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United States Court of Appeals for the Federal Circuit

04-1046

NEOMAGIC CORPORATION,

Plaintiff-Appellant,

v.

TRIDENT MICROSYSTEMS, INC.,

Defendant-Appellee.

DECIDED: August 5, 2004

Before LOURIE, Circuit Judge, FRIEDMAN, Senior Circuit Judge, and PROST, Circuit Judge.

LOURIE, Circuit Judge.

DECISION

NeoMagic Corporation appeals from the decision of the United States District Court for the District of Delaware granting Trident Microsystems, Inc.'s motion for summary judgment of noninfringement of United States Patent 5,703,806. NeoMagic Corp. v. Trident Microsystems, Inc., Civ. Action No. 98-699-KAJ (D. Del. May 9, 2003), amended by NeoMagic Corp. v. Trident Microsystems, Inc., Civ. Action No. 98-699-KAJ (D. Del. July 30, 2003). We affirm.

BACKGROUND

NeoMagic owns the '806 patent, which is directed to a graphics controller system that combines a graphics engine and video memory on a single integrated circuit for use in notebook computers.¹ The invention prevents noise generated by the memory components in the semiconductor substrate from interfering with the graphics engine by, among other things, electrically isolating the analog components of the graphics engine in a well and then biasing the junction between the substrate and the well. In the preferred embodiment, the junction is reverse-biased by applying to the substrate a voltage that is less positive than the voltage applied to the well. Figure 5 of the '806 patent provides a cross-sectional diagram of an analog component isolated in accordance with the claimed invention. It depicts a capacitor in a well (at a voltage V_{DD}), which is formed in the semiconductor substrate (at a voltage V_{BB}):

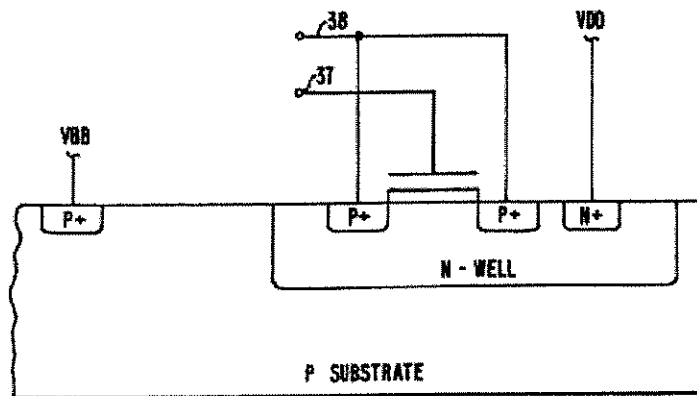


FIG. 5.

The only claims at issue in this appeal derive from independent claims 7 and 18. Claim 7 recites a capacitor comprising, *inter alia*, a "well connected to a first power

¹ For a detailed explanation of the technology involved, see NeoMagic Corp. v. Trident Microsystems, Inc., 287 F.3d 1062, 1063-68 (Fed. Cir. 2002).

supply” and a “substrate connected to a second power supply at a negative voltage with respect to said first power supply.” Claim 18 in turn recites an integrated circuit comprising, inter alia, the capacitor disclosed in claim 7. Claims 9 and 13 depend from claim 7, while claims 20, 24, and 26 depend from claim 18.

Trident manufactures the Cyber 9388, 9520, 9525, 9540, and PV8 embedded memory graphics accelerators. Like the invention claimed in the '806 patent, Trident's products isolate analog components from noise in the semiconductor substrate by placing them in wells. Trident's products apply a positive voltage VDD to the well and a ground voltage VSS (i.e., zero volts) to the substrate. Trident's products additionally utilize a split-bias device to maintain certain current sources at constant values; the split-bias device connects to the gate of a capacitor over the BIAS signal line.

In December 1998, NeoMagic filed suit against Trident for infringement of claims 7, 9, 13, 18, 20, 24, and 26 of the '806 patent.² After initially construing the disputed claim terms in May 2000, NeoMagic Corp. v. Trident Microsystems, Inc., 98 F. Supp. 2d 538 (D. Del. 2000), the district court granted Trident's motion for summary judgment of noninfringement in February 2001, NeoMagic Corp. v. Trident Microsystems, Inc., 129 F. Supp. 2d 689 (D. Del. 2001). In its summary judgment opinion, the court revisited two of its earlier claim constructions. It now interpreted the term “power supply” to mean “a source of electrical energy, such as a battery, that requires at least two power supply lines to deliver a constant voltage supply of power to an electrical circuit.” Id. at

² NeoMagic also sued Trident for infringement of United States Patent 5,650,955. The current appeal raises no issues relating to the '955 patent, however, as we earlier affirmed the district court's summary judgment of noninfringement with regard to that patent, id. at 1072.

696. It also construed the phrase “negative voltage with respect to” to require the substrate to be tapped at a voltage of less than zero volts. Id. at 697. Applying those revised claim constructions, the court then concluded that there were no genuine issues of material fact and that the accused products’ split-bias device is neither a “second power supply” nor at “a negative voltage with respect to” a first power supply. Id. at 696-97. The court accordingly held that Trident was entitled to summary judgment of no literal infringement and no infringement under the doctrine of equivalents. Id. at 697-98.

On appeal, this court vacated and remanded. First, we adopted the district court’s construction of the term “power supply” to the extent that it required two supply lines to deliver power in an electrical circuit but, finding that the district court had improperly construed the term so as to exclude the accused products, remanded for further consideration of whether a “power supply” must provide a constant voltage. NeoMagic Corp. v. Trident Microsystems, Inc., 287 F.3d 1062, 1073-74 (Fed. Cir. 2002). Second, we construed the “negative voltage with respect to” language to mean that the second power supply must have a voltage that is less positive than that of the first power supply, but need not have a voltage that is negative with respect to ground (i.e., zero volts). Id. at 1075. Having materially altered the district court’s claim constructions, we vacated the summary judgment of noninfringement and remanded for further proceedings with respect to both claim construction and infringement. Id. at 1075-76.

On remand, the district court designated a magistrate judge to resolve the pending motions for summary judgment. The magistrate judge found no need to

address whether the term “power supply” calls for a constant output voltage and instead interpreted the term to require “deliver[y of] power at a voltage to enable the junction between the well and the substrate to remain reverse-biased.” NeoMagic Corp. v. Trident Microsystems, Inc., Civ. Action No. 98-699-KAJ, slip op. at 25 (D. Del. May 9, 2003). Turning to the question of infringement, the magistrate judge then held that the accused products cannot infringe the '806 patent because they do not have a “second power supply” as recited in the claims. Initially, she explained that the accused products’ split-bias device cannot be a “second power supply” because its AVSS line grounds the substrate at zero volts and its BIAS line does not deliver power to the substrate. Id. at 31-32. Upon Trident’s motion for clarification, however, she modified her reasoning, explaining that the split-bias device cannot be a “second power supply” because it does not influence the voltage of the well and does not enable the junction between the substrate and the well to remain reverse-biased. NeoMagic Corp. v. Trident Microsystems, Inc., Civ. Action No. 98-699-KAJ, slip op. at 6-7 (D. Del. July 30, 2003) (amending the May 9, 2003 memorandum opinion). The magistrate judge thus granted Trident’s motion for summary judgment of noninfringement, and the district court entered final judgment pursuant to Federal Rule of Civil Procedure 54(b).³ NeoMagic Corp. v. Trident Microsystems, Inc., Civ. Action No. 98-699-KAJ (D. Del. Sept. 24, 2003).

NeoMagic timely appealed to this court. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(1).

³ The district court retained continuing jurisdiction over all unresolved pending claims, including an antitrust counterclaim filed by Trident.

DISCUSSION

We review a district court's grant of summary judgment de novo, reapplying the same standard used by the district court. Ethicon Endo-Surgery, Inc. v. U.S. Surgical Corp., 149 F.3d 1309, 1315 (Fed. Cir. 1998). Summary judgment is appropriate "if the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a judgment as a matter of law." Fed. R. Civ. P. 56(c). "The evidence of the non-movant is to be believed, and all justifiable inferences are to be drawn in his favor." Anderson v. Liberty Lobby, Inc., 477 U.S. 242, 255 (1986).

A determination of infringement requires a two-step analysis. "First, the court determines the scope and meaning of the patent claims asserted . . . [and second,] the properly construed claims are compared to the allegedly infringing device." Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1454 (Fed. Cir. 1998) (en banc) (citations omitted). Step one, claim construction, is a question of law, Markman v. Westview Instruments, Inc., 52 F.3d 967, 970-71 (Fed. Cir. 1995) (en banc), aff'd, 517 U.S. 370 (1996), that we review de novo, Cybor, 138 F.3d at 1456. Step two, comparison of the claims to the accused device, requires a determination that every claim limitation or its equivalent be found in the accused device. Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17, 29 (1997). That determination is a question of fact. Bai v. L&L Wings Inc., 160 F.3d 1350, 1353 (Fed. Cir. 1998).

On appeal, NeoMagic challenges the district court's summary judgment of noninfringement, charging that the court made errors in both its claim construction analysis and its infringement analysis. NeoMagic first contends that the court erred in

reading the claims to require the two recited power supplies to reverse-bias the junction between the substrate and the well. NeoMagic further argues that the accused products' split-bias device is a "second power supply" and thus that the accused products literally infringe the asserted claims.⁴ Trident responds that the district court did not err in construing the "power supply" limitations or in determining that the split-bias device cannot be a "second power supply" because it does not contribute to the reverse-biasing of the substrate-well junction.

We agree with Trident that the district court was correct to enter summary judgment of noninfringement because the accused products do not have a "second power supply" as recited in the claims. We begin our analysis with the construction of the "power supply" limitations. As we held in our earlier opinion, the term "power supply" means, at minimum, "a source of electrical energy . . . that requires at least two power supply lines to deliver power in an electrical circuit." NeoMagic, 287 F.3d at 1074 (omission in original). The question now before us is whether the recited power supplies must also "deliver power at a voltage to enable the junction between the well and the substrate to remain reverse-biased," as the district court concluded on remand. NeoMagic Corp. v. Trident Microsystems, Inc., Civ. Action No. 98-699-KAJ, slip op. at 25 (D. Del. May 9, 2003). We hold that they must.

NeoMagic focuses its claim construction argument on the meaning of the term "power supply"; however, the terms "first power supply" and "second power supply" must be read in the context of the claim limitations of which they are a part. The

⁴ NeoMagic makes no express argument on appeal concerning infringement under the doctrine of equivalents.

relevant language in claims 7 and 18 reads as follows: “said . . . well connected to a first power supply, and said substrate connected to a second power supply at a negative voltage with respect to said first power supply.” The claims thus instruct that the well and the substrate must be connected to the respective power supplies at voltages necessary for reverse-biasing the junction between the substrate and the well (i.e., “at a negative voltage with respect to said first power supply”). Importantly, the claims refer to the voltages not of the substrate and the well, but of the power supplies to which they are connected. In so doing, the claims identify the power supplies as the sources of the substrate and well voltages and expressly link the two power supplies to the reverse-biased condition of the substrate-well junction. We therefore conclude that the first and second power supplies must apply voltages to the well and substrate, respectively, so as to enable the reverse-biasing of the substrate-well junction.

NeoMagic argues, however, that the district court erred in requiring each power supply, standing alone, to reverse-bias the substrate-well junction. Although the magistrate judge’s claim construction analysis does not include such a requirement, her amended infringement analysis contains some statements that could be read to that effect. To avoid any misunderstanding on this point, we clarify that each power supply need not be capable of reverse-biasing the substrate-well junction by itself. Such a construction would be nonsensical in that it would effectively vitiate the second power supply in the context of the invention. Moreover, it would impermissibly exclude the specification’s preferred embodiment, in which the first power supply is an external source that generates and applies to the well a positive voltage V_{DD} , ’806 patent, col. 4, ll. 54-60 & fig. 5, and the second power supply is an on-chip charge pump that

generates and applies to the substrate a negative voltage V_{BB} , *id.*, col. 3, l. 64 to col. 4, l. 6 & fig. 5. The preferred embodiment is thus one in which both power supplies are necessary to reverse-bias the junction, and the claims should be interpreted so as not to exclude that embodiment. We therefore reiterate that each power supply need not be capable of reverse-biasing the substrate-well junction on its own; rather, the first power supply and the second power supply must apply voltages to the well and the substrate, respectively, so as to establish and maintain the reverse-biased condition.

NeoMagic further objects to the district court's construction of the "power supply" limitations on the ground that it renders the "negative voltage with respect to" language superfluous. NeoMagic asserts that the claims are silent regarding how the substrate-well junction is reverse-biased and that they only require the substrate to be at a voltage that is negative with respect to the voltage of the well. We disagree, for as noted above, the claims do not simply recite that the substrate voltage must be less positive than the well voltage; instead, they disclose the relative voltages of the substrate and the well by reference to the voltages of the power supplies to which they are connected. The "power supply" and "negative voltage with respect to" clauses thus serve two distinct purposes: the former establishes the sources of the well and substrate voltages, while the latter establishes the relative values of those voltages. As such, the district court's construction of the "power supply" limitations—and ours—gives meaning to the "power supply" and the "negative voltage with respect to" language.

In sum, we conclude that the district court did not err in interpreting claims 7 and 18 to require the two power supplies to contribute to reverse-biasing the substrate-well junction. Based on our reading of the claims and the specification, we hold that the

“first power supply” and the “second power supply” must deliver power to the well and the substrate, respectively, at voltages that enable the junction between the substrate and the well to remain reverse-biased.

Having construed the “power supply” limitations, we turn next to the question whether the accused products’ split-bias device may be considered a “second power supply” within the meaning of the claims. NeoMagic argues that the split-bias device is a “second power supply” because it has two supply lines (i.e., BIAS and AVSS), the latter of which connects to the substrate and provides a voltage that is negative with respect to the voltage provided by the first power supply. Trident responds that the split-bias device cannot satisfy the “second power supply” limitation because it has nothing to do with reverse-biasing the substrate-well junction or isolating the capacitor from noise in the substrate. According to Trident, the accused products’ first power supply (i.e., VDD/VSS) is alone sufficient to maintain the reverse-biased condition.

We agree with Trident that the district court was correct in concluding that there is no genuine issue of material fact whether the accused products’ split-bias device can be a “second power supply” as recited in the claims. It cannot. Even if the split-bias device may be considered a “power supply” as that term has been construed, it does not deliver power to the substrate at a voltage that enables the junction between the substrate and the well to remain reverse-biased. Rather, the split-bias device uses the BIAS signal line to deliver a control voltage to a capacitor in order to maintain certain current sources at constant values. The mere fact that both the split-bias device and the substrate are tied to ground does not, as NeoMagic suggests, mean that the split-bias device contributes to reverse-biasing the substrate-well junction, for it is the

external reference voltage VSS, and not the split-bias device, that establishes the voltage of the substrate. Indeed, under NeoMagic's purported logic, any component that is tied to ground—most, if not all, of the components in the integrated circuit—would contribute to reverse-biasing the substrate-well junction. However, as discussed above, the claims require the second power supply to enable the reverse-biased condition by establishing the voltage of the substrate at a voltage that is less positive than the voltage applied to the well. The split-bias device does not do that.⁵ We therefore conclude that it cannot be a “second power supply” within the meaning of the claims.⁶

CONCLUSION

For the foregoing reasons, we conclude that the district court did not err in construing the claims to require that the recited power supplies contribute to reverse-biasing the substrate-well junction or in concluding as a matter of law that the accused products lack a “second power supply.” Accordingly, we affirm the district court's summary judgment of noninfringement.

⁵ In her amended infringement analysis, the magistrate judge stated that the split-bias device cannot be a “second power supply” because, among other reasons, it does not influence the well voltage. NeoMagic Corp. v. Trident Microsystems, Inc., Civ. Action No. 98-699-KAJ, slip op. at 7 (D. Del. July 30, 2003) (amending the May 9, 2003 memorandum opinion). We do not agree that the second power supply must influence the well voltage, but we conclude nonetheless that the split-bias device cannot satisfy the “second power supply” limitation for the other reasons stated above.

⁶ In light of our disposition of the primary issues on appeal, we do not reach Trident's alternative ground for affirming the summary judgment of noninfringement—namely, that the accused products' split-bias device cannot be a “power supply” because it does not provide a constant voltage.

