UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

ADVANCED MEMORY TECHNOLOGIES, LLC, Plaintiff, vs. SK HYNIX INC., Defendant.	Civil Action No. 2:24-cv-01078 **JURY TRIAL DEMANDED**

AMENDED COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement in which Plaintiff Advanced Memory Technologies, LLC ("AMT" or "Plaintiff") makes the following allegations against Defendant SK hynix Inc. ("SK hynix") for infringing the Patents asserted in this matter.

PARTIES

1. Plaintiff AMT is a Texas limited liability company with its principal place of business at 825 Watters Creek Blvd. Suite 250, Allen, Texas 75013.

2. Defendant SK hynix is a corporation organized and existing under the laws of the Republic of Korea ("Korea"). It has a principal place of business at 2091 Gyeongchung-daero, Bubal-eup, Icheon, Gyeonggi-do, Korea.

JURISDICTION AND VENUE

3. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a) because this action arises under the patent laws of the United States, 35 U.S.C. §§ 1 *et seq.*

4. SK hynix is subject to this Court's specific personal jurisdiction pursuant to due process and the Texas Long Arm Statute because it directly and/or through subsidiaries and agents makes, imports, ships, distributes, offers for sale, sells, uses, and advertises (including offering

products and services through its websites) infringing semiconductor memory modules in the United States, Texas, and this District.

5. SK hynix is also subject to this Court's specific personal jurisdiction pursuant to due process and the Texas Long Arm Statute because it directly and/or through its subsidiaries and agents induces its direct and indirect customers to commit acts of infringement in the United States, Texas, and this District.

6. SK hynix directly, through its subsidiaries and agents, and through its direct and indirect customers, purposefully and voluntarily places infringing semiconductor memory modules in the stream of commerce while knowing, expecting, and intending them to be sold in and purchased and used by consumers in the United States, Texas, and this District.

7. SK hynix's subsidiaries and agents include: (1) SK hynix America Inc., a wholly-owned subsidiary of SK hynix that is registered in Texas as a foreign corporation, with a registered agent at the Prentice-Hall Corporation System, Inc., 211 E. 7th Street, Suite 620, Austin, TX 78701; (2) SK hynix NAND Product Solutions Co., d/b/a Solidigm, a wholly-owned subsidiary of SK hynix; and (3) SK hynix Memory Solutions America Inc., a wholly-owned subsidiary of SK hynix.

8. SK hynix's business includes the manufacture and sale of semiconductor devices, including flash memory ("NAND"), dynamic random access memory ("DRAM"), and CMOS image sensors ("CIS"). As of 2023, NAND flash memory products accounted for 29% of SK hynix's sales, with DRAM products accounting for another 63% of sales.[1]

9. SK hynix derives a significant portion of its revenue from business in the United States. For example, SK hynix earned nearly $12 billion in revenue from the United States in the

[1] *Corporate Fact Sheet*, https://news.skhynix.com/corporate/fact-sheet/ (last accessed Apr. 2, 2025).

first six months of 2024—over half of the company's overall revenue during that time. And this share is growing: the United States accounted for 64% of SK hynix's sales in the third quarter of 2024.

10. On information and belief, SK hynix's infringing semiconductor memory modules are sold directly or intended to be sold indirectly through agents in the United States to end-users in the United States, Texas, and this District. For example, SK hynix sells infringing semiconductor memory modules directly to end-users in the United States, including those in this District, through its website.

11. On information and belief, SK hynix's customers make, import, ship, distribute, offer for sale, sell, use, and advertise (including offering products and services through websites) SK hynix's infringing semiconductor memory modules (or products incorporating those infringing semiconductor memory modules) in the United States, Texas, and this District.

12. SK hynix also provides support for users and customers of its infringing semiconductor products in the United States, Texas, and this District. For example, SK hynix provides installation, technical, and other support for its products through its website. The website provides an interface for customers, including those in this District, to communicate with SK hynix for additional support. SK hynix also offers online firmware updates and other downloads for its semiconductor memory modules in the United States, Texas, and this District.

13. SK hynix also sells infringing semiconductor memory modules to third-party business customers, which in turn incorporate the infringing semiconductor memory modules into consumer electronics, including smart phones, servers, computers, tablets, automobiles, and more. SK hynix actively encourages and supports its customers' efforts to use, sell, offer to sell, and import the infringing semiconductor memory modules after they have been incorporated into

consumer electronics.

14. SK hynix actively promotes and attempts to sell its products in the United States, including through attendance at major events like HPE Discover 2024, Hewlett Packard Enterprise's ("HPE") technology conference, which was held in Las Vegas, Nevada from June 17–20, 2024.[2]

15. SK hynix also actively promotes and attempts to sell its products in Texas, including through attendance at major events like the Dell Technologies Forum 2024, which was held in Arlington, Texas on November 14, 2024.

16. SK hynix advertises its operations in Texas. SK hynix's website lists two "sales office[s]" in Texas: one located at 4201 West Parmer Lane Bldg. B, Suite 245, Austin, Texas

[2] *SK hynix Showcases Power of Its Groundbreaking AI Memory Solutions at HPE Discover 2024*, available at https://news.skhynix.com/hpe-discover-24-sk-hynix-shows-leading-ai-memory-solutions (last accessed Apr. 2, 2025).

78727, and the second located at 20333 Tomball Parkway, Suite 320, Houston, Texas 77070.

17. SK hynix is actively investing throughout the United States, including Texas. For example, a 2022 Press Release stated that the company and its subsidiaries "expected to quadruple U.S. employees" by 2025 and had planned more than $50 billion in U.S. investments.[3] A graphic on that same page reflects a "semiconductor memory sales" site in Texas.

18. On information and belief, personnel working at SK hynix's Austin sales office engage in activities directly related to SK hynix's infringing semiconductor memory modules. On information and belief, personnel working at the Austin sales office have expertise in semiconductors, application-specific integrated circuits, embedded systems, and testing and qualification of memory modules; these personnel provide high-level technical support to SK hynix's Texas customers. On information and belief, SK hynix's sales procurement also occurs out of its Austin sales office.

19. SK hynix sells NAND flash memory modules and DRAM modules to a variety of customers in the United States.

20. On information and belief, and by way of example, one of SK hynix's customers in the United States is Dell Technologies, Inc., which is based in Texas. Dell, a major technology company, reported annual revenue of over $88 billion in fiscal year 2024. Dell has substantial operations and physical places of business throughout Texas.

21. Dell uses a wide variety of SK hynix's non-volatile memory products, including its flash memory products, which are incorporated into Dell's own electronics.[4]

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[3] *SK Ramps Up U.S. Investments With More Than $50 Billion Planned* (May 4, 2022), available at https://eng.sk.com/perspectives/sk-investing-in-u-s-industries-2022.

[4] *Comprehensive Guide to Find Hynix Drivers in the Windows Server Catalog,* available at https://www.dell.com/support/kbdoc/en-us/000217333/finding-hynix-drive-in-windows-server-catalog (last accessed Apr. 2, 2025).

Brand Product Name	Dell Part Number	SK Hynix Part Number	Microsoft Windows catalog
SE4011 3.84 TB	D6C0R	HFS3T8G32FEH-7410A	DELL D6C0R DE08 | Windows Server Catalog
SE4011 1.92 TB	0XMV9	HFS1T9G32FEH-7410A	DELL 0XMV9 DE03 | Windows Server Catalog
SE4011 960GB	C0K9Y	HFS960G32FEH-7410A	DELL C0K9Y DE08 | Windows Server Catalog
SE5031 480GB	J1TYJ	HFS480G3B2X051N	DELL J1TYJ DD02 | Windows Server Catalog
SE5031 960GB	7GR2K	HFS960G3B2X051N	DELL 7GR2K DD02 | Windows Server Catalog
SE5031 1.92 TB	GKTF1	HFS1T9G3B2X051N	DELL GKTF1 DD02 | Windows Server Catalog
SE5031 3.84 TB	64D9V	HFS3T8G3B2X051N	DELL 64D9V DD02 | Windows Server Catalog
SE5130 960GB	G162V	HFS960G3E2X149N	DELL 0G162V DG00 | Windows Server Catalog
SE5130 1.92 TB	HCR09	HFS1T9G3E2X149N	DELL 0HCR09 DG00 | Windows Server Catalog
SE5130 3.84 TB	T39XV	HFS3T8G3E2X149N	DELL 0T39XV DG00 | Windows Server Catalog
SE5110 480GB	3397M	HFS480G3H2X069N	DELL 03397M DZ02 | Windows Server Catalog
SE5110 960GB	6NFDV	HFS960G3H2X069N	DELL 06NFDV DZ02 | Windows Server Catalog
SE5110 1.92 TB	962FP	HFS1T9G3H2X069N	DELL 0962FP DZ02 | Windows Server Catalog
SE5110 3.84 TB	3GDK0	HFS3T8G3H2X069N	DELL 03GDK0 DZ02 | Windows Server Catalog
Dell DC NVMe SED PE8010 RI U.2 960 GB	7652G	HFS960GEDTX070N	DELL 7652G 1.3.0 | Windows Server Catalog
Dell DC NVMe SED PE8010 RI U.2 1.92 TB	TKMH1	HFS1T9GEDTX070N	DELL TKMH1 1.0.0 | Windows Server Catalog
Dell DC NVMe SED PE8010 RI U.2 3.84 TB	6N53X	HFS3T8GEDTX070N	DELL 6N53X 1.3.0 | Windows Server Catalog
Dell DC NVMe SED PE8010 RI U.2 7.68 TB	THVD3	HFS7T6GEDTX070N	DELL THVD3 1.0.0 | Windows Server Catalog
Dell DC NVMe PE8010 RI U.2 960 GB	WR2FG	HFS960GECTX088N	DELL WR2FG 1.3.0 | Windows Server Catalog
Dell DC NVMe PE8010 RI U.2 1.92 TB	T3NRP	HFS1T9GECTX088N	DELL T3NRP 1.1.0 | Windows Server Catalog
Dell DC NVMe PE8010 RI U.2 3.84 TB	V6WP5	HFS3T8GECTX088N	DELL V6WP5 1.3.0 | Windows Server Catalog
Dell DC NVMe PE8010 RI U.2 7.68 TB	16JT7	HFS7T6GECTX088N	DELL 16JT7 1.3.0 | Windows Server Catalog
Dell DC NVMe SED PE8010 RI M.2 480 GB	7KGMT	HFS480GDC8X096N	DELL HFS480GDC8X096N 1.3.0 | Windows Server Catalog
Dell DC NVMe SED PE8010 RI M.2 960 GB	7MTJ8	HFS960GDC8X096N	DELL HFS960GDC8X096N 1.3.0 | Windows Server Catalog
Dell DC NVMe SED PE8010 RI M.2 1.92 TB	0TWCD	HFS1T9GDC8X096N	DELL HFS1T9GDC8X096N 1.3.0 | Windows Server Catalog
Dell DC NVMe PE8010 RI M.2 480 GB	08M01	HFS480GDC8X099N	DELL HFS480GDC8X099N 1.3.0 | Windows Server Catalog
Dell DC NVMe PE8010 RI M.2 960 GB	21GXV	HFS960GDC8X099N	DELL HFS960GDC8X099N 1.3.0 | Windows Server Catalog
Dell DC NVMe PE8010 RI M.2 1.92 TB	ND62C	HFS1T9GDC8X099N	DELL HFS1T9GDC8X099N 1.3.0 | Windows Server Catalog
Dell NVMe PE8030 MU M.2 800 GB	31XDY	HFS800GDC8X088N	DELL HFS800GDC8X088N 1.3.0 | Windows Server Catalog
Dell NVMe SED PE8030 MU M.2 800 GB	Y1RFY	HFS800GDC8X096N	DELL HFS800GDC8X096N 1.3.0 | Windows Server Catalog
Dell NVMe PE8110 RI M.2 1.92T	MY5M4	HFS1T9GDE0X088N	DELL HFS1T9GDE0X088N 1.2.0 | Windows Server Catalog
Dell NVMe PE8110 RI M.2 3.84T	5JR5H	HFS3T8GDE0X088N	DELL HFS3T8GDE0X088N 1.2.0 | Windows Server Catalog
Dell NVMe SED PE8110 RI M.2 1.92T	4VKH4	HFS1T9GDE0X089N	DELL HFS1T9GDE0X089N 1.2.0 | Windows Server Catalog
Dell NVMe SED PE8110 RI M.2 3.84T	P2TN0	HFS3T8GDE0X089N	DELL HFS3T8GDE0X089N 1.2.0 | Windows Server Catalog
Dell NVMe ISE PS1010 RI U.2 1.92 TB	7GGK1	HFS1T9GEJVX171N	DELL HFS1T9GEJVX171N 1.1.0 | Windows Server Catalog
Dell NVMe ISE PS1010 RI U.2 3.84 TB	J4TDK	HFS3T8GEJVX171N	DELL HFS3T8GEJVX171N 1.1.0 | Windows Server Catalog
Dell NVMe ISE PS1010 RI U.2 7.68 TB	2533N	HFS7T6GEJVX171N	DELL HFS7T6GEJVX171N 1.1.0 | Windows Server Catalog
Dell NVMe ISE PS1030 MU U.2 1.6 TB	1HYKD	HFS1T6GEJVX171N	DELL HFS1T6GEJVX171N 1.1.0 | Windows Server Catalog
Dell NVMe ISE PS1030 MU U.2 3.2 TB	9VWPD	HFS3T2GEJVX171N	DELL HFS3T2GEJVX171N 1.1.0 | Windows Server Catalog
Dell NVMe ISE PS1030 MU U.2 6.4 TB	PYMY6	HFS6T4GEJVX171N	DELL HFS6T4GEJVX171N 1.1.0 | Windows Server Catalog
OSNN	3JC4V	HFS480GDJ8X167N	DELL 3JC4V 1.1.0 | Windows Server Catalog
OSNN	XN5KG	HFS960GDJ8X167N	DELL XN5KG 1.1.0 | Windows Server Catalog
OSNN	7NMPT	HFS1T9GDJ8X167N	DELL 7NMPT 1.1.0 | Windows Server Catalog

22. On information and belief, SK hynix sells infringing semiconductor memory modules to Dell, which Dell uses in building its own consumer products. SK hynix then provides ongoing support to Dell, so that Dell can sell its products and its customers can use these products within the United States, Texas, and this District.

23. On information and belief, personnel at SK hynix's Austin sales office direct efforts to provide Dell with infringing semiconductor memory modules and support Dell's use, sale, importation, and offering for sale of infringing semiconductor memory modules. SK hynix's Austin sales office provides commercial support, high-level technical support, and operational support for customers in Texas.

24. On information and belief, another of SK hynix's customers in the United States is NVIDIA Corporation. NVIDIA has substantial operations and physical places of business in Texas, including an office in Austin. NVIDIA uses SK hynix's high-bandwidth DRAM chips in its artificial intelligence processors and Grace CPU Superchip. On information and belief, NVIDIA's GB300 systems also use SK hynix's LPDDR5x memory.[5]

25. On information and belief, another of SK hynix's customers in the United States is Microsoft Corporation. Microsoft has substantial operations and physical places of Texas: according to its website, Microsoft has offices in Austin, Houston, San Antonio, Dallas, Friendswood, Frisco, and The Woodlands.[6] Microsoft uses SK hynix's memory modules in a variety of its products, including its Xbox Series X/S gaming consoles and some Surface products.

26. On information and belief, another of SK hynix's customers in the United States is Advanced Micro Devices, Inc. ("AMD"). AMD has substantial operations and physical places of business in Texas, including five offices in Austin, Houston, and Dallas. AMD uses SK hynix's memory modules in a variety of its products, including its graphics cards.

27. Dell, NVIDIA, Microsoft, and AMD are among the largest technology companies in the United States, and they maintain substantial operations and physical places of business throughout Texas. Using their vast, national distribution channels, Dell, NVIDIA, Microsoft, and AMD directly or indirectly make, import, ship, distribute, offer for sale, sell, and advertise (including by offering products and services through their websites) products incorporating SK hynix's infringing memory modules in the United States, Texas, and this District.

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[5] Anton Shilov, *Micron and SK hynix Unveil New LPDDR5X SOCAMM Memory up to 128GB, Debuts on NVIDIA GB300 Systems*, Tom's Hardware (Mar. 19, 2025), available at https://www.tomshardware.com/pc-components/ram/micron-and-sk-hynix-unveil-lpddr5x-socamm-up-to-128gb-for-ai-servers.

[6] *Microsoft U.S. Office Locations*, available at https://www.microsoft.com/en-us/about/officelocator/all-offices (last accessed Apr. 2, 2025).

28. SK hynix's relationship and ongoing business with end-device makers like Dell, NVIDIA, Microsoft, and AMD is sufficient to establish specific personal jurisdiction over SK hynix in Texas and this District.

29. On information and belief, additional United States customers for SK hynix's infringing semiconductor memory modules include Lenovo, Tesla, Inc., Intel, Qualcomm, HPE, and others.

30. On information and belief, SK hynix and/or its subsidiaries distribute products, such as the infringing semiconductor memory modules, throughout the United States, Texas, and this District. For example, Mouser Electronics, a company based in Mansfield, Texas, is a significant distributor of SK hynix products throughout Texas and this District.

31. Through its direct and indirect customers, SK hynix has purposefully and voluntarily placed, and contributed to placing, infringing products into the stream of commerce, all the while knowing, expecting, and intending them to be sold, purchased, and used in the United States, including Texas (the second most populous state in the United States) and this District.

32. SK hynix also directly and/or through its agents and subsidiaries offers to sell, sells, imports, and/or advertises its infringing semiconductor memory modules throughout the United States, including Texas and this District.

33. SK hynix therefore knows, expects, intends, and desires that its infringing semiconductor products, and electronics containing its infringing semiconductor products, will be sold in the United States, Texas, and this District.

34. On information and belief, SK hynix has derived, and continues to derive, substantial revenue from its infringing acts in Texas and this District, including from the sale and use of infringing semiconductor memory modules.

35. SK hynix has committed acts, and continues to commit acts, within Texas and this District giving rise to this action. SK hynix has established sufficient minimum contacts with the State of Texas, such that the Court's exercise of jurisdiction over this matter would not offend traditional notions of fair play and substantial justice.

36. Further, on information and belief, this Court has personal jurisdiction over SK hynix at least by virtue of Federal Rule of Civil Procedure 4(k)(2).

37. Venue is proper against SK hynix in this District pursuant to 28 U.S.C. § 1391(c)(3). SK hynix is not a resident of the United States and may be sued in any district, including this District.

THE PATENTS

38. This complaint asserts causes of action for infringement of United States Patent No. 7,777,557 (the "'557 Patent"), United States Patent No. 7,920,018 (the "'018 Patent"), United States Patent No. 7,969,231 (the "'231 Patent"), United States Patent No. 8,593,888 (the "'888 Patent"), and United States Patent No. 8,400,835 ("the '835 Patent") (collectively, the "Asserted Patents").

39. Each of the five Asserted Patents claims patent-eligible subject matter and is a valid and enforceable U.S. patent, the entire right, title, and interest to which AMT owns by assignment.

U.S. Patent No. 7,777,557

40. U.S. Patent No. 7,777,557 is entitled "Booster Circuit" and was issued by the U.S. Patent and Trademark Office ("PTO") to inventor Seiji Yamahira on August 17, 2010. AMT holds by assignment all rights and title to the '557 Patent, including the sole and exclusive right to bring a claim for its infringement. A copy of the '557 Patent is attached to this complaint as Exhibit A.

41. The '557 Patent generally claims a structure of a booster circuit.

42. The invention disclosed and claimed in the ’557 Patent generally allows a more efficient booster circuit with a reduced footprint.

43. To the extent applicable, Plaintiff has complied with 35 U.S.C. § 287(a) with respect to the ’557 Patent.

U.S. Patent No. 7,920,018

44. U.S. Patent No. 7,920,018 is entitled “Booster Circuit,” and was issued by the PTO to inventor Seiji Yamahira on April 5, 2011. AMT holds by assignment all rights and title to the ’018 Patent, including the sole and exclusive right to bring a claim for its infringement. A copy of the ’018 Patent is attached to this complaint as Exhibit B.

45. The application preceding the ’018 Patent was a divisional of U.S. Patent Application No. 12/015,882, which became the ’557 Patent.

46. The ’018 Patent generally claims a structure of a booster circuit.

47. The invention disclosed and claimed in the ’018 Patent generally allows a more efficient booster circuit with a reduced footprint.

48. To the extent applicable, Plaintiff has complied with 35 U.S.C. § 287(a) with respect to the ’018 Patent.

U.S. Patent No. 7,969,231

49. U.S. Patent No. 7,969,231 is entitled “Internal Voltage Generating Circuit,” and was issued by the PTO to inventor Seiji Yamahira on June 28, 2011. AMT holds by assignment all rights and title to the ’231 Patent, including the sole and exclusive right to bring a claim for its infringement. A copy of the ’231 Patent is attached to this complaint as Exhibit C.

50. The ’231 Patent generally claims a structure of an internal voltage generating circuit.

51. The invention disclosed and claimed in the ’231 Patent generally allows a more efficient circuit with a reduced footprint.

52. To the extent applicable, Plaintiff has complied with 35 U.S.C. § 287(a) with respect to the ’231 Patent.

U.S. Patent No. 8,593,888

53. U.S. Patent No. 8,593,888 is entitled “Semiconductor Memory Device,” and was issued by the PTO to inventors Reiji Mochida, Takafumi Maruyama, and Yukimasa Hamamoto on November 26, 2013. AMT holds by assignment all rights and title to the ’888 Patent, including the sole and exclusive right to bring a claim for its infringement. A copy of the ’888 Patent is attached to this complaint as Exhibit D.

54. The ’888 Patent generally claims a structure of a semiconductor memory device capable of erasing and writing memory contents in a memory cell using an electric signal.

55. The invention disclosed and claimed in the ’888 Patent generally allows a semiconductor memory device with a reduced footprint.

56. To the extent applicable, Plaintiff has complied with 35 U.S.C. § 287(a) with respect to the ’888 Patent.

U.S Patent No. 8,400,835

57. U.S. Patent No. 8,400,835 is entitled “Non-volatile Semiconductor Memory,” and was issued by the PTO to inventors Yukimasa Hamamoto and Masahiro Toki on March 19, 2013. AMT holds by assignment all rights and title to the ’835 Patent, including the sole and exclusive right to bring a claim for its infringement. A copy of the ’835 Patent is attached to this complaint as Exhibit E.

58. The ’835 Patent generally claims a system allowing a semiconductor device to

reduce write delays when a number of cells are written at the same time

59. The invention disclosed and claimed in the ’835 Patent generally allows a semiconductor device to more efficiently access, store, and use memory.

60. To the extent applicable, Plaintiff has complied with 35 U.S.C. § 287(a) with respect to the ’835 Patent.

SK HYNIX’S USE OF AMT’S PATENTED TECHNOLOGY

61. SK hynix manufactures and sells semiconductor devices, including NAND flash memory and DRAM modules. NAND flash memory is a type of non-volatile memory, meaning data is not lost after power is turned off. DRAM, short for dynamic random access memory, is a type of volatile memory and DRAM devices require power to retain data. At a high level, the key differences relate to speed and energy consumption: DRAM memory is faster than NAND flash, but DRAM also consumes more power.[7]

62. The NAND flash memory and DRAM modules SK hynix manufactures and sells are, in turn, incorporated by its customers into a vast array of consumer products, including smartphones, servers, computers, tablets, gaming consoles, IoT (internet of things or “smart”) devices, and automotive devices.

63. Hereafter, the term “Accused Flash Memory Modules” refers to all NAND flash memory modules manufactured, sold, and/or offered for sale by SK hynix, including but not limited to solid-state drives (“SSDs”), including internal SSDs and portable SSDs; USB flash drives; PCI devices; flash package dies; and flash bare dies.

64. Hereafter, the term “Accused 96-Layer and 128-Layer Flash Memory Modules” refers to all NAND flash modules in which cells are stacked in 96 or 128 layers manufactured,

[7] *See, e.g.*, Alex Yoon, *Understanding Memory*, Semiconductor Engineering (Feb. 15, 2018), available at https://semiengineering.com/whats-really-happening-inside-memory/.

sold, and/or offered for sale by SK hynix, including but not limited to solid-state drives ("SSDs"), including SSDs and portable SSDs; USB flash drives; PCI devices; flash package dies; and flash bare dies.

65. Hereinafter, the term "Accused DRAM Modules" refers to all DRAM modules manufactured, sold, and/or offered for sale by SK hynix.

COUNT ONE
INFRINGEMENT OF U.S. PATENT NO. 7,777,557

66. AMT repeats and incorporates by reference each preceding paragraph as if fully set forth herein and further states:

67. SK hynix has directly infringed and continues to directly infringe the '557 Patent under 35 U.S.C. § 271(a), either literally or through the doctrine of equivalents, by making, using, selling, offering to sell, and/or importing in or into the United States Accused Flash Memory Modules that practice the '557 Patent as described below, including at least Claims 1 and 14. By way of example, such Accused Flash Memory Modules include the SK hynix Gold P31 SSD devices manufactured, used, sold, offered for sale, and/or imported by SK hynix.

68. For example, Claim 1 is illustrative of the claims of the '557 Patent. It recites "[a] booster circuit comprising:

> boosting cells each having a first-conductivity type first well region on a substrate, a second-conductivity type second well region in the first well region, and at least one switching element in either or both of the first well region and the second well region, wherein the at least one switching [e]lement switches to transfer charges from a first terminal to a second terminal;
>
> a first boosting cell row including N stages ($N \geqq 1$) of the boosting cells;
>
> a second boosting cell row including M stages ($M \geqq 1$) of the boosting cells; and
>
> at least one analog comparison circuit for outputting a well bias potential generated by an output potential of the boosting cell on the i-th stage ($1 \leqq i \leqq N$) of the first boosting cell row and an output potential of the boosting cell on the i-th stage ($1 \geqq i \geqq M$) of the second boosting cell row,

wherein the well bias potential of the at least one analog comparison circuit is applied to the first well region of the switching element included in the at least one boosting cell of the first and second boosting cell rows."

69. The exemplar SK hynix Gold P31 SSD device manufactured by SK hynix meets every element of this claim.[8]

70. The SK hynix Gold P31 SSD contains NAND flash memory modules with a booster circuit (also known as a charge pump) of an infringing structure.

71. Circuit extraction and scanning electron microscopy show that the exemplary SK hynix Gold P31 SSD has a booster circuit comprised of multiple boosting cells. Each boosting cell includes a first well region of one conductivity type (N type) on a substrate, a second well region of another conductivity type (P type) in the first well region, and one or more switching elements in these regions.

72. Circuit extraction also shows that, within this booster circuit of the SK hynix Gold P31 SSD, the switching elements transfer charges from one terminal to another terminal.

73. Circuit extraction further shows that this booster circuit of the SK hynix Gold P31 SSD contains two rows of boosting cells, and each row contains at least one boosting cell.

74. Circuit extraction further shows that, within this booster circuit, there is at least one analog comparison circuit transistor for outputting a well bias potential. The well bias potential is generated by an output potential of a boosting cell in each of the two rows. And the well bias potential is applied to the first well region of the switching element in the boosting cells of the two rows.

75. Because the SK hynix Gold P31 SSD contains a booster circuit matching the

[8] This description of infringement is illustrative and not intended to be an exhaustive or limiting explanation of every manner in which the SK hynix Gold P31 SSD infringes.

elements of Claim 1, this device practices at least Claim 1 of the ’557 Patent.

76. Upon information and belief, all Accused Flash Memory Modules similarly infringe. For example, on information and belief, SK hynix uses common design and structural elements in its NAND flash memory modules that contain booster circuits matching the elements of Claim 1 of the ’557 Patent. To achieve the higher voltages required for programming, wordline and erase operations, memory devices rely on booster circuits, which are a fundamental design requirement for all Accused Flash Memory modules. Additionally, SK hynix uses common designs in charge pumps for all Accused Flash Memory Modules, regardless of the number of cell layers. One example of this is the use of triple well designs with well potential generation across products with different numbers of layers. Accordingly, all Accused Flash Memory Modules infringe at least one claim of the ’557 Patent in the same manner as the SK hynix Gold P31 SSD.

77. SK hynix marketing materials also demonstrate common design principles utilized across multiple generations of its NAND Flash products. *See, e.g.*, *NAND Technology Development at SK hynix: Reaching New Heights*, SK hynix (Oct. 27, 2022), https://news.skhynix.com/nand-development-history.

78. In addition, infringement by other SK hynix NAND Flash devices with different numbers of cell layers further demonstrates that, upon information and belief, all Accused Flash Memory Modules infringe the ’557 Patent. For example, the SK hynix Gold P31 SSD is a 128-layer NAND Flash memory device. The SK hynix Platinum P41 SSD is a 176-layer device that similar circuit extraction and scanning electron microscopy techniques show infringes at least claim 14 of the ’557 Patent.

79. In addition to directly infringing the ’557 Patent by making, using, selling, offering to sell, and/or importing Accused Flash Memory Modules into the United States, SK hynix

likewise has induced infringement of the ’557 Patent under 35 U.S.C. § 271(b). SK hynix has actively encouraged its customers to directly infringe the ’557 Patent by using, selling, offering for sale, and/or importing electronic devices and products containing the Accused Flash Memory Modules. SK hynix, through its sales, engineering, and technical staff, actively encourages its customers to purchase the infringing Accused Flash Memory Modules and incorporate them into the customers’ own consumer products. SK hynix’s staff tout the specifications and features of the Accused Flash Memory Modules and, on information and belief, even tailor the Accused Flash Memory Modules to customers’ needs so the Accused Flash Memory Modules can more seamlessly be incorporated into the customers’ own products. SK hynix also provides ongoing technical support for the Accused Flash Memory Modules, including firmware updates, to its customers.

80. SK hynix purposefully and knowingly sells and offers to sell the Accused Flash Memory Modules to its subsidiaries, distributors, and/or customers knowing and expecting that the Accused Flash Memory Modules or products containing them will enter the United States, where they will be imported, used, sold, and offered for sale by those distributors, customers, and/or other end-users.

81. As a result of SK hynix’s active encouragement and intentional inducement, its customers have committed acts directly infringing the ’557 Patent. SK hynix has known that its customers’ acts constituted direct infringement of at least one claim of the ’557 Patent at least since the filing of the initial complaint in this case (Dkt. No. 1).

82. Moreover, SK hynix intends to cause, and has taken affirmative steps to induce, infringement by customers and end-users by at least, *inter alia*, encouraging, promoting, instructing, and/or directing the infringing use of the Accused Flash Memory Modules.

83. As detailed above, the SK hynix Gold P31 SSD, SK hynix Platinum P41 SSD, and other Accused Flash Memory Modules infringe at least one claim of the ’557 Patent. Accordingly, by encouraging, promoting, instructing, and/or directing users to use the SK hynix Gold P31 SSD, SK hynix Platinum P41, and other Accused Flash Memory Modules, SK hynix is actively inducing infringement of the ‘557 Patent in violation of 35 U.S.C. § 271(b).

84. SK hynix likewise is liable as a contributory infringer of the ’557 Patent under 35 U.S.C. § 271(c). SK hynix has offered to sell and/or sold within the United States the SK hynix Gold P31 SSD, SK hynix Platinum P41, and other Accused Flash Memory Modules that practice the ’557 Patent. The Accused Flash Memory Modules comprise booster circuits, each of which constitutes a material part of the ’557 Patent’s invention that can be incorporated into storage devices. SK hynix has known such Accused Flash Memory Modules to be especially adapted for practicing, and thus infringing, the ’557 Patent, where the Accused Flash Memory Modules are not staple articles nor a commodity of commerce suitable for substantial non-infringing use.

85. SK hynix has had actual knowledge of the ’557 Patent since at least February 3, 2022, when the ’557 Patent was identified as prior art during prosecution of SK hynix’s patent application 17/461,597.

86. SK hynix’s continued infringement of the ’557 Patent since at least February 3, 2022, has been intentional, deliberate, and willful.

87. In the alternative, SK hynix has been aware of the ’557 Patent since the filing of the initial complaint in this case (Dkt. No. 1).

88. SK hynix’s direct, induced, contributory, and willful infringement of the ’557 Patent has caused, and will continue to cause, substantial damage to AMT. Therefore, AMT is entitled to an award of monetary damages adequate to compensate for SK hynix’s past, present,

and future infringement, but not less than reasonable royalty, together with pre-and post-judgment interest, attorneys' fees, and costs as fixed by the Court under 35 U.S.C. §§ 284 and 285.

COUNT TWO
INFRINGEMENT OF U.S. PATENT NO. 7,920,018

89. AMT repeats and incorporates by reference each preceding paragraph as if fully set forth herein and further states:

90. SK hynix has directly infringed and continues to directly infringe the '018 Patent under 35 U.S.C. § 271(a), either literally or through the doctrine of equivalents, by making, using, selling, offering to sell, and/or importing in or into the United States Accused 96-Layer and 128-Layer Flash Memory Modules that practice the '018 Patent as described below, including at least Claim 1. By way of example, such Accused 96-Layer and 128-Layer Flash Memory Modules include the SK hynix Gold P31 SSD devices manufactured, used, sold, offered for sale, and/or imported by SK hynix.

91. For example, Claim 1 is illustrative of the claims of the '018 Patent. It recites "[a] booster circuit comprising:

> a first boosting cell row including N stages (N≧1) of the boosting cells;
>
> a second boosting cell row including M stages (M≧1) of boosting cells; and
>
> at least one analog comparison circuit for outputting a well bias potential generated by an input potential of the boosting cell on the i-th stage (1≦i≦N) of the first boosting cell row and an input potential of the boosting cell on the i-th stage (1≦i≦M) of the second boosting cell row, wherein:
>
> each boosting cell includes a first-conductivity type first well region on a substrate, a second-conductivity type second well region in the first well region, and at least one switching element in either or both of the first well region and the second well region,
>
> the at least one switching element is configured to transfer charges from a first terminal to a second terminal, and
>
> the well bias potential of the at least one analog comparison circuit is applied to the first well region of the switching element included in the at least one boosting cell of the first

and second boosting cell rows."

92. The exemplar SK hynix Gold P31 SSD manufactured by SK hynix meets every element of this claim.[9]

93. The SK hynix Gold P31 SSD contains NAND flash memory modules with a booster circuit (also known as a charge pump) of an infringing structure.

94. Circuit extraction shows that this booster circuit on the SK hynix Gold P31 is comprised of two rows of boosting cells, with each row containing at least one boosting cell.

95. Circuit extraction further shows that this booster circuit is also comprised of at least one analog comparison circuit for outputting a well bias potential. The well bias potential is generated by an input potential of a boosting cell in each of the two rows.

96. Circuit extraction and scanning electron microsposy further show that, within this booster circuit, each boosting cell includes a first well region of one conductivity type (N type) on a substrate, a second well region of another conductivity type (P type) in the first well region, and one or more switching elements in these regions.

97. Circuit extraction further shows that, within this booster circuit of the SK hynix Gold P31 SSD, the switching elements transfer charges from one terminal to another terminal.

98. Circuit extraction further shows that, within this booster circuit, the well bias potential of the analog comparison circuit is applied to the first well region of the switching element in the boosting cells of the two rows.

99. Because the SK hynix Gold P31 SSD contains at least one booster circuit matching the elements of Claim 1, this device practices at least Claim 1 of the '018 Patent.

100. Because the SK hynix Gold P31 SSD practices at least Claim 1 of the '018 Patent,

[9] This description of infringement is illustrative and not intended to be an exhaustive or limiting explanation of every manner in which the SK hynix Gold P31 SSD infringes.

upon information and belief all Accused 96-Layer and 128-Layer Flash Memory Modules similarly infringe. For example, on information and belief, SK hynix uses common design and structural elements in its NAND flash memory modules that contain booster circuits matching the elements of Claim 1 of the ’018 Patent. To achieve the higher voltages required for programming, wordline and erase operations, memory devices rely on booster circuits, which are a fundamental design requirement for all Accused 96-Layer and 128-Layer Flash Memory Modules. Additionally, SK hynix uses common designs in charge pumps for all Accused Flash Memory Modules, regardless of the number of cell layers. One example of this is the use of triple well designs with well potential generation across products with different numbers of layers. Although these sources reflect similarities across a range of NAND layer devices, the ’018 Patent applies only to the Accused 96-Layer and 128-Layer Flash Memory Modules because of limitations in the patent. Accordingly, all Accused 96-Layer and 128-Layer Flash Memory Modules infringe at least Claim 1 of the ’018 Patent in the same manner as the SK hynix Gold P31 SSD.

101. SK hynix marketing materials also demonstrate common design principles utilized across multiple generations of its NAND Flash products. *See, e.g.*, *NAND Technology Development at SK hynix: Reaching New Heights*, SK hynix (Oct. 27, 2022), https://news.skhynix.com/nand-development-history.

102. In addition to directly infringing the ’018 Patent by making, using, selling, offering to sell, and/or importing Accused 96-Layer and 128-Layer Flash Memory Modules into the United States, SK hynix likewise has induced infringement of the ’018 Patent under 35 U.S.C. § 271(b). SK hynix has actively encouraged its customers to directly infringe the ’018 Patent by using, selling, offering for sale, and/or importing electronic devices and products containing the Accused 96-Layer and 128-Layer Flash Memory Modules. SK hynix, through its sales, engineering, and

technical staff, actively encourages its customers to purchase the infringing Accused 96-Layer and 128-Layer Flash Memory Modules and incorporate them into the customers' own consumer products. SK hynix's staff tout the specifications and features of the Accused 96-Layer and 128-Layer Flash Memory Modules and, on information and belief, even tailor the Accused 96-Layer and 128-Layer Flash Memory Modules to customers' needs so the Accused 96-Layer and 128-Layer Flash Memory Modules can more seamlessly be incorporated into the customers' own products. SK hynix also provides ongoing technical support for the Accused 96-Layer and 128-Layer Flash Memory Modules, including firmware updates, to its customers.

103. SK hynix purposefully and knowingly sells and offers to sell the Accused 96-Layer and 128-Layer Flash Memory Modules to its subsidiaries, distributors, and/or customers knowing and expecting that the Accused 96-Layer and 128-Layer Flash Memory Modules or products containing them will enter the United States, where they will be imported, used, sold, and offered for sale by those distributors, customers, and/or other end-users.

104. As a result of SK hynix's active encouragement and intentional inducement, its customers have committed acts directly infringing the '018 Patent. SK hynix has known that its customers' acts constituted direct infringement of at least one claim of the '018 Patent at least since the filing of the initial complaint in this case (Dkt. No. 1).

105. Moreover, SK hynix intends to cause, and has taken affirmative steps to induce, infringement by customers and end-users by at least, *inter alia*, encouraging, promoting, instructing, and/or directing the infringing use of the Accused 96-Layer and 128-Layer Flash Memory Modules.

106. As detailed above, the SK hynix Gold P31 SSD and other Accused 96-Layer and 128-Layer Flash Memory Modules infringe at least Claim 1 of the '018 Patent. Accordingly, by

encouraging, promoting, instructing, and/or directing users to use the SK hynix Gold P31 SSD and other Accused 96-Layer and 128-Layer Flash Memory Modules, SK hynix is actively inducing infringement of the '018 Patent in violation of 35 U.S.C. § 271(b).

107. SK hynix likewise is liable as a contributory infringer of the '018 Patent under 35 U.S.C. § 271(c). SK hynix has offered to sell and/or sold within the United States the SK hynix Gold P31 SSD and other Accused 96-Layer and 128-Layer Flash Memory Modules that practice the '018 Patent. The Accused 96-Layer and 128-Layer Flash Memory Modules comprise booster circuits, each of which constitutes a material part of the '018 Patent's invention that can be incorporated into storage devices. SK hynix has known such Accused 96-Layer and 128-Layer Flash Memory Modules to be especially adapted for practicing, and thus infringing, the '018 Patent, where the Accused 96-Layer and 128-Layer Flash Memory Modules are not staple articles nor a commodity of commerce suitable for substantial non-infringing use.

108. SK hynix has had actual knowledge of the '018 Patent since at least February 3, 2022, when the '557 Patent, of which the '018 Patent is a divisional, was identified as prior art during prosecution of SK hynix's patent application 17/461,597.

109. SK hynix's continued infringement of the '018 Patent since at least February 3, 2022, has been intentional, deliberate, and willful.

110. In the alternative, SK hynix has been aware of the '018 Patent since the filing of the initial complaint in this case (Dkt. No. 1).

111. SK hynix's direct, induced, contributory, and willful infringement of the '018 Patent has caused, and will continue to cause, substantial damage to AMT. Therefore, AMT is entitled to an award of monetary damages adequate to compensate for SK hynix's past, present, and future infringement, but not less than reasonable royalty, together with pre-and post-judgment

interest, attorneys' fees, and costs as fixed by the Court under 35 U.S.C. §§ 284 and 285.

COUNT THREE
INFRINGEMENT OF U.S. PATENT NO. 7,969,231

112. AMT repeats and incorporates by reference each preceding paragraph as if fully set forth herein and further states:

113. SK hynix has directly infringed and continues to directly infringe the '231 Patent under 35 U.S.C. § 271(a), either literally or through the doctrine of equivalents, by making, using, selling, offering to sell, and/or importing in or into the United States Accused Flash Memory Modules and Accused DRAM Modules that practice the '231 Patent as described below, including at least Claims 1 and 3. By way of example, such Accused Flash Memory Modules include the SK hynix Gold P31 SSD devices manufactured, used, sold, offered for sale, and/or imported by SK hynix. By way of further example, such Accused DRAM Modules include devices manufactured, used, sold, offered for sale, and/or imported by SK hynix that incorporate the SK hynix MDHD5E2100E LPDDR5x die.

114. For example, Claim 1 is illustrative of the claims of the '231 Patent. Claim 1 recites "[a]n internal voltage generating circuit comprising:

> a first boost circuit provided between a first voltage and a first terminal;
>
> a second boost circuit provided between the first terminal and a second terminal;
>
> a frequency dividing circuit configured to divide a first clock signal to be supplied to the first boost circuit to generate a second clock signal; and
>
> a buffer circuit configured to select and supply the first clock signal or the second clock signal to the second boost circuit."

115. By way of further example, Claim 3 is also illustrative of the claims of the '231 Patent. Claim 3 recites "[a]n internal voltage generating circuit comprising:

> a first charge pump circuit configured to generate a second voltage from a first voltage;

a second charge pump circuit configured to generate a third voltage from the second voltage;

a frequency dividing circuit configured to divide a first clock signal to generate a second clock signal; and

a buffer circuit configured to select the first clock signal or the second clock signal and generate a third clock signal, wherein the third clock signal is supplied to the second charge pump circuit."

116. The exemplar SK hynix Gold P31 SSD and SK hynix MDHD5E2100E LPDDR5x die manufactured by SK hynix each meet every element of at least one of these claims.[10]

117. Circuit extraction and scanning electron microscopy show that the exemplar SK hynix Gold P31 SSD contains NAND flash memory modules (H25FTB0 die) with an internal voltage generating circuit (or charge pump) of an infringing structure.

118. Circuit extraction further shows that this internal voltage generating circuit in the SK hynix Gold P31 SSD contains four circuits: (1) a charge pump circuit, which generates a second voltage from an initial voltage; (2) a second charge pump circuit, which generates a third voltage from the second voltage; (3) a frequency dividing circuit, which divides an initial clock signal to generate a second clock signal; and (4) a buffer circuit, which generates a third clock signal from the first or the second.

119. Circuit extraction further shows that within this internal voltage generating circuit, the third clock signal is supplied to the second charge pump circuit.

120. Because the SK hynix Gold P31 SSD contains at least one internal voltage generating circuit matching the elements of Claim 3, this device practices at least Claim 3 of the '231 Patent.

[10] This description of infringement is illustrative and not intended to be an exhaustive or limiting explanation of every manner in which the SK hynix Gold P31 SSD and SK hynix MDHD5E2100E LPDDR5x die infringe.

121. Because the SK hynix Gold P31 SSD practices at least Claim 3 of the ’231 Patent, upon information and belief all Accused Flash Memory Modules similarly infringe. For example, on information and belief, SK hynix uses common design and structural elements in all its NAND flash memory modules that contain at least one internal voltage generating circuit matching the elements of Claim 3 of the ’231 Patent. To achieve the higher voltages required for programming, wordline and erase operations, memory devices rely on booster circuits, which are a fundamental design requirement for all Accused Flash Memory modules. Additionally, SK hynix uses common designs in charge pumps for all Accused Flash Memory Modules, regardless of the number of cell layers. One example of this is the use of triple well designs with well potential generation across products with different numbers of layers. Accordingly, all Accused Flash Memory Modules infringe at least Claim 3 of the ’231 Patent in the same manner as the SK hynix Gold P31 SSD.

122. SK hynix marketing materials also demonstrate common design principles utilized across multiple generations of its NAND Flash products. *See, e.g.*, *NAND Technology Development at SK hynix: Reaching New Heights*, SK hynix (Oct. 27, 2022), https://news.skhynix.com/nand-development-history.

123. Circuit extraction shows that the exemplar SK hynix MDHD5E2100E LPDDR5x die contains DRAM memory modules with an internal voltage generating circuit of an infringing structure.

124. Circuit extraction further shows that this internal voltage generating circuit contains four circuits: (1) a first boost circuit provided between a first voltage and a first terminal; (2) a second boost circuit provided between the first terminal and a second terminal; (3) a frequency dividing circuit configured to divide a first clock signal to be supplied to the first boost circuit to generate a second clock signal; and (4) a buffer circuit configured to select and supply the first

clock signal or the second clock signal to the second boost circuit.

125. Because the SK hynix MDHD5E2100E LPDDR5x die contains at least one internal voltage generating circuit matching the elements of Claim 1, this device practices at least Claim 1 of the ’231 Patent.

126. Because the SK hynix DDR5 DRAM Devices practice at least Claim 1 of the ’231 Patent, on information and belief all Accused DRAM Modules similarly infringe. On information and belief, SK hynix uses common design elements in the voltage pumps of its DRAM products. For example, the exemplary SK hynix MDHD5E2100E LPDDR5x DRAM die and the SK hynix MDHD5C20101 DDR5 DRAM die have common top-level schematics and multiple sub-blocks such as D flip flops, multiplexers, and logic gates demonstrating common design elements across multiple SK hynix DRAM products. As a result, all Accused DRAM Modules infringe at least Claim 1 of the ’231 Patent in the same manner as the SK hynix MDHD5E2100E LPDDR5x die.

127. In addition to directly infringing the ’231 Patent by making, using, selling, offering to sell, and/or importing Accused Flash Memory Modules and Accused DRAM Modules into the United States, SK hynix likewise has induced infringement of the ’231 Patent under 35 U.S.C. § 271(b). SK hynix has actively encouraged its customers to directly infringe the ’231 Patent by using, selling, offering for sale, and/or importing electronic devices and products containing the Accused Flash Memory Modules and/or Accused DRAM Modules. SK hynix, through its sales, engineering, and technical staff, actively encourages its customers to purchase the infringing Accused Flash Memory Modules and/or Accused DRAM Modules and incorporate them into the customers’ own consumer products. SK hynix’s staff tout the specifications and features of the Accused Flash Memory Modules and/or Accused DRAM Modules and, on information and belief, even tailor the respective accused modules to customers’ needs so the accused modules can more

seamlessly be incorporated into the customers' own products. SK hynix also provides ongoing technical support for the Accused Flash Memory Modules and Accused DRAM Modules, including firmware updates, to its customers.

128. SK hynix purposefully and knowingly sells and offers to sell the Accused Flash Memory Modules and Accused DRAM Modules to its subsidiaries, distributors, and/or customers knowing and expecting that the Accused Flash Memory Modules and Accused DRAM Modules or products containing them will enter the United States, where they will be imported, used, sold, and offered for sale by those distributors, customers, and/or other end-users.

129. As a result of SK hynix's active encouragement and intentional inducement, its customers have committed acts directly infringing the '231 Patent. SK hynix has known that its customers' acts constituted direct infringement of at least one claim of the '231 Patent at least since the filing of the initial complaint in this case (Dkt. No. 1).

130. Moreover, SK hynix intends to cause, and has taken affirmative steps to induce, infringement by customers and end-users by at least, *inter alia*, encouraging, promoting, instructing, and/or directing the infringing use of the Accused Flash Memory Modules and Accused DRAM Modules.

131. As detailed above, the SK hynix Gold P31 SSD and other Accused Flash Memory Modules infringe at least Claim 3 of the '231 Patent. Accordingly, by encouraging, promoting, instructing, and/or directing users to use the SK hynix Gold P31 SSD and other Accused Flash Memory Modules, SK hynix is actively inducing infringement of the '231 Patent in violation of 35 U.S.C. § 271(b).

132. As detailed above, the SK hynix MDHD5E2100E LPDDR5x die and other Accused DRAM Modules infringe at least Claim 1 of the '231 Patent. Accordingly, by encouraging,

promoting, instructing, and/or directing users to use the SK hynix MDHD5E2100E LPDDR5x die and other Accused DRAM Modules, SK hynix is actively inducing infringement of the '231 Patent in violation of 35 U.S.C. § 271(b).

133. SK hynix likewise is liable as a contributory infringer of the '231 Patent under 35 U.S.C. § 271(c). SK hynix has offered to sell and/or sold within the United States the SK hynix Gold P31 SSD and other Accused Flash Memory Modules that practice the '231 Patent. The Accused Flash Memory Modules comprise internal voltage generating circuits, each of which constitutes a material part of the '231 Patent's invention that can be incorporated into storage devices. SK hynix has known such Accused Flash Memory Modules to be especially adapted for practicing, and thus infringing, the '231 Patent, where the Accused Flash Memory Modules are not staple articles nor a commodity of commerce suitable for substantial non-infringing use. SK hynix similarly has offered to sell and/or sold within the United States the SK hynix MDHD5E2100E LPDDR5x die and other Accused DRAM Modules that practice the '231 Patent. The Accused DRAM Modules comprise semiconductor memory devices capable of erasing and writing memory contents in a memory cell using an electric signal, each of which constitutes a material part of the '231 Patent's invention that can be incorporated into storage devices. SK hynix has known such Accused DRAM Modules to be especially adapted for practicing, and thus infringing, the '231 Patent, where the Accused DRAM Modules are not staple articles nor a commodity of commerce suitable for substantial non-infringing use.

134. SK hynix has had actual knowledge of the '231 Patent since at least June 17, 2016, when the '231 Patent was identified as prior art during prosecution of SK hynix's patent application 14/698,542.

135. SK hynix's continued infringement of the '231 Patent since at least June 17, 2016,

has been intentional, deliberate, and willful.

136. In the alternative, SK hynix has been aware of the ’231 Patent since the filing of the initial complaint in this case (Dkt. No. 1).

137. SK hynix’s direct, induced, contributory, and willful infringement of the ’231 Patent has caused, and will continue to cause, substantial damage to AMT. Therefore, AMT is entitled to an award of monetary damages adequate to compensate for SK hynix’s past, present, and future infringement, but not less than reasonable royalty, together with pre-and post-judgment interest, attorneys’ fees, and costs as fixed by the Court under 35 U.S.C. §§ 284 and 285.

COUNT FOUR
INFRINGEMENT OF U.S. PATENT NO. 8,593,888

138. AMT repeats and incorporates by reference each preceding paragraph as if fully set forth herein and further states:

139. SK hynix has directly infringed and continues to directly infringe the ’888 Patent under 35 U.S.C. § 271(a), either literally or through the doctrine of equivalents, by making, using, selling, offering to sell, and/or importing in or into the United States Accused DRAM Modules that practice the ’888 Patent as described below, including at least Claim 1. By way of example, such Accused DRAM Modules include the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die manufactured, used, sold, offered for sale, and/or imported by SK hynix.

140. For example, Claim 1 is illustrative of the claims of the ’888 Patent. It recites “[a] semiconductor memory device capable of erasing and writing memory contents in a memory cell using an electric signal, comprising:

> the memory cell, one regulator, first and second switches, and a voltage applying transistor for applying a voltage to the memory cell,
>
> wherein

an output of the regulator is coupled to inputs of the first and second switches,

an output of the first switch is coupled to a gate of the voltage applying transistor,

a voltage is applied from a drain terminal of the voltage applying transistor to a drain terminal of the memory cell, and

an output of the second switch is coupled to a gate of the memory cell for application of a voltage.

141. The exemplar SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die manufactured by SK hynix meet every element of this claim.[11]

142. Both the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die contain embedded NOR Flash memory modules.

143. The embedded NOR Flash memory modules of the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die contain a semiconductor memory device capable of erasing and writing memory contents in a memory cell using an electric signal of an infringing structure.

144. Circuit extraction shows that, in each product, this semiconductor memory device comprises a memory cell, one regulator, first and second switches, and a voltage applying transistor for applying a voltage to the memory cell.

145. Circuit extraction further shows that, in each product, within this semiconductor memory device, an output of the regulator is coupled to inputs of the first and second switches.

146. Circuit extraction further shows that, in each product, within this semiconductor memory device, an output of the first switch is coupled to a gate of the voltage applying transistor.

147. Circuit extraction further shows that, in each product, within this semiconductor

[11] This description of infringement is illustrative and not intended to be an exhaustive or limiting explanation of every manner in which the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die devices infringe.

memory device, a voltage is applied from a drain terminal of the voltage applying transistor to a drain terminal of the memory cell.

148. Circuit extraction further shows that, in each product, within this semiconductor memory device, an output of the second switch is coupled to a gate of the memory cell for application of a voltage.

149. Because the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die each contain at least one semiconductor memory device capable of erasing and writing memory contents in a memory cell using an electric signal and matching the elements of Claim 1, the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die each practice at least Claim 1 of the ’888 Patent.

150. Because the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die each practice at least Claim 1 of the ’888 Patent, all Accused DRAM Modules similarly infringe. For example, on information and belief, SK hynix DRAM products all contain embedded NOR Flash modules that contain at least one semiconductor memory device capable of erasing and writing memory contents in a memory cell using an electric signal that matches the elements of Claim 1 of the ’888 Patent. For example, in addition to the exemplary SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die, the MDHD5C20101 DDR5 die also contains an embedded NOR Flash module. Upon information and belief, SK hynix also uses similar design and constituent components across its DRAM products. As a result, all Accused DRAM Modules infringe at least Claim 1 of the ’888 Patent in the same manner as the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die.

151. In addition to directly infringing the ’888 Patent by making, using, selling, offering to sell, and/or importing Accused DRAM Modules into the United States, SK hynix likewise has

induced infringement of the ’888 Patent under 35 U.S.C. § 271(b). SK hynix has actively encouraged its customers to directly infringe the ’888 Patent by using, selling, offering for sale, and/or importing electronic devices and products containing the Accused DRAM Modules. SK hynix, through its sales, engineering, and technical staff, actively encourages its customers to purchase the infringing Accused DRAM Modules and incorporate them into the customers’ own consumer products. SK hynix’s staff tout the specifications and features of the Accused DRAM Modules and, on information and belief, even tailor the Accused DRAM Modules to customers’ needs so the Accused DRAM Modules can more seamlessly be incorporated into the customers’ own products. SK hynix also provides ongoing technical support for the Accused DRAM Modules, including firmware updates, to its customers.

152. SK hynix purposefully and knowingly sells and offers to sell the Accused DRAM Modules to its subsidiaries, distributors, and/or customers knowing and expecting that the Accused DRAM Modules or products containing them will enter the United States, where they will be imported, used, sold, and offered for sale by those distributors, customers, and/or other end-users.

153. As a result of SK hynix’s active encouragement and intentional inducement, its customers have committed acts directly infringing the ’888 Patent. SK hynix has known that its customers’ acts constituted direct infringement of at least one claim of the ’888 Patent at least since the filing of the initial complaint in this case (Dkt. No. 1).

154. Moreover, SK hynix intends to cause, and has taken affirmative steps to induce, infringement by customers and end-users by at least, *inter alia*, encouraging, promoting, instructing, and/or directing the infringing use of the Accused DRAM Modules.

155. As detailed above, the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die and other Accused DRAM Modules infringe at least Claim 1 of the

’888 Patent. Accordingly, by encouraging, promoting, instructing, and/or directing users to use the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die, and/or other Accused DRAM Modules, SK hynix is actively inducing infringement of the ‘888 Patent in violation of 35 U.S.C. § 271(b).

156. SK hynix likewise is liable as a contributory infringer of the ’888 Patent under 35 U.S.C. § 271(c). SK hynix has offered to sell and/or sold within the United States the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die and other Accused DRAM Modules that practice the ’888 Patent. The Accused DRAM Modules comprise semiconductor memory devices capable of erasing and writing memory contents in a memory cell using an electric signal, each of which constitutes a material part of the ’888 Patent’s invention that can be incorporated into storage devices. SK hynix has known such Accused DRAM Modules to be especially adapted for practicing, and thus infringing, the ’888 Patent, where the Accused DRAM Modules are not staple articles nor a commodity of commerce suitable for substantial non-infringing use.

157. SK hynix has been aware of the ’888 Patent since the filing of the initial complaint in this case (Dkt. No. 1).

158. SK hynix’s direct, induced, contributory, and willful infringement of the ’888 Patent has caused, and will continue to cause, substantial damage to AMT. Therefore, AMT is entitled to an award of monetary damages adequate to compensate for SK hynix’s past, present, and future infringement, but not less than reasonable royalty, together with pre-and post-judgment interest, attorneys’ fees, and costs as fixed by the Court under 35 U.S.C. §§ 284 and 285.

COUNT FIVE
INFRINGEMENT OF U.S. PATENT NO. 8,400,835

159. AMT repeats and incorporates by reference each preceding paragraph as if fully set

forth herein and further states:

160. SK hynix has directly infringed and continues to directly infringe the ’835 Patent under 35 U.S.C. § 271(a), either literally or through the doctrine of equivalents, by making, using, selling, offering to sell, and/or importing in or into the United States Accused DRAM Modules that practice the ’835 Patent as described below, including at least Claim 1. By way of example, such Accused DRAM Modules include the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die manufactured, used, sold, offered for sale, and/or imported by SK hynix.

161. For example, Claim 1 is illustrative of the claims of the ’835 Patent. It recites “non-volatile semiconductor memory in which a plurality of non-volatile memory cells can be simultaneously written using a plurality of bit lines, the device comprising:”

> M data lines connected to the plurality of bit lines based on a column address signal, where M is an integer of two or more and is smaller than the number of the bit lines;
>
> a drain voltage generation circuit configured to generate a voltage which is a source of a drain voltage of each of the plurality of non-volatile memory cells;
>
> a drain voltage supply line connected to an output of the drain voltage generation circuit; and
>
> M switch circuits and M switch control circuits provided between the M data lines and the drain voltage supply line,
>
> wherein
>
>> each of the M switch circuits includes N switches, where N is an integer of one or more,
>>
>> each of the M×N switches includes a first and a second terminal, and the first terminals of the N switches of each of the M switch circuits are connected at a common point to a corresponding one of the M data lines, and the second terminals of the N switches of each of the M switch circuits are connected at a common point to the drain voltage supply line, and
>>
>> the drain voltage supply line is connected to the M data lines via the M×N switches,

and the M×N switches are controlled by the M switch control circuits.

162. The exemplar SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die manufactured by SK hynix meet every element of this claim.[12]

163. Both the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die contain embedded NOR Flash memory modules.

164. The embedded NOR Flash memory modules of the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die Devices each contain a non-volatile semiconductor memory device in which a plurality of non-volatile memory cells can be simultaneously written using a plurality of bit lines.

165. Circuit extraction shows that this semiconductor memory device comprises M data lines, which is an integer of two or more and is smaller than the number of bit lines.

166. Circuit extraction further shows that this device comprises a drain voltage generation circuit configured to generate a voltage which is a source of a drain voltage of each of the plurality of non-volatile memory cells.

167. Circuit extraction further shows that this device comprises a drain voltage supply line that is connected to an output of the drain voltage generation circuit.

168. Circuit extraction further shows that, within this semiconductor memory device, there are M switch circuits and M switch control circuits provided between the M data lines and the drain voltage supply line.

169. Circuit extraction further shows that each of the M switch circuits includes N switches, and N is an integer of one or greater.

[12] This description of infringement is illustrative and not intended to be an exhaustive or limiting explanation of every manner in which the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die infringe.

170. Circuit extraction further shows that each of the MxN switches includes a first and second terminal, and the first terminals of the N switches of each of the M switch circuits are connected at a common point to a corresponding one of the M data lines, and the second terminals of the N switches of each of the M switch circuits are connected at a common point to the drain voltage supply line.

171. Circuit extraction further shows that the drain voltage supply line is connected to the M data lines via the MxN switches, which are controlled by the M switch control circuits.

172. Because the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die each contain at least one semiconductor memory device in which a plurality of non-volatile memory cells can be simultaneously written using a plurality of bit lines matching the elements of Claim 1, the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die practice at least Claim 1 of the ’835 Patent.

173. Because the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die practice at least Claim 1 of the ’835 Patent, all Accused DRAM Modules similarly infringe. For example, on information and belief, SK hynix DRAM products all contain embedded NOR Flash modules that contain at least one semiconductor memory device in which a plurality of non-volatile memory cells can be simultaneously written using a plurality of bit lines that matches the elements of Claim 1 of the ’835 Patent. For example, in addition to the exemplary SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die, the MDHD5C20101 DDR5 die also contains such an embedded NOR Flash module. Upon information and belief, SK hynix also uses similar design and constituent components across its DRAM products. As a result, all Accused DRAM Modules infringe at least Claim 1 of the ’835 Patent in the same manner as the SK hynix MDHD5E2100E LPDDR5x die and SK hynix

H5CNAG8NM DDR5 die.

174. In addition to directly infringing the ’835 Patent by making, using, selling, offering to sell, and/or importing Accused DRAM Modules into the United States, SK hynix likewise has induced infringement of the ’835 Patent under 35 U.S.C. § 271(b). SK hynix has actively encouraged its customers to directly infringe the ’835 Patent by using, selling, offering for sale, and/or importing electronic devices and products containing the Accused DRAM Modules. SK hynix, through its sales, engineering, and technical staff, actively encourages its customers to purchase the infringing Accused DRAM Modules and incorporate them into the customers’ own consumer products. SK hynix’s staff tout the specifications and features of the Accused DRAM Modules and, on information and belief, even tailor the Accused DRAM Modules to customers’ needs so the Accused DRAM Modules can more seamlessly be incorporated into the customers’ own products. SK hynix also provides ongoing technical support for the Accused DRAM Modules, including firmware updates, to its customers.

175. SK hynix purposefully and knowingly sells and offers to sell the Accused DRAM Modules to its subsidiaries, distributors, and/or customers knowing and expecting that the Accused DRAM Modules or products containing them will enter the United States, where they will be imported, used, sold, and offered for sale by those distributors, customers, and/or other end-users.

176. As a result of SK hynix’s active encouragement and intentional inducement, its customers have committed acts directly infringing the ’835 Patent. SK hynix has known that its customers’ acts constituted direct infringement of at least one claim of the ’835 Patent at least since the filing of this Complaint.

177. Moreover, SK hynix intends to cause, and has taken affirmative steps to induce, infringement by customers and end-users by at least, *inter alia*, encouraging, promoting,

instructing, and/or directing the infringing use of the Accused DRAM Modules.

178. As detailed above, the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die and other Accused DRAM Modules infringe at least Claim 1 of the ’835 Patent. Accordingly, by encouraging, promoting, instructing, and/or directing users to use the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die and other Accused DRAM Modules, SK hynix is actively inducing infringement of the ’835 Patent in violation of 35 U.S.C. § 271(b).

179. SK hynix likewise is liable as a contributory infringer of the ’835 Patent under 35 U.S.C. § 271(c). SK hynix has offered to sell and/or sold within the United States the SK hynix MDHD5E2100E LPDDR5x die and SK hynix H5CNAG8NM DDR5 die devices and other Accused DRAM Modules that practice the ’835 Patent. The Accused DRAM Modules comprise semiconductor memory devices capable of erasing and writing memory contents in a memory cell using an electric signal, each of which constitutes a material part of the ’835 Patent’s invention that can be incorporated into storage devices. SK hynix has known such Accused DRAM Modules to be especially adapted for practicing, and thus infringing, the ’835 Patent, where the Accused DRAM Modules are not staple articles nor a commodity of commerce suitable for substantial non-infringing use.

180. SK hynix has been aware of the ’835 Patent since the filing of this complaint.

181. SK hynix’s direct, induced, contributory, and willful infringement of the ’888 Patent has caused, and will continue to cause, substantial damage to AMT. Therefore, AMT is entitled to an award of monetary damages adequate to compensate for SK hynix’s past, present, and future infringement, but not less than reasonable royalty, together with pre-and post-judgment interest, attorneys’ fees, and costs as fixed by the Court under 35 U.S.C. §§ 284 and 285.

DEMAND FOR JURY TRIAL

182. Plaintiff hereby demands a jury trial for all issues so triable.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff AMT requests entry of judgment in its favor and against Defendant SK hynix as follows:

A. Declaring that SK hynix has directly infringed, either literally and/or under the doctrine of equivalents, and continues to directly infringe, United States Patent Nos. 7,777,557, 7,920,018, 7,969,231, 8,593,888, and 8,400,835;

B. Declaring that SK hynix has induced infringement, and continues to induce infringement, of United States Patent Nos. 7,777,557, 7,920,018, 7,969,231, 8,593,888, and 8,400,835;

C. Declaring that SK hynix has contributorily infringed, and continues to contributorily infringe, United States Patent Nos. 7,777,557, 7,920,018, 7,969,231, 8,593,888, and 8,400,835;

D. Awarding lost profits and/or reasonable royalty damages, including treble damages for willful infringement, to AMT in an amount no less than a reasonable royalty for SK hynix's infringement of the Asserted Patents, together with prejudgment and post-judgment interest and costs as permitted under 35 U.S.C. § 284;

E. Awarding attorneys' fees pursuant to 35 U.S.C. § 285 or as otherwise permitted by law;

F. Ordering SK hynix to pay supplemental damages to AMT, including any ongoing royalties and interest, with an accounting, as needed;

G. Enjoining SK hynix from practicing the Asserted Patents; and

H. Awarding such other costs and further relief as the Court may deem just and proper.

Dated: April 2, 2025

Respectfully submitted,

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that counsel of record who are deemed to have consented to electronic services are being served with a copy of this document via the Court's CM/ECF system per Local Rule CV-5(a)(3) on April 2, 2025.

/s/ Justin A. Nelson
Justin A. Nelson