

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TAIWAN SEMICONDUCTOR)	
MANUFACTURING COMPANY)	
LIMITED,)	
)	
Plaintiff,)	
)	
v.)	C.A. No. _____
)	
GLOBALFOUNDRIES U.S. INC.,)	JURY TRIAL DEMANDED
)	
Defendant.)	

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Taiwan Semiconductor Manufacturing Company Limited (“TSMC” or “Plaintiff”) brings this action for patent infringement against Defendant GlobalFoundries U.S. Inc. (“GlobalFoundries” or “Defendant”) as follows:

NATURE OF THE ACTION

1. This is a civil action for patent infringement under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*
2. Defendant has infringed and continue to infringe, has contributed to and continues to contribute to the infringement of, and has induced and continues to induce the infringement of one or more claims of U.S. Patent Nos. 7,170,118 (“the ’118 patent”); 7,105,894 (“the ’894 patent”), 9,166,053 (“the ’053 patent”); and 6,720,619 (“the ’619 patent”) (collectively, the “Asserted Patents”) at least by making, using, selling, offering for sale, and importing into the United States semiconductor devices and integrated circuits that infringe one or more claims of each of the Asserted Patents.

3. TSMC is the legal owner by assignment of the Asserted Patents, which were duly and legally issued by the United States Patent and Trademark Office (“USPTO”). TSMC seeks monetary damages and injunctive relief to address ongoing infringement of its valuable patent portfolio.

THE PARTIES

4. Taiwan Semiconductor Manufacturing Co., Ltd. is a Taiwanese company and is located at No. 8, Li Hsin Road VI, Hsinchu Science Park, Hsinchu 300-78, Taiwan, R.O.C.

5. GlobalFoundries is a Delaware corporation with its principal place of business at 2600 Great America Way, Santa Clara, California 95054.

6. GlobalFoundries, either itself and/or through the activities of its subsidiaries, makes, uses, sells, offers for sale, and/or imports throughout the United States, including within this District, products, such as semiconductor devices and integrated circuits, that infringe the Asserted Patents. GlobalFoundries’ customers incorporate these products into downstream products that are made, used, sold, offered for sale, and/or imported throughout the United States, including within this District. These downstream products may include, but are not limited to, semiconductor devices, integrated circuits, computer processors, network controllers, graphics cards, smartphones, tablets, laptop computers, televisions, and various other consumer electronics devices that include infringing semiconductor devices and integrated circuits.

JURISDICTION AND VENUE

7. This is a civil action for patent infringement arising under the patent laws of the United States, 35 U.S.C. §§ 1 *et seq.*

8. This Court has subject matter jurisdiction over the matters asserted herein under 28 U.S.C. §§ 1331 and 1338(a).

9. GlobalFoundries is subject to this Court's personal jurisdiction. GlobalFoundries is incorporated in this District and has infringed TSMC's patents in this District by, among other things, engaging in infringing conduct within and directed at or from this District. For example, GlobalFoundries has purposefully and voluntarily placed one or more of its infringing products, as described below, into the stream of commerce with the expectation that these infringing products will be used in this District. These infringing products have been and continue to be used in this District.

10. On information and belief, GlobalFoundries has regularly and systematically transacted business in this District, directly or through subsidiaries or intermediaries, and/or committed acts of patent infringement in this District as alleged more particularly below. GlobalFoundries has also placed integrated circuits (and products containing those integrated circuits) into the stream of commerce by shipping infringing products into this District, shipping infringing products knowing that those products would be shipped into this District, and/or shipping infringing products knowing that these infringing products would be incorporated into other infringing products that would be shipped into this District.

11. The Court therefore has both general and specific personal jurisdiction over GlobalFoundries.

12. Venue is proper in this District pursuant to 28 U.S.C. § 1400(b) at least because, as discussed above, GlobalFoundries is incorporated in this District and hence resides in this District.

FACTUAL BACKGROUND

13. TSMC is a world-class semiconductor foundry with over 48,000 employees worldwide. TSMC pioneered the pure-play foundry business model in 1987 when it was founded and has been the world's largest dedicated semiconductor foundry ever since. TSMC's

groundbreaking foundry model immediately revolutionized the semiconductor and electronics industries and was the first foundry model that enabled fast and efficient manufacturing of made-to-specification silicon semiconductor wafers. For years, TSMC has been recognized as the world's most advanced and most successful provider of semiconductor fabrication and foundry services for customers who design their own circuit layouts, but who either lack their own semiconductor manufacturing expertise and facilities or simply wish to use TSMC's leading-edge fabrication services and technology to manufacture wafers.

14. Each year, TSMC spends billions of dollars on research and development to improve its semiconductor technology and maintain the most advanced semiconductor manufacturing capability in the world. Today, TSMC is the world's largest semiconductor foundry, manufacturing more than 10,000 different products using more than 250 distinct process technologies for over 480 different customers.

15. TSMC serves its customers with annual capacity of more than 12 million 12-inch equivalent wafers (more than any other foundry). It was also the first foundry in the world to provide production capability for the most advanced manufacturing technologies, including 7-nanometer processes, and will be the first foundry to offer commercial production of the world's most advanced 5-nanometer manufacturing technology in 2020. TSMC's pioneering history and dedication to research and development has helped solidify its position as the most innovative and advanced foundry in the world today.

16. TSMC's history of innovation and dedication to innovation has resulted in a world-class patent portfolio, with thousands of patents awarded in the United States and worldwide every year, and a total of almost 37,000 patents issued to date. Due to its dedication

to innovation and its investment in research and development, TSMC has been one of the top ten U.S. patent holders based on the number of new patent grants for three years running.

17. GlobalFoundries is a foundry owned by a sovereign wealth fund, Mubadala Investment Company. It was created by the divestiture of the manufacturing arm of Advanced Micro Devices (AMD). GlobalFoundries has a history of lackluster performance and outmoded technology. Industry analysts have noted that both the Samsung and TSMC foundries are far ahead of GlobalFoundries in key technology advances and that the technology gap is widening every year. For example, one analyst noted that Samsung and TSMC are both ahead of GlobalFoundries in leading-edge nodes and packaging technologies such as TSMC's CoWoS, a 2.5D chip stack, and InFO, a wafer-level fan-out technique. TSMC's advantage in 7-nanometer manufacturing capability and these critical technologies helped TSMC capture lucrative, high-volume opportunities with all leading smartphone vendors and many mobile and high performance computing providers.

18. On information and belief, in August 2018, unable to keep pace with emerging technology trends and not willing to invest the \$2-4 billion required to support a new technology process, GlobalFoundries announced it would be halting all development of its 7 nanometer technology (which GlobalFoundries' new CEO, Tom Caulfield, termed "bleeding edge") in favor of scaling out its 14 and 12 nanometer platforms. This strategic blunder left GlobalFoundries without a viable 10 nanometer or 7 nanometer platform and resulted in the major advanced chip suppliers flocking to TSMC for this mission-critical technology. Even though 7 nanometer manufacturing capability was by all accounts a lucrative investment, GlobalFoundries found itself at least six months behind TSMC in development, so it abandoned all efforts to innovate and support this emerging technology. In fact, on information and belief,

AMD, which spun off its manufacturing arm to create GlobalFoundries, still purchased 7 nanometer solutions from TSMC because GlobalFoundries did not have any applicable 7 nanometer solutions.

19. Starting in late 2018, GlobalFoundries started to sell off portions of its business and decrease manufacturing capacity. In December 2018, GlobalFoundries announced the sale of a major fabrication facility in Singapore to Vanguard International Semiconductor for \$236 million. Four months later, in April 2019, GlobalFoundries sold a key fabrication plant in New York to ON Semiconductor for \$430 million. Less than one month later, in May 2019, GlobalFoundries sold off its ASIC business and Avera Semiconductor, the chip-design team that GlobalFoundries acquired back in 2015 when it purchased IBM's microelectronics division, for \$650 million to Marvell Semiconductor.

20. On information and belief, in August 2019, faced with intense pressure to extract as much income as possible from the business, GlobalFoundries, without notice and unprovoked, launched a massive patent infringement campaign against TSMC and its customers in an attempt to monetize GlobalFoundries' stagnant and outdated patent portfolio. In doing so, GlobalFoundries decided to abandon work on technological advancement and instead shifted focus to wielding the legal process for profit by filing 19 district court lawsuits against TSMC and its customers.

21. Since its inception, GlobalFoundries has failed to adequately invest in developing emerging technologies. It instead decided to use dozens—if not hundreds—of innovative and patented technologies of TSMC without payment or permission. As set forth below, the infringing GlobalFoundries products incorporate or use many technologies that were developed

by TSMC and protected by patents owned by TSMC. TSMC respectfully seeks relief from this Court for GlobalFoundries' extensive infringement.

THE ASSERTED PATENTS

22. The '118 patent, issued on January 30, 2007, is entitled "Field effect transistor (FET) device having corrugated structure and method for fabrication thereof." Fu-Liang Yang is the named inventor. TSMC is the original and current owner by assignment of the '118 patent. A true and correct copy of the '118 patent is attached hereto as Exhibit A.

23. The '894 patent, issued on September 12, 2006, is entitled "Contacts to semiconductor fin device." Yee-Chia Yeo, Fu-Liang Yang, and Chenming Hu are the named inventors. TSMC is the original and current owner by assignment of the '894 patent. A true and correct copy of the '894 patent is attached hereto as Exhibit B.

24. The '053 patent, issued on October 20, 2015, is entitled "FinFET device including a stepped profile structure." Chih-Wei Kuo, Yuan-Shun Chao, Hou-Yu Chen, and Shyh-Horng Yang are the named inventors. TSMC is the original and current owner by assignment of the '053 patent. A true and correct copy of the '053 patent is attached hereto as Exhibit C.

25. The '619 patent, issued on April 13, 2004, is entitled "Semiconductor-on-insulator chip incorporating partially-depleted, fully-depleted, and multiple-gate devices." Hao-Yu Chen, Yee-Chia Yeo, Fu-Liang Yang, and Chenming Hu are the named inventors. TSMC is the original and current owner by assignment of the '619 patent. A true and correct copy of the '619 patent is attached hereto as Exhibit D.

ACTS GIVING RISE TO THIS ACTION

26. The allegations provided below are exemplary and without prejudice to TSMC's infringement contentions. In providing these allegations, TSMC does not convey or imply any particular claim constructions or the precise scope of the claims. TSMC's claim construction contentions regarding the meaning and scope of the claim terms will be provided under the Court's scheduling order and local rules.

27. The infringing products include, but are not limited to, all GlobalFoundries semiconductor devices, integrated circuits, and products manufactured at 32 nanometer technology nodes and smaller including, but not limited to, semiconductor devices manufactured using GlobalFoundries' 32/28 nanometer High-k Metal Gate (HGMK) processes (including GlobalFoundries' 28 nanometer High Performance Plus (28HPP) and 28 nanometer Super Low Power (28SLP) processes), GlobalFoundries' 22 nanometer technology (including GlobalFoundries' 22 nanometer Fully-Depleted Silicon-On-Insulator (FD-SOI) technology and 22FDX platform), GlobalFoundries' 16 nanometer technology (including GlobalFoundries' 16 nanometer Fin Field Effect Transistor ("FinFET") process), GlobalFoundries' 14 nanometer technology (including GlobalFoundries' 14 nanometer FinFET and 14LPP processes), and GlobalFoundries' 12 nanometer technology (including GlobalFoundries' 12 nanometer FinFET and 12LP process and 12FDX platform), and all chipsets, systems-on-a-chip ("SoCs"), processors, controllers, products, and devices containing or utilizing the foregoing technologies, processes, or platforms ("Accused Products"). Some non-exhaustive examples of the Accused Products include the AMD A8-3800 Llano (32nm), Rockchip RK3188 (28nm), Rockchip RK1808 (22nm), AMD RX480 (14nm), and AMD Ryzen 7 2700 (12nm) devices, as well as any other semiconductor device, integrated circuit, chipset, SoC, processor, controller, product, or device manufactured using an infringing GlobalFoundries' technology.

28. As detailed in more detail below, each element of at least one claim of each of the Asserted Patents is literally present in the Accused Products, or is literally practiced by the process through which each of the Accused Products is made. To the extent that any element is not literally present or practiced, each such element is present or practiced under the doctrine of equivalents.

29. In short, GlobalFoundries has made extensive use of TSMC's patented technologies, including the technology described and claimed in the Asserted Patents. TSMC has no choice but to defend its proprietary and patented technology. TSMC thus requests that this Court award it damages sufficient to compensate for GlobalFoundries' infringement of the Asserted Patents, find this case exceptional and award TSMC its attorneys' fees and costs, and grant an injunction against GlobalFoundries to prevent ongoing infringement of the Asserted Patents.

COUNT I: INFRINGEMENT OF U.S. PATENT NO. 7,170,118

30. TSMC incorporates by reference and realleges all the foregoing paragraphs of this Complaint as if fully set forth herein.

31. On information and belief, GlobalFoundries has directly infringed, continues to infringe, and/or has induced or contributed to the infringement of at least claim 11 of the '118 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority or license, integrated circuits manufactured by GlobalFoundries using, for example, GlobalFoundries' 14 and 12 nanometer technology and products containing these integrated circuits (collectively, "the '118 Accused Products") in violation of 35 U.S.C. § 271(a). The '118 Accused Products are non-limiting examples that were identified based on publicly available information, and TSMC reserves the right to identify additional infringing activities, products and services, including, for example, on the basis of information obtained during

discovery. The '118 Accused Products include at least the AMD RX480 (14nm) and AMD Ryzen 7 2700 (12nm) devices fabricated using, for example, GlobalFoundries' 14 or 12 nanometer processes.

32. On information and belief, GlobalFoundries also actively, knowingly, and intentionally induces infringement of one or more claims of the '118 patent under 35 U.S.C. § 271(b) by actively encouraging others to import into the United States, and/or make, use, sell, and/or offer to sell in the United States, '118 Accused Products or products containing the infringing semiconductor components of the '118 Accused Products.

33. On information and belief, GlobalFoundries further contributes to the infringement of one or more claims of the '118 patent under 35 U.S.C. § 271(c) by offering to sell, selling, and/or importing into the United States a component of the '118 Accused Products, or a material or apparatus for use in practicing a process claimed in the '118 patent, that constitutes a material part of the inventions, knowing the same to be especially made or especially adapted for use in an infringement of the '118 patent, and is not a staple article or commodity of commerce suitable for substantial noninfringing use.

34. By at least September 30, 2019, TSMC disclosed, at least by filing this Complaint, the existence of the '118 patent and identified at least some of GlobalFoundries' and others' activities that infringe the '118 patent. Thus, based on this disclosure, GlobalFoundries had knowledge of the '118 patent and that its activities infringe the '118 patent since at least September 30, 2019. Based on TSMC's disclosures, GlobalFoundries has also known or should have known since at least September 30, 2019 that its customers, distributors, suppliers, and other purchasers of the '118 Accused Products are infringing the '118 patent at least because GlobalFoundries has known that it is infringing the '118 patent.

35. On information and belief, GlobalFoundries infringes one or more claims of the '118 patent under 35 U.S.C. § 271(g) by using, offering to sell, selling, and/or importing into the United States a product made by a process claimed in the '118 patent. For example, on information and belief, GlobalFoundries uses, offers to sell, sells, and/or imports into the United States the '118 Accused Products that were fabricated using a process claimed in the '118 patent and those products were not materially changed by subsequent processes or a trivial and nonessential component of another product.

36. The '118 Accused Products meet all the limitations of at least claim 11 of the '118 patent. Specifically, claim 11 of the '118 patent recites: a method for forming a field effect transistor (FET) device comprising: providing a semiconductor substrate comprising an active region defined by isolation regions; forming a gate electrode over a portion of the active region and at least a portion of the isolation regions to cover and define a channel region within the active region; and forming a pair of source/drain regions within the active region and separated by the channel region within the active region wherein an interface of the active region is corrugated, said corrugated interface comprising rounded valley bottom portions and peak portions.

37. The '118 Accused Products are field effect transistor (FET) devices. For example, the AMD RX480 (14nm) is a graphics card featuring the Polaris GPU. The AMD Ryzen 7 2700 (12nm) is a 64-bit 8-core desktop processor. Each of the '118 Accused Products contain integrated circuits with finFETs fabricated using, for example, GlobalFoundries' 14 and 12 nanometer processes.

38. The '118 Accused Products are formed by providing a semiconductor substrate comprising an active region defined by isolation regions. For example, each of the '118 Accused

Products includes finFET NMOS and PMOS logic transistors on a silicon semiconductor substrate with fins built up from the substrate. The fins make up, for example, at least part of an active region between the source and drain regions. Isolation regions containing, for example, silicon oxide (SiO) define the active regions and are interposed between the fins using, for example, STI techniques.

39. The '118 Accused Products are formed with a gate electrode over a portion of the active region and at least a portion of the isolation regions to cover and define a channel region within the active region. For example, each of the '118 Accused Products includes finFET NMOS and PMOS logic transistors with fin structures at least partially surrounded by a gate electrode that controls one or more of the transistors. By surrounding at least a portion of the fin structures, the gate electrode is positioned over a portion of the active region of each fin structure. The gate electrode also extends over SiO isolation regions interposed between the fin structures. A channel region is defined at least partially within the fin structure and between the source and drain regions.

40. The '118 Accused Products are formed with a pair of source/drain regions within the active region and separated by the channel region within the active region. For example, the '118 Accused Products include fin structures that connect the source and drain regions using a channel region within the active region. The active region includes, for example, at least a portion of the fin structure between the source and drain regions.

41. The '118 Accused Products have an interface of the active region that is corrugated, the corrugated interface comprising rounded valley bottom portions and peak portions. For example, the gate electrode within the finFET PMOS and NMOS logic transistors within the '118 Accused Products makes up at least part of the interface of the active regions (for

example, the interface between the gate electrode and the fin structures). The gate electrode and interface between the gate electrode and the fins the electrode controls is corrugated and contains rounded valley bottom portions and peak portions.

42. This description is based on publicly available information and a reasonable investigation of the structure and operation of the '118 Accused Products. TSMC reserves the right to modify this description, including, for example, on the basis of information about the '118 Accused Products that it obtains during discovery.

43. GlobalFoundries' infringement has damaged and continues to damage TSMC in an amount yet to be determined, of at least a reasonable royalty and/or the lost profits that TSMC would have made but for GlobalFoundries' acts of infringement.

44. This is an exceptional case. TSMC is entitled to attorneys' fees and costs under 35 U.S.C. § 285 as a result of the infringement of the '118 patent by GlobalFoundries.

COUNT II: INFRINGEMENT OF U.S. PATENT NO. 7,105,894

45. TSMC incorporates by reference and realleges all the foregoing paragraphs of this Complaint as if fully set forth herein.

46. On information and belief, GlobalFoundries has directly infringed, continues to infringe, and/or has induced or contributed to the infringement of at least claim 1 of the '894 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority or license, integrated circuits manufactured by GlobalFoundries using, for example, GlobalFoundries' 14 and 12 nanometer technology and products containing these integrated circuits (collectively, "the '894 Accused Products") in violation of 35 U.S.C. § 271(a). The '894 Accused Products are non-limiting examples that were identified based on publicly available information, and TSMC reserves the right to identify additional infringing activities, products and services, including, for example, on the basis of information obtained during

discovery. The '894 Accused Products include at least the AMD RX480 (14nm) and AMD Ryzen 7 2700 (12nm) devices fabricated using, for example, GlobalFoundries' 14 or 12 nanometer process.

47. On information and belief, GlobalFoundries also actively, knowingly, and intentionally induces infringement of one or more claims of the '894 patent under 35 U.S.C. § 271(b) by actively encouraging others to import into the United States, and/or make, use, sell, and/or offer to sell in the United States, '894 Accused Products or products containing the infringing semiconductor components of the '894 Accused Products.

48. On information and belief, GlobalFoundries further contributes to the infringement of one or more claims of the '894 patent under 35 U.S.C. § 271(c) by offering to sell, selling, and/or importing into the United States a component of the '894 Accused Products, or a material or apparatus for use in practicing a process claimed in the '894 patent, that constitutes a material part of the inventions, knowing the same to be especially made or especially adapted for use in an infringement of the '894 patent, and is not a staple article or commodity of commerce suitable for substantial noninfringing use.

49. By at least September 30, 2019, TSMC disclosed, at least by filing this Complaint, the existence of the '894 patent and identified at least some of GlobalFoundries' and others' activities that infringe the '894 patent. Thus, based on this disclosure, GlobalFoundries had knowledge of the '894 patent and that its activities infringe the '894 patent since at least September 30, 2019. Based on TSMC's disclosures, GlobalFoundries has also known or should have known since at least September 30, 2019 that its customers, distributors, suppliers, and other purchasers of the '894 Accused Products are infringing the '894 patent at least because GlobalFoundries has known that it is infringing the '894 patent.

50. The '894 Accused Products meet all the limitations of at least claim 1 of the '894 patent. Specifically, claim 1 of the '894 patent recites: a contact to a semiconductor fin having reduced resistance comprising: the semiconductor fin comprising a top surface and two sidewall surfaces formed on an insulating substrate, said fin comprising a channel region, a source region and a drain region; a dielectric layer on said fin and on a portion of said insulating substrate; and the contact formed of an electrically conductive material in electrical communication with said fin, said contact on at least one surface of said fin overlying said source and drain regions, said at least one surface exposed through said dielectric layer to form a contact opening, said at least one surface comprising at least one of the two sidewall surfaces.

51. The '894 Accused Products are semiconductor devices manufactured with finFETs that include contacts to a semiconductor fin having reduced resistance. For example, the AMD RX480 (14nm) is a graphics card featuring the Polaris GPU. The AMD Ryzen 7 2700 (12nm) is a 64-bit 8-core desktop processor. Each of the '446 Accused Products contain integrated circuits fabricated using, for example, GlobalFoundries' 14 or 12 nanometer FinFET processes.

52. The '894 Accused Products have semiconductor fins comprising a top surface and two sidewall surfaces formed on an insulating substrate, with the fin comprising a channel region, a source region, and a drain region. For example, each of the '894 Accused Products include NMOS logic transistors and PMOS logic transistors fabricated using GlobalFoundries' 14 or 12 nanometer FinFET processes. Silicon fins extend from the substrate connecting source and drain regions, as is typical with FinFETs. The tops and sidewall surfaces of the fins are formed on an insulating substrate, for example, a silicon substrate.

53. The '894 Accused Products have a dielectric layer on said fin and on a portion of said insulating substrate. For example, a dielectric layer of silicon oxide (SiO) is used on the fin and a portion of the insulating substrate in the standard GlobalFoundries' 14 and 12 nanometer FinFET processes.

54. The '894 Accused Products have a contact formed of an electrically conductive material in electrical communication with the fin, the contact on at least one surface of said fin overlying the source and drain regions, the at least one surface exposed through the dielectric layer to form a contact opening, and the at least one surface comprising at least one of the two sidewall surfaces. For example, the '894 Accused Products include source/drain subcontacts (SCs) on at least one surface of said fin overlying the source/drain regions, surrounding each fin, and directly contacting both fin sidewalls, for example, at least at the sidewalls of the epitaxy tips of the fins. The SCs extend down vertically past the top of the fin, surround the fin, and are electrically connected to the fin sidewalls with TiN, TiSi, and/or TiSiGe.

55. This description is based on publicly available information and a reasonable investigation of the structure and operation of the '894 Accused Products. TSMC reserves the right to modify this description, including, for example, on the basis of information about the '894 Accused Products that it obtains during discovery.

56. GlobalFoundries' infringement has damaged and continues to damage TSMC in an amount yet to be determined, of at least a reasonable royalty and/or the lost profits that TSMC would have made but for GlobalFoundries' acts of infringement.

57. This is an exceptional case. TSMC is entitled to attorneys' fees and costs under 35 U.S.C. § 285 as a result of the infringement of the '894 patent by GlobalFoundries.

COUNT III: INFRINGEMENT OF U.S. PATENT NO. 9,166,053

58. TSMC incorporates by reference and realleges all the foregoing paragraphs of this Complaint as if fully set forth herein.

59. On information and belief, GlobalFoundries has directly infringed, continues to infringe, and/or has induced or contributed to the infringement of at least claim 1 of the '053 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority or license, integrated circuits manufactured by GlobalFoundries using, for example, GlobalFoundries' 14 and 12 nanometer technology and products containing these integrated circuits (collectively, "the '053 Accused Products") in violation of 35 U.S.C. § 271(a). The '053 Accused Products are non-limiting examples that were identified based on publicly available information, and TSMC reserves the right to identify additional infringing activities, products and services, including, for example, on the basis of information obtained during discovery. The '053 Accused Products include at least the AMD RX480 (14nm) and AMD Ryzen 7 2700 (12nm) devices fabricated using, for example, GlobalFoundries' 14 or 12 nanometer processes.

60. On information and belief, GlobalFoundries also actively, knowingly, and intentionally induces infringement of one or more claims of the '053 patent under 35 U.S.C. § 271(b) by actively encouraging others to import into the United States, and/or make, use, sell, and/or offer to sell in the United States, '053 Accused Products or products containing the infringing semiconductor components of the '053 Accused Products.

61. On information and belief, GlobalFoundries further contributes to the infringement of one or more claims of the '053 patent under 35 U.S.C. § 271(c) by offering to sell, selling, and/or importing into the United States a component of the '053 Accused Products, or a material or apparatus for use in practicing a process claimed in the '053 patent, that

constitutes a material part of the inventions, knowing the same to be especially made or especially adapted for use in an infringement of the '053 patent, and is not a staple article or commodity of commerce suitable for substantial noninfringing use.

62. By at least September 30, 2019, TSMC disclosed, at least by filing this Complaint, the existence of the '053 patent and identified at least some of GlobalFoundries' and others' activities that infringe the '053 patent. Thus, based on this disclosure, GlobalFoundries had knowledge of the '053 patent and that its activities infringe the '053 patent since at least September 30, 2019. Based on TSMC's disclosures, GlobalFoundries has also known or should have known since at least September 30, 2019 that its customers, distributors, suppliers, and other purchasers of the '053 Accused Products are infringing the '053 patent at least because GlobalFoundries has known that it is infringing the '053 patent.

63. The '053 Accused Products meet all the limitations of at least claim 1 of the '053 patent. Specifically, claim 1 of the '053 patent recites: a FinFET device comprising: a substrate including a fin structure, the fin structure including a first fin and a second fin, the second fin being disposed adjacent to the first fin; a shallow trench isolation (STI) feature disposed on the substrate in a region between the first fin and the second fin; a gate structure disposed on a gate dielectric, the gate structure traversing the first fin, the second fin, and the STI feature, the gate structure having a first stepped profile at the first fin and a second stepped profile at the second fin, wherein the first stepped profile of the gate structure has a first width at a centerline of the first fin, a second width at a first distance from the centerline of the first fin, and a third width at the first distance from the centerline of the first fin, the second width being measured at a topmost portion of the gate structure and the third width being measured at a bottommost point of the gate structure, the first width being less than the third width, and the second width being

less than the third width, wherein the second stepped profile of the gate structure has the first width at a centerline of the second fin; an interfacial layer, the interfacial layer being interposed between the fin structure and the gate dielectric; and gate spacers disposed along sidewalls of the gate structure, the gate dielectric being interposed between the gate spacers and the gate structure.

64. The '053 Accused Products are FinFET devices. For example, the AMD RX480 (14nm) is a graphics card featuring the Polaris GPU. The AMD Ryzen 7 2700 (12nm) is a 64-bit 8-core desktop processor. Each of the '053 Accused Products contain integrated circuits, including finFET transistors fabricated using, for example, GlobalFoundries' 14 or 12 nanometer process.

65. The '053 Accused Products have a substrate including a fin structure, the fin structure including a first fin and a second fin, the second fin being disposed adjacent to the first fin. For example, the '053 Accused Products include PMOS and CMOS logic transistors with fin structures fabricated using, for example, GlobalFoundries' 14 or 12 nanometer process. Multiple fins are disposed adjacent to each but separated by STI of silicon oxide.

66. The '053 Accused Products have a shallow trench isolation (STI) feature disposed on the substrate in a region between the first fin and the second fin. For example, STI feature containing silicon oxide are disposed between the fin structures.

67. The '053 Accused Products have a gate structure disposed on a gate dielectric, the gate structure traversing the first fin, the second fin, and the STI feature. For example, a single gate electrode is used to control multiple adjacent fin structures within the CMOS and PMOS transistors in each of the '053 Accused Products. The gate electrode is deposited on a gate dielectric containing, for example, silicon oxide.

68. The '053 Accused Products have CMOS and PMOS transistors where the gate structure has a first stepped profile at the first fin and a second stepped profile at the second fin, wherein the first stepped profile of the gate structure has a first width at a centerline of the first fin, a second width at a first distance from the centerline of the first fin, and a third width at the first distance from the centerline of the first fin, the second width being measured at a topmost portion of the gate structure and the third width being measured at a bottommost point of the gate structure, the first width being less than the third width, and the second width being less than the third width, wherein the second stepped profile of the gate structure has the first width at a centerline of the second fin. For example, on information and belief, at least some of the transistors with the '053 Accused Products have stepped profiles whereby the topmost portion of the gate structure measures approximately 25 nm in width while the bottommost portion of the gate structure measures approximately 30 nm in width. The width of the gate structure at the centerline of the fin is also approximately 25 nm, the same as the width of the topmost portion of the gate structure.

69. The '053 Accused Products have an interfacial layer, the interfacial layer being interposed between the fin structure and the gate dielectric. For example, the '053 Accused Products have an interfacial layer of silicon oxide interposed between the fin structure and the gate dielectric.

70. The '053 Accused Products have gate spacers disposed along sidewalls of the gate structure, the gate dielectric being interposed between the gate spacers and the gate structure. For example, gate spacers of silicon oxynitride (SiON) are disposed along sidewalls of the gate structure, and the gate dielectric of silicon oxide is interposed between the gate spacers and the gate structure.

71. This description is based on publicly available information and a reasonable investigation of the structure and operation of the '053 Accused Products. TSMC reserves the right to modify this description, including, for example, on the basis of information about the '053 Accused Products that it obtains during discovery.

72. GlobalFoundries' infringement has damaged and continues to damage TSMC in an amount yet to be determined, of at least a reasonable royalty and/or the lost profits that TSMC would have made but for GlobalFoundries' acts of infringement.

73. This is an exceptional case. TSMC is entitled to attorneys' fees and costs under 35 U.S.C. § 285 as a result of the infringement of the '053 patent by GlobalFoundries.

COUNT IV: INFRINGEMENT OF U.S. PATENT NO. 6,720,619

74. TSMC incorporates by reference and realleges all the foregoing paragraphs of this Complaint as if fully set forth herein.

75. On information and belief, GlobalFoundries has directly infringed, continues to infringe, and/or has induced or contributed to the infringement of at least claim 1 of the '619 patent by making, using, selling, offering for sale, and/or importing into the United States, without authority or license, integrated circuits manufactured by GlobalFoundries using, for example, GlobalFoundries' 14 and 12 nanometer technology and products containing these integrated circuits (collectively, "the '619 Accused Products") in violation of 35 U.S.C. § 271(a). The '619 Accused Products are non-limiting examples that were identified based on publicly available information, and TSMC reserves the right to identify additional infringing activities, products and services, including, for example, on the basis of information obtained during discovery. The '619 Accused Products include at least the AMD RX480 (14nm) and AMD

Ryzen 7 2700 (12nm) devices fabricated using, for example, GlobalFoundries' 14 or 12 nanometer process.

76. On information and belief, GlobalFoundries also actively, knowingly, and intentionally induces infringement of one or more claims of the '619 patent under 35 U.S.C. § 271(b) by actively encouraging others to import into the United States, and/or make, use, sell, and/or offer to sell in the United States, '619 Accused Products or products containing the infringing semiconductor components of the '619 Accused Products.

77. On information and belief, GlobalFoundries further contributes to the infringement of one or more claims of the '619 patent under 35 U.S.C. § 271(c) by offering to sell, selling, and/or importing into the United States a component of the '619 Accused Products, or a material or apparatus for use in practicing a process claimed in the '619 patent, that constitutes a material part of the inventions, knowing the same to be especially made or especially adapted for use in an infringement of the '619 patent, and is not a staple article or commodity of commerce suitable for substantial noninfringing use.

78. By at least September 30, 2019, TSMC disclosed, at least by filing this Complaint, the existence of the '619 patent and identified at least some of GlobalFoundries' and others' activities that infringe the '619 patent. Thus, based on this disclosure, GlobalFoundries had knowledge of the '619 patent and that its activities infringe the '619 patent since at least September 30, 2019. Based on TSMC's disclosures, GlobalFoundries has also known or should have known since at least September 30, 2019 that its customers, distributors, suppliers, and other purchasers of the '619 Accused Products are infringing the '619 patent at least because GlobalFoundries has known that it is infringing the '619 patent.

79. For example, the '619 Accused Products meet all the limitations of at least claim 1 of the '619 patent. Specifically, claim 1 of the '619 patent recites: a multiple-gate device structure, comprising: a substrate; a semiconductor depletion material with a first predetermined height and width overlying a predetermined portion of the substrate to form an active region; an isolation material formed on top of the substrate surrounding the active region so as to bury a bottom portion of the active region therein, thereby exposing a top portion of the active region; a gate dielectric layer covering the exposed portion of the top and two sidewalls of the top portion of the active region; and at least one gate electrode formed on top of the gate dielectric layer and extending through two sidewalls thereof to reach the isolation material, wherein source and drain regions of the multiple-gate device are separated by the gate electrode, wherein the exposed top portion of the active region has its top corners rounded.

80. The '619 Accused Products are semiconductor devices that include multiple-gate device structures. For example, the AMD RX480 (14nm) is a graphics card featuring the Polaris GPU. The AMD Ryzen 7 2700 (12nm) is a 64-bit 8-core desktop processor. Each of the '619 Accused Products contain integrated circuits having multiple-gate device structures such as finFETs fabricated using, for example, GlobalFoundries' 14 or 12 nanometer processes.

81. The '619 Accused Products have a substrate. For example, the '619 Accused Products include a silicon substrate.

82. The '619 Accused Products have a semiconductor depletion material with a first predetermined height and width overlying a predetermined portion of the substrate to form an active region. For example, on information and belief, the '619 Accused Products include a silicon depletion material. The silicon depletion material has a predetermined height and width overlying a predetermined portion of the silicon substrate to form an active region.

83. The '619 Accused Products have an isolation material formed on top of the substrate surrounding the active region so as to bury a bottom portion of the active region therein, thereby exposing a top portion of the active region. For example, the '619 Accused Products include a silicon oxide (SiO) isolation material formed on top of the silicon substrate. The isolation material surrounds the active region such that it buries a bottom portion of the active region and exposes a top portion of the active region.

84. The '619 Accused Products have a gate dielectric layer covering the exposed portion of the top and two sidewalls of the top portion of the active region. For example, the '619 Accused Products include a gate dielectric layer composed of, for example, silicon oxide (SiO). The gate dielectric layer covers the exposed portion of the top and two sidewalls of the top portion of the active region.

85. The '619 Accused Products have at least one gate electrode formed on top of the gate dielectric layer and extending through two sidewalls thereof to reach the isolation material, wherein source and drain regions of the multiple-gate device are separated by the gate electrode, wherein the exposed top portion of the active region has its top corners rounded. For example, the '619 Accused Products include a NMOS/PMOS gate electrode that is formed on top of the gate dielectric layer and extends through two sidewalls thereof to reach the silicon oxide (SiO) isolation material. Source and drain regions of the multiple-gate device are separated by the NMOS/PMOS gate electrode. The exposed top portion of the active region has rounded top corners.

86. This description is based on publicly available information and a reasonable investigation of the structure and operation of the '619 Accused Products. TSMC reserves the

right to modify this description, including, for example, on the basis of information about the '619 Accused Products that it obtains during discovery.

87. GlobalFoundries' infringement has damaged and continues to damage TSMC in an amount yet to be determined, of at least a reasonable royalty and/or the lost profits that TSMC would have made but for GlobalFoundries' acts of infringement.

88. This is an exceptional case. TSMC is entitled to attorneys' fees and costs under 35 U.S.C. § 285 as a result of the infringement of the '619 patent by GlobalFoundries.

PRAYER FOR RELIEF

WHEREFORE, TSMC respectfully requests:

1. That Judgment be entered that GlobalFoundries has infringed one or more of the Asserted Patents, directly and indirectly, by way of inducement or contributory infringement, literally or under the doctrine of equivalents;

2. That, in accordance with 35 U.S.C. § 283, GlobalFoundries and all 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 Asserted Patents and (2) making, using, selling, offering for sale and/or importing the Accused Products;

3. An award of damages sufficient to compensate TSMC for GlobalFoundries' infringement under 35 U.S.C. § 284;

4. That the case be found exceptional under 35 U.S.C. § 285 and that TSMC be awarded its attorneys' fees;

5. Costs and expenses in this action;

6. An award of prejudgment and post-judgment interest; and

7. Such other and further relief as the Court may deem just and proper.

DEMAND FOR JURY TRIAL

Pursuant to Rule 38(b) of the Federal Rules of Civil Procedure, TSMC respectfully demands a trial by jury on all issues raised by the Complaint.

Respectfully submitted,

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