


ANDREWS, UNITED STATES DISTRICT JUDGE:

This is a summary judgment opinion. Plaintiff L-3 Communications Corporation asserts claim 15 of United States Patent No. 5,541,654 (“the ‘654 Patent”) against Defendants Sony Corporation, Sony Electronics Inc., and Sony Mobile Communications (USA) Inc. (collectively “Sony”). L-3 alleges that Sony’s manufacture and sale of CMOS image sensors infringe the ‘654 Patent. Sony now moves for summary judgment of non-infringement. (D.I. 111). The Court heard oral argument on April 11, 2013. (D.I. 145).

DISCUSSION

A patent is infringed when a person “without authority makes, uses, offers to sell, or sells any patented invention, within the United States ... during the term of the patent.” 35 U.S.C. § 271(a). A two-step analysis is employed in making an infringement determination. *See Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976 (Fed. Cir. 1995). First, the court must construe the asserted claims to ascertain their meaning and scope. *See id.* The trier of fact must then compare the properly construed claims with the accused infringing product. *See id.* “Direct infringement requires a party to perform or use each and every step or element of a claimed method or product.” *BMC Res., Inc. v. Paymentech, L.P.*, 498 F.3d 1373, 1378 (Fed. Cir. 2007), *overruled on other grounds by Akamai Technologies, Inc. v. Limelight Networks, Inc.*, 692 F.3d 1301 (Fed. Cir. 2012) (en banc). “If any claim limitation is absent from the accused device, there is no literal infringement as a matter of law.” *Bayer AG v. Elan Pharm. Research Corp.*, 212 F.3d 1241, 1247 (Fed. Cir. 2000). A product that does not literally infringe a patent claim may still infringe under the doctrine of equivalents if the differences between an individual limitation of the claimed invention and an element of the accused product are insubstantial. *See Warner–Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 24 (1997).

The patent owner has the burden of proving infringement and must meet its burden by a preponderance of the evidence. *See SmithKline Diagnostics, Inc. v. Helena Lab. Corp.*, 859 F.2d 878, 889 (Fed. Cir. 1988).

When an accused infringer moves for summary judgment of non-infringement, such relief may be granted only if at least one limitation of the claim in question does not read on an element of the accused product, either literally or under the doctrine of equivalents. *See Chimie v. PPG Indus. Inc.*, 402 F.3d 1371, 1376 (Fed. Cir. 2005); *see also TechSearch, L.L.C. v. Intel Corp.*, 286 F.3d 1360, 1369-70 (Fed. Cir. 2002). Thus, summary judgment of non-infringement can only be granted if, after viewing the facts in the light most favorable to the non-movant, there is no genuine issue as to whether the accused product is covered by the claims. *See Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1304 (Fed.Cir.1999).

1. Literal Infringement

Sony argues that L-3 cannot present evidence that the accused sensors literally infringe the limitations of claim 15 of the '654 Patent. Claim 15 follows:

A method of providing an image of a scene, said method comprising the steps of:

providing an image element including a photovoltaic element which provides electric charge in response to light flux incident thereon,

storing electric charge from said photovoltaic element at said image element, and

connecting said stored charge to an output device only in response to an interrogation signal to said image element;

further including the steps of providing an output amplifier at said image element as part of said output device; and

wherein said step of providing said output amplifier includes providing a transistor at said image element, and using said stored charge to control an output voltage signal by controlling conductance of said transistor.

Claim 15 is a method claim, and only one limitation is at issue. That limitation is the second step of the claim, which requires a sensor that performs the function of “storing electric charge from said photovoltaic element at said image element.” At the *Markman* hearing, L-3 argued that the “storing electric charge” step may be accomplished by the “photovoltaic element which provides electric charge” step as recited in the claim. In other words, L-3 argued that the same element may generate and store charge. Sony disagreed, arguing that the “storing electric charge” step must be accomplished by an element “separate and distinct” from the “photovoltaic element which provides electric charge.”

The Court agreed with Sony. See *L-3 Commc'ns Corp. v. Sony Corp.*, 2012 WL 2412158, *3 (D. Del. June 22, 2012). The Court noted that a natural reading of the claim language suggested that because the storing electric charge step occurs after charge is received “from” the charge creation element, the two steps occur in different locations. *Id.* The Court further noted that this understanding was consistent with the specification, as all of the embodiments show a capacitance storage element separate from the photovoltaic element. *Id.* (citing Figures 2 and 9 of the '654 Patent). Finally, the “storing electric charge” step was construed consistently with the “charge storage element” term from then asserted claim 16 of U.S. Patent No. 5,452,004 (“the '004 Patent”).¹ The '654 Patent is a divisional patent of the '004 Patent, and they share an identical specification. Claim 16 of the '004 Patent is a device claim reciting “a gain control element interposed between said photoresponsive element and said storage element.”² The gain control element’s position between the photoresponsive and storage

¹ The '004 Patent was dropped from the case after the claim construction order. (D.I. 92 at 1; D.I. 107 at 1; D.I. 145 at 15).

² In the *Markman* opinion, the Court mistakenly referred to claim 1 of the '654 Patent as the claim that disclosed the “gain control element interposed” limitation, when in actuality it is found in then asserted claim 16 of the '004 Patent. This does not change the result of the construction.

elements literally requires those latter two elements to be physically separate and distinct from each other, as it would not be possible for the gain control element to be interposed between them otherwise. Claim 15 of the '654 Patent was construed consistent with this understanding, as, although it is a method claim, it refers to the “image element” and the “photovoltaic element” structures. For these reasons, the “storing electric charge” step was construed as occurring at a “separate and distinct” element from the “provides electric charge” step.

Thus, in order for Sony to succeed on its motion, it must show that no facts support a finding that the accused sensors perform the charge storing step on an element separate and distinct from the photovoltaic element. The parties essentially agree as to the function of the accused sensors. As this is a motion for summary judgment, and the Court views the evidence in the light most favorable to L-3, the Court adopts L-3's factual description. The accused sensors are constructed on a monolithic semiconductor microchip. Each sensor is comprised of an array of pixels, and each pixel is comprised of one photodiode combined with four transistors. This combination is called a “4T” arrangement, and is used to save space. The photodiode creates charge in response to light, and is comprised of layers, including two “P” areas with an “N-region” between them. The N-region has an excess of electrons. When the sensor is activated, light hits the center of the N-region. The light displaces the electrons, creating electron-hole pairs, *i.e.*, electric charge. Because the lenses focus light on only the center of the N-region, the surrounding edges of the N-region do not receive light and therefore do not create charge.³ Charge is thus only created on that central region, where the light is focused. The charge, however, does not remain segregated in the center of the N-region. It instead spreads evenly

³ Light may also be blocked by shadows created by the circuitry above and to the sides of the photodiode, further reducing the area on the N-region where charge is produced.

through the entire N-region, including the edges of the N-region where no charge is created. This is where the charge is stored. When the charge is ready for release, voltage is applied to turn the transfer transistor on. The charge is then drained from the N-region through the transfer transistor to the floating diffusion node. This completes the charge creation and charge storage cycle.

Sony argues that the described charge storage function does not literally meet the “separate and distinct” requirement of the “storing electric charge” step. Sony argues this is because it is undisputed that charge is stored on the N-region of the photodiode, rather than on a separate and distinct charge storage element. Sony cites a specifically commissioned report of L-3’s own consultant, Semiconductor Insights. (D.I. 113, Exh. 1). The report analyzed the operation of the accused sensors and compared that operation with the “storing electric charge” step of claim 15. (*Id.* at 5). The report concluded that “[t]he electric charge is stored on the self-capacitance of the photodiode.” (*Id.*). In other words, there is no separate capacitance or charge storage element from the photodiode. Sony also asserts that the report demonstrates that the source of each transfer gate is the photodiode itself, not an independent charge storage component. (D.I. 113, Exh. 9 at ¶ 8). According to Sony, because the charge is stored on the photodiode and not on a dedicated charge-storage element, there is no question of material fact that the accused sensors do not store charge on a separate and distinct charge storage element.

L-3 disagrees, arguing that a jury could find that the “separate and distinct” requirement is met by the accused sensors. L-3 argues that this is because the charge is not generated throughout the entirety of the photodiode’s N-region. It is only charged in the central portion of the N-region, where the light is focused. The charge is then distributed evenly and stored throughout the N-region, including the central portion where light was generated. According to

L-3, because there are non-charging areas of the N-region that nevertheless do store charge, there are separate and distinct charge-generation and charge-storage elements. L-3 also asserts that the photodiode and the transfer transistors share the charge storing N-region, which then serves as the source for the transfer transistor. Accordingly, charge is stored at an element distinct from the photodiode. L-3's expert sums up his opinion as follows:

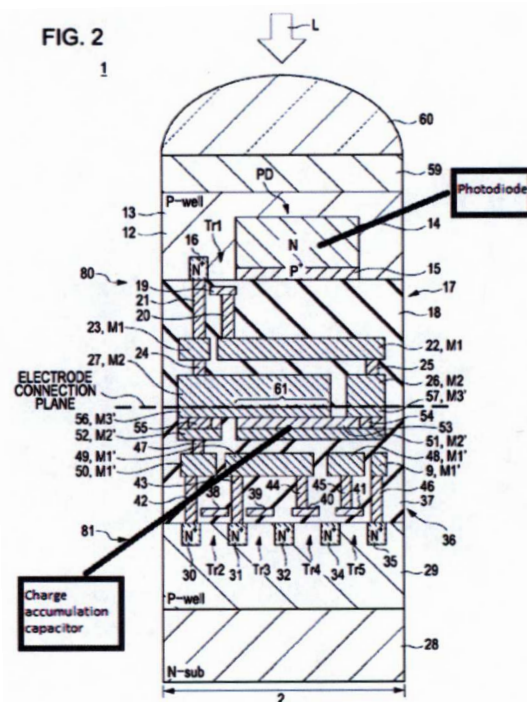
My prior declarations focus on explaining why the accused image sensors have separate and distinct charge-generation and charge-storage elements.... Sony documentation show[s] (1) that the accused Sony image sensors focus light on a central portion of the "photodiode"; (2) that the outer portion of the "photodiode" does not receive light; and (3) that charge is stored across all of the photodiode. Thus, there are significant portions of the "photodiode" that are storing charge, even though they are not acting as "photoresponsive" elements. These charge-storage areas are thus separate and distinct from the photoresponsive areas, as required by the Court's claim construction.

(D.I. 146, p. 2 at ¶ 4). L-3 further argues that because the accused sensors are integrated circuits, and virtually all elements within an integrated circuit share at least one doped region, elements are not as clearly defined as one might find on a circuit board. Accordingly, where the charge creation element ends and the charge storage element begins cannot be readily defined, as they necessarily share overlapping real estate on the chip. L-3 argues that this technological reality of integrated chips makes it unrealistic to strictly require physical separation between the charge creation and charge storage elements.

The Court does not agree with L-3's suggestion that its requirement for showing differentiation between the elements of an integrated circuit only results from a misunderstanding of integrated circuit technology. Although the basic concept that components of an integrated circuit will share layers, wires, conductors, and other sub-components is accepted, those components may still be recognizably distinct from one another. L-3's own submissions contradict any notion otherwise. First, L-3 admits that "where" the different

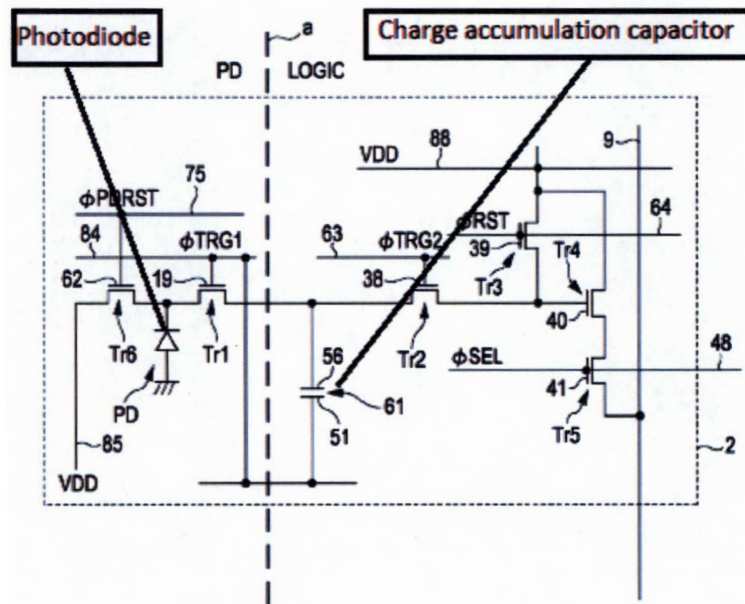
functions are performed is the deciding factor of this motion. (D.I. 150, p. 2). This indicates that pinning down the location of circuit components is not an impossible task. Second, and more importantly, L-3's own briefing identifies a non-accused Sony CMOS sensor design with clearly defined separate and distinct charge creation and storage elements, and L-3 had no problem relying on this distinction in support of its position on a now-mooted discovery dispute.

L-3's opposition brief to this motion complained that summary judgment was not yet ripe due to Sony's failure to comply with discovery requests.⁴ (D.I. 117). One reason given was Sony's alleged failure to produce discovery on Sony's newly designed Exmor RS sensors, which L-3 believed constituted the actual reduction to practice of Sony U.S. Patent Application No. 2010/0238334 ("'334 Application"). L-3 argued that discovery on these products should have been produced, precisely because the '334 Application described "distinct charge generation and charge storage elements." (*Id.* at 10). L-3 included Figure 2 from the '334 Application in



⁴ At oral argument, L-3 agreed that the discovery issues were resolved and there were no more procedural barriers to consideration of the summary judgment motion. (D.I. 145, pp. 50-51).

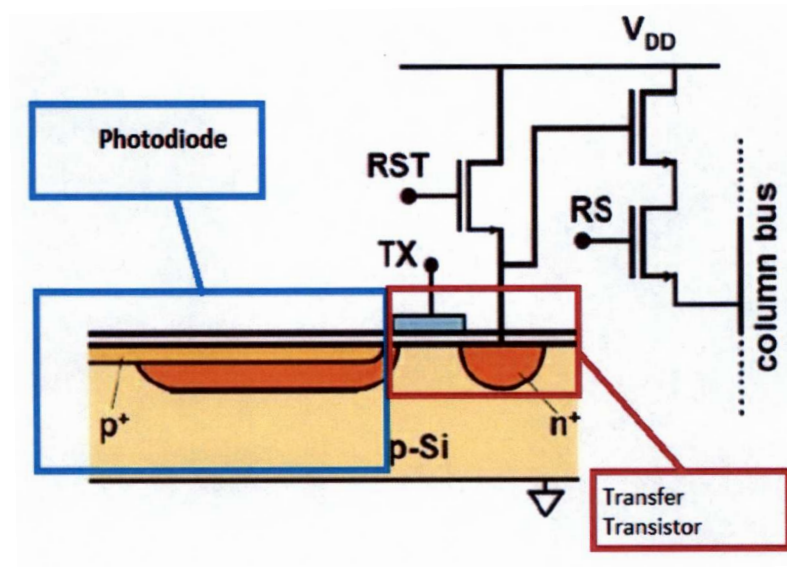
support, identifying the charge generation and charge storage units as distinct from one another. L-3's expert explained, "In this figure, charge is provided at the photodiode, and then transferred and stored at the charge accumulation capacitor[.]" (D.I. 118, pp. 15-16 at ¶ 21). L-3 also provides the circuit diagram of the system:



L-3's expert stated that this diagram of the system "confirms that it provides charge at one location and stores it at another location." (*Id.*). L-3's expert evidently had no trouble distinguishing between those locations, despite the fact that the figure and diagram apparently disclose "monolithic semiconductor structures—that is, *integrated* circuits."⁵ L-3's own expert's finding is incompatible with L-3's position that requiring separate and distinct circuit elements would only arise from a misunderstanding of the integrated circuit technology.

⁵ L-3 used this language to argue that components of integrated circuits cannot be readily defined or distinguished. (D.I. 150, p. 2).

With this in mind, the Court compares the accused sensors to the “storing electric charge” limitation. A facsimile of L-3’s diagram of the accused products’ circuit components follow:



The blue and red boxes represent the photodiode and the transfer transistor elements. The orange layer is the N-region. It is not disputed that the accused sensors both create and store charge on the N-region of the photodiode. It is not disputed that the charge is only generated in the central portions of the N-region, while charge storage occurs throughout the entire N-region. It is further not disputed that an edge of the N-region extends from the photodiode into the transfer transistor.⁶ As charge is stored throughout the N-region, it is stored in both the photodiode and the transfer transistor. L-3 argues that the accused sensors thus store charge at an element “separate and distinct” from where they generate charge, because charge is stored in areas of the N-region where charge is not generated, and also because charge is partially stored at the transfer transistor.

⁶ Sony refers to the “transfer transistor” as the “transfer gate.” (D.I. 145, p. 25 ll. 18-19).

The Court disagrees. The patent requires the “storing electric charge” step to occur at an element “separate and distinct” from the “provides electric charge” step. Here, it is the N-region, a single circuit element, which accomplishes both of these tasks. This is true regardless of whether the charge storage and generation steps coincide in the same exact areas of the N-region. The N-region is the active layer of the photodiode, and it is a single element. The fact that charge is stored in places of the N-region where charge is not generated does not convert the N-region into dual elements. It is a single element performing dual functions, and that is not sufficient to meet the separate and distinct requirement.⁷ In other words, the N-region cannot be separate and distinct from itself. Similarly, the N-region’s overlap between the photodiode and transfer gate does not alter the fact that the N-region is doing all the relevant electrical work, i.e., storing and generating charge. For these reasons, summary judgment is granted as to the literal non-infringement of the accused sensors.

2. Doctrine of equivalents.

“A product that does not literally infringe a patent claim may still infringe under the doctrine of equivalents if the differences between an individual limitation of the claimed invention and an element of the accused product are insubstantial.” *Collectis S.A. v. Precision Biosciences, Inc.*, 2013 WL 1415609, *6 (D. Del. Apr. 9, 2013). “The patent owner has the burden of proving infringement [under the doctrine of equivalents] and must meet its burden by a preponderance of the evidence.” *Id.* “[T]he insubstantial differences inquiry may be guided by determining whether the element in the accused device ‘performs substantially the same function

⁷ What is not shown in the accused sensors is a capacitance element identifiably distinct from the N-region, which L-3 apparently did locate in relation to the sensors depicted in the ‘334 Application.

in substantially the same way to obtain the same result.’” *Boehringer Ingelheim Vetmedica, Inc. v. Schering-Plough Corp.*, 320 F.3d 1339, 1351 (Fed. Cir. 2003). To create a material issue of fact on the doctrine of equivalents, the plaintiff should provide “particularized testimony and linking argument” from an expert that specifically addresses equivalents on a limitation-by-limitation basis. *AquaTex Indus., Inc. v. Techniche Solutions*, 479 F.3d 1320, 1329 (Fed. Cir. 2007). The expert should explain the insubstantiality of the differences between the patented method and the accused product, or discuss the function, way, result test. *Id.*

L-3 argues that the differences between the accused sensor and the requirements of claim 15 are insubstantial. L-3’s expert declaration refers to the equivalence of a photodiode and a circuit having separate charge-generation and charge-storage elements. (D.I. 146, p. 4 at ¶ 9). His opinion is that “a person having ordinary skill in the art would recognize that a photodiode having separate charge-generation and -storage regions is the equivalent of (i.e., insubstantially different from) a circuit having separate photoresponsive and charge-storage elements.” (*Id.*). This declaration fails to give rise to a question of fact in support of an insubstantial difference. What is required under the claim is that the accused sensor have separate and distinct charge creation and charge storage elements. L-3 argues that a single photodiode element performing those two functions may be understood to be equivalent to two different elements performing those functions, but to allow such a finding would “overtake the statutory function of the claims in defining the scope of the patentee’s exclusive rights,” as the claim requires two elements, not one. *Deere & Co. v. Bush Hog, LLC*, 703 F.3d 1349, 1356 (Fed. Cir. 2012). A single element is the antithesis of the requirement for two separate and distinct elements. In other words, the accused sensors do not achieve the same function in substantially the same way as what is

claimed. As such, the Court grants the motion for summary judgment as to non-infringement under the doctrine of equivalents.

An appropriate order will be entered.