IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

ELM 3DS INNOVATIONS, LLC, a Delaware limited liability company,

Plaintiff,

v.

SK HYNIX INC., a Korean corporation, SK HYNIX AMERICA INC., a California corporation, HYNIX SEMICONDUCTOR MANUFACTURING AMERICA INC., a California corporation, and SK HYNIX MEMORY SOLUTIONS INC., a Delaware corporation,

Defendants.

C.A. No. 14-cv-1432-LPS

Jury Trial Demanded

SECOND AMENDED COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Elm 3DS Innovations, LLC ("Plaintiff" or "Elm 3DS"), by its attorneys, for its complaint against Defendants SK hynix Inc., and its U.S. subsidiaries and related entities SK hynix America Inc., Hynix Semiconductor Manufacturing America Inc., and SK hynix Memory Solutions Inc. (individually or collectively "Defendants" or "Hynix") hereby alleges as follows:

INTRODUCTION

1. This is an action for patent infringement under the Patent Laws of the United States, 35 U.S.C. § 1 et seq., for infringing the following Elm 3DS patents:

(a) U.S. Patent No. 7,193,239 ("Leedy '239 patent"), entitled "Three Dimensional Structure Integrated Circuit," owned by Elm 3DS Innovations, LLC (attached as Exhibit 1);

(b) U.S. Patent No. 7,474,004 ("Leedy '004 patent"), entitled "Three Dimensional Structure Memory," owned by Elm 3DS Innovations, LLC (attached as Exhibit 2);

(c) U.S. Patent No. 7,504,732 ("Leedy '732 patent"), entitled "Three Dimensional Structure Memory," owned by Elm 3DS Innovations, LLC (attached as Exhibit 3);

(d) U.S. Patent No. 8,410,617 ("Leedy '617 patent"), entitled "Three Dimensional Structure Memory" owned by Elm 3DS Innovations, LLC (attached as Exhibit 4);

(e) U.S. Patent No. 8,629,542 ("Leedy '542 patent"), entitled "Three Dimensional Structure Memory," owned by Elm 3DS Innovations, LLC (attached as Exhibit 5);

(f) U.S. Patent No. 8,653,672 ("Leedy '672 patent"), entitled "Three Dimensional Structure Memory," owned by Elm 3DS Innovations, LLC (attached as Exhibit 6);

(g) U.S. Patent No. 8,791,581 ("Leedy '581 patent"), entitled "Three Dimensional Structure Memory," owned by Elm 3DS Innovations, LLC (attached as Exhibit 7);

(h) U.S. Patent No. 8,796,862 ("Leedy '862 patent"), entitled "Three Dimensional Memory Structure," owned by Elm 3DS Innovations, LLC (attached as Exhibit 8);

(i) U.S. Patent No. 8,841,778 ("Leedy '778 patent"), entitled "Three Dimensional Memory Structure, owned by Elm 3DS Innovations, LLC (attached as Exhibit 9);

(j) U.S. Patent No. 8,907,499 ("Leedy '499 patent"), entitled "Three Dimensional Structure Memory," owned by Elm 3DS Innovations, LLC (attached as Exhibit 10);

(k) U.S. Patent No. 8,928,119 ("Leedy '119 patent"), entitled "Three Dimensional Structure Memory," owned by Elm 3DS Innovations, LLC (attached as Exhibit 11);

(l) U.S. Patent No. 8,933,570 ("Leedy '570 patent"), entitled "Three Dimensional Structure Memory," owned by Elm 3DS Innovations, LLC (attached as Exhibit 12).

2. The Elm 3DS patents cover foundational semiconductor technologies in the design and manufacture of three-dimensional integrated circuits such as memory, processors, and image sensors. These fundamental technologies reduce manufacturing costs while improving speed and efficiency. Among other things, the Elm 3DS patents disclose technologies that enable

semiconductor manufacturers to stack multiple integrated circuits ("die") on top of one another within one integrated circuit package, and to form interconnect circuitry for communication among the stacked die, including interconnect circuitry passing through silicon substrates in stacked integrated circuits.

3. Hynix has infringed and continues to infringe the Elm 3DS patents, directly and indirectly, by making using, selling, offering for sale, and/or importing into the United States, semiconductor products with multiple stacked die and/or electronics products containing the same; and by encouraging third parties to use, sell, offer for sale, and/or import into the United States, Hynix semiconductor products with multiple stacked die and/or electronics products containing the same, with knowledge of the Elm 3DS patents and in the infringement resulting therefrom.

THE PARTIES

4. Elm 3DS Innovations, LLC, is a Delaware limited liability company with its principal address at 26147 Carmelo Street, Carmel, California 93923. Elm 3DS owns patents, originally issued to its President, inventor Glenn J. Leedy, covering Mr. Leedy's groundbreaking technology for thinning, vertically stacking and interconnecting integrated circuits.

5. SK hynix Inc. is a Korean corporation with its principal place of business at 2091, Gyeongchung-daero, Bubal-eub, Icheon-si, Gyeonggi-do, Republic of Korea. On information and belief, SK hynix Inc. previously did business under the name "Hynix Semiconductor Inc." On information and belief, SK hynix Inc. is a global leader in producing semiconductor products, such as DRAM and NAND flash and System IC including CMOS Image Sensors. On information and belief, SK hynix Inc. designs, manufactures, has manufactured, uses, offers for sale, sells and/or imports into the United States—including into Delaware—billions of dollars of memory and semiconductor technologies each year.

6. SK hynix America Inc. is a California corporation with its principal place of business at 3101 North First Street, San Jose, CA 95134. On information and belief, SK hynix America Inc. is a subsidiary of SK hynix Inc. On information and belief, SK hynix America Inc. previously did business under the name "Hynix Semiconductor America Inc." On information and belief, SK hynix America Inc. develops, distributes, markets, manufactures, has manufactured, uses, offers for sale, sells and/or imports into the United States—including into Delaware— memory and logic types of semiconductors, flash memory devices, application-specific integrated circuits, liquid crystal displays, and wireless communications systems, as well as flash drives for MP3 players, video- game consoles, mobile phones, and other consumer electronics.

7. Hynix Semiconductor Manufacturing America Inc. ("HSMA") is a California corporation with its principal place of business at 3101 North First Street, San Jose, CA 95134. On information and belief, HSMA is a wholly-owned subsidiary of SK hynix Inc. On information and belief, HSMA manufactures, has manufactured, uses, offers for sale, sells and/or imports into the United States—including into Delaware— dynamic random access memory chips.

8. SK hynix Memory Solutions Inc. is a Delaware corporation with its principal place of business at 3101 North First Street, San Jose, CA 95134. On information and belief, SK hynix Memory Solutions is a wholly-owned subsidiary of SK hynix Inc. On information and belief, SK hynix Memory Solutions Inc. develops, manufactures, has manufactured, uses, offers for sale, sells and/or imports into the United States—including into Delaware— custom system-on-chip solutions for peripheral data storage devices and provides solutions for NAND flash controllers and solid-state-drive controllers.

JURISDICTION

9. This is an action for patent infringement, over which this Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

10. This Court has personal jurisdiction over each of the Defendants consistent with the requirements of the Due Process Clause of the United States Constitution and the Delaware Long Arm Statute. On information and belief, each Defendant transacts substantial business in Delaware, and/or has committed and continues to commit acts of patent infringement in Delaware as alleged in this Complaint. In addition, SK hynix Memory Solutions Inc. is incorporated under the laws of Delaware. Further, on information and belief, the Defendants have admitted or not contested proper personal jurisdiction in this District in other patent infringement actions.

VENUE

11. Venue is proper in this District pursuant to 28 U.S.C. §§ 1391 (b)-(d) and 1400(b) because Defendants are subject to personal jurisdiction in this District, each has committed acts of patent infringement in this District, each has purposefully availed itself of the rights and benefits of Delaware law and regularly does and solicits business in Delaware, and each derives substantial revenue from things used or consumed in this District. Further, on information and belief, the Defendants have admitted or not contested proper venue in this District in other patent infringement actions.

FACTUAL BACKGROUND

I. The Elm 3DS Patents

12. Plaintiff solely owns all rights, titles, and interests in and to the following United States patents (collectively, the "Elm 3DS Patents"), including the exclusive rights to bring suit with respect to any past, present, and future infringement thereof:

(a) U.S. Patent No. 7,193,239 ("Leedy '239 patent"), entitled "Three Dimensional Structure Integrated Circuit," which was duly and legally issued on March 20, 2007, from a patent application filed July 3, 2003, with Glenn J. Leedy as the named inventor. The Leedy '239 patent claims priority from U.S. Patent No. 5,915,167,

which was duly and legally issued on June 22, 1999, from a patent application filed on April 4, 1997, with Glenn J. Leedy as the named inventor;

(b) U.S. Patent No. 7,474,004 ("Leedy '004 patent"), entitled "Three Dimensional Structure Memory," which was duly and legally issued on January 6, 2009, from a patent application filed December 18, 2003, with Glenn J. Leedy as the named inventor. The Leedy '004 patent claims priority from U.S. Patent No. 5,915,167, which was duly and legally issued on June 22, 1999, from a patent application filed on April 4, 1997, with Glenn J. Leedy as the named inventor;

(c) U.S. Patent No. 7,504,732 ("Leedy '732 patent"), entitled "Three Dimensional Structure Memory," which was duly and legally issued on March 17, 2009, from a patent application filed August 19, 2002, with Glenn J. Leedy as the named inventor. The Leedy '732 patent claims priority from U.S. Patent No. 5,915,167, which was duly and legally issued on June 22, 1999, from a patent application filed on April 4, 1997, with Glenn J. Leedy as the named inventor;

(d) U.S. Patent No. 8,410,617 ("Leedy '617 patent"), entitled "Three Dimensional Structure Memory" which was duly and legally issued on April 2, 2013, from a patent application filed July 4, 2009, with Glenn J. Leedy as the named inventor. The Leedy '617 patent claims priority from U.S. Patent No. 5,915,167, which was duly and legally issued on June 22, 1999, from a patent application filed on April 4, 1997, with Glenn J. Leedy as the named inventor;

(e) U.S. Patent No. 8,629,542 ("Leedy '542 patent"), entitled "Three Dimensional Structure Memory," which was duly and legally issued on January 14, 2014, from a patent application filed March 17, 2009, with Glenn J. Leedy as the named inventor. The Leedy '542 patent claims priority from U.S. Patent No. 5,915,167, which was

duly and legally issued on June 22, 1999, from a patent application filed on April 4, 1997, with Glenn J. Leedy as the named inventor;

(f) U.S. Patent No. 8,653,672 ("Leedy '672 patent"), entitled "Three Dimensional Structure Memory," which was duly and legally issued on February 18, 2014, from a patent application filed May 27, 2010, with Glenn J. Leedy as the named inventor. The Leedy '672 patent claims priority from U.S. Patent No. 5,915,167, which was duly and legally issued on June 22, 1999, from a patent application filed on April 4, 1997, with Glenn J. Leedy as the named inventor;

(g) U.S. Patent No. 8,791,581 ("Leedy '581 patent"), entitled "Three Dimensional Structure Memory," which was duly and legally issued on July 29, 2014 from a patent application filed October 23, 2013, with Glenn J. Leedy as the named inventor. The Leedy '581 patent claims priority from U.S. Patent No. 5,915,167, which was duly and legally issued on June 22, 1999, from a patent application filed on April 4, 1997, with Glenn J. Leedy as the named inventor;

(h) U.S. Patent No. 8,796,862 ("Leedy '862 patent"), entitled "Three Dimensional Memory Structure," which was duly and legally issued on August 5, 2014, from a patent application filed August 9, 2013, with Glenn J. Leedy as the named inventor. The Leedy '862 patent claims priority from U.S. Patent No. 5,915,167, which was duly and legally issued on June 22, 1999, from a patent application filed on April 4, 1997, with Glenn J. Leedy as the named inventor;

(i) U.S. Patent No. 8,841,778 ("Leedy '778 patent"), entitled "Three Dimensional Memory Structure," which was duly and legally issued on September 23, 2014, from a patent application filed August 9, 2013, with Glenn J. Leedy as the named inventor. The Leedy '778 patent claims priority from U.S. Patent No. 5,915,167, which was

duly and legally issued on June 22, 1999, from a patent application filed on April 4, 1997, with Glenn J. Leedy as the named inventor;

(j) U.S. Patent No. 8,907,499 ("Leedy '499 patent"), entitled "Three Dimensional Structure Memory," which was duly and legally issued on December 9, 2014, from a patent application filed January 4, 2013, with Glenn J. Leedy as the named inventor. The Leedy '499 patent claims priority from U.S. Patent No. 5,915,167, which was duly and legally issued on June 22, 1999, from a patent application filed on April 4, 1997, with Glenn J. Leedy as the named inventor;

(k) U.S. Patent No. 8,928,119 ("Leedy '119 patent"), entitled "Three Dimensional Structure Memory," which was duly and legally issued on January 6, 2015, from a patent application filed March 17, 2009, with Glenn J. Leedy as the named inventor. The Leedy '119 patent claims priority from U.S. Patent No. 5,915,167, which was duly and legally issued on June 22, 1999, from a patent application filed on April 4, 1997, with Glenn J. Leedy as the named inventor;

(l) U.S. Patent No. 8,933,570 ("Leedy '570 patent"), entitled "Three Dimensional Structure Memory," which was duly and legally issued on January 13, 2015, from a patent application filed March 17, 2009, with Glenn J. Leedy as the named inventor. The Leedy '570 patent claims priority from U.S. Patent No. 5,915,167, which was duly and legally issued on June 22, 1999, from a patent application filed on April 4, 1997, with Glenn J. Leedy as the named inventor.

Each of the Elm 3DS Patents is valid and enforceable.

13. The Elm 3DS Patents disclose three-dimensional integrated circuit structures and methods for manufacturing the same. In one exemplary embodiment, the patents disclose a three-dimensional structure with thinned and polished integrated circuit substrates that are stacked on top

of one another and electrically connected. The disclosed technology enhances memory speed and efficiency because the signal paths are shorter. The disclosed technology also improves memory density because multiple storage arrays can be stacked within a single package that meets industry form-factor requirements. Industry implementations are referred to as "stacked" memories that are electrically connected with either wire bonds or through-silicon vias ("TSV").

II. The Inventor

14. Glenn J. Leedy is the sole named inventor on the Elm 3DS Patents. Mr. Leedy had been involved in the information technology industry since the 1960s. Working first for established IT companies such as IBM and Fairchild Semiconductor, and eventually as an independent inventor, Mr. Leedy had consistently developed essential technologies that have significantly advanced the state of the art. Today, Mr. Leedy's foundational inventions are used in literally billions of semiconductor products around the world.

15. Mr. Leedy graduated from the University of Michigan with a degree in Mathematics, in 1968.

16. After working at IBM, the University of Michigan, Sycor and ComShare, Mr. Leedy joined Digital Equipment Corporation ("DEC") in 1976. While there, Mr. Leedy assisted in the design of DEC's first 32-bit minicomputer, and in the development of the first 16-bit microprocessor. Mr. Leedy also invented a solution for providing high-speed backup and restore for large databases, an advance in the technology that saved DEC and its customers millions of dollars.

17. Mr. Leedy joined Fairchild Semiconductor in 1978. While there, Mr. Leedy assisted in the development of gate-array programmable logic products. Mr. Leedy's time at Fairchild also provided him with the opportunity to become familiar with the semiconductor fabrication processes used to manufacture the integrated circuits he helped design.

18. In 1981, Mr. Leedy joined National Semiconductor. While there, Mr. Leedy assisted in the development of the computer industry's first 32-bit microprocessor.

19. In 1983, Mr. Leedy left National Semiconductor to start his own business: American Information Systems ("AIS"). Mr. Leedy formed his own business to continue inventing but with independent creative control and ownership of his inventions.

20. Under Mr. Leedy's direction, AIS developed and sold a 32-bit minicomputer. The minicomputer used the 32-bit National Semiconductor microprocessor Mr. Leedy had helped develop, and the minicomputer was instantly popular because it cost a fraction of the 32-bit DEC minicomputer Mr. Leedy worked on for his prior employer. AIS was short-lived, however, as National Semiconductor decided to cease manufacture and development of its 32-bit microprocessor. Without an affordable alternative 32-bit processor on the market, AIS' cost-performance advantage disappeared and it was forced to shut down.

21. After, Mr. Leedy worked for General Research for several years before again going into business for himself in 1989. Mr. Leedy then devoted himself to finding solutions to the various technological challenges he had encountered during his two decades in the IT industry. Over the next few years, Mr. Leedy developed the technologies underlying two patent portfolios that disclose and claim foundational inventions found in modern semiconductors the world over.

22. In the early 1990s, Mr. Leedy applied for and received a portfolio of patents built around his Membrane Dielectric Isolation ("MDI") technology. The MDI technology uses a thin, flexible membrane of dielectric material to electrically isolate semiconductor devices such as transistors, which can then be used to form test circuitry.

23. Mr. Leedy developed the MDI technology in an effort to develop a semiconductor-grade dielectric that could serve as a membrane for testing bare integrated circuits. Mr. Leedy first worked on integrated circuit fabrication equipment in the basement of a friend, and later with an

integrated circuit equipment manufacturer. One key aspect of the MDI technology was Mr. Leedy's development of a tensile low-stress dielectric that could be fabricated into a flexible, free-standing membrane. The ductile characteristics of the novel membrane permitted "at speed" testing of integrated circuits while in wafer form.

24. Mr. Leedy's MDI technology enabled testing methods and devices that ultimately became essential components in the semiconductor manufacturing process, a fact validated by Mr. Leedy's sale of the MDI patent portfolio in 2008 to Taiwan Semiconductor Manufacturing Co., the world's largest semiconductor foundry.

25. Following the successful development of his MDI technology, Mr. Leedy next applied for and received a portfolio of patents built around his Three-Dimensional Stacked "3DS" integrated circuit technology. The 3DS technology uses thinned, polished, flexible substrates to form vertical stacks of integrated circuits that are connected to one another using either wire-bonds, or vertical interconnects that pass through the stacked substrates.

26. Mr. Leedy developed the 3DS technology in an effort to solve the processor-memory bottleneck—a longstanding barrier in computer-system design. The bottleneck arises when a computer's processor is able to request and process data faster than the memory is able to provide it. Mr. Leedy believed that building the memory vertically, by stacking memory circuits on top of each other, rather than laying the memory circuits out horizontally, would shorten the electrical paths used to read and write data, thereby improving memory read/write speeds. Mr. Leedy was the first to understand that, in order to obtain an acceptable yield when stacking and connecting multiple thinned and polished integrated circuits, one needed to use a tensile low-stress dielectric layer to retain the structural integrity of the thinned and polished substrates. This prevented the substrates from cracking or warping, which can cause "bad" die.

27. Mr. Leedy maintained control over the 3DS portfolio until his passing in July 2017, as Elm 3DS's President, and was extremely active in its development. In preparing the 3DS technology for patenting, Mr. Leedy drafted a rich specification that provides—among other things—a detailed account of the technical aspects of his inventions, the benefits associated with the inventions, and various embodiments of the inventions. The disclosures in the specification have provided enormous benefit to the semiconductor industry, and also permitted Mr. Leedy to claim the technical aspects of his inventions across the portfolio in many different ways that the semiconductor industry can understand. He continued to prosecute a number of patent applications that arose from his groundbreaking inventions until July 2017.

28. Mr. Leedy's 3DS technology has allowed semiconductor manufacturers to improve performance and to lower the "cost-per-bit" of memory storage. Using thin integrated circuits allows manufacturers to stack multiple integrated circuits in a single industry-standard package with a thickness of 1.2 mm, a feature demanded by form- factor sensitive industries such as servers and smartphones. Further, using vertical interconnects improves memory speed, reduces power consumption, and shrinks the integrated circuit footprint.

29. Presently, all three leading memory manufacturers—Samsung, SK hynix and Micron—use Mr. Leedy's 3DS technology in various stacked semiconductor products. And in the future the industry's adoption of Mr. Leedy's 3DS technology will become more widespread, as the cost of propagating Moore's Law and fitting more and more transistors on a single silicon die becomes increasingly cost-prohibitive.

30. In 2006, the transistor design node used to fabricate leading microprocessors was 65 nm. In 2015, the transistor design node used to fabricate leading microprocessors is 22 nm. Today, the transistor design node used to fabricate leading microprocessors is 5 nm. According to one industry report, constructing a semiconductor fabrication facility at the 65nm transistor design node

cost under $3 billion, and designing a chip for fabrication on the 65nm node cost under $50 million. http://www.eetimes.com/author.asp?section_id=36&doc_id=1323755 (last accessed Nov. 20, 2014) (attached as Exhibit 13). According to the same report, constructing a semiconductor fabrication facility at the 22 nm node cost nearly $9 billion, and designing a chip for fabrication on the 22 nm node cost nearly $150 million.

31. Mr. Leedy's 3DS technology provides the solution to the compounding cost of semiconductor fabrication at smaller transistor nodes, by providing semiconductor manufacturers with the technologies needed to continue delivering faster, denser, and more efficient memories—it allows the manufacturers to expand memory up rather than out. The manufacturers' adoption of this technology can be seen in their development of technologies such as stacked NAND Flash, the Hybrid Memory Cube ("HMC"), and TSV.

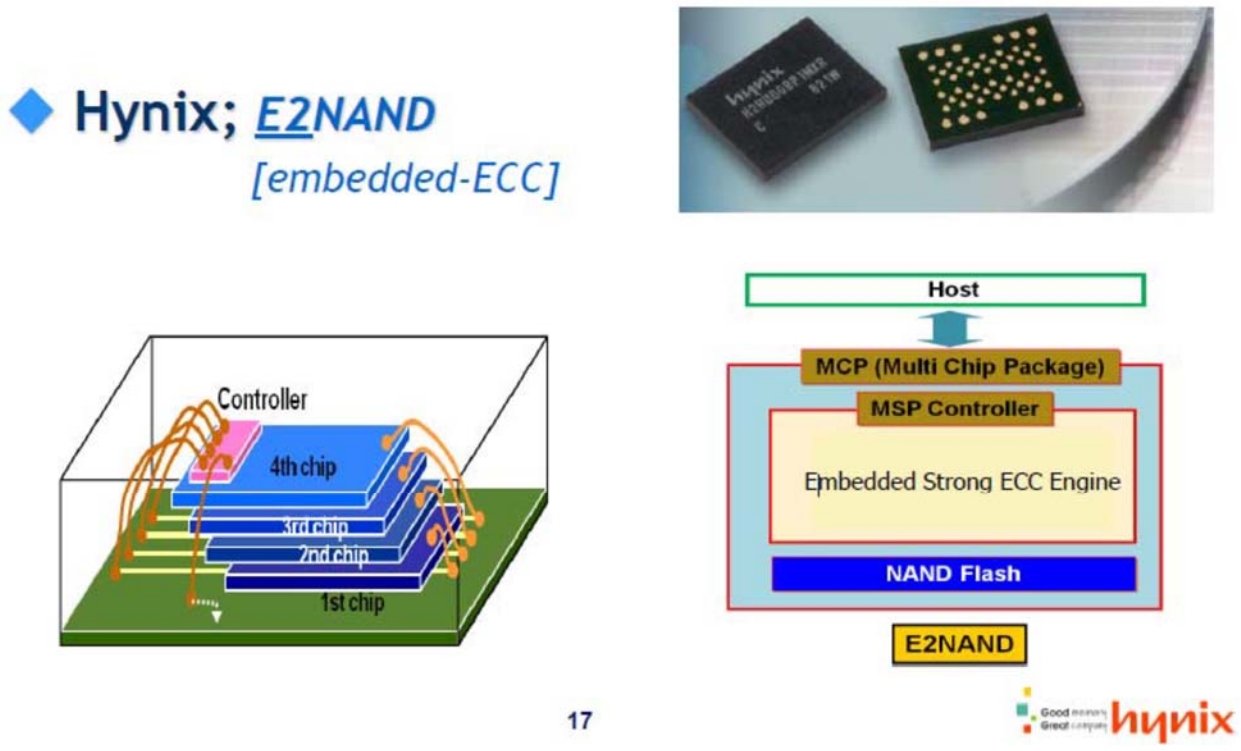
III. The Meeting With Defendants

32. Mr. Leedy personally met with Farhad Tabrizi, VP World Wide Marketing at Hyundai Semiconductor (now sk Hynix) in 2000 or 2001, shortly after issuance of the '167 patent, the first in the 3DS family of patents, in 1999. Mr. Leedy was invited to Korea by Mr. Tabrizi. During the meeting, Mr. Leedy provided approximately 60 Hynix engineers with a presentation and a copy of the '167 patent, and explained the benefits of the patented technology. Mr. Leedy also explained that the technology was available to a limited number of licensees. Terms were not discussed, and a license agreement was never reached.

IV. The Defendants' Direct Infringement

33. Despite not having a license to Mr. Leedy's 3DS technology, Defendants have widely used it in their stacked memory products. Evidence of Defendants' infringement can be found on their website, at www.skhynix.com, where Defendants describe their stacked semiconductor products.

34. According to Hynix's website, Hynix uses stacked memory in at least some eMMC devices: "[A] Flash card that is embedded in the device is called eMMC and it integrates a Flash controller and high-speed NAND flash memory in a single FBGA package. The eMMC controller performs memory management, RAM buffering, defect management and Error Correction Code (ECC) functions, independent of the host CPU . . . The 32GB is designed by stacking eight 41nm 32Gb NAND/MLC flash memory chips [and] an integrated controller all in a single FBGA (fine-pitched ball grid array) package measuring 12 x 18 x 1.4 (mm)." http://www.hynix.com/mail/newsletter_2009_06/newsletter_eng/sub01.html (last accessed Nov. 20, 2014) (attached as Exhibit 14). A Hynix presentation provides a picture of die-stacking technology:

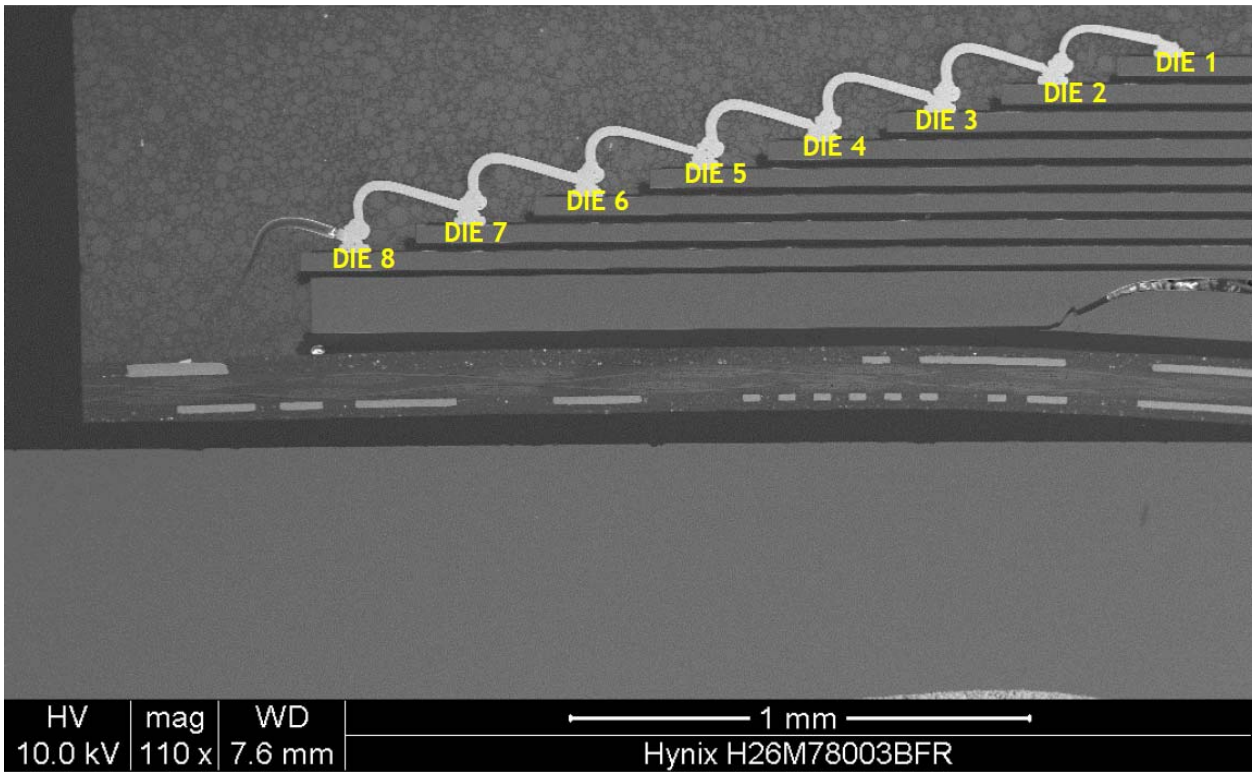


http://www.flashmemorysummit.com/English/Collaterals/Proceedings/2011/20110810_Keynote6_Lee.pdf (last accessed Nov. 20, 2014) (attached as Exhibit 15).

35. Further, Hynix's website represents that its "E2NAND 2.0 comes in a high density stack comprising the NAND Flash Controller and several NAND Flash dies. The existing E2NAND 1.0 is mainly focused on ECC functions to check and correct errors, on the other hand E2NAND 2.0 not only has the ECC function, but also features an advanced buffer and parallel processing function that significantly improves performance." http://hynix.com/mail/newsletter_2010_03/eng/sub03.html (last accessed Nov. 20, 2014) (attached as Exhibit 16).

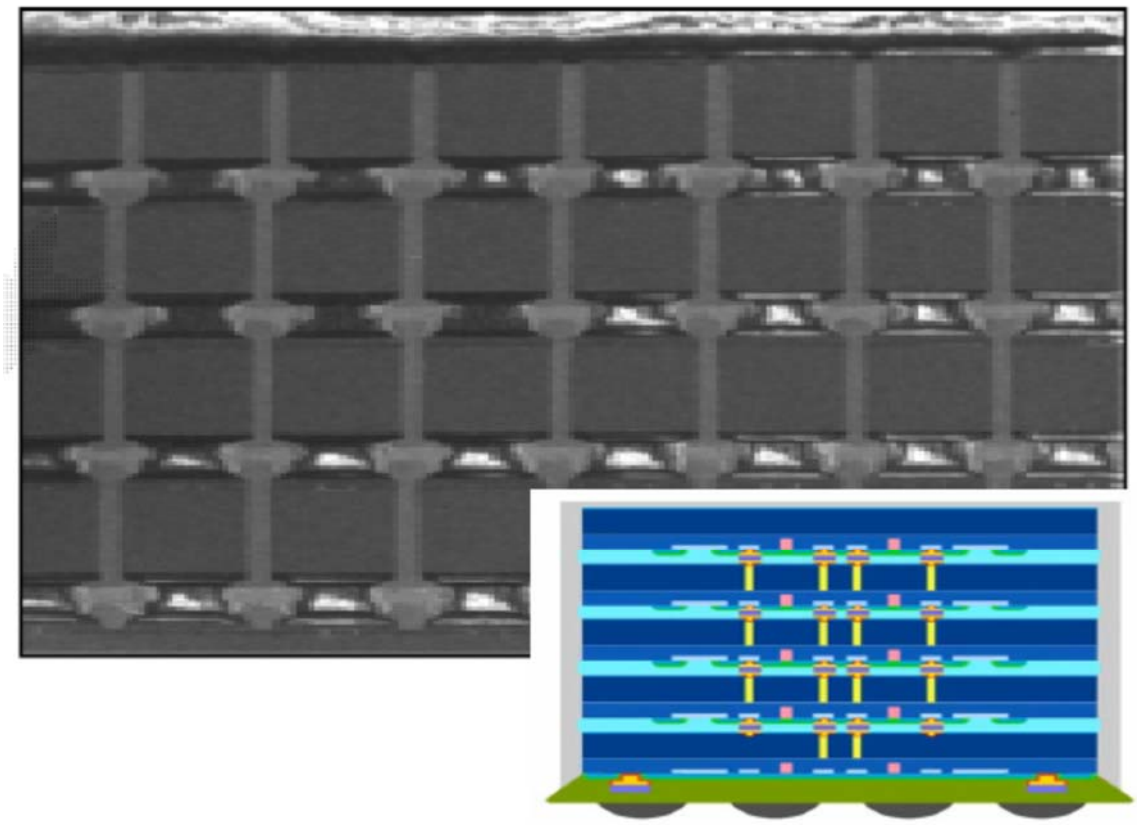
36. Hynix's press releases also discuss stacking memories suitable for mobile applications "Seoul, June 10, 2013 –SK Hynix Inc. (or 'the Company', www.skhynix.com) announced that it has developed the world's first 8Gb (Gigabit) LPDDR3(Low Power DDR3) using its advanced 20nm class process technology. This product is a top-performance mobile memory solution which features high density, ultrahigh speed and low power consumption. The new products can be stacked up and realize a high density of maximum 4GB (Gigabytes, 32Gb) solution in a single package. In addition, the height of this package becomes dramatically thinner than the existing 4Gb-based one. In terms of its high density and competitive package height, it is suitable for the newest trend of the mobile applications." http://www.skhynix.com/en/pr_room/news-data-view.jsp?search.seq=2235 (last accessed Nov. 20, 2014) (attached as Exhibit 17).

37. An example of Hynix's die-stacking technology in Flash NAND memory is shown below:



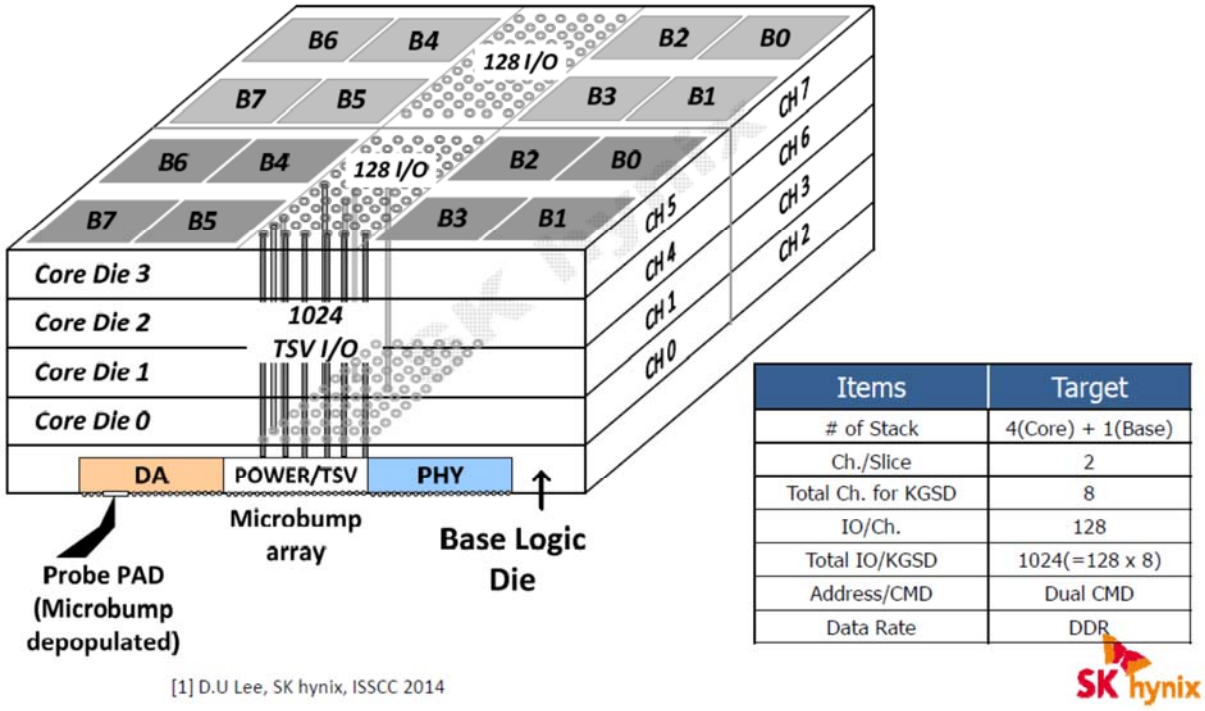
38. Hynix has represented that it is using TSV technology in its High Bandwidth Memory. According to Hynix's website, "HBM (High Bandwidth Memory) is a new future memory using TSV and Wide IO technology in order to satisfy performance requirement that has increased exponentially." http://www.skhynix.com/gl/products/graphics/graphics_info.jsp (last accessed March 22, 2015) (attached as Exhibit 18). Hynix's website provides the following picture of the High Bandwidth Memory:

A Hynix presentation provides the following image of Hynix's TSV technology in High Bandwidth Memory:



http://www.hotchips.org/wp-content/uploads/hc_archives/hc26/HC26-11-day1-epub/HC26.11-3-Technology-epub/HC26.11.310-HBM-Bandwidth-Kim-Hynix-Hot%20Chips%20HBM%202014%20v7.pdf (last accessed Mar. 24, 2015) (attached as Exhibit 19).

39. Hynix has also represented that it is using circuit block stacks or vaults in its High Bandwidth Memory:



(*See* Ex. 19). Each "die" is a separate semiconductor chip, connected by TSVs and organized into vaults, e.g., B0, B1, B2, B3.

40. Hynix's use, sale, offer for sale and/or manufacture of stacked NAND, stacked DRAM, HBM and other stacked semiconductor products in the United States, and/or importation of said products into the United States, constitutes infringement of at least one of the Leedy '239, '004, '732, '617, '542, '672, '581, '862, '778, '499, '119, and '570 patents.

41. Hynix has actual notice of the Leedy '239, '542, and '672 patents and of the infringement alleged herein at least upon filing of the original Complaint [D.I. 1] (if not earlier), pursuant to 35 U.S.C. § 287(a). Hynix has had actual notice of the Leedy '004, '732, '617, '581, '862, '778, '499, '119, and '570 patents and the infringement alleged herein at least upon filing of the First Amended Complaint [D.I. 13] (if not earlier), pursuant to 35 U.S.C. § 287(a).

42. Each of the Defendants has directly infringed, and continues to infringe, literally or under the doctrine of equivalents, one or more claims of the Elm 3DS Patents by acting without

authority to make, have made, use, offer to sell, sell within the United States, and/or import into the United States semiconductor products that practice the patented inventions, and/or electronics products that incorporate said semiconductor products including inter alia, solid state drives ("SSD").

43. The above-described acts of infringement committed by Defendants have caused injury and damage to Plaintiff, and will cause additional severe and irreparable injury and damages in the future.

V. The Defendants' Indirect Infringement

GENERAL ALLEGATIONS

44. Hynix indirectly infringes the Elm 3DS Patents by inducing infringement by others, such as OEMs, manufacturers, importers, resellers, customers and end users under 35 U.S.C. § 271(b) in this District and elsewhere in the United States. On information and belief, Hynix has intended and continues to intend to induce patent infringement by these third parties and has had actual knowledge that the inducing acts would cause infringement or has been willfully blind to the possibility that its inducing acts would cause infringement. For example, Hynix is aware of the Elm 3DS Patents, that the structural aspects of thinned, stacked, and electrically interconnected semiconductors are always present in infringing stacked semiconductor packages and cannot be modified by a purchaser of such stacked semiconductor packages and, therefore, that Hynix's customers will infringe one or more claims of the Elm 3DS Patents by incorporating such stacked semiconductor packages in other products in the United States or importation into the United States, and that subsequent sales of such products in the United States would be a direct infringement of one or more claims of the Elm 3DS Patents.

45. On information and belief, Hynix indirectly infringes one or more claims of the Elm 3DS Patents by inducing numerous third-party OEMs, manufacturers, importers, resellers,

customers, and end users to make, have made, use, sell, offer to sell in, and/or import into the United States, products that incorporate stacked semiconductor products and/or multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another through vertical interconnects within a single chip package, which are manufactured by Hynix and infringe one or more claims of the Elm 3DS Patents.

46. On information and belief, Hynix has designed, marketed and sold infringing products to third parties with knowledge and the specific intent to cause the third parties to in turn make, have made, use, sell, offer to sell in, and/or import into the United States, products incorporating Hynix's stacked semiconductor products and/or multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another through vertical interconnects within a single chip package.

47. On information and belief, Hynix has designed its infringing products such that, as incorporated into the products of third parties, the third-party product infringes one or more claims of the Elm 3DS Patents if made, used, sold, offered for sale in, or imported into the United States.

48. On information and belief, Hynix is aware that by making, having made, using, selling, offering to sell in, or importing into the United States products that incorporate Hynix's infringing products, these third parties directly infringe one or more claims of the Elm 3DS Patents.

49. On information and belief, Hynix is aware that these third parties include, among many others, Apple, Microsoft, Samsung, and HTC; and that products they make, have made, use, sell, offer to sell in, or import into the United States, include, among many others, personal computer and mobile devices.

HYNIX'S PRE-SUIT INDIRECT INFRINGEMENT

A. NOTICE OF PATENTS

50. Hynix had pre-suit notice of the '239 Patent.

51. In 2000 or 2001, Mr. Leedy provided Hynix with a presentation on the Elm 3DS technology and sent a copy of the 5,915,167 patent. The '167 Patent is the parent patent in the Elm 3DS Patent portfolio. The presentation comprised several slides depicting figures from the '167 patent, and explained the benefits of the technology.

52. Upon information and belief, since 2000, Hynix's competitors in the marketplace, such as Samsung, followed Mr. Leedy's Elm 3DS portfolio as it obtained the patents-in-suit.

53. Further, the '239 patent is well-known in the semiconductor industry as it has been cited by at least 40 issued U.S. patents since 2008. These citations were on patents assigned to well-known Hynix competitors in the semiconductor field: Micron Technology, Inc., Elpida Memory, Inc.; Sanyo Electric Co., Ltd., Xilinx, Inc., Tessera, Inc., IBM Corporation, and Sharp. *See* https://www.google.com/patents/US7193239?dq=7,193,239&hl=en&sa=X&ei=_ewUVbDxC8HToASwloH4DA&ved=0CB0Q6AEwAA (attached as Exhibit 20).

54. Hynix, Samsung, Micron Technology, Inc., Xilinx, Inc., and IBM Corporation are all participants in the HMC Consortium, which is a forum of semiconductor manufacturers that have come together for the explicit purpose of developing and adopting an industry-wide interface for DRAM memory architectures that revolves around vertical stacks of DRAM die. On information and belief, these companies discuss intellectual property relating to the HMC design as part of their work in the consortium. *See* http://www.hybridmemorycube.org/about.html (last accessed March 27, 2015) (attached as Exhibit 21).

55. Additionally, Micron Technology, Inc., one of Hynix's largest competitors in the semiconductor industry, routinely cites to the Elm 3DS portfolio. For example, since 2000, 40 patents assigned to Micron have cited to at least one U.S. patent issued to Mr. Leedy, and owned by Elm 3DS.

56. Micron Technology, Inc. has had actual notice of the '239 patent as of 2008 or 2013 as it included the '239 patent on Information Disclosure Statements submitted during prosecution of applications that eventually issued as U.S. patents. Further, Micron submitted a supplemental IDS in 2013 that was devoted entirely to disclosing patents and patent applications belonging to Mr. Leedy, including the '239 patent, the '542 patent, and the '672 patent.

57. Mr. Leedy's Elm 3DS Patent portfolio and in particular, the '239 Patent, were frequently referenced in the semiconductor industry, and were widely and publicly known. The semiconductor industry is tight knit and highly aware of each other's actions. Therefore, based on industry knowledge, and Hynix's meeting with Mr. Leedy in 2000 or 2001, and Hynix's participation in the HMC consortium, Hynix had pre-suit notice of the '239 patent as of the date it issued (March 20, 2007).

B. NOTICE OF HOW PRODUCTS INFRINGE

58. On information and belief, Hynix understood that its customers, companies in the computing, in the computing, consumer, networking, telecommunications, and imaging markets, directly infringed the '239 patent when they imported or sold finished electronics products containing infringing Hynix semiconductor chips in the United States. Examples of infringing electronics products include, but are not limited to, mobile phones, desktop PCs, servers, notebooks and workstations.

59. On information and belief, while Hynix was following Mr. Leedy's Elm 3DS portfolio as it obtained the patents-in-suit, Hynix engineers reviewed the specification and claims of the '239 patent as others in the industry did.

60. Claim 1 to the '239 patent reads as follows:

a plurality of monolithic substrates having integrated circuits formed thereon and stacked in layers such that each layer comprises only one of the substrates, wherein at least one of the

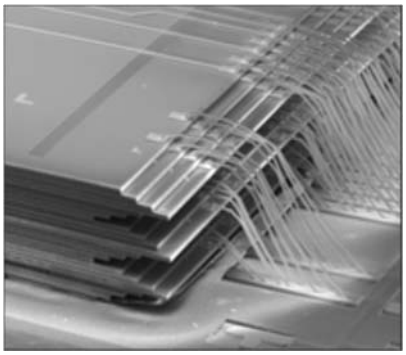
plurality of substrates is a substantially flexible substrate, and wherein a major portion of the monolithic substrate is removed; and between adjacent substrates, a bonding layer bonding together the adjacent substrates, the bonding layer being formed by bonding first and second substantially planar surfaces having a bond-forming material throughout a majority of the surface area thereof.

61. On information and belief, based on its review of the '239 patent specification and claims, Hynix understood when the '239 patent issued that the '239 patent claims covered thinned, stacked semiconductor die that are bonded together in a single package.

62. Hynix is a global manufacturer and marketer of semiconductor devices, principally DRAM and NAND Flash memory, with deep expertise in manufacturing such memory products. Thus, Hynix possessed the technical expertise required to understand the content and scope of the Leedy '239 patent.

63. On information and belief, based on its knowledge of its own products, Hynix understood when the '239 patent issued that certain of its products comprised thinned, stacked semiconductor die that were bonded together in a single package.

64. Hynix's 2009 Memory Product Catalog states that Hynix is a leading supplier of advanced semiconductor memory and that in 2007 it "developed the world's first 24 stack NAND Flash multi-chip package." (Exhibit 22). The Korea Times confirmed this in an article entitled "Hynix Surprised NAND Chip Industry," showing the following image:



See http://www.koreatimes.co.kr/www/news/biz/2007/09/123_9628.html (last accessed March 27, 2015) (attached as Exhibit 23).

65. On information and belief, based on its knowledge of its own products and its review of the '239 patent specification and claims, Hynix understood in 2007 that certain of its products that comprised thinned, stacked semiconductor die that were bonded together in a single package infringed the '239 patent.

C. NOTICE OF HOW CUSTOMERS INFRINGE

66. On information and belief, Hynix further understood in 2007 that its OEM customers were directly infringing the '239 patent when they imported into or sold in the United States, a finished product that contained thinned, stacked semiconductor die that were bonded together in a single package.

67. Hynix's 2007 10-K states that "DRAM is being applied in diverse areas, such as digital home appliances and graphics and mobile devices, driving a steady increase in demand. As for NAND Flash, increased shipments of MP3 phones, navigation devices for automobiles and PMPs are expected to continue pushing the demand trend upward. With the launch of Windows Vista and the potential for improved PC performance, NAND Flash demand from USBs and memory cards are forecast to pick up, and demand for Intel's Robson, Hybrid HDD and SSD (Solid State Disk) for PCs is expected to start in 2007." (Attached as Exhibit 24).

68. On information and belief, Hynix understood that its customers, including global OEMs like Apple, Microsoft, Samsung, and HTC, sold finished products such as mobile phones, desktop PCs, workstations, laptops, and servers in the United States, and/or imported such products into the United States.

69. On information and belief, based on its knowledge of its customers' business activities, Hynix understood that its customers would incorporate its products, including stacked

DRAM or NAND products, into finished electronics products sold around the world, including in the United States. In addition, based on its knowledge of its own products and its review of the '239 patent specification and claims, Hynix understood that when its customers sold finished electronics products containing Hynix stacked DRAM and NAND in the United States, or imported such electronics products into the United States, those acts constituted direct infringement of the '239 patent.

70. Hynix was aware that its stacked DRAM and NAND products cannot be used or sold in a manner that does not infringe. Hynix is aware that the infringing stacked memory products are integral components of the computer and mobile products incorporating them, and that the infringing stacked memory products were built into the computer and mobile products and cannot be removed or disabled by a purchaser of the consumer products containing the infringing circuits. Therefore, Hynix was aware that its customers would infringe one or more claims of the '239 Patent by selling the products as-sold and as-marketed by Hynix, and that subsequent sales of such products in the United States would be direct infringement of the '239 Patent.

D. ENCOURAGEMENT / SPECIFIC INTENT TO INDUCE THE INFRINGEMENT

71. On information and belief, Hynix actively encouraged its customers to directly infringe the '239 patent by encouraging its customers to use Hynix products comprising thinned, stacked semiconductor die that were bonded together in a single package, in their finished products, while understanding that some of those finished products would be sold in or imported into the United States.

72. Hynix's 2007 10-K indicates that Hynix actively promoted the purchase and adoption of its products, including at least stacked NAND products comprising thinned, stacked semiconductor die that were bonded together in a single package, to numerous customers, including global OEMs like STMicroelectronics. Hynix's 10-K states that it "entered into a strategic alliance

with STMicroelectronics to develop and market a full portfolio of NAND Flash memory devices. This partnership allies Hynix's cost leadership and memory technologies with STMicroelectronic's applied technologies and broad customer base, creating a win-win agreement for both companies." (*See* Ex. 24.)

73. Hynix's 2008 10-K indicates that Hynix actively promotes the purchase and adoption of its products, including at least DRAM products comprising thinned, stacked semiconductor die that were bonded together in a single package, to numerous customers. Hynix's 10-K states that "Hynix will secure its market presence in 2008 by focusing on profitability, customer management and the establishment of new growth engines . . . In the customer management field, we will maintain our No. 1 position in strategic accounts, focus on marketing to core customers, and expand our server sales. The competition in 2008 DRAM market is expected to escalate, and Hynix will therefore work to increase sales to existing customers and mitigate price factors by increasing our sales ratio of premium products and successfully migrating to finer technology nodes.

74. On information and belief, Hynix understood that its customers including global OEMs like Apple, Microsoft, Samsung, and HTC sold finished products such as mobile phones, desktop PCs, workstations, laptops, and servers in the United States, and imported such products into the United States.

75. On information and belief, based on its knowledge of its customers' business activities, its own products, and its review of the '239 patent specification and claims, Hynix understood that when it encouraged its customers to purchase and adopt at least stack DRAM products comprising thinned, stacked semiconductor die that were bonded together in a single package, it was encouraging those customers to directly infringe the '239 patent by selling finished electronics products containing Hynix stack DRAM in the United States, or importing such electronics products into the United States.

76. Hynix's marketing efforts, partnerships, and sales volume all evidence its intent to induce companies to infringe one or more claims of the '239 patent. Given (1) its likely review of the '239 patent specification and claims, (2) its understanding that the '239 patent claims covered thinned, stacked semiconductor die that are bonded together in a single package, (3) its knowledge that it manufactured and sold at least stacked mobile memory products comprising thinned, stacked semiconductor die that are bonded together in a single package, (4) its knowledge that its OEM customers directly infringed by importing or selling into the United States, a finished product that contained thinned, stacked semiconductor die that are bonded together in a single package, and (5) its sales and marketing materials encouraging third parties to include Hynix's stacked semiconductors in their products, Hynix had the specific intent to induce infringement of the '239 patent, or has been willfully blind to the direct infringement it is inducing.

HYNIX'S POST-SUIT INDIRECT INFRINGEMENT

A. NOTICE OF PATENTS

77. At the very latest, Hynix has had actual notice of the Leedy '239, '542, and '672 patents and of its infringement as of the date of the original Complaint [D.I. 1]. At the very latest, Hynix has had actual notice of the Leedy '004, '732,'617, '581, '862, '778, '499, '119, and '570 patents and of its infringement as of the date of the First Amended Complaint [D.I. 13].

B. NOTICE OF HOW PRODUCTS INFRINGE

78. Hynix is aware of the manner in which its stacked semiconductor products infringe the Elm 3DS patents as set forth in paragraphs 33 – 39 of the original Complaint, and at paragraphs 33 – 37, 41 – 42 of the First Amended Complaint.

79. Hynix is aware of the manner in which its stacked semiconductor products using TSV technology infringe the Elm 3DS patents as set forth at paragraphs 38 – 42 of the First Amended Complaint.

C. NOTICE OF HOW CUSTOMERS INFRINGE

80. On information and belief, products sold or manufactured in the United States that incorporate Hynix's infringing stacked semiconductor products and/or multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another using TSV technology include, but are by no means limited to, the Apple iPhone 6, the Apple iPhone 6 Plus, the Apple iPad Air 2, the Microsoft Surface Pro 2, the Microsoft Surface Pro 3, the Samsung Galaxy Tab, and the HTC 601. These and other products incorporating Hynix's infringing products are currently offered for sale in the United States.

81. Hynix is aware that the products cannot be used or sold in a manner that does not infringe. Hynix is aware that the infringing stacked memory products are integral components of the computer and mobile products incorporating them, and that the infringing stacked memory products are built into the computer and mobile products and cannot be removed or disabled by a purchaser of the consumer products containing the infringing circuits. Therefore, Hynix is aware that its customers will infringe one or more claims of the Elm 3DS patents by selling the products as-sold and as-marketed by Hynix, and that subsequent sales of such products in the United States would be direct infringement of the Elm 3DS patents.

D. ENCOURAGEMENT / SPECIFIC INTENT TO INDUCE THE INFRINGEMENT

82. On information and belief, Hynix's customers are exclusively or almost exclusively third-party businesses such as OEMs, manufacturers, and resellers. On information and belief, Hynix works closely with these third-party customers to engineer smartphones, notebooks, desktop computers, server systems, and other computing and mobile devices that incorporate and depend on Hynix's infringing stacked semiconductor products to function.

83. On information and belief, Hynix sells its infringing products to its customers, such as OEMs, manufacturers, importers, resellers, customers, and end users, with the specific intent to induce infringement of one or more claims of the Elm 3DS Patents.

84. Through its marketing of the infringing stacked semiconductor products, Hynix specifically intends for its customers, such as OEMs, manufacturers, importers, resellers, customers, and end users, to purchase Hynix's stacked semiconductor products and to incorporate them into end products that directly infringe one or more claims of the Elm 3DS Patents. Hynix routinely markets its infringing stacked memory products to third parties for inclusion in products that are sold to customers in the United States.

85. On information and belief, Hynix's entire business is oriented toward manufacturing memory circuits, many of which infringe one or more claims of the Elm 3DS Patents. For instance, on the "Company Overview—Sales by Products" section of the Hynix corporate website, all sales are attributable to either "DRAM" or "NAND Flash & Others." *See* http://www.skhynix.com/en/invest/info/importance.jsp (last accessed Nov. 20, 2014) (attached as Exhibit 25).

86. Hynix's website touts Hynix as "the global leader in producing semiconductor, such as DRAM and NAND flash." *See* https://www.skhynix.com/en/company/corp_overview.jsp (last accessed Nov. 20, 2014) (attached as Exhibit 26). The CEO has said that "[t]he company is characterized by its unchanging tradition of focusing on goals, defying limits and putting customers first." *See* https://www.skhynix.com/en/company/ceo.jsp (last accessed Nov. 20, 2014) (attached as Exhibit 27). Hynix's customers, of course, coordinate with Hynix to import into the United States and sell billions of dollars worth of products every year, which infringe and benefit from one or more claims of the Elm 3DS Patents.

87. Hynix also advertises on its website that "SK Hynix will enhance product portfolios with [High Bandwidth Memory] technology to diversify into various applications such as Graphic card, Network/HPC and PC/Game console." *See* http://www.skhynix.com/gl/products/graphics_info.jsp (last accessed Mar. 13, 2015) (attached as Exhibit 28). On information and belief, Hynix has expressed that High Bandwith Memory may also be used in super computers and servers. On information and belief, Hynix does not make the referenced applications. On information and belief, examples of third-party electronics products that incorporate or will incorporate Hynix's High Bandwith Memory include, but are not limited to the Nvidia GeForce "Pascal" graphics adapter.

88. On information and belief, Hynix has sales centers, sales staff, and technical support in the United States, with the specific goal of selling its infringing stacked semiconductor products in the United States. Hynix maintains at least five offices devoted to selling and servicing its products in the United States. *See* http://www.skhynix.com/en/company/global2.jspm (last accessed Nov. 20, 2014) (attached as Exhibit 29).

89. On information and belief, Hynix has marketed its stacked semiconductor products for mobile phones specifically to third parties. The company markets these infringing products with the goal of including them in third-party products that are sold in the United States. As evidenced by Hynix's publicly available revenue figures, Hynix succeeds at this goal. These marketing activities demonstrate specific intent to induce infringement.

90. Hynix also provides OEMs, manufacturers, importers, resellers, customers, and end users instructions, user guides, and technical specifications on how to incorporate its infringing stacked semiconductor products into electronics products that are made used, sold, offered for sale in and/or imported into the United States. When OEMs, manufacturers, importers, resellers, customers, and end users follow such instructions, user guides, and technical specifications and

embed the stacked semiconductor products in end products and make, have made, use, offer to sell, sell, or import into the United States, they directly infringe one or more claims of the Elm 3DS Patents. Hynix knows that by providing such instructions, user guides, and technical specifications, OEMs, manufacturers, importers, resellers, customers, and end users follow these instructions, user guides, and other technical specifications, and directly infringe one or more claims of the Elm 3DS Patents. Hynix thus knows that its actions actively induce infringement.

91. On information and belief, the target for these marketing efforts are OEMs or other manufacturers who then incorporate Hynix's infringing stacked semiconductor products into electronics products that are made, used, sold, offered for sale in and/or imported into the United States. These marketing efforts demonstrate Hynix's attempts to induce infringement.

92. For example, at the 2014 Flash Memory Summit, in Santa Clara, California, Hynix showcased its latest memory technologies, in an effort to encourage various OEMs, manufacturers, importers, resellers, customers, and end users to include its infringing technology in its computers, server hardware, and mobile devices. This event was attended by companies that make, have made, use, offer to sell, sell, or import in the United States products that use memory components such as those made by Hynix. At the Flash Memory Summit Hynix made presentations touting the virtues of its memory products, including products that infringe.

93. In addition, Hynix showcased its High Bandwidth Memory at the 2014 MemCon conference in Santa Clara, California, in an effort to encourage various OEMs, manufacturers, importers, resellers, customers, and end users to include its infringing technology in their electronics products. *See* http://www.memcon.com/agenda.aspx (last accessed Mar. 13, 2015). In its presentation, Hynix revealed that target applications include System-in-Package ("SiP"). *See* http://www.memcon.com/pdfs/proceedings2014/NET104.pdf (last accessed Mar. 13, 2015) (attached as Exhibit 30). On information and belief, this event was attended by companies that

make, use, offer to sell, sell, or import into the United States products that use memory components such as those made by Hynix. At the MemCon conference, Hynix made a presentation touting the virtues of its High Bandwith [sic] Memory, an infringing product.

94. On information and belief, products sold or manufactured in the United States that incorporate Hynix's infringing stacked semiconductor products and/or multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another using TSV technology include, but by no means are limited to, the Apple iPhone 6, the Apple iPhone 6 Plus, the Apple iPad Air 2, the Microsoft Surface Pro 2, the Microsoft Surface Pro 3, the Samsung Galaxy Tab, and the HTC 601. These and other products incorporating Hynix's infringing products are currently offered for sale in the United States. Hynix is aware of the manner in which its stacked products infringe the Elm 3DS patents as set forth in paragraphs 33 – 39 of the original Complaint, and at paragraphs of 33 – 37 and 41 – 42 of this First Amended Complaint.

95. The specific products listed herein are merely examples of the myriad products in which Hynix's infringing circuits are incorporated. Hynix indirectly infringes one or more claims of the Elm 3DS Patents by pursuing third-party customers for its products who then directly infringe by making, having made, using, offering to sell, selling, or importing in the United States products that infringe. Hynix markets and touts in press releases, announcements, and other materials that its infringing products are sold by these direct infringers.

96. Hynix derives significant revenue by selling semiconductors to third parties who directly infringe the Elm 3DS Patents in the United States. For instance, Hynix had sales of at least $12 billion of memory products in 2013. *See* http://www.skhynix.com/en/invest/info/share.jsp (last accessed Nov. 20, 2014) (attached as Exhibit 31.)

97. Hynix's marketing efforts, press releases, sales volume, and partnerships all evidence its intent to induce companies to infringe one or more claims of the Elm 3DS Patents. Because

Hynix has marketed its products to customers which it knows infringe one or more claims of the Elm 3DS Patents, it had the manifest specific intent to cause direct infringement and is therefore liable for indirect infringement. Given: (1) Hynix's knowledge that its stacked semiconductor products infringe one or more claims of the Elm 3DS Patents; (2) the volume of Hynix's stacked semiconductor sales within the United States; (3) Hynix's ubiquitous sales and marketing efforts directed to inducing third parties to include Hynix's stacked semiconductors in their products; (4) the fact that many third parties directly infringe one or more claims of the Elm 3DS Patents by making, having made, using, offering to sell, selling, or importing products that incorporate Hynix's stacked semiconductor products, Hynix has had specific intent to induce infringement or has been willfully blind to the direct infringement it is inducing.

98. On information and belief, some third parties make, have made, use, offer to sell, sell, or import products in the United States incorporating an infringing Hynix semiconductor product bearing a Hynix part number that is not publicly available. For instance, Hynix publishes extensive catalogs of its various memory products. *See, e.g.*, https://www.skhynix.com/products/mobile/mobile.jsp?info.ramCategory=&info.ramKind=33&info.eol=NOT&posMap=MobileDDR3 (last accessed Nov. 20, 2014) (attached as Exhibit 32.) The fact that these parties incorporate a part supplied by Hynix that is not listed in Hynix's product listings demonstrates that Hynix coordinates with these third parties to provide proprietary stacked memory products. For example, a part designated by Hynix as H9CKNNN8KTMRWR has been found in Apple's iPhone 6. Yet, on information and belief, that part number does not appear in Hynix's product catalogs or website. Coordination like this with third-parties is evidence of Hynix's specific intent to induce infringement because it is designing products specifically with the sole use of incorporation into the infringing products of direct infringers.

99. The above-described acts of infringement committed by Defendants have caused injury and damage to Plaintiff, and will cause additional severe and irreparable injury and damages in the future.

FIRST CLAIM FOR RELIEF

Infringement of U.S. Patent No. 7,193,239

100. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 99 above as if specifically set forth herein.

101. Defendants have directly infringed one or more claims of the Leedy '239 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271. The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

102. Defendants have indirectly infringed one or more claims of the Leedy '239 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271(b). The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

103. As a consequence of Defendants' infringement, Plaintiff is entitled to recover damages adequate to compensate it for the injuries complained of herein, but in no event less than a reasonable royalty.

SECOND CLAIM FOR RELIEF

Infringement of U.S. Patent No. 7,474,004

104. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 99 above as if specifically set forth herein.

105. Defendants have directly infringed one or more claims of the Leedy '004 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271. The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another through vertical interconnects within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

106. Defendants have indirectly infringed one or more claims of the Leedy '004 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271(b). The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another through vertical interconnects within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

107. As a consequence of Defendants' infringement, Plaintiff is entitled to recover damages adequate to compensate it for the injuries complained of herein, but in no event less than a reasonable royalty.

THIRD CLAIM FOR RELIEF

Infringement of U.S. Patent No. 7,504,732

108. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 99 above as if specifically set forth herein.

109. Defendants have directly infringed one or more claims of the Leedy '732 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271. The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another through vertical interconnects within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

110. Defendants have indirectly infringed one or more claims of the Leedy '732 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271(b). The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another through vertical interconnects within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

111. As a consequence of Defendants' infringement, Plaintiff is entitled to recover damages adequate to compensate it for the injuries complained of herein, but in no event less than a reasonable royalty.

FOURTH CLAIM FOR RELIEF

Infringement of U.S. Patent No. 8,410,617

112. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 99 above as if specifically set forth herein.

113. Defendants have directly infringed one or more claims of the Leedy '617 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271. The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one

another through vertical interconnects within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

114. Defendants have indirectly infringed one or more claims of the Leedy '617 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271(b). The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another through vertical interconnects within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

115. As a consequence of Defendants' infringement, Plaintiff is entitled to recover damages adequate to compensate it for the injuries complained of herein, but in no event less than a reasonable royalty.

FIFTH CLAIM FOR RELIEF

Infringement of U.S. Patent No. 8,629,542

116. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 99 above as if specifically set forth herein.

117. Defendants have directly infringed one or more claims of the Leedy '542 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271. The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

118. Defendants have indirectly infringed one or more claims of the Leedy '542 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271(b). The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate

multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

119. As a consequence of Defendants' infringement, Plaintiff is entitled to recover damages adequate to compensate it for the injuries complained of herein, but in no event less than a reasonable royalty.

SIXTH CLAIM FOR RELIEF

Infringement of U.S. Patent No. 8,653,672

120. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 99 above as if specifically set forth herein.

121. Defendants have directly infringed one or more claims of the Leedy '672 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271. The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

122. Defendants have indirectly infringed one or more claims of the Leedy '672 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271(b). The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

123. As a consequence of Defendants' infringement, Plaintiff is entitled to recover damages adequate to compensate it for the injuries complained of herein, but in no event less than a reasonable royalty.

SEVENTH CLAIM FOR RELIEF

Infringement of U.S. Patent No. 8,791,581

124. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 99 above as if specifically set forth herein.

125. Defendants have directly infringed one or more claims of the Leedy '581 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271. The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another through vertical interconnected circuit block stacks or vaults within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

126. Defendants have indirectly infringed one or more claims of the Leedy '581 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271(b). The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another through vertical interconnected circuit block stacks or vaults within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

127. As a consequence of Defendants' infringement, Plaintiff is entitled to recover damages adequate to compensate it for the injuries complained of herein, but in no event less than a reasonable royalty.

EIGHTH CLAIM FOR RELIEF

Infringement of U.S. Patent No. 8,796,862

128. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 99 above as if specifically set forth herein.

129. Defendants have directly infringed one or more claims of the Leedy '862 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271. The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

130. Defendants have indirectly infringed one or more claims of the Leedy '862 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271(b). The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

131. As a consequence of Defendants' infringement, Plaintiff is entitled to recover damages adequate to compensate it for the injuries complained of herein, but in no event less than a reasonable royalty.

NINTH CLAIM FOR RELIEF

Infringement of U.S. Patent No. 8,841,778

132. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 99 above as if specifically set forth herein.

133. Defendants have directly infringed one or more claims of the Leedy '778 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271. The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another through vertical interconnects within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

134. Defendants have indirectly infringed one or more claims of the Leedy '778 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271(b). The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another through vertical interconnects within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

135. As a consequence of Defendants' infringement, Plaintiff is entitled to recover damages adequate to compensate it for the injuries complained of herein, but in no event less than a reasonable royalty.

TENTH CLAIM FOR RELIEF

Infringement of U.S. Patent No. 8,907,499

136. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 99 above as if specifically set forth herein.

137. Defendants have directly infringed one or more claims of the Leedy '499 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271. The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another within a single chip package and through vertical interconnected circuit block stacks or

vaults, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

138. Defendants have indirectly infringed one or more claims of the Leedy '499 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271(b). The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another within a single chip package and through vertical interconnected circuit block stacks or vaults, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

139. As a consequence of Defendants' infringement, Plaintiff is entitled to recover damages adequate to compensate it for the injuries complained of herein, but in no event less than a reasonable royalty.

ELEVENTH CLAIM FOR RELIEF

Infringement of U.S. Patent No. 8,928,119

140. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 99 above as if specifically set forth herein.

141. Defendants have directly infringed one or more claims of the Leedy '119 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271. The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another through vertical interconnects within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

142. Defendants have indirectly infringed one or more claims of the Leedy '119 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271(b). The infringing

products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another through vertical interconnects within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

143. As a consequence of Defendants' infringement, Plaintiff is entitled to recover damages adequate to compensate it for the injuries complained of herein, but in no event less than a reasonable royalty.

TWELFTH CLAIM FOR RELIEF

Infringement of U.S. Patent No. 8,933,570

144. Plaintiff incorporates by reference the allegations set forth in paragraphs 1 through 99 above as if specifically set forth herein.

145. Defendants have directly infringed one or more claims of the Leedy '570 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271. The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another through vertical interconnects within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

146. Defendants have indirectly infringed one or more claims of the Leedy '570 patent, literally and/or under the doctrine of equivalents, in violation of 35 U.S.C. § 271(b). The infringing products include, but are not limited to, certain of Hynix semiconductor products that incorporate multiple semiconductor die that are thinned, stacked on top of and electrically connected to one another through vertical interconnects within a single chip package, and Hynix electronics products that incorporate such chip packages. The infringement remains ongoing.

147. As a consequence of Defendants' infringement, Plaintiff is entitled to recover damages adequate to compensate it for the injuries complained of herein, but in no event less than a reasonable royalty.

JURY TRIAL DEMANDED

Elm 3DS Innovations, LLC, hereby demands a trial by jury on all claims and issues so triable.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff respectfully requests that this Court:

A. enter judgment that each of the Defendants has infringed one or more claims of one or more of the Elm 3DS Patents;

B. enter an order, pursuant to 35 U.S.C. § 284, awarding to Plaintiff damages adequate to compensate for Defendants' infringement of the Elm 3DS Patents (and, if necessary, related accountings), in an amount to be determined at trial, but not less than a reasonable royalty;

C. enter an order, pursuant to 35 U.S.C. § 285, deeming this to be an "exceptional case" and thereby awarding to Plaintiff its reasonable attorneys' fees, costs, and expenses;

E. enter an order that Defendants account for and pay to Plaintiff the damages to which Plaintiff is entitled as a consequence of the infringement;

F. enter an order awarding to Plaintiff pre- and post-judgment interest at the maximum rates allowable under the law; and

G. enter an order awarding to Plaintiff such other and further relief, whether at law or in equity, that this Court deems just and proper.

Dated: June 22, 2020

Respectfully submitted,

FARNAN LLP

/s/ Michael J. Farnan

Brian E. Farnan (#4089)
Michael J. Farnan (#5165)
919 North Market Street
12th Floor
Wilmington, DE 19801
Tel: (302) 777-0300
Fax: (302) 777-0301
bfarnan@farnanlaw.com
mfarnan@farnanlaw.com

Adam K. Mortara (*pro hac vice*)
Matthew R. Ford (*pro hac vice*)
BARTLIT BECK LLP
54 West Hubbard Street, Suite 300
Chicago, IL 60654
Tel: (312) 494-4400
Fax: (312) 494-4440
adam.mortara@bartlitbeck.com
matthew.ford@bartlitbeck.com

John M. Hughes (*pro hac vice*)
Nosson D. Knobloch (*pro hac vice*)
Katherine L.I. Hacker (*pro hac vice*)
Daniel C. Taylor (*pro hac vice*)
BARTLIT BECK LLP
1801 Wewatta Street, Suite 1200
Denver, CO 80202
Tel: (303) 592-3100
Fax: (303) 592-3140
john.hughes@bartlitbeck.com
nosson.knobloch@bartlitbeck.com
kat.hacker@bartlitbeck.com
dan.taylor@bartlitbeck.com

Counsel for Plaintiff
ELM 3DS INNOVATIONS, LLC