

**UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, DC**

**Before the Honorable Monica Bhattacharyya
Administrative Law Judge**

In the Matter of

**CERTAIN POWER SEMICONDUCTORS,
AND MOBILE DEVICES AND
COMPUTERS CONTAINING SAME**

Inv. No. 337-TA-1308

**COMMISSION INVESTIGATIVE STAFF'S
REBUTTAL *MARKMAN* BRIEF**

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I. INTRODUCTION

Pursuant to Order No. 8 (May 24, 2022) and Ground Rule 6, the Commission Investigative Staff (“Staff”) respectfully submits this brief in response to the opening claim construction briefs filed by Complainant Arigna Technology Limited (“Complainant” or “Arigna”) and Respondents Apple Inc. (“Apple”) and TCL Electronics Holdings Limited, TTE Technology, Inc., TCT Mobile (US) Inc., and TCL Communication Limited (collectively, “TCL”) (together, “Respondents”). *See* Complainant Arigna Technology Limited’s Opening Claim Construction Brief, EDIS Doc. ID No. 777313 (Aug. 5, 2022) (“Compl. Br.”); Respondents’ Opening Claim Construction Brief, EDIS Doc. ID No. 777325 (Aug. 5, 2022) (“Resp. Br.”). For the reasons discussed below and also addressed in the Staff’s Initial *Markman* Brief, the Staff submits that its proposed constructions should be adopted for each of the eight (8) disputed terms in asserted claims 1 and 2 of U.S. Patent No. 7,183,835 (“’835 Patent”).

II. U.S. PATENT NO. 7,183,835

1. claim preamble (claim 1)

Complainant’s Construction (<i>Revised</i>)	Staff’s and Respondents’ Construction
Non-limiting in part	The preamble is limiting

The preamble to claim 1 of the ’835 Patent is: “[a] semiconductor device controlling a drive of an insulated gate transistor by generating a control output signal on a basis of a control input signal[.]” ’835 Patent at claim 1. The preamble operates as a claim limitation.

“Whether to treat a preamble as a limitation is a determination resolved only on review of the entire patent to gain an understanding of what the inventors actually invented and intended to encompass by the claim.” *Catalina Mktg. Int’l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (quotation omitted). Generally, a claim preamble will limit the invention “if it

recites essential structure or steps, or if it is necessary to give life, meaning, and vitality to the claim.” *Id.* (quotation omitted). Conversely, a preamble is typically not limiting “where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention.” *Id.*

“[T]here is no ‘litmus test’ for determining whether a preamble is limiting.” *Eli Lilly & Co. v. Teva Pharms. Int’l GmbH*, 8 F.4th 1331, 1340 (Fed. Cir. 2021) (rejecting “proposed binary distinction between statements of mere intended purpose on the one hand and limiting preambles on the other”). However, the U.S. Court of Appeals for the Federal Circuit (“Federal Circuit”) has identified each of the following as “guideposts” that can indicate a preamble operates as a limitation: (1) dependence on preamble phrase for antecedent basis, (2) preamble is essential to understanding limitations or terms in the body of the claim, (3) preamble recites “additional structure or steps underscored as important by the specification,” and (4) “clear reliance on the preamble during prosecution to distinguish the claimed invention from the prior art.” *See Catalina Mktg.*, 289 F.3d at 808-09.

There are multiple reasons why the preamble to claim 1 of the ’835 Patent is limiting. First, the preamble sets forth structure that is not otherwise recited in the body of the claim which the patentee expressly describes in the patent specification as forming part of the structure that they consider to be their invention. *See, e.g.*, ’835 Patent at 1:10-15, 1:49-2:9. For illustration, the patent specification describes the patented invention, in the summary of the invention section, as follows: “An aspect of ***a semiconductor device according to the present invention is that a semiconductor device controls a drive of an insulated gate transistor by generating a control output signal on a basis of a control input signal***, and ***includes*** a driver ... and a short-circuit protection circuit....” *Id.* at 1:52-57 (emphasis added). The preamble thus recites

structure that is underscored as important to the invention by the patent specification. *See Deere & Co. v. Bush Hog, LLC*, 703 F.3d 1349, 1358 (Fed. Cir. 2012) (finding “rotary cutter deck” limitation in claim preamble limiting where “[t]he recitation of a ‘rotary cutter deck’ in Claim 1 is necessary to understand the subject matter encompassed by the claim, which otherwise generally recites deck walls that ‘define a box section having torsional stiffness’”).

The “driver” and “short-circuit protection circuit” elements recited in the body of claim 1 do not alone provide a complete structure for “[a] semiconductor device.” *See generally Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 952 (Fed. Cir. 2006) (holding preamble was limiting where it recited “essential elements of the invention pertaining to the structure of the abutment that is used with the claimed emergence cuff”). The additional structure for a “semiconductor device” that is recited in the claim preamble is thus necessary to give life, meaning, and vitality to the claim. *See Proveris Scientific Corp. v. Innovasystems, Inc.*, 739 F.3d 1367, 1373 (Fed. Cir. 2014) (“Thus, reading the patent as a whole, the inventors clearly relied on both the preamble and the body of claim 3 to define the claimed invention. Accordingly, the preamble of claim 3 should be construed as importing a limitation into the claim.”). It should be treated as a claim limitation.

Second, the preamble to claim 1 provides antecedent basis for multiple terms appearing in the body of the claim. The elements of “**said** insulated gate transistor,” “**said** control output signal,” and “**said** control input signal” in the body of claim 1 are all direct references back to the language of the claim preamble. This manner of claim drafting indicates that the patent drafter intended for the statement in the preamble to be limiting. *See, e.g., Eaton Corp. v. Rockwell Intern. Corp.*, 323 F.3d 1332, 1342 (Fed. Cir. 2003) (finding “the inventor chose to use both the preamble and the body of the claim to define his invention. The preamble therefore limits the

claimed invention.”).

The preamble to claim 1 also provides context that is essential to understanding the subsequent language found in the body of the claim. For example, the preamble explicates that “said control output signal” is generated “on a basis of [said] control input signal” and that it is used for “controlling a drive of [said] insulated gate transistor.” *See* ’835 Patent at claim 1. The claim preamble thus sets forth a relationship for the subsequent limitations that rely on and derive their antecedent basis from the claim preamble. *See id.*; *see also see also NTP, Inc. v. Research in Motion, Ltd.*, 418 F.3d 1282, 1306 (Fed. Cir. 2005) (“Because these limitations of claim 1 of the ’960 patent derive their antecedent basis from the claim 1 preamble and are necessary to provide context for the claim limitations, the use of these limitations in the preamble limits the claim.”). This is a further reason why the claim 1 preamble should be deemed limiting.

Complainant initially took the position that the preamble to claim 1 is not limiting. *See* Joint Disclosure of Disputed Claim Term Constructions, EDIS Doc. ID No. 775549 (July 15, 2022), at Ex. A (p. 1). However, in its opening claim construction brief, Complainant has changed its position to an argument that the preamble is “non-limiting *in part*.” *See* Compl. Br. at 3-6 (emphasis added). Complainant’s revised position requires awkwardly parsing the language of the claim preamble between the words “*of*” and “*an*”: “[a] semiconductor device controlling a drive of ~~/~~ an insulated gate transistor by generating a control output signal on a basis of a control input signal.” *See id.* at 4-5. Complainant maintains that the first part of the preamble statement for “[a] semiconductor device controlling a drive of” is not limiting. *See id.*

Complainant’s position ignores that the preamble to claim 1 is a cohesive whole that is not clearly amenable to this type of segmentation. The portion of the preamble that Complainant concedes may be limiting— “an insulated gate transistor *by generating* a control output signal on

a basis of a control input signal”—is an incomplete statement that does not make sense read in isolation. *See* Compl. Br. at 4-5. By parsing out the earlier claim language before “an insulated gate transistor,” Complainant has problematically stripped out the relationship between the subsequent claim elements of the “insulated gate transistor” and the “control output signal.” *See* ’835 Patent at claim 1; *see also Bio-Rad Labs., Inc. v. 10X Genomics Inc.*, 967 F.3d 1353, 1372 (Fed. Cir. 2020) (holding entire preamble limiting where “the preamble in this case cannot be neatly packaged into two separate portions”); *Certain Power Inverters and Converters, Vehicles Containing the Same, and Components Thereof*, Inv. No. 337-TA-1267, Order No. 30 at 34-36 (Jan. 18, 2022) (holding it was inappropriate to splice “for correcting” language out of a claim preamble where this language was closely intertwined with the preamble language that immediately followed and not duplicative of language in the body of the claim).

Further, unless the entirety of the claim preamble and its recitation for a “semiconductor device controlling a drive of an insulated transistor” is treated as a limitation, the elements of the “driver” and “short-circuit protection circuit” in the body of the claim do not by themselves form a complete structure for a “semiconductor device.” *Contra* Compl. Br. at 6 (for Complainant’s argument that, “[i]f the preamble were deleted, the disclosed invention—the driver outputting a control output signal and short-circuit protection circuit monitoring the control output signal—would still be structurally complete”). In contrast to the Federal Circuit’s decision in *TomTom Inc. v. Adolph*, 790 F.3d 1315, 1323 (Fed. Cir. 2015), which found a mere statement of purpose or intended use in a method claim to be a non-limiting portion of a claim preamble, the language in the preamble to claim 1 for “[a] semiconductor device for controlling a drive of an insulated gate transistor....” is a reference to a specific device structure that must be used with the elements set forth in the body of the claim. It is not a mere contextual statement of purpose or

intended use for the other claim language. Nor is it duplicative of the limitations set forth in the body of the claim. *Contra* Compl. Br. at 5 (for Complainant’s argument that “[t]he structural elements of both the driver and the short-circuit protection circuit are recited in the claim, and the preamble merely duplicates that disclosure”). There is no indication that the “short-circuit protection circuit” recited in the body of the claim would even be operable within any type of semiconductor device structure other than the one that is specifically set forth in the claim preamble.

Also, in *SIMO Holdings v. Hong Kong uCloudlink*, the Federal Circuit held that a claim preamble was limiting where the body of the claim did not define a structurally complete invention, the preamble supplied essential structure, and the preamble provided antecedent basis for limitations in the body of the claim. *See SIMO Holdings Inc. v. Hong Kong uCloudlink Network Technology Limited*, 983 F.3d 1367, 1375-76 (Fed. Cir. 2021). As part of that holding, the Federal Circuit declined to parse the preamble into limiting and non-limiting segments in a case where “the preamble supplies the only structure of the claimed device and the disputed language does not merely identify an intended use or functional property but is ‘intertwined with the rest of the preamble,’ and supplies structure noted in the specification as among the inventive advances.” *Id.* at 1376 (quoting *Bio-Rad*, 967 F.3d at 1371). Similarly here, the entire structure recited in the preamble must necessarily be understood as part of the invention. *See* ’835 Patent at 1:52-2:5 (describing the “present invention” as a semiconductor device having the structure recited in the claim preamble).

Finally, Complainant’s argument that the claim preamble should not be construed as limiting, because the patentee did not rely upon the preamble to distinguish prior art during patent prosecution is legally flawed. *See* Comp. Br. at 5-6 (quoting *Catalina Mktg.*, 289 F.3d at

809). In *Catalina Marketing* and its progeny, the Federal Circuit has held that reliance on the preamble during patent prosecution is only one of several possible indicators or guideposts that can alone or together go to establish that a claim preamble is limiting. *See Catalina Mktg.*, 289 F.3d at 808-09. The other recognized guideposts indicating that the preamble to claim 1 operates as a claim limitation are all present here. *See id.*; *see also Deere v. Bush Hog*, 703 F.3d at 1357-58 (finding preamble limiting based on its recitation of additional structure underscored as important by the specification and due to the preamble providing antecedent basis for a claim limitation). Thus, for all of the above reasons, the Staff submits that the preamble to claim 1 should be construed as a limitation.

2. “insulated gate transistor” (claims 1 and 2)

Staff’s and Complainant’s Construction	Respondents’ Construction
“a transistor whose gate is electrically insulated from the channel”	Plain meaning, <i>i.e.</i> IGBT (insulated gate bipolar transistor)

The Staff and Complainant propose that the term “insulated gate transistor” in asserted claims 1 and 2 of the ’835 Patent should be construed as “a transistor whose gate is electrically insulated from the channel.” The central dispute between the parties with respect to the “insulated gate transistor” term in asserted claims 1 and 2 of the ’835 Patent concerns whether the term should be limited to an insulated gate *bipolar* transistor (“IGBT”) as Respondents propose. The Staff and Complainant maintain that the term is not so limited. The Staff and Complainant’s proposed construction would cover both IGBTs and metal-oxide-semiconductor field effect transistors (“MOSFETs”) because both of these types of transistors have a structure where the gate of the transistor is electrically insulated from the channel. *See Staff Exs. 8-11* (for further background on same).

The ’835 Patent is directed to “a semiconductor device module including a short-circuit

protection function of an *insulated gate type switching device such as* an IGBT (Insulated Gate Bipolar Transistor) *and so on.*” ’835 Patent at 1:12-15 (emphasis added). As of the date of the patented invention, IGBTs and MOSFETs were both known in the art as switching transistors with an insulated gate structure. *See* Staff Exs. 8-11. In fact, MOSFETs were also known as “*insulated gate field effect transistors.*” *See id.* Extrinsic evidence explains that “[t]he *Insulated Gate Bipolar Transistor*, (IGBT) combines the insulated gate (hence the first part of its name) technology of the MOSFET with the output performance characteristics of a conventional bipolar transistor, (hence the second part of its name).” Staff Ex. 11 (emphasis in original).

In arguing that the term “insulated gate transistor” should be limited to an IGBT, Respondents commit the fundamental error of restricting the claim language to the preferred embodiment in the patent specification when the patent specification and the claim language provide no indication that the language should be read so narrowly. *See* Resp. Br. at 21-25. The Federal Circuit has repeatedly “‘rejected the contention that [even] if a patent describes only a single embodiment, the claims of the patent must be construed as limited to that embodiment.’” *Continental Circuits LLC v. Intel Corp.*, 915 F.3d 788, 796-98 (Fed. Cir. 2019) (quoting *Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005) (en banc)); *Ethanol Boosting Sys., LLC v. Ford Motor Co.*, 2022 WL 2798395, at *2 (Fed. Cir. July 18, 2022) (same).

The patent specification is clear and consistent from its outset that the term “insulated gate transistor” is not intended to be limited to an IGBT. *See, e.g.*, ’835 Patent at 1:17-19 (“[a] semiconductor device in which the insulated gate type switching device *such as* the IGBT *and so on...*”), 2:48-51 (“groups of transistors **11** and **12**, **21** and **22** and **31** and **32** (all N channel type) which are insulated gate type switching devices *such as* an IGBT (Insulated Gate Bipolar Transistor) *and so on* are connected...”). Notably, the language of claim 1 does not specifically

use the term “IGBT (Insulated Gate Bipolar Transistor),” despite the patentee having used that same term in the patent specification. In sum, Respondents’ proposed construction, which would limit the term “insulated gate transistor,” to an IGBT is unduly narrow. The term “insulated gate transistor” should instead be construed as “a transistor whose gate is electrically insulated from the channel.”

3. “controlling a drive of an insulated gate transistor” (claim 1)

Complainant’s Construction (<i>Revised</i>)	Staff’s and Respondents’ Construction
Non-limiting preamble Alternatively, plain and ordinary meaning	controlling the voltage supplied to the gate of an insulated gate transistor to switch the transistor between ON and OFF states

The Staff and Respondents submit that the disputed preamble phrase “controlling a drive of an insulated gate transistor” should be construed as “controlling the voltage supplied to the gate of an insulated gate transistor to switch the transistor between ON and OFF states.” For general background, “[o]ne of the most fundamental applications of a transistor is using it to control the flow of power to another part of the circuit -- using it as an electric switch. *Driving it* in either cutoff or saturation mode, the transistor can create the binary on/off effect of a switch.” Staff Ex. 2 (emphasis added); *see also* ’835 Patent at 2:58-60 (reference to connecting patented device to a downstream motor element), 11:11 (same).

In the ’835 Patent, the invention is *always* specifically described as a semiconductor device with control circuitry and a short-circuit protection function for one or more transistors used as a switch. *See, e.g., See* ’835 Patent at 1:9-15 (“Field of the Invention”: “*insulated gate type switching device*”), 2:16-20 (“a control circuit *controlling a drive of that switching device*”), 2:48-50 (“groups of transistors ... which are *insulated gate type switching devices*”), 4:11-13 (“*a circuit performing a switching control of the transistor*”), 6:6-7 (“*transistor 12 which is the insulated gate type switching device*”), 7:39-43 (purported advantages for “*the*

switching device”), 7:50-51 (“the control device HIC1 illustrated in FIG. 6 is *a circuit performing a switching control of the transistor 11*”), 11:3-7 (same). Likewise, the switching of the patented device is always controlled by a voltage. *See, e.g.*, ’835 Patent at 2:66-3:1 (“High Voltage Integrated Circuit”), 3:34-35 (“Low Voltage Integrated Circuit”), 5:62-6:5 (“*when a voltage of the control output signal S3 exceeds a threshold value of the transistor 12, the transistor 12 comes to be in ON state...*”), 6:17-19 (“The state is maintained while the voltage of the control output signal S3 exceeds the reference voltage V1.”). There is no evidence that the switching operation of the transistor can be effectuated differently. *See id.*; *see also* Staff Ex. 11 (noting IGBTs and MOSFETs used as switches are both voltage-controlled).

In sum, the Staff’s and Respondents’ proposed construction is fully in accordance with the intrinsic evidence. *See Phillips*, 415 F.3d at 1316 (“The construction that stays true to the claim language and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.”). “When a patent thus describes the features of the ‘present invention’ as a whole, this description limits the scope of the invention.” *Regents of Univ. of Minnesota v. AGA Medical Corp.*, 717 F.3d 929, 936 (Fed. Cir. 2013). Therefore, the Staff submits that “controlling a drive of an insulated gate transistor” should be construed to mean “controlling the voltage supplied to the gate of an insulated gate transistor to switch the transistor between ON and OFF states.”

Complainant first argues that the disputed term should be treated as non-limiting, because it is part of the claim preamble. *See* Compl. Br. at 8-9. This argument is incorrect for the reasons addressed above. *See supra*, pp. 1-6. Complainant also argues, in the alternative, that this term should be given its “plain and ordinary meaning.” Compl. Br. at 9-11. It is unclear exactly what Complainant believes the “plain and ordinary meaning” for this term is. *See id.*

Previously, in the Joint Disclosure of Disputed Claim Term Constructions, Complainant proposed that the disputed term should be construed as “plain and ordinary meaning, *e.g., controlling the signal applied to the gate of an insulated gate transistor.*” *See* Joint Disclosure of Disputed Claim Term Constructions, EDIS Doc. ID No. 775549 (July 15, 2022), at Ex. A (p. 1) (emphasis added). This additional definition was confusing because merely applying a signal to a gate of an insulated gate transistor does not necessarily operate to *drive* anything. In its opening claim construction brief, Complainant appears to have revised its earlier construction to just a bare statement of “plain and ordinary meaning,” with no further specificity. *See* Compl. Br. at 8-11.

While hiding behind a proposed construction of “plain and ordinary meaning” (with no further explanation or specificity), Complainant attempts to criticize aspects of the Staff’s and Respondents’ proposed construction. *See* Compl. Br. at 10-11. Complainant is wrong that Staff’s and Respondents’ construction is not fully supported by the intrinsic evidence. *See id.*

Complainant first argues that the words “to switch the transistor between ON and OFF states” excludes the possibility of “multiple states” other than ON and OFF. *See* Compl. Br. at 10-11. However, the patent *always* describes a transistor being used as a switch. A transistor used as a switch only has two states: ON and OFF. *See* Staff Ex. 2 (“binary on/off effect of a switch”). Those are the only states described in the patent specification. *See, e.g.,* ’835 Patent at 5:52-6:5 (describing the voltage-controlled switching operation). The description in the patent specification relating to switching the transistor ON and then *maintaining* it for some time in its ON state is fully consistent with the Staff’s and Respondents’ proposed construction. *See id.*

Complainant also argues that the Staff’s and Respondent’s proposed construction improperly restricts this term to a “voltage.” *See* Compl. Br. at 11. However, the ’835 Patent

never describes controlling the switching transistor using anything other than a voltage. *See generally* '835 Patent at 5:52-6:5 (describing the voltage-controlled switching operation).

Insulated gate type switching transistors such as IGBTs and MOSFETs are generally known in the art to be **voltage**-controlled devices. *See* Staff Ex. 11 (“The result of this hybrid combination is that the ‘IGBT Transistor’ has the output switching and conduction characteristics of a bipolar transistor but is voltage-controlled like a MOSFET.”). The short-circuit protection circuit described and claimed in the '835 Patent will not work with anything other than a voltage. *See* '835 Patent at 6:11-26 (comparator of the short-circuit protection circuit compares “the **voltage** of the control output signal S3” with “the reference voltage V1”), claim 1 (“the detecting **voltage** of the control output signal”). It is thus not improper to limit the disputed phrase to the use of a voltage.

By not clearly taking a position as to what it contends the “plain and ordinary meaning” is, the Staff suspects that Complainant is trying to reinterpret the claim language to cover a transistor being driven as a power amplifier rather than as a switch (*e.g.*, RF signal applied to the gate and varying power supply applied to the source of transistor). *See generally* Staff Ex. 2 (describing transistors used for power amplification). But, again, the '835 Patent is exclusively concerned with a transistor used as a switch. *See, e.g.*, '835 Patent at 1:10-20 (“a control circuit controlling a drive of that switching device”), 4:11-13 (“the composition is described by applying a circuit performing a switching control of the transistor”), 7:50-51 (“a circuit performing a switching control of the transistor”). It has nothing to do with power amplification. This effort by Complainant should thus not be countenanced.

It is axiomatic that “[t]he only meaning that matters in claim construction is the meaning in the context of the patent.” *Trustees of Columbia Univ. in City of N.Y. v. Symantec Corp.*, 811

F.3d 1359, 1363 (Fed. Cir. 2016) (citing to *Phillips*, 415 F.3d at 1316). Therefore, in keeping with the intrinsic evidence in the '835 Patent, the term “controlling a drive of an insulated gate transistor” should be construed to mean “controlling the voltage supplied to the gate of an insulated gate transistor to switch the transistor between ON and OFF states.”

4. “indicates a/the conduction of said insulated gate transistor” (claim 1)

Complainant’s Construction	Staff’s and Respondents’ Construction
Plain and ordinary meaning, e.g., indicates that said insulated gate transistor is turned on	indicates that said insulated gate transistor is in the ON state

The Staff and Respondents propose to construe the disputed term “indicates a/the conduction of said insulated gate transistor” in asserted claim 1 of the '835 Patent as “indicates that said insulated gate transistor is in the ON state.” As explained above, the insulated gate transistor of the claimed invention is being used as a switch. *See generally* Staff Ex. 2 (for background relating to transistors used as switches). A transistor used as a switch only has two states: ON and OFF. *See id.* (“binary on/off effect of a switch”). These are the only states described in the patent specification. *See, e.g.*, '835 Patent at 5:52-6:5 (describing the switching operation of the transistor). In the ON state, power is flowing through the transistor to another part of the circuit. *See id.* In the OFF state, it is not. *See id.*

The language of claim 1 of the '835 Patent provides that “said control output signal indicates a conduction of said insulated gate transistor” and “said control input signal indicates the conduction of said insulated gate transistor.” *See* '835 Patent at claim 1. The conduction of the insulated gate transistor also corresponds to a time limitation. *See id.* (“predetermined period according to a timing when said control input signal indicates the conduction of said insulated gate transistor”). Because the transistor is being used as a switch, the control output signal and control input signal will indicate a conduction of the insulated gate transistor only when they

reach or exceed the (saturation) threshold that corresponds to the insulated transistor being in its ON state. *See* '835 Patent at 5:52-6:5 (“when a voltage of the control output signal S3 exceeds a threshold value of the transistor 12, the transistor 12 comes to be in ON state”); *see also* Staff Ex. 2 (describing a transistor used as a switch). The term “ON state” is both clear and expressly used in the patent specification. *See id.*

Complainant’s proposed “plain and ordinary meaning” construction is substantially more ambiguous. Complainant disregards that the insulated gate transistor is being used as a switch. A transistor used as a switch will typically be connected to a constant power source irrespective of whether the transistor has been switched to its ON or OFF states. *See* '835 Patent at 1:48-60, Fig. 1 (power source PS). While one might argue that a transistor is operational (turned on) when it receives any input, the transistor will only be conducting power (for downstream elements) in its ON state. *See generally id.* at 2:58-60 (reference to unclaimed downstream motor element), 5:52-6:5 (describing the ON-OFF operation at the transistor). Accordingly, the Staff submits that the disputed term should be construed to mean “indicates that said insulated gate transistor is in the ON state.”

5. “significant” (claim 1)

Complainant’s Construction (Revised)	Respondents’ Construction	Staff’s Construction
No construction necessary. To the extent a construction is necessary, then the plain and ordinary meaning, e.g., active ¹	Plain meaning, <i>i.e.</i> large or important enough to have a	active-high or active-low state indicating a condition is met

¹ It is not entirely clear what Complainant’s position is for this claim term. In its briefing, Complainant further defines its proposed construction as “active” or “having meaning.” *See* Compl. Br. at 33 (“In sum, Complainant’s definition, ‘active’ or ‘having meaning,’ conveys what ‘significant’ means in the examples above.”). This clarification does not impart any substantially greater measure of clarity to the term.

	meaningful effect, <i>e.g.</i> , a HIGH potential state ²	
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The Staff’s proposed construction for the disputed term “significant” in claim 1 of the ’835 Patent is “active-high or active-low state indicating a condition is met.” There are a couple of concepts tied up with the Staff’s construction: 1) “significant” refers to either a high or low state, depending on circuit design; and 2) “significant” is not the default or baseline state but is instead a high or low state that is indicative of some other condition being met. *See, e.g.*, ’835 Patent at 10:17-26.

In their opening claim construction brief, Respondents criticize the Staff’s use of the word “active,” because that term is not used in the patent specification. *See* Resp. Br. at 33 (“***Although the Staff’s construction accurately captures the concept of indicating a condition,*** the terms ‘active-high’ and ‘active-low’ are not found in the patent and appear to inject additional ambiguity regarding the meaning of those terms.”). “Active” is a convention that is sometimes used in the art for digital high and low logic signals. *See* Staff Ex. 5 (explaining this convention). The Staff added the word “active” to its construction to preclude the possibility that its construction might otherwise be improperly read onto the default or baseline (high or low) state (*i.e.*, the non-significant signal state).

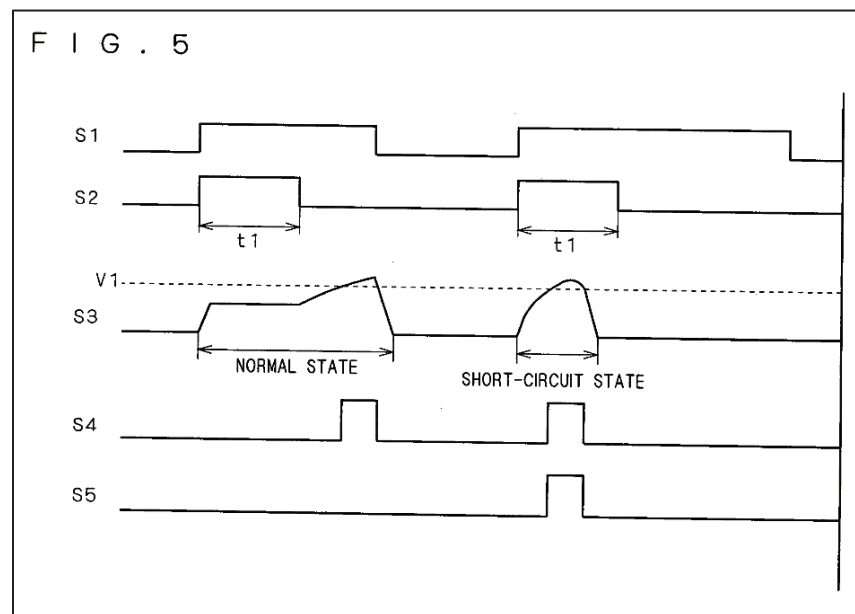
The Staff is amenable to a revising its construction to further specify “active-high or active-low state indicating a condition is met, where active-high indicates a condition is met when active-low is the baseline condition, and active-low indicates a condition is met when active-high is the baseline condition.” The Staff is also not necessarily tied to the use of the

² The Staff understands that Respondents may propose a revised construction of “active-high or active-low state indicating a condition is met, where active-high indicates a condition is met when active-low is the baseline condition, and active-low indicates a condition is met when active-high is the baseline condition.” The Staff considers this to be an acceptable construction.

word “active” if there is another proposed construction that satisfactorily encapsulates the above-referenced concepts.

In the Staff’s view, Complainant’s proposed construction reduces the full import of the disputed claim term. *See* Compl. Br. at 13-16. Complainant’s proposed construction does not require a high or low signal. *See generally* Staff Ex. 5 (explaining digital logic signals). Nor does it require that the signal indicate a condition is met. *See id.* Complainant’s proposed construction of “active” or “having meaning” appears capable of being read onto nearly any operative signal.

Complainant criticizes the Staff’s use of the words “indicating a condition is met.” Compl. Br. at 15-16. Complainant alleges that “in FIG. 5, S2 is ‘significant’ because it is high (see, e.g., col. 6:35-40), but it is not clear exactly what ‘condition’ is met.” *Id.* at 15-16.



'835 Patent at Fig. 5. This argument is incorrect, because the condition that is met whenever S2 goes high is *a regular, predetermined time interval t_1* which is set by the circuit designer. *See* '835 Patent at Fig. 5, 6:35-54 (further explaining that time period t_1 should be set to “be almost

equal to a period when the control output signal S3 is clamped to a certain voltage”). S2 will never go HIGH (become significant) unless this condition is met. *See id.*

In their briefing, Respondents appear to agree with the Staff, at least conceptually. *See* Resp. Br. at 30 (“Staff and Respondents seem to largely agree on the substance of the construction—a ‘significant’ signal must be different from an insignificant signal and must do or indicate something as required by the claims.”). However, Respondents’ initial proposed construction of “large or important enough to have a meaningful effect, *e.g.*, a HIGH potential state,” is not an especially good one. Respondents’ proposed construction appears to overly rely on extrinsic dictionary definitions for the word “significant” (*see* Resp. Br. at 33), is ambiguous in its scope, and would seem limited to a signal that is either “large” in size or in a HIGH potential state. The asserted claims specifically use the word “significant” and not “large” or “HIGH potential state.” *See* ’835 Patent at claims 1-2. The patent examples also explain that the significant signal condition is not always the high state: “in a significant condition and a high potential ‘H’ State *in this case*,” “the significant condition, in the ‘H’ state *in this case*,” and “the significant condition, the ‘H’ state *in this case*.” *See id.* at 6:14-16, 6:38-39, 10:24-25. In contrast to their construction, Respondents’ briefing actually acknowledges that, depending on circuit design, the disputed term “is not limited to a ‘high’ or ‘H’ potential state. For example, if the baseline of the signals above in Figure 5 was high/ON (instead of low/OFF as depicted), then the ‘low’ or ‘L’ OFF state could potentially be considered significant.” Resp. Br. at 34.

Accordingly, the Staff submits that the disputed term “significant” in asserted claims 1 and 2 of the ’835 Patent should be construed as “active-high or active-low state indicating a condition is met.” Or alternatively, “active-high or active-low state indicating a condition is met,

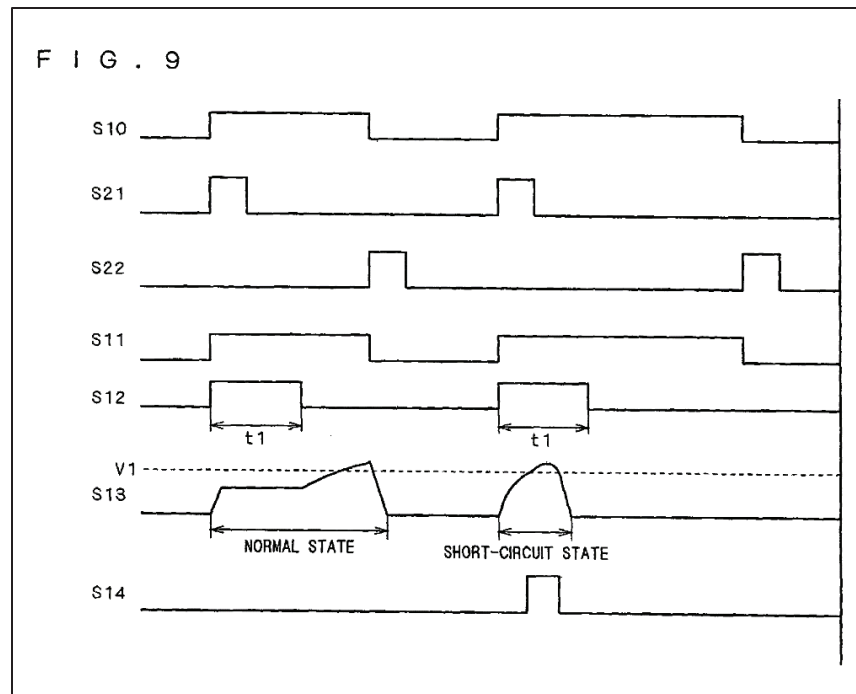
where active-high indicates a condition is met when active-low is the baseline condition, and active-low indicates a condition is met when active-high is the baseline condition.”

6. “clamped constantly” (claim 2)

Staff’s and Complainant’s Construction	Respondents’ Construction
held at a constant voltage	clamped to a certain voltage for a determined period by a Miller effect

The Staff and Complainant propose to construe the disputed term “clamped constantly” in asserted claim 2 of the ’835 Patent as “held at a constant voltage.” Respondents propose to construe the same term as “clamped to a certain voltage for a determined period by a Miller effect.” There is no reason to import a requirement that the control output signal must “be clamped by a Miller effect” into the claim.

Dependent claim 2 provides that “said predetermined period when said first pulse signal is significant is set on a basis of a period when a voltage of said control output signal is *clamped constantly* when said insulated gate transistor normally operates.” ’835 Patent at claim 2 (emphasis added). The patent describes “a period when the control output signal S13 is *clamped to a constant voltage*.” See ’835 Patent at 9:35-37 (emphasis added). A “clamp period” where the control output signal S13 is clamped to a constant voltage is also shown for example in Figure 9. See ’835 at 9:34-37 (“this period t1 is a period when the short-circuit protection function is activated, and it is set to be almost equal to a period when the control output signal S13 is clamped to a constant voltage”), 10:45-53 (describing how “the voltage begins to increase after passing the clamp period of the control output signal S13 and exceeds the reference voltage V1”). As can be seen in Figure 9 (shown on next page), the control output signal (S13) is held at a constant voltage for time t1.



Id. at Fig. 9. Thus, in view of the patent specification, the Staff submits that the term “clamped constantly” in asserted claim 2 means “held at a constant voltage.”

There is nothing in the claim language that would require that the control output signal must be clamped using a particular method. As explained above, the insulated gate transistor is being used as a switch. *See* '835 Patent at 5:52-6:10. When the control output signal reaches a certain threshold, the insulated gate transistor will be switched to the ON state. *See id.* (“when a voltage of the control output signal **S3** exceeds a threshold value of the transistor **12**, the transistor **12** comes to be in the ON state”). It makes sense that the control voltage signal would then be clamped at this voltage to maintain the insulated gate transistor in its ON state. *See id.* It is generally undesirable to have the control output signal continue to climb to voltages beyond what is necessary for the transistor to be ON (saturated). *See generally* Staff Ex. 2 (background re: transistor used as a switch). However, there are other ways than the use of a Miller clamp by which a voltage can be “clamped constantly.” *See generally* '835 Patent at 4:43-49 (discussing

clamping a reference voltage using Zener diode method). The Staff is of the view that there is no reason to import a requirement for a particular manner of clamping into the claim language.

Respondents argue that a section of the patent specification stating “thus a voltage of the control output signal S3 is clamped to a certain voltage for a determined period by a *mirror* effect, however, the voltage of the controlled output signal S3 rises to be a value almost equal to the drive voltage Vcc of the gate driver GD after that” was a mistranslation from Japanese that should instead read Miller effect. *See* ’835 Patent at 5:66-6:3; Resp. Br. at 38. This line of argument misses the point. Even if this one section of the patent specification was a typographical error and was indeed intended to refer to clamping by a “Miller effect,” this limited section of the patent specification does not establish that Miller clamping is the only method of clamping that can ever be used with the patented invention in all cases. *See generally* ’835 Patent at 5:60-6:10. It is a matter of circuit design. *See generally* ’835 Patent at 4:43-49 (discussing clamping a reference voltage using Zener diode method).

More fundamentally, the claim language “clamped constantly” does not itself require that the clamping of the control output signal must be effectuated using a particular method. “The written description part of the specification itself does not delimit the right to exclude. That is the function and purpose of claims.” *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 980 (Fed. Cir. 1995) (en banc); *see also Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1371 (Fed. Cir. 2014) (“While we read claims in view of the specification, of which they are a part, we do not read limitations from the embodiments in the specification into the claims.”).

Accordingly, it would nonetheless be an error to read an additional requirement for Miller clamping into the claim language.

Respondents also attempt to argue that the Miller effect is an essential part of the claimed invention. *See* Resp. Br. at 35-37. They allege that “[t]he time period of the Miller effect and resulting plateau are thus critical to the alleged invention’s ability to detect a short circuit when monitoring the control output signal.” *Id.* at 37. However, in the Staff’s view, the Miller effect is not an integral part of the invention. This is a dependent claim limitation. If the control output signal is being clamped constantly during normal operation (as provided in claim 2), the short-circuit protection circuit will be set-up to detect a clamp failure by any clamping mechanism (not just the Miller effect). *See* ’835 Patent at 9:31-37 (“this period t1 is a period when the short-circuit protection function is activated, and it is set to be almost equal to a period when the control output signal S13 is clamped to a constant voltage”). There is no cause for appending an additional claim requirement relating to the Miller effect to claim 2. *See generally Phillips*, 415 F.3d at 1316 (“The construction that stays **true to the claim language** and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.”).

7. “control output signal” (claim 1)

Complainant’s Construction (<i>Revised</i>)	Staff’s and Respondents’ Construction
No construction necessary. To the extent a construction is necessary, then the plain and ordinary meaning, e.g., output signal that is controlling an insulated gate transistor	signal supplied to the gate of an insulated gate transistor to switch the transistor between ON and OFF states

In the ’835 Patent, the “control output signal” in asserted claim 1 of the ’835 Patent is a “signal supplied to the gate of an insulated gate transistor to switch the transistor between the ON and OFF states.” In every one of the patent embodiments, the control output signal is supplied to the gate of the insulated gate transistor from a control device which is a circuit performing a switching control of the transistor. *See, e.g.,* ’835 Patent at 4:11-15 (“a circuit performing a switching control of the transistor **12** ... the control output signal is supplied to the gate electrode

of the transistor **12**”), 7:47-59 (“a circuit performing a switching control of the transistor **11** ... is supplied as a control output signal **S13** to the gate electrode of the transistor **11**”). The control output signal operates to switch the transistor between ON and OFF states. *See id.* at 5:60-6:5.

Complainant’s positions that no construction is necessary or that this term should be given its plain and ordinary meaning *e.g.* “output signal that is controlling an insulated gate transistor,” ignore the intrinsic evidence. *See* Compl. Br. at 18-20. While the terms control, output, and signal have common parlance, the term “control output signal” has no clear “plain and ordinary” meaning outside of the context of the ’835 Patent. *See 3M Innovative Properties Co. v. Tredegar Corp.*, 725 F.3d 1315, 1321 (Fed. Cir. 2013) (“Idiosyncratic language, highly technical terms, and terms coined by the inventor are best understood by reference to the specification.”). Critically, Complainant’s position ignores both what the claimed signal is and what it does in the particular context of the patented device. *See Phillips*, 415 F.3d at 1313 (“Importantly, the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.”).

The Staff is of the view that Respondents and the Staff have raised a dispute with respect to the proper construction for this term that warrants resolution by the Administrative Law Judge (“ALJ”). *See O2 Micro Intern. Ltd. v. Beyond Innovation Tech. Co., Ltd.*, 521 F.3d 1351, 1361 (Fed. Cir. 2008) (“A determination that a claim term ‘needs no construction’ or has the ‘plain and ordinary meaning’ may be inadequate when a term has more than one ‘ordinary’ meaning or when reliance on a term’s ‘ordinary’ meaning does not resolve the parties’ dispute.”). In view of the intrinsic evidence, the Staff submits that the disputed term “control output signal” should be given a construction of “signal supplied to the gate of an insulated gate transistor to switch the

transistor between ON and OFF states.”

8. “short circuit protection circuit” (claim 1)

Complainant’s Construction (<i>Revised</i>)	Staff’s and Respondents’ Construction
No construction necessary. To the extent a construction is necessary, then the plain and ordinary meaning, e.g., circuit that performs function of short-circuit protection	circuit that performs short-circuit protection without a shunt resistor

“Short-circuit protection circuit” is a structural limitation in the body of claim 1. It is not a non-limiting claim preamble. Complainant’s argument that this term does not require any construction and can simply be ignored because there are other surrounding claim limitations concerning its structure and function is without merit. *See* Compl. Br. at 20-21 (blanket assertion that “[n]othing more is needed to define ‘short-circuit protection circuit’”). “Claims are interpreted with an eye to giving effect to all terms in the claim.” *Cat Tech LLC v. TubeMaster, Inc.*, 528 F.3d 871, 885 (Fed. Cir. 2008) (quoting *Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 950 (Fed. Cir. 2006)).

The Staff and Respondents propose to construe the term “short-circuit protection circuit” in claim 1 of the ’835 Patent as “circuit that performs short-circuit protection without a shunt resistor.” One point of clarification with respect to this construction: the construction only precludes a shunt resistor from being part of the *circuit* within the semiconductor device that is responsible for short-circuit protection. *Compare* Compl. Br. at 22 (argument “a shunt resistor can still be used”). The very title of the ’835 Patent is “Semiconductor Device Which Realizes a Short-Circuit Protection Function Without Shunt Resistor, and Semiconductor Device Module.” ’835 Patent at title. The entire patent is directed to a device having a circuit that achieves short-circuit protection without a shunt resistor. *See id.* at 1:47-51 (“A semiconductor device which realizes a short-circuit protection function without a shunt resistor and an IPM in which the

semiconductor device is built are provided.”). It is the sole purported advantage of the patented invention over prior art devices. *See id.* at 1:17-45 (describing prior art).

The patent specification thus always uses the term “short-circuit protection circuit” specifically in reference to circuitry that eliminates any need for a shunt resistor. *See* ’835 Patent at 3:65-4:2 (1:63-2:5 (“The inverter module **100** described above has a composition that ***a shunt resistor and a current detecting terminal connecting the shunt resistor which are conventionally necessary are not included*** but the LVIC or the HVIC in the module includes the short-circuit protection function.”). It would not make sense for the claimed “short-circuit protection circuit” to nonetheless now be construed as including a shunt resistor, because that would undermine the purpose of the invention and its only purported advantage over the prior art. *See, e.g., id.* at 1:17-25 (explanation that in, a prior art, “conventional IPM, a short-circuit protection is performed by connecting a shunt resistor detecting a main current flowing between main power terminals of the switching device outside the package and monitoring the main current”), 7:22-43 (noting differences and advantages over prior art, conventional IPM with shunt resistor).

Complainant argues that its position that the “short-circuit protection circuit” can include a shunt resistor is supported by the Federal Circuit’s recent decision in *Ethanol Boosting Systems, LLC v. Ford Motor Company*, 2022 WL 2798395 (Fed. Cir. July 18, 2022). However, *Ethanol Boosting* involved ambiguous title evidence and a claim construction argument that was contravened by other evidence in the patent specification. Specifically, the Federal Circuit declined to construe “a first fueling system” as limited to dual-fuel systems based on a title’s reference to “ethanol enhancement of gasoline engines” ***when there was also an embodiment that disclosed a 100% ethanol fuel system.*** *See Ethanol Boosting Systems, LLC v. Ford Motor*

Company, 2022 WL 2798395 at *3 (Fed. Cir. July 18, 2022) (holding “the title’s reference to ‘ethanol enhancement of gasoline engines’ is not a clear and unmistakable disavowal of single-fuel system, particular in view of the disclosed 100% ethanol embodiment. Accordingly, the patents’ titles do not support the district court’s imported requirement of two different fuels.”). This is substantially different from the situation here where the entirety of the patent specification (including the title) is clear that the “short-circuit protection circuit” of the invention performs short-circuit protection without a shunt resistor.

“Where the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside the reach of the claims of the patent, even though the language of the claims, read without reference to the specification, might be considered broad enough to encompass the feature in question.” *SciMed Life Sys., Inc. v. Adv. Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1341 (Fed. Cir. 2001) (holding “[b]ecause the three SciMed patents make clear that the lumens referred to in the claims are all coaxial in structure, the district court was correct to construe the patents as disclaiming the dual lumen configuration”). The evidence in the specification and the title of the ’835 Patent together amount to a clear disavowal of a “short-circuit protection circuit” that uses a shunt resistor. *See, e.g., Techtronic Indus. Co. Ltd. v. Int’l Trade Comm’n*, 944 F.3d 901, 907 (Fed. Cir. 2019) (holding disavowal “may be inferred from clear limiting descriptions of the invention in the specification or prosecution history”). Therefore, the claim requirement for a “short-circuit protection circuit” should be construed to require a “circuit that performs short-circuit protection without a shunt resistor.”

III. CONCLUSION

For the reasons set forth above, the Staff respectfully submits that its constructions should be adopted for each of the disputed claim terms.

Date: August 19, 2022

Respectfully submitted,

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CERTIFICATE OF SERVICE

The undersigned certifies that on August 19, 2022, the foregoing **Commission Investigative Staff's Rebuttal Markman Brief** was filed with the Commission, served upon the Administrative Law Judge (by email to Bhattacharyya337@usitc.gov), and served in the manner indicated below:

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