

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

GREENTHREAD, LLC

Plaintiff,

vs.

**ON SEMICONDUCTOR CORPORATION;
SEMICONDUCTOR COMPONENTS
INDUSTRIES, LLC D/B/A ON
SEMICONDUCTOR LLC**

Defendants.

Civil Action No.

JURY TRIAL DEMANDED

ORIGINAL COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Greenthread, LLC (“Greenthread” or “Plaintiff”) files this Original Complaint against Defendants ON Semiconductor Corporation, Semiconductor Components Industries, LLC d/b/a ON Semiconductor LLC (collectively “ON Semiconductor” or “Defendants”) and hereby alleges as follows:

THE NATURE OF THE ACTION

1. Greenthread owns a family of patents related to transistors and other components of integrated semiconductor devices. Greenthread’s patented inventions describe semiconductor devices that employ graded dopants and well regions for creating electric fields for aiding and/or limiting the movement of carriers to (or from) the semiconductor surface to (or from) the semiconductor substrate. These inventions improve semiconductor devices by (1) creating faster, more efficient, and more reliable processors, logic devices, and image sensors and (2) allowing manufacturers to scale down the feature size of their semiconductor products.

2. Defendants have infringed and continue to infringe two Greenthread patents:

10,510,842 (the “842 Patent”), and 11,121,222 (the “222 Patent) (collectively “the Greenthread Patents”), copies of which are attached hereto as Exhibits 1-2, respectively. Defendants have infringed and continue to infringe the Greenthread Patents by making, using, selling, offering for sale, and/or importing into the United States, semiconductor devices with infringing graded dopant regions and/or electronic products containing the same.

THE PARTIES

3. Plaintiff Greenthread, LLC (“Greenthread”) is a limited liability company organized and existing under the laws of Texas, having its principal place of business at 7424 Mason Dells Drive, Dallas, Texas 75230-3244.

4. Defendant ON Semiconductor Corporation is a corporation organized and existing under the laws of Delaware, having its principal place of business at 5005 East McDowell Road, Phoenix, Arizona, 85008. ON Semiconductor Corporation may be served through its registered agent the Corporation Trust Company at Corporation Trust Center 1209 Orange Street, Wilmington, Delaware 19801.

5. Defendant Semiconductor Components Industries, LLC., is a limited liability company with its principal place of business at 5005 East McDowell Road, Phoenix, Arizona, 85008. Upon information and belief, Semiconductor Components Industries, LLC., is the principal domestic operating subsidiary of ON Semiconductor Corporation and does business under the name of ON Semiconductor. Upon information and belief, Semiconductor Components Industries, LLC is a wholly-owned subsidiary of ON Semiconductor Corporation.

6. ON Semiconductor designs, manufactures, and markets a comprehensive portfolio of semiconductor products. More specifically, ON Semiconductor describes itself as a supplier of

“intelligent power and sensing technologies that solve the most challenging customer problems.”¹
ON Semiconductor further describes itself as a “leader in intelligent power and sensing” that has
“pivoted our investments to align with the high-growth megatrends in automotive and industrial.”²

7. Upon information and belief, Defendants are part of the same corporate structure and distribution chain for the making, importing, designing, manufacturing, offering to sell, selling, and/or using of the ON Semiconductor Accused Products in the United States, including in the state of Delaware generally and in this judicial district in particular. Upon information and belief, Defendants and their affiliates share the same management, common ownership, advertising platforms, facilities, distribution chains and platforms, and product lines involving the ON Semiconductor Accused Products.

SUBJECT MATTER JURISDICTION

8. This action arises under the patent laws of the United States, namely 35 U.S.C. §§ 271, 281, and 284-285, among others.

9. This court has subject matter jurisdiction over the patent infringement claims asserted in this case under 28 U.S.C. §§ 1331 and 1338(a).

PERSONAL JURISDICTION AND VENUE

10. This Court has specific personal jurisdiction over Defendants because they have committed acts within this District giving rise to this action (including acts of infringement) and have established minimum contacts with this forum such that the exercise of jurisdiction over Defendants would not offend traditional notions of fair play and substantial justice. Such acts

¹ <https://investor.onsemi.com/static-files/e6394327-d8e6-48f9-81ab-2ff550c298e6>

² *Id.*

include selling ON Semiconductor Accused Products.

11. The Court has general personal jurisdiction over ON Semiconductor Corporation because it is incorporated in Delaware.

12. The Court has general personal jurisdiction over Semiconductor Components Industries, LLC, because its sole member is a Delaware corporation, ON Semiconductor Corporation.

13. Venue is proper under 28 U.S.C. §§ 1391(b) and 1400(b), because Defendants reside in this District.

14. “ON Semiconductor Accused Products” are products accused of meeting the claim limitations of a Greenthread Patent in this suit. Defendants designs and manufactures semiconductor devices containing transistors and other structures that infringe the Greenthread Patents in the United States. The infringing structures within semiconductor devices have application in many types of devices designed and manufactured by ON Semiconductor, including discrete & power modules, power management, signal conditioning & control, sensors, motor control, custom & audio/video application-specific standard products (ASSP), interfaces, wireless connectivity, and timing, logic, and memory devices.³

15. Exhibit 4 demonstrates how exemplary ON Semiconductor Accused Products meet the claim limitations of Greenthread Patents and is herein incorporated by reference.

THE GREENTHREAD PATENTS

16. On December 17, 2019, the U.S. Patent and Trademark Office duly and legally issued U.S. Patent No. 10,510,842 (“the ’842 Patent”), entitled “Semiconductor Devices with

³ <https://www.onsemi.com/products>

Graded Dopant Regions,” listing Dr. Mohan Rao as the inventor, from a patent application filed on May 9, 2017. The ’842 Patent claims priority from U.S. Patent Application No. 10/934,915,⁴ filed on September 3, 2004. A true and correct copy of the ’842 Patent is attached hereto as Exhibit 1 and incorporated herein by reference.

17. On September 14, 2021, the U.S. Patent and Trademark Office duly and legally issued U.S. Patent No. 11,121,222 (“the ’222 Patent”), entitled “Semiconductor Devices with Graded Dopant Regions,” listing Dr. Mohan Rao as the inventor, from a patent application filed on July 27, 2020. The ’222 Patent claims priority from U.S. Patent Application No. 10/934,915,⁵ filed on September 3, 2004. A true and correct copy of the ’222 Patent is attached hereto as Exhibit 2 and incorporated herein by reference.

18. The ’842 and the ’222 Patents are collectively referred to as the “Greenthread Patents.”

19. Greenthread exclusively owns all rights, title, and interest in the Greenthread Patents necessary to bring this action, including the right to recover past and future damages. Certain of the Greenthread Patents were previously owned by Dr. G.R. Mohan Rao (“Dr. Rao”). On April 27, 2015, Dr. Rao assigned to Greenthread the then-issued Greenthread Patents and all related “continuations, continuations-in-part and extensions of said Applications and Patents and any pending applications or issued patents that directly claim or are amended to claim priority to any of the Applications or Patents.” Dr. Rao’s assignment was recorded with the U.S. Patent and Trademark Office on May 13, 2015, and again on July 22, 2021, and is attached hereto as Exhibit 3. Greenthread has therefore owned all rights to the Greenthread Patents necessary to bring this

⁴ Pub. No. US 2006/0049464.

⁵ Pub. No. US 2006/0049464.

action throughout the period of ON Semiconductor's infringement and still owns those rights to the Greenthread Patents.

20. Defendants are not currently licensed to practice the Greenthread Patents.

21. The Greenthread Patents are valid and enforceable.

FACTUAL BACKGROUND

22. Dr. G.R. Mohan Rao ("Dr. Rao"), the sole inventor of the Greenthread Patents, has been an innovator in the semiconductor industry since the 1960s. He is a named inventor on more than 100 Patents worldwide and authored numerous technical publications over the last 50 years.

23. In September 1968, Dr. Rao received a Ph.D. in physics with a specialization in electronics from Andhra University in Waltair, India. He then traveled to the United States to attend a graduate program in physics at the University of Cincinnati.

24. After learning of an opportunity to work with Professor William Carr of Southern Methodist University ("SMU"), Dr. Rao transferred to SMU where he earned a Ph.D. in Electrical Engineering. While there, he worked in the SMU laboratory with Jack Kilby of Texas Instruments (a pioneering electrical engineer who would later receive a Nobel Prize for his work), on metal-oxide-silicon transistors ("MOS devices"), which are used for switching and amplifying electronic signals in electronic devices. MOS devices form the basis of modern electronics and are the most widely used semiconductor devices in the world. The U.S. Patent and Trademark Office has called this device a "groundbreaking invention that transformed life and culture around the world."⁶ Dr. Rao built these devices from scratch while a graduate student at SMU.

25. Through his mentor, Jack Kilby, Dr. Rao interviewed with—and was ultimately hired by—Texas Instruments to continue his work on MOS devices in 1972. Dr. Rao worked at

⁶ <https://www.uspto.gov/about-us/news-updates/remarks-director-iancu-2019-international-lectual-property-conference>

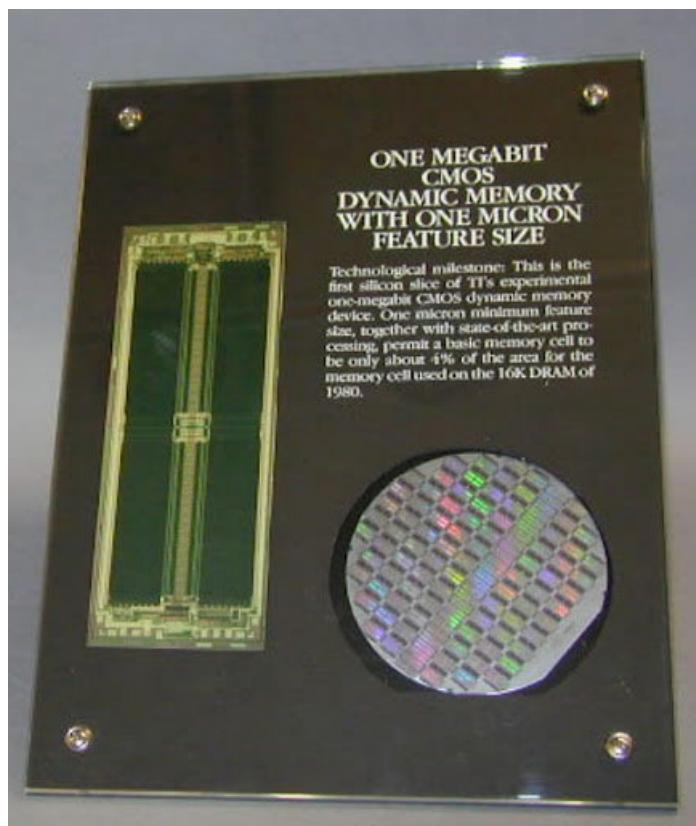
Texas Instruments for the next twenty-two years, rising from an engineer to a Senior Fellow. At that time, Texas Instruments had only 12 Senior Fellows out of approximately 20,000 engineers. Eventually, Dr. Rao moved into a management position at Texas Instruments, ultimately becoming a Senior Vice President in 1985.

26. At Texas Instruments, Dr. Rao received his first patent while working in a process and product engineering capacity to solve a production problem with Texas Instruments' 4-kilobit RAM product. That patent was merely the beginning of Dr. Rao's long inventive career. Indeed, from the late 1970s through the mid-1980s, Dr. Rao worked on or managed projects relating to Texas Instruments' 64kb RAM, 256Kb RAM, 1Mb RAM, 4 Mb RAM, EEPROM, SRAM, and microcontrollers. For that work, Dr. Rao received numerous additional U.S. Patents.

27. The USPTO was not the only organization to recognize Dr. Rao's achievements. Some of Dr. Rao's work at Texas Instruments was so remarkable that it has been credited in multiple exhibits in the National Museum of American History at the Smithsonian Institution.⁷ For example, the Smithsonian has displayed Texas Instruments' experimental 1-megabit CMOS DRAM, produced in April 1985 under Dr. Rao's leadership, and credited Dr. Rao for the achievement.⁸

⁷ <http://smithsonianchips.si.edu/texas/wafer.htm>

⁸ http://smithsonianchips.si.edu/texas/t_360.htm



28. In 1994, Dr. Rao left Texas Instruments for Cirrus Logic. During his two-year tenure at Cirrus Logic, he received more U.S. Patents relating to his work on integrated graphics controllers and memory.

29. In 1996, Dr. Rao started a company called Silicon Aquarius. Through a relationship between Silicon Aquarius and Matsushita, Dr. Rao led a design team in working on a 256Mb DRAM chip. After Silicon Aquarius ceased operations, Dr. Rao did consulting work for a number of different consulting companies and devoted much of his free time to thinking about various challenges and problems with which the semiconductor industry had struggled for years.

30. In 2003, Dr. Rao and Philip John founded Greenthread to continue Dr. Rao's pioneering work. A focal point of Dr. Rao's research was poor refresh time and the related problem of how to deal with and control the movement of both wanted and unwanted carriers in semiconductor devices, including memory and logic devices. Dr. Rao realized that graded dopants

could be used to create a “drift layer” and other structures to facilitate the movement—in an upward or downward direction, as appropriate—of carriers from the semiconductor surfaces down into the substrate and vice versa. It was Dr. Rao’s work on this problem that culminated in the Greenthread Patents.

ON SEMICONDUCTOR’S INFRINGEMENT

31. ON Semiconductor has directly infringed, and continues to infringe, one or more claims of each of the Greenthread Patents through making, using, offering to sell, selling within the United States, and/or importing into the United States semiconductor products, including AR0820AT, that practice the claimed inventions (*i.e.*, the ON Semiconductor Accused Products). A non-exhaustive, exemplary list of the types or categories of products or devices that infringe are further identified in Exhibit 4.

32. As shown in Exhibit 4, the exemplary ON Semiconductor Accused Product, AR0820AT, meets each and every element of at least one claim of the Greenthread Patents.

33. Upon information and belief, ON Semiconductor fabricates and designs the ON Semiconductor Accused Products using similar designs according to a limited number of processes, many or all of which utilize substantially similar process steps, including process steps for creating regions with graded dopant concentrations, because the invention would have application in those categories of products, for example by improving switching time in transistors in the ON Semiconductor Accused Products. Upon information and belief, the ON Semiconductor Accused Products are in relevant part substantially similar to the exemplary AR0820AT shown in Exhibit 4, particularly with regard to the manner in which the exemplary AR0820AT includes and utilizes regions with graded dopant concentrations. Exhibit 4 is thus illustrative of the manner in which the ON Semiconductor Accused Products meet the claim limitations of the Greenthread

Patents.⁹

COUNT I: INFRINGEMENT OF U.S. PATENT NO. 10,510,842

34. Greenthread incorporates by reference and re-alleges all of the foregoing paragraphs of this Complaint and exhibits attached hereto as if fully set forth herein.

35. The following allegations are based on publicly available information and a reasonable investigation of the structure and operation of the ON Semiconductor Accused Products. Greenthread reserves the right to modify this description, including, for example, on the basis of information about the ON Semiconductor Accused Products that it obtains during discovery.

36. As alleged above and in Exhibit 4, the products analyzed in Exhibit 4 meet each and every one of the claim limitations of at least one claim of the '842 Patent.

37. As alleged above, the products analyzed in Exhibit 4 are exemplary of the ON

⁹ Multiple courts have upheld Greenthread's construction of the Greenthread Patents in related matters. In *Greenthread, LLC v. Samsung Electronics Co., Ltd. et al.*, Case No. 2:19-cv-00147-JRG (E.D. Tex.), the Eastern District of Texas Court adopted Greenthread's claim construction. *See* Dkt. 67. In *Greenthread, LLC v. Intel Corp., et al.*, Case No. 6:22-cv-00105-ADA (W.D. Tex), the Western District of Texas similarly issued a preliminary claim construction order adopting Greenthread's construction. *See* Dkt. 36-21 in *Greenthread, LLC v. Intel Corp.*, Case No. 3:22-cv-02001-JR (attaching as an exhibit the Western District of Texas's preliminary claim construction order in a status update before the District of Oregon). The claims in this matter against Intel were ultimately severed and transferred to Oregon, and the District of Oregon adopted the Western District of Texas' preliminary claim construction. *See* Dkt. 44 ("The Court also finds that the WDTX's preliminary constructions and summary judgment rulings are neither legally incorrect nor factually distinguishable. As a result, the Court adopts the WDTX's preliminary constructions and summary judgment rulings as its own. . ."). The Western District of Texas also denied Defendants' motions to dismiss and for summary judgment on similar grounds. *See* Dkt. 36-22 in *Greenthread, LLC v. Intel Corp.*, Case no. 3:22-cv-02001-JR (attaching as an exhibit the Western District of Texas' denial of Defendants' motion for summary judgment); Dkt. 110 in *Greenthread LLC v. Intel Corp.*, Case No. 6:22-cv-00105-ADA (W.D. Tex). The District of Oregon similarly adopted these rulings. *See* Dkt. 44 in *Greenthread, LLC v. Intel Corp.*, Case no. 3:22-cv-02001-JR.

Semiconductor Accused Products.

38. As alleged above, Defendants have infringed and continue to infringe at least one claim of the '842 Patent by making, using, offering to sell, selling within the United States, and/or importing into the United States ON Semiconductor Accused Products.

39. Defendants' infringement has damaged and continues to damage Greenthread in an amount yet to be determined, of at least a reasonable royalty.

COUNT II: INFRINGEMENT OF U.S. PATENT NO. 11,121,222

40. Greenthread incorporates by reference and re-alleges all of the foregoing paragraphs of this Complaint and exhibits attached hereto as if fully set forth herein.

41. The following allegations are based on publicly available information and a reasonable investigation of the structure and operation of the ON Semiconductor Accused Products. Greenthread reserves the right to modify this description, including, for example, on the basis of information about the ON Semiconductor Accused Products that it obtains during discovery.

42. As alleged above and in Exhibit 4, the products analyzed in Exhibit 4 meet each and every one of the claim limitations of at least one claim of the '222 Patent.

43. As alleged above, the products analyzed in Exhibit 4 are exemplary of the ON Semiconductor Accused Products.

44. As alleged above, Defendants have infringed and continue to infringe at least one claim of the '222 Patent by making, using, offering to sell, selling within the United States, and/or importing into the United States ON Semiconductor Accused Products.

45. Defendants' infringement has damaged and continues to damage Greenthread in an amount yet to be determined, of at least a reasonable royalty.

DAMAGES

46. As a result of Defendants' acts of infringement, Greenthread has suffered and continues to suffer actual and consequential damages. However, Greenthread does not yet know the full extent of the infringement and the amount of damages cannot be ascertained except through discovery and special accounting. To the fullest extent permitted by law, Greenthread seeks recovery of damages at least for reasonable royalties, unjust enrichment, and benefits received by Defendant as a result of using the patented technology. Greenthread further seeks any other damages to which Greenthread is entitled under law or in equity.

DEMAND FOR JURY TRIAL

47. Greenthread hereby demands a jury trial for all issues so triable.

PRAYER FOR RELIEF

WHEREFORE, Greenthread respectfully requests that this Court enter judgment in its favor as follows:

- A. That Judgment be entered that Defendants have infringed one or more claims of the Greenthread Patents, literally and under the doctrine of equivalents;
- B. That, in accordance with 35 U.S.C. § 283, Defendants and all their affiliates, employees, agents, officers, directors, attorneys, successors, and assigns and all those acting on behalf of or in active concert or participation with any of them, be preliminarily and permanently enjoined from (1) infringing the Greenthread Patents and (2) making, using, selling, and offering for sale, or importing into the United States, the ON Semiconductor Accused Products;
- C. An award of damages sufficient to compensate Greenthread for Defendants' infringement under 35 U.S.C. § 284;

- D. That the case be found exceptional under 35 U.S.C. § 285 and that Greenthread be awarded its reasonable attorneys' fees;
- E. Costs and expenses in this action;
- F. Damages for pre-issuance infringement under 35 U.S.C. § 154(d);
- G. An award of prejudgment and post-judgment interest; and
- H. Such other and further relief as the Court may deem just and proper.

Dated: April 21, 2023

Respectfully submitted,

FARNAN LLP

/s/ Brian E. Farnan

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