17, n.5; D.I. 166 at 32-33). Accordingly, the Court will limit its discussion to the applicability of Section 112, ¶ 6, and if Section 112, ¶ 6 applies, to the appropriate corresponding structures.

Power Integrations contends that the term "soft start circuit" should be construed as a means-plus-function element. Power Integrations recognizes that the term "means" is not used in the claim, which gives rise to the presumption that the term is not a means-plus-function element. However, Power Integrations contends that the presumption is overcome in this case, because one skilled in the art would not be able to discern from the claim language which specific structure or class of structures is covered by the claim. Power Integrations contends that the structures corresponding to the soft start circuit are shown in Figures 3, 6, and 9 of the '366 patent specification and discussed at column 6, lines 7 through 17; column 6, line 35 through column 7, line 18; column 11, lines 40 through 50 and column 12, lines 5 through 10. (D.I. 152 at 17-20).

Fairchild contends that "soft start circuit" should not be construed as a means-plus-function limitation. Based on the

Federal Circuit's decision in Linear Tech. Corp. v. Impala Linear Corp., 379 F.3d 1311, 1320 (Fed. Cir. 2004), Fairchild contends that a circuit is a sufficiently definite structure such that Power Integrations has not overcome the presumption that Section 112, ¶ 6 does not apply. To the extent the Court chooses to construe "soft start circuit" as a means-plus-function limitation, Fairchild contends that all of the embodiments to the specification should be considered, including soft start capacitor (110), and that Power Integrations' identification of proposed corresponding structures improperly limits the claim to particular embodiments in an attempt to avoid the prior art. (D.I. 166 at 29-33).

When the word "means" is not used in a claim term, a rebuttable presumption arises that Section 112, ¶ 6 does not apply. This presumption can be rebutted, if the party advancing a means-plus-function construction demonstrates that the claim term fails to recite sufficiently definite structure or recites a function without reciting a sufficient structure for performing that function. In the Court's view, Power Integrations has overcome this presumption. Although one skilled in the art would know the functionality of soft start, the Court is not persuaded that such a person would also know the precise structures for a soft start circuit, because the function of a soft start circuit can be achieved in a variety of ways making it unclear what the

specific structures are for performing the recited functions. Fairchild contends that a soft start circuit should be construed as a "circuit that minimizes inrush currents at start up." However, the portion of the specification upon which Fairchild relies does not define "soft start circuit." Rather, the specification defines "soft start functionality," not "soft start circuit," and "soft start functionality" is defined in terms of the prior art depicted in Figure 1. In contrast, the specification uses the term "soft start circuit" to describe the claimed invention, and the term "soft start circuit" is not equated with the prior art's use of the soft start capacitor 110.

Fairchild also contends that a soft start circuit is not a means-plus-function limitation, because the Federal Circuit has recognized in other cases that the term "circuit" identifies a sufficient structure. However, a claim element must be construed in light of the specific claims at issue, and the Court is persuaded that the cases to which Fairchild refers involve a different use of the term "circuit." For example, in Linear, the Federal Circuit concluded that the term "circuit" was sufficiently coupled with a description of the circuit's operation such that "persons of ordinary skill in the art would understand the structural arrangements of circuit components from the term 'circuit' coupled with the qualifying language of claim 1 . . ." 379 F.3d at 1320 (emphasis added). Similarly, in Apex

Inc. v. Raritan Computer, Inc., the Federal Circuit recognized that "every use of the term 'circuit' in the asserted claims include[d] additional adjectival qualifications further identifying sufficient structure to perform the claimed functions to one of ordinary skill in the art." 325 F.3d 1364, 1374 (Fed. Cir. 2003). In this case, however, the Court is persuaded that one skilled in the art would understand the term "soft start circuit" as encompassing a variety of different possible structures and that those possible structures are not sufficiently identifiable from the claim language. Accordingly, the Court agrees with Power Integrations that the term "soft start circuit" should be construed in accordance with Section 112, ¶ 6.

Having concluded that Section 112, ¶ 6 applies, the Court must next identify the corresponding structures that perform the functions recited in the claims. Based on the teachings of the specification, the Court concludes that the corresponding structures are shown in Figures 3, 6 and 9 of the '366 patent and described in the specification at column 6, lines 7 through 17; column 6, line 35 through column 7, line 18; column 11, lines 40-50 and column 12, lines 5 through 10. Fairchild argues that the corresponding structure must include the soft start capacitor 110 depicted in the prior art. The Court disagrees. "A structure disclosed in the specification qualifies as 'corresponding'

structure only if the specification or prosecution history clearly links or associates that structure to the function recited in the claim." Cross Medical Products, Inc. v. Medtronic Sofamor Danek, Inc., 424 F.3d 1293, 1308-1309 (Fed. Cir. 2005). In the Court's view, the term "soft start circuit" is used to describe the invention which is an internal "soft start circuit." The Court does not read the specification to equate the claimed "soft start circuit" with the soft start capacitor 110. To the contrary, in the Court's view, the specification teaches away from the prior art of soft start capacitor 110, which is an external capacitor. ('366 patent, col. 3, ll. 5-16) (discussing problems with using external capacitor to provide soft start functionality). Moreover, patent claims should be construed, where possible, to uphold their validity, and the Court is not persuaded that Fairchild's construction, which embraces the prior art, is sound, particularly where, as here, the Patent Examiner allowed the claims in the face of prior art that was expressly disclosed, labeled and discussed at length in the patent.

2. Claim 1 of the '851 patent

Claim 1 of the '851 patent recites:

1. A pulse width modulated switch comprising:

a first terminal;

a second terminal;

a switch comprising a control input, said switch allowing a signal to be transmitted

> between said first terminal and said second terminal according to a drive signal provided at said control input;
>
> a frequency variation circuit that provides a frequency variation signal;
>
> an oscillator that provides an oscillation signal having a frequency range, said frequency of said oscillation signal varying within said frequency range according to said frequency variation signal, said oscillator further providing a maximum duty cycle signal comprising a first state and a second state; and
>
> a drive circuit that provides said drive signal when said maximum duty cycle signal is in said first state and a magnitude of said oscillation signal is below a viable threshold level.

('851 patent, col. 12, ll. 15-34).

a. **frequency variation circuit that provides a frequency variation signal**

As a threshold matter, the parties agree that the term "frequency variation circuit" means "a structure that provides the frequency variation signal." (D.I. 152 at 21; D.I. 166 at 20, n.12). Thus, the parties' dispute centers on the meaning of the "frequency variation signal."

Fairchild contends that the term "frequency variation signal" should be construed in accordance with its plain meaning as "a signal that is used to vary the frequency of the oscillation signal." (D.I. 156 at 27). Fairchild contends that its construction is consistent with other claim elements like the oscillator element:

> an oscillator that provides an oscillation signal having a frequency range, said frequency of said oscillation signal varying within said frequency range according to said frequency variation signal . . .

('851 patent, claims 1, col. 6 ll. 25-28 and claim 11, col. 13, ll. 35-38).

Power Integrations contends that the term "frequency variation signal" means "an internal signal that cyclically varies in magnitude during a fixed period of time and is used to modulate the frequency of the oscillation signal within a predetermined frequency range." (D.I. 152 at 23). Power Integrations' proposed construction is derived from a discussion in the specification of the frequency variation signal which contrasts such a signal from the known prior art.

Reviewing the disputed claim in the context of the claim language and the specification, taken as a whole, the Court concludes that a "frequency variation signal" means "an internal signal that cyclically varies in magnitude during a fixed period of time and is used to modulate the frequency of the oscillation signal within a predetermined frequency range." The Court's construction is supported by the specification which defines the frequency variation signal in terms of a known and fixed frequency range during a fixed period of time. In this regard, the specification teaches:

> Alternatively, or in addition to soft start functionality, pulse width modulated switch 262 may also have frequency jitter functionality. That is, the

switching frequency of the pulse width modulated switch 262 varies according to an internal frequency variation signal. This has an advantage over the frequency jitter operation of FIG. 1 in that **the frequency range of the presently preferred pulse width modulated switch 262 is known and fixed**, and is not subject to the line voltage or load magnitude variations.

('851 patent, col. 6, ll. 10-17).

Referring to FIG. 3, frequency variation signal 400 is utilized by the pulse width modulated switch 262 to vary its switching frequency within a frequency range. The frequency variation signal 400 is provided by frequency variation circuit 405, which preferably comprises an oscillator that operates at a lower frequency than main oscillator 465. The frequency variation signal 400, is presently preferred to be a triangular waveform that preferably oscillates between four point five (4.5) volts and one point five (1.5) volts. Although the presently preferred frequency variation signal 400 is triangular waveform, **alternate frequency variation signals such as ramp signals, counter output signals or other signals that vary in magnitude during a fixed period of time may be utilized as the frequency variation signal**.

('851 patent, col. 6, ll. 25-38).

If the frequency variation signal 400 is a ramp signal, the frequency would linearly rise to a peak and then immediately fall to its lowest value. In this way, the current provided to current source input 485 of PWM oscillator 480 **is varied in a known fixed range** that allows for easy and accurate frequency spread of the high frequency current generated by the pulse width modulated switch.

('851 patent, col. 7, ll. 43-49).

That is, the switching frequency of the regulation circuit 850 varies according to **an internal frequency variation signal**. This has an advantage over the frequency jitter operation of FIG. 1 in that **the frequency range of the presently regulation circuit 850 is known and fixed**, and is not subject to the line voltage or load magnitude variations.

('851 patent, col. 11, ll. 45-50).

Based on the specification taken as a whole, the Court concludes that Fairchild's construction of the term "frequency variation signal" is overly broad. Read in the context of the specification, the Court is persuaded that the definition of the term "frequency variation signal" should include a fixed period of time and a predetermined frequency range. Accordingly, the Court will adopt the construction proposed by Power Integrations for the term "frequency variation signal."

CONCLUSION

For the reasons discussed, the Court has construed the disputed terms in the '075, '366, '851 and '876 patents as provided herein. An Order consistent with this Memorandum Opinion will be entered setting forth the meaning of the disputed terms in the asserted patents.

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

POWER INTEGRATIONS, INC., a Delaware corporation,	:	
Plaintiff,	:	
v.	:	C.A. No. 04-1371-JJF
FAIRCHILD SEMICONDUCTOR INTERNATIONAL, INC., a Delaware corporation, and FAIRCHILD SEMICONDUCTOR CORPORATION, a Delaware corporation,	:	
Defendants.	:	

O R D E R

At Wilmington, this 31 day of March 2006, for the reasons discussed in the Memorandum Opinion issued this date;

IT IS HEREBY ORDERED that the following terms and/or phrases in U.S. Patent Nos. 4,811,075 (the "'075 patent"), 6,107,851 (the "'851 patent"), 6,229,366 (the "'366 patent"), 6,249,876 (the "'876 patent") are assigned the following meanings:

1. The term **"MOS transistor"** means "a metal oxide transistor."

2. The term **"substrate"** means "the physical material on which a transistor or microcircuit is fabricated."

3. The phrase **"a pair of laterally spaced pockets of semiconductor material of a second conductivity type within the substrate"** means "two laterally spaced pockets of semiconductor material of the opposite conductivity type from the substrate."

4. The phrase **"a surface adjoining layer of material of the first conductivity type on top of an intermediate portion of the extended drain region between the drain contact pocket and the surface adjoining positions"** is construed according to its plain meaning, and further construction by the Court is not required.

5. The phrase **"said top layer of material"** is construed according to its plain meaning when read in the context of the claim, and further construction by the Court is not required.

6. The term **"reverse bias voltage"** means "a voltage applied across a rectifying junction with a polarity that provides a high-resistance path."

7. The phrase **"substrate region thereunder which forms a channel"** is construed according to its plain meaning when read in the context of the claim, and further construction by the Court is not required.

8. The term **"frequency jittering"** means "varying the switching frequency of a switch mode power supply about a target frequency in order to reduce electromagnetic interference."

9. The term **"coupled"** means that "two circuits are coupled when they are connected such that voltage, current or control signals pass from one to another."

10. The term **"primary voltage"** means a "base or initial voltage" and the term is not defined by reference to the

source from which it may be generated.

11. The term **"secondary voltage"** means "a subsequent or additional voltage."

12. The term **"combining"** means "adding together."

13. The term **"supplemental voltage"** means "a voltage in addition to the primary voltage."

14. The term **"soft start circuit"** is a means-plus-function element. The functions of the various "soft start circuits" are construed in accordance with the plain meaning of the claims setting forth such soft start circuit functions. The corresponding structures related to the "soft start circuit" are shown in Figures 3, 6 and 9 of the '366 patent and described in the specification of the '366 patent at col. 6, ll. 7-17; col. 6, l. 35-col. 7, l. 18; col. 11, ll. 40-50 and col. 12, ll. 5-10.

15. The phrase **"frequency variation circuit"** means "a structure that provides the frequency variation signal."

16. The phrase **"frequency variation signal"** means "an internal signal that cyclically varies in magnitude during a fixed period of time and is used to modulate the frequency of the oscillation signal within a predetermined frequency range."

Joseph J. Farnan

UNITED STATES DISTRICT JUDGE