UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

ACQIS LLC, a Texas limited liability company, Plaintiff, v. Hon Hai Precision Industry Co., Ltd. d/b/a Foxconn, a Taiwanese corporation, Defendant.	Civil Action No. 6:23-cv-264 JURY TRIAL DEMANDED

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff ACQIS LLC ("Plaintiff" or "ACQIS"), by its attorneys, hereby alleges patent infringement against Defendant Hon Hai Precision Industry Co., Ltd. d/b/a Foxconn ("Defendant" or "Hon Hai") as follows:

INTRODUCTION

1. This is an action for patent infringement under the United States Patent Laws, 35 U.S.C. § 1 *et seq*. Beginning in the late 1990s, Dr. William Chu founded ACQIS and invented a variety of pioneering computer technologies that employed serial transmission along low voltage differential signal (LVDS) channels to dramatically increase the speed at which data can be transmitted while also reducing power consumption and noise. Dr. Chu's inventions have become foundational in the computer industry, and are found in a variety of data transmission systems, including PCI Express (PCIe) and/or USB 3.x[1] transactions.

[1] As used herein, "USB 3.x" refers to USB 3.0 and subsequent versions, including USB 3.1, USB 3.2, and any other subsequent versions.

2. Hon Hai has infringed the following patents owned by ACQIS: U.S. Patent Nos. 9,703,750 ("'750 patent"), 8,977,797 ("'797 patent"), 9,529,769 ("'769 patent"), RE45,140 ("'140 patent"), and RE44,654 ("'654 patent") (collectively, the "ACQIS Patents"). Copies of the ACQIS Patents are attached to this Complaint as Exhibits 1-5.

3. Specifically, Hon Hai has directly infringed the ACQIS Patents through at least the importation into the United States, and/or sale, offer to sell, or use in the United States, of computer products made abroad using ACQIS's patented processes.

4. ACQIS seeks damages and other relief for Hon Hai's infringement of the ACQIS Patents. ACQIS is entitled to past damages because, without limitation, it asserts method claims which do not require marking.

THE PARTIES AND RELATED ENTITIES

5. Plaintiff ACQIS LLC is a limited liability company organized and existing under the laws of the State of Texas, with offices at 411 Interchange Street, McKinney, Texas 75071. A related entity, ACQIS Technology, Inc., is a corporation organized under the laws of the State of Delaware, having its principal place of business at 1503 Grant Road, Suite 100, Mountain View, California 94040. ACQIS LLC is operated from California, where its President, Dr. William Chu, resides. Dr. Chu is also the Chief Executive Officer of ACQIS Technology, Inc.

6. Hon Hai is a corporation organized and existing under the laws of Taiwan, with its principal place of business at No. 66, Zhongshan Road, Tucheng Industrial Zone, Tucheng Dist., New Taipei City, Taiwan, R.O.C. Hon Hai is an original design manufacturer providing a variety of support services related to design, manufacturing, and after-sales service for information and communication technology products. Upon information and belief, and as described below, Defendant Hon Hai contracts with purchasers for manufacture and sale of electronics, which Hon Hai manufactures through its corporate subsidiaries and affiliates, then imports into the United

States with Hon Hai as the shipper and either the customer, or Hon Hai itself, as the consignee of the imports.

7. Hon Hai is the parent company of a multinational conglomerate that operates under the name "Foxconn." Hon Hai describes itself as "the world's largest electronics manufacturer."[2] According to its website, "[t]he company has established R&D and manufacturing centers in other markets around the world including China, India, Japan, Vietnam, Malaysia, Czech Republic, U.S. and more."[3]

8. Hon Hai, individually and through its related corporate entities, manufactures and assembles computer products for its customers.

9. Hon Hai has manufactured phones for sale by entities in the United States since approximately 2007.

10. By mid-2017, for example, Hon Hai was manufacturing "150 million iPhones each year, along with 20 million iPads and other electronics" which it then sells to its third-party customer.[4] It employed over a million workers in the People's Republic of China alone, including 250,000 workers at a single factory complex in Zhengzhou.[5]

11. As of early 2023, analysts estimate that Hon Hai "assembles around 70% of iPhones, and the Zengzhou plant produces the majority of its premium models including the iPhone 14

[2] Company Profile, https://www.foxconn.com/en-us/about/group-profile; *see also* Yoko Kubota, *Foxconn Feels Chill as Apple Slips*, THE WALL STREET JOURNAL, May 15, 2018, at B4 (describing Hon Hai as "the world's largest contract electronics maker"); *Foxconn's January sales surge as China COVID disruption shaken off*, ETMAG.COM, Feb. 7, 2023.
[3] Company Profile, https://www.foxconn.com/en-us/about/group-profile.
[4] Eva Dou, *How the iPhone Built a City in China*, THE WALL STREET JOURNAL, July 5, 2017, at B1.
[5] Eva Dou, *How the iPhone Built a City in China*, THE WALL STREET JOURNAL, July 5, 2017, at B1.

Pro."[6] Hon Hai's Zhenzhou plant alone is estimated to produce "roughly 50% of the world's iPhone units…."[7]

12. Hon Hai has manufactured tablet computers for over a decade,[8] and continues to manufacture them to date.[9]

13. Hon Hai also manufactures personal computers. In or around early 2018, Hon Hai increased the amount of production of personal computers.[10] Hon Hai has continued to manufacture personal computers to this day.[11]

14. Hon Hai is the parent corporation of Foxconn (Far East) Limited, which in turn invests capital and owns shares of various Foxconn manufacturing facilities in mainland China. For example, Foxconn (Far East) Limited owns FIH Mobile Limited. Upon information and belief, FIH Mobile Limited is a corporation organized and existing under the laws of Taiwan, with its principal place of business in China, and is an original design manufacturer providing a variety of

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[6] *Foxconn's January sales surge as China COVID disruption shaken off*, ETMAG.COM, Feb. 7, 2023.
[7] *The one incentive Foxconn uses to get people to build your iPhone units*, INDIAN TECHNOLOGY NEWS, Feb. 6, 2023.
[8] *See, e.g., Hon Hai good investment pick, Barclays Capital says*, TAIPEI TIMES, Jan. 12, 2012 (describing Hon Hai as "the worlds *[sic]* largest contract electronics maker," and mentioning the iPhone and iPad as two of the products it makes).
[9] *See, e.g., Hon Hai sees little effect from power rationing*, TAIPEI TIMES, Aug. 23, 2022 ("Analysts said Hon Hai, known as Foxconn Technology Group globally, uses its Chengdu production sites as its major sources for Apple Watch, iPad and MacBook assembly.").
[10] *See, e.g., Apple MacBook 2018: Foxconn Building More Units This Year*, INTERNATIONAL BUSINESS TIMES NEWS, Jan. 15, 2018.
[11] *See, e.g.,* Angelica Oung, *Hon Hai Posts 35% Profit Bump*, TAIPEI TIMES, Nov. 13, 2020 ("Apple on Tuesday introduced new Macs carrying its own chips. The laptops might further boost profit for Hon Hai, which is reportedly assembling two of the new models, the 13-inch MacBook Air and MacBook Pro."); Coco Feng, *Apple said to produce laptops in Vietnam*, SOUTH CHINA MORNING POST, Dec. 22, 2022 ("In November 2020, Taiwan-based Foxconn, formally known as Hon Hai Precision Industry, was reportedly planning to move some iPad and MacBook assembly to Vietnam…. The new MacBook assembly lines are located at Foxconn's plant in Vietnam's northeastern BAC Giang province, about 50km east of the capital Hanoi.").

support services related to design, manufacturing, and after-sales service for information and communication technology products.

15. In its 2021 report, Hon Hai identified dozens of "Investee [entities] in Mainland China" into which it invested, through Foxconn (Far East) Limited, including:

a. Hongfujin Precision Electronics (Zhenzhou) Co., Ltd.: Manufacturing and marketing of cell phone and components, *i.e.,* the Zhenzhou iPhone facility;

b. Hongfujin Precision Electronics (Chengdu) Co., Ltd.: Manufacturing and marketing of tablet PC;

c. FIH (Tian Jin) Precision Industry Co., Ltd.: Manufacturing and marketing of wireless phone and components;

d. FIH Precision Elecronics (Lang Fanc) Co., Ltd.: Manufacturing and marketing of cell phone and components; and

e. Futaihua Industrial (Shenzhen) Co., Ltd.: Manufacturing and marketing of microcomputer, cell phone and components.[12]

16. Hon Hai also has manufacturing facilities in countries outside of P.R.C., including India.[13]

17. Hon Hai has sold infringing smartphones, tablets, and laptops to related entities and to third parties in the United States, and has shipped infringing smartphones, tablets, and laptops to the United States. For example, in October 2018, Hon Hai imported shipments labeled "Telephone Handsets," weighing over 35,000 pounds.[14] A cell phone may be referred to as a handset.[15] As

[12] Hon Hai 2021 Annual Report at Table 11, pages 542-571, available at https://www.foxconn.com/en-us/investor-relations/financial-information/annual-reports.
[13] *A quarter of Apple's production to shift to India*, THE FINANCIAL EXPRESS, Jan. 24, 2023.
[14] U.S. Import Bills of Lading Nos. SHKK344757994787, SHKK344758122172, SHKK344758122202.
[15] *See* Oxford Dictionary; *see also* https://www.techopedia.com/definition/2946/handset; *see also*

another example, in October 2017 alone, Hon Hai sent eight containers to the United States, exceeding 150,000 pounds total, of product titled "Portable Computer" and given the import HS Code 84713090, which according to the U.S. Census Bureau, would apply to both tablets and personal computers.[16]

18. On information and belief, Hon Hai has sold infringing server products to related entities and to third parties in the United States, and has shipped infringing server products to the United States. On information and belief, Hon Hai serves as ODM for third parties for servers and other products.

JURISDICTION AND VENUE

19. This is an action for patent infringement under the United States patent laws, 35 U.S.C. § 101 *et seq*.

20. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

21. This Court has personal jurisdiction over the Defendant consistent with the requirements of the Due Process Clause of the United States Constitution and the Texas Long Arm Statute.

22. Defendant has registered with the Texas Secretary of State as a foreign corporation organized under the laws of Taiwan, and has identified a registered agent in Texas (Sean Phillips, 8801 Fallbrook Dr., Houston, TX 77064).

23. Defendant has entered and performed on contracts with at least one U.S. customer for production with respect to the design and manufacture of computer products and with respect to

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U.S. Import Bill of Lading No. CMDUSHZ2724820 (another importer describing a "handset" by FCC number, corresponding to a registered cell phone).

[16] U.S. Import Bills of Lading Nos. FTNVHKOAHN000088, FTNVHKOAHN000098, FTNVHKOAHN000099, FTNVHKOAHN000101, FTNVHKOAHN000110, FTNVHKOAHN000111, FTNVHKOAHN000112, FTNVHKOAHN000113; *see also* U.S. Census website, https://uscensus.prod.3ceonline.com.

the importation into the United States of computer products and of computer products made abroad using patented processes claimed in the ACQIS Patents.

24. On information and belief, Defendant has purposefully manufactured and/or distributed computer products that infringe the ACQIS Patents, or that were made abroad using patented processes claimed in the ACQIS Patents, through established distribution channels with the expectation that those products would be sold in the United States, State of Texas, and in this District.

25. The products made abroad using patented processes were in fact sold in this District. For example, iPhones were offered for sale within this District in 2017 in the Cielo Vista Mall in El Paso, Texas and in the Barton Creek Mall in Austin, Texas.[17] Upon information and belief, at least some of the phones sold in this District had been imported by Defendant.

26. Publicly available import data indicates that Hon Hai imports phones, tablets and other electronic equipment into the United States. Data from Import Genius indicates that, in the past five years, Hon Hai has acted as supplier for over 4,800 shipments imported into the United States, including nearly 800 shipments to this District.

27. Further, Defendant has (itself and/or through the activities of subsidiaries, affiliates, or intermediaries) committed acts of patent infringement in the United States, State of Texas and this District, including by importing infringing computer products and/or computer products made abroad using ACQIS's patented processes into the United States for sale in the State of Texas and this District.

[17] *See, e.g.,* https://www.apple.com/retail/cielovistamall/ (website for store in El Paso, TX, captured July 8, 2017); https://www.apple.com/retail/bartoncreek/ (website for store in Austin, TX, captured July 12, 2017).

28. Accordingly, Hon Hai has established minimum contacts within Texas and purposefully availed itself of the benefits of Texas, and the exercise of personal jurisdiction over Hon Hai would not offend traditional notions of fair play and substantial justice. In addition, or in the alternative, this Court has personal jurisdiction over Hon Hai pursuant to Federal Rule of Civil Procedure 4(k)(2). *See, e.g., ACQIS LLC v. Lenovo Group Ltd. et al.*, 572 F. Supp. 3d 291, 302-307 (W.D. Tex. Nov. 16, 2021) (denying motion to dismiss for lack of personal jurisdiction as to served defendants).

29. Venue is proper in this District pursuant to 28 U.S.C. § 1391(c)(3) because Defendants do not reside in the United States and thus may be sued in any judicial district in the United States pursuant to 28 U.S.C. § 1391(c)(3).

30. Venue is also appropriate because the patents asserted in this case have been previously asserted in cases before this Court. *See ACQIS LLC v. MiTac Computing Tech. Corp.*, No. W-20-cv-00962-ADA, 2021 U.S. Dist. LEXIS 197938, 2021 WL 4805431 (W.D. Tex., Oct. 14, 2021) (describing four pending cases and denying motion to transfer venue).

FACTUAL BACKGROUND

Dr. Chu and the ACQIS Patents

31. Dr. William Chu has been a prolific innovator in the computing industry since the 1970s.

32. In 1976, Dr. Chu received his Ph.D. in Electrical Engineering from the University of California, Berkeley. Dr. Chu then began working in semiconductor design for American Microsystems, Inc. from 1976 to 1977, and then for Zilog, Inc. from 1977 to 1982.

33. In 1982, Dr. Chu founded Verticom, Inc., which developed innovative technologies relating to video transmission over telephone lines. Verticom also developed graphics products for the PC computer-aided design (CAD) market. Verticom's success resulted in its stock being

listed on the NASDAQ exchange in 1987. In 1988, Verticom was acquired by Western Digital Imaging, Inc.

34. Dr. Chu served as Vice President of Engineering for Western Digital from 1988 to 1991, overseeing a development team in the desktop and portable graphics chip division. In the course of his work at Western Digital, Dr. Chu in 1988 started the company's portable graphics chip business, which became #1 in the portable graphics chip market by 1991. Dr. Chu also led Western Digital to achieve the #1 market share in the PC graphics market in 1990.

35. After Western Digital, Dr. Chu worked for Acumos, Inc. from 1991 to 1992 as a Vice President managing engineering for computer graphics chip development. Acumos was acquired by Cirrus Logic, Inc. in 1992.

36. Dr. Chu then worked for Cirrus Logic from 1992 to 1997, first as a General Manager in the Desktop Graphics Division and later as Co-President of the Graphics Chip Business Unit. During Dr. Chu's time at Cirrus Logic, the company achieved #1 market share in the PC graphics chip market.

37. In 1998, Dr. Chu founded ACQIS Technology, Inc. to pursue his vision of developing a small, portable computer module that could be interchangeably connected with a variety of different peripheral consoles. In the course of this development effort, Dr. Chu recognized the need for a better interconnection between the core computing module and a peripheral console. Such interconnections traditionally conveyed peripheral component interconnect (PCI) bus transactions in parallel using a large number of signal channels and connector pins. This made it difficult to employ LVDS channels, which are more "cable friendly," consume less power, and generate less noise. Dr. Chu wanted to develop an interconnection system that was scalable, used connectors with low pin counts, was power-efficient, high performing, and easily extendible for

future computing needs and technologies. This development work resulted in a large family of patents now owned by ACQIS, which disclose and claim a variety of pioneering inventions relating to improved, high-performance and low-power consuming interconnection technologies for computer modules.

38. After several decades in the industry, Dr. Chu is now a named inventor of over forty U.S. Patents.

39. Among the patent portfolio covering Dr. Chu's inventions and owned by ACQIS are the ACQIS Patents asserted in this case.

40. The '750 patent, entitled "Computer System Including CPU or Peripheral Bridge Directly Connected to a Low Voltage Differential Signal Channel that Communicates Serial Bits of a Peripheral Component Interconnect Bus Transaction in Opposite Directions," was duly and legally issued on July 11, 2017, from a patent application filed October 9, 2014, with William W.Y. Chu as the sole named inventor. The '750 patent claims priority to U.S. Provisional Patent Application No. 60/134,122, filed on May 14, 1999.

41. The '797 patent, entitled "Method of Improving Peripheral Component Interface Communications Utilizing a Low Voltage Differential Signal Channel," was duly and legally issued on March 10, 2015, from a patent application filed October 10, 2012, with William W.Y. Chu as the sole named inventor. The '797 patent claims priority to U.S. Provisional Patent Application No. 60/134,122, filed on May 14, 1999.

42. The '769 patent, entitled "Computer System Including CPU or Peripheral Bridge Directly Connected to a Low Voltage Differential Signal Channel that Communicates Serial Bits of a Peripheral Component Interconnect Bus Transaction In Opposite Directions," was duly and legally issued on December 27, 2016, from a patent application filed February 26, 2016, with

William W.Y. Chu as the sole named inventor. The '769 patent claims priority to U.S. Patent Application No. 11/097,694, filed on March 31, 2005.

43. The '140 patent, entitled "Data Security Method and Device for Computer Modules," was duly and legally issued on September 16, 2014, from a reissue application filed December 17, 2013, with William W.Y. Chu as the sole named inventor. The '140 patent is a reissue of U.S. Patent No. 6,643,777, which issued on November 4, 2003, from a patent application filed May 14, 1999. The '140 patent claims priority to U.S. Patent Application No. 09/312,199, filed on May 14, 1999.

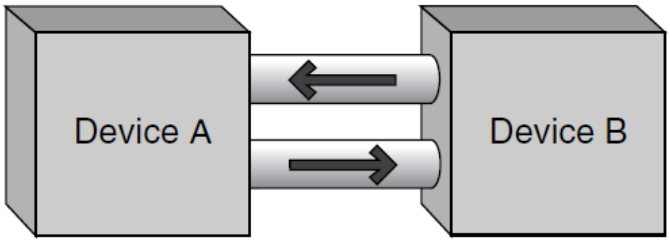
44. The '654 patent, entitled "Data Security Method and Device for Computer Modules," was duly and legally issued on December 17, 2013, from a reissue application filed October 10, 2012, with William W.Y. Chu as the sole named inventor. The '654 patent is a reissue of U.S. Patent No. 6,643,777, which issued on November 4, 2003, from a patent application filed May 14, 1999. The '654 patent claims priority to U.S. Patent Application No. 09/312,199, filed on May 14, 1999.

45. The inventions claimed in the ACQIS Patents enable computers to operate faster with better efficiency through faster interconnections including between the core computing power modules and any connected consoles.

46. The claims in the ACQIS Patents generally relate to computers and computer systems that employ CPUs coupled to LVDS channels that convey various types of data (*e.g.*, PCI bus transactions, USB 3.x data, and/or digital video data) in a serial bit stream using pairs of unidirectional channels to convey the data in opposite directions.

47. Over the years, Dr. Chu's inventive developments have become more and more widely used in computing technologies. One prime example is the computing industry's adoption of PCI

Express, which post-dates Dr. Chu's inventions but embodies Dr. Chu's patented interconnection invention by using "high speed, low voltage, differential serial pathway for two devices … to communicate simultaneously by implementing dual unidirectional paths between two devices[.]"



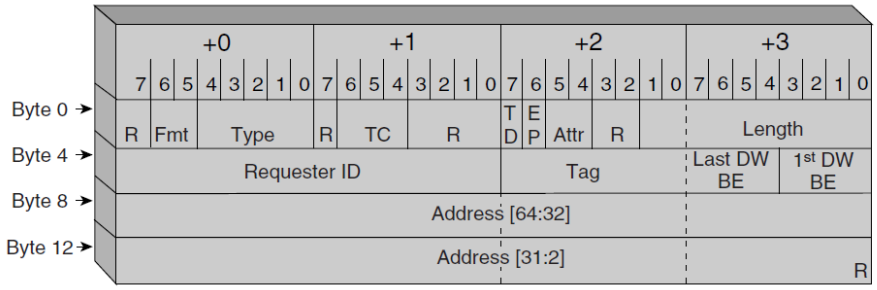
See Introduction to PCI Express – A Hardware and Software Developers Guide, Intel Press (2003), at 1-2 ("There are certain times in the evolution of technology that serve as inflection points that forever change the course of events. For the computing sector and communications, the adoption of PCI Express, a groundbreaking new general input/output architecture, will serve as one of these inflection points.").

48. PCI Express "establishes a unique divergence from historical PCI evolutions through a layered architecture improving serviceability and scalability as well as easing software transitions through backward compatibility."[18] The compatibility of PCI Express with PCI can be further explained as follows: "PCI Express employs the same usage model and load-store communication model as PCI and PCI-X. It supports familiar transactions such as memory read/write, IO read/write and configuration read/write transactions. The memory, IO, and configuration address space model is the same as PCI and PCI-X address spaces. By maintaining the address space model, existing OS and driver software will run in a PCI Express system without any modifications. In other words, PCI Express is software backward compatible with PCI and

[18] Adam H. Wilen, Justin P. Schade, Ron Thornburg. INTRODUCTION TO PCI EXPRESS - A HARDWARE AND SOFTWARE DEVELOPER'S GUIDE, Intel Press, 2003, pages 51-52.

PCI-X systems. In fact a PCI Express system will boot an existing OS with no changes to current drivers and application programs. Even PCI/ACPI power management software will still run."[19]

49. PCI Express connections transmit data packets known as transaction layer packets (TLP) that include data bits, address bits, and byte enable (BE) information bits.



Id. at 93-114.

50. In sum, PCI Express connections are LVDS channels that convey data bits, address bits, and byte enable information bits of a PCI bus transaction in a serial bit stream using pairs of unidirectional, differential signal lanes to convey the information in opposite directions allowing the connection to be scalable and dramatically reducing the pin-count required for connectors, as well as other benefits. "Currently PCI Express defines the following configuration of serial links: x1, x2, x4, x8, x12, x16, and x32. … An x2 configuration indicates two serial paths to and from a device[.]"

[19] Ravi Budruk, et al., PCI EXPRESS SYSTEM ARCHITECTURE, 400, (MindShare Inc., 2004) at 11.

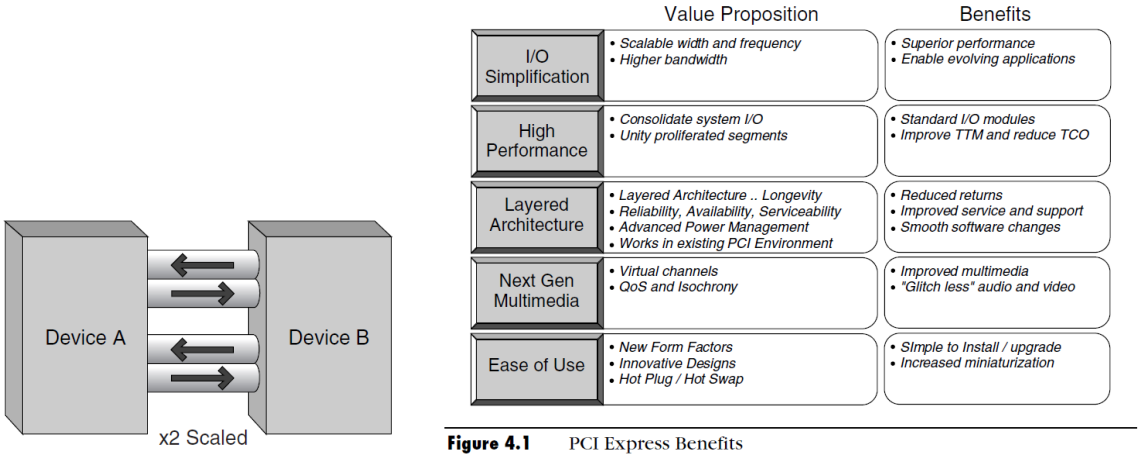


Figure 4.1 PCI Express Benefits

Id. at 3, 50.

51. Another example of a computer-to-peripheral interconnection that embodies Dr. Chu's patented invention is the USB 3.x connection. The "Super Speed" USB 3.0 architecture uses at least two pairs of unidirectional, point-to-point differential signal paths. Each pair includes a transmit path and a receiving path, thus transmitting the USB data packet information in opposite directions.

3.1.4 USB 3.0 Architecture Summary

USB 3.0 is a dual-bus architecture that incorporates USB 2.0 and a SuperSpeed bus. Table 3-1 summarizes the key architectural differences between SuperSpeed USB and USB 2.0.

Table 3-1. Comparing SuperSpeed to USB 2.0

Characteristic	SuperSpeed USB	USB 2.0
Data Rate	SuperSpeed (5.0 Gbps)	low-speed (1.5 Mbps), full-speed (12 Mbps), and high-speed (480 Mbps)
Data Interface	Dual-simplex, four-wire differential signaling separate from USB 2.0 signaling Simultaneous bi-directional data flows	Half-duplex two-wire differential signaling Unidirectional data flow with negotiated directional bus transitions
Cable signal count	Six: Four for SuperSpeed data path Two for non-SuperSpeed data path	Two: Two for low-speed/full-speed/high-speed data path
Bus transaction protocol	Host directed, asynchronous traffic flow Packet traffic is explicitly routed	Host directed, polled traffic flow Packet traffic is broadcast to all devices.

Universal Serial Bus 3.0 Specification, Rev. 1.0 (Nov. 12, 2008), at 3-1 to 3.5. USB 3.x ports operate in conformance with all USB protocols, including USB 2.0 protocols and USB 3.0 or later protocols, which are backward compatible with the USB 2.0 protocol. In sum, USB 3.x connections are LVDS channels using two unidirectional, differential signal pairs that transmit USB protocol data packets in opposite directions.

52. The Direct Media Interface ("DMI") is similar to PCIe and implements at least four serial lanes that all use differential signaling constituting 2 transmit lanes and 2 receive lanes and, therefore, transmitting data in opposite directions. *See* https://www.intel.com/content/dam/www/public/us/en/documents/white-papers/ia-introduction-basics-paper.pdf; *see also* https://en.wikipedia.org/wiki/Direct_Media_Interface ("DMI shares many characteristics with PCI Express, using multiple lanes and differential signaling to form a point-to-point link.").

53. The On-Package Interface (OPI) is like DMI but is used when a CPU and system controller are integrated into a single system-on-a-chip ("SoC"). *See* https://web.archive.org/web/20170106002415/https://www.anandtech.com/show/10959/intel-launches-7th-generation-kaby-lake-i7-7700k-i5-7600k-i3-7350k/5.

54. Additional interfaces that employ LVDS channels include, but are not limited to, DisplayPort[20], Embedded DisplayPort (eDP)[21], MIPI DSI[22], Serial-Attached SCSI ("SAS")[23],,

[20] Tektonix, THE BASICS OF SERIAL DATA COMPLIANCE AND VALIDATION MEASUREMENTS – PRIMER, page 9.

[21] eDP is a display panel interface standard that defines the signaling interface between CPUs/GPUs and integrated displays. It is based on the existing DisplayPort standard. Essentially, it is an embedded version of the DisplayPort standard oriented toward applications, such as notebooks and All-In-One PCs. Like DisplayPort, it consists of the Main Link, Auxiliary channel, and an optional Hot-Plug Detect signal. *See* https://edc.intel.com/content/www/us/en/design/ipla/software-development-platforms/client/platforms/alder-lake-desktop/12th-generation-intel-core-processors-datasheet-volume-1-of-2/003/embedded-displayport-edp/.

[22] The MIPI Display Serial Interface (MIPI DSI) defines a high-speed serial interface between a host processor and a display module. *See* https://www.mipi.org/specifications/dsi. MIPI DSI operates on the MIPI D-PHY physical layer, which uses LVDS. *See* MIPI Alliance. Specification for D-PHY Version 1.2, 01 August 2014, MIPI Board Adopted 10 September 2014,page 60.

[23] HP. *Serial ATA and Serial Attached SCSI technologies*. TECHNOLOGY BRIEF, 2003, page 5. Available at http://h10032.www1.hp.com/ctg/Manual/c00256909.pdf.

and Serial ATA or Serial AT Attachment ("SATA") [24,25]. Other protocols that use LVDS channels are USB4, Thunderbolt 3, and Thunderbolt 4. Since USB4, Thunderbolt 3, and Thunderbolt 4 use USB-Type C connectors, at least two low voltage differential signaling pairs in opposite directions are used to transfer PCI Express, DisplayPort, and/or USB packets.[26] Moreover, Thunderbolt controllers use PCI Express.[27] USB4 offers display, data, and load/store functionality over a single USB Type-C connector and retains compatibility with the existing ecosystem of USB and Thunderbolt products.[28] USB4 (formerly known as Thunderbolt 3 protocol) can tunnel USB 3/x, PCIe, and DisplayPort protocols. It uses up to two lanes, each consisting of two differential signal pairs (Tx/Rx), and is used for tunneled protocol and control traffic.[29]

55. Each claim of the ACQIS Patents is a patentable, valid and enforceable invention that is novel and non-obvious over the prior art.

56. ACQIS has not authorized or licensed Hon Hai to practice any of the inventions claimed in the ACQIS Patents.

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[24] HP. *Serial ATA and Serial Attached SCSI technologies*. TECHNOLOGY BRIEF, 2003, page 5. Available at http://h10032.www1.hp.com/ctg/Manual/c00256909.pdf.

[25] Tektonix, THE BASICS OF SERIAL DATA COMPLIANCE AND VALIDATION MEASUREMENTS – PRIMER, page 9.

[26] Brad Saunders. *USB Type-C System Overview: Enabling connections for data, display, and power*. USB DEVELOPER DAYS 2019 – Taipei, Taiwan, November 19, 2019, pag3 7. Available at https://www.usb.org/sites/default/files/D1T1-2%20-%20USB%20Type-C%20System%20Overview.pdf.

[27] *See* Intel. *Thunderbolt Technology: The Transformational PC I/O*. TECHNOLOGY BRIEF, page 3. Available at http://www.123seminarsonly.com/Seminar-Reports/008/51703485-intel-thunderbolt-technology.pdf.
See also Jeff Bake, Dinesh Jain, and Jacob Ontiveros. *Thunderbolt™ 3 Technology and USB-C*. INTEL DEVELOPER FORUM (IDF15), page 27. Available at https://www.thunderbolttechnology.net/sites/default/files/Thunderbolt3USBC-IDFf.pdf

[28] Universal Serial Bus 4 (USB4) Specification, Version 1.0, August 2019, page 1.

[29] https://www.usb.org/sites/default/files/D1T1-3%20-%20USB4%20System%20Overview.pdf at 14.

Hon Hai's Infringing Products

57. Hon Hai is a global leader in computer device manufacturing, described by the Wall Street Journal as "the world's largest contract electronics maker."[30] Hon Hai makes and sells a variety of smartphones, tablets and laptop computers, among other technology products like servers. Hon Hai imports smartphones, tablets, laptop computers, and servers made using infringing processes, into the United States and into this judicial District, through established distribution channels with the expectation that those products would be sold in the United States, State of Texas and this District.

58. Hon Hai's sale of smartphones, tablets, laptops, and servers generates billions of dollars in revenue every year. (ACQIS will seek further information regarding other potentially infringing Hon Hai products, like servers in this suit).

59. Hon Hai has directly infringed one or more claims of each of the ACQIS Patents under at least 35 U.S.C. §271(g), by making, using, offering to sell, and/or selling within the United States, and/or importing into the United States, and/or using, offering to sell, and/or selling in, computer products that embody the claimed inventions of Dr. Chu, and/or by importing into the United States computer products that were made abroad using patented processes claimed in the ACQIS Patents.

60. Hon Hai imports into the United States, and/or uses, offers to sell, and/or sells within the United States, smartphone computer products that were made abroad using patented processes claimed in the ACQIS Patents including, without limitation, smartphones which are ultimately sold by a third-party customer under the brand name iPhone, which on information

[30] Yoko Kubota, *Foxconn Feels Chill as Apple Slips*, THE WALL STREET JOURNAL, May 15, 2018, at B4; *see also Foxconn's January sales surge as China COVID disruption shaken off*, ETMAG.COM, Feb. 7, 2023.

and belief includes the iPhone 6, iPhone 6s, iPhone 7, iPhone 7, iPhone 8, iPhone X, iPhone XS, iPhone XR, and related models or variations of the above. These products which are manufactured by Hon Hai are collectively referred to as the "Accused Hon Hai Smartphones." On information and belief, Hon Hai has assembled the exemplary smartphone, the iPhone 6S.[31]

61. Hon Hai imports into the United States, and/or uses, offers to sell, and/or sells within the United States, tablet computer products that were made abroad using patented processes claimed in the ACQIS Patents including, without limitation, tablets which are ultimately sold by a third-party customer under the brand name iPad, which on information and belief includes the 5th generation iPad, 6th generation iPad, 1st generation iPad Pro, 2nd generation iPad Pro, 3rd generation iPad Pro, iPad Air 2, iPad Air 3, iPad Mini 4, iPad Mini 5, and related models or variations of the above. These products which are manufactured by Hon Hai are collectively referred to as the "Accused Hon Hai Tablets." On information and belief, Hon Hai has assembled the exemplary tablet, the iPad Pro (12.9").[32]

62. Hon Hai imports into the United States, and/or uses, offers to sell, and/or sells within the United States, laptop computer products that were made abroad using patented processes claimed in the ACQIS Patents including, without limitation, laptops which are ultimately sold by a third-party customer under the brand names MacBook Air, MacBook Pro, and Mac Mini. These products which are manufactured by Hon Hai are collectively referred

[31] *See, e.g.,* Usman, *Apple Supplier Foxconn Saw 20% Drop in Sales in December*, IPHONE IN CANADA, Jan. 8, 2016 ("The company published the numbers today, amid growing concerns about slowing shipments of Apple's latest iPhone 6s, which is also assembled by Foxconn.").
[32] *See, e.g.*, Lugmayr, *Apple orders Low Volumes for iPad Pro*, I4U NEWS, Jul. 13, 2015 ("Apple is supposed very cautious about placing orders for the 12.9-inch tablet that will be reportedly manufactured by Foxconn (Hon Hai Precision Industry) according to Digitimes.")

to as the "Accused Hon Hai Laptops." On information and belief, Hon Hai has assembled the exemplary laptop, the MacBook Pro (13 inch, 2017).[33]

63. The Accused Hon Hai Smartphones, Accused Hon Hai Tablets, and Accused Hon Hai Laptops are collectively referred to herein as the "Accused Hon Hai Products."

64. On information and belief, Hon Hai manufactures and tests at least certain of the Accused Hon Hai Products abroad and uses, offers to sell, and/or sells such products in the United States, and/or imports such products into the United States.

65. On information and belief, at least certain of the Accused Hon Hai Products that Hon Hai imports into the United States are manufactured outside the United States using one or more processes claimed in the ACQIS Patents.

66. The Accused Hon Hai Products also include products made using the processes claimed in the ACQIS Patents and imported into the United States within the six years preceding the date of this Complaint.

The Accused Hon Hai Smartphones

67. On information and belief, all of the Accused Hon Hai Smartphones are configured and operate in substantially the same way as explained below using the product manufactured by Hon Hai that is ultimately known as the iPhone 6s as an example for illustrative purposes.

68. The iPhone 6s is a computer system that runs the iOS operating system.

[33] *See, e.g.,* Angelica Oung, *Hon Hai Posts 35% Profit Bump*, TAIPEI TIMES, Nov. 13, 2020 ("Apple on Tuesday introduced new Macs carrying its own chips. The laptops might further boost profit for Hon Hai, which is reportedly assembling two of the new models, the 13-inch MacBook Air and MacBook Pro.");

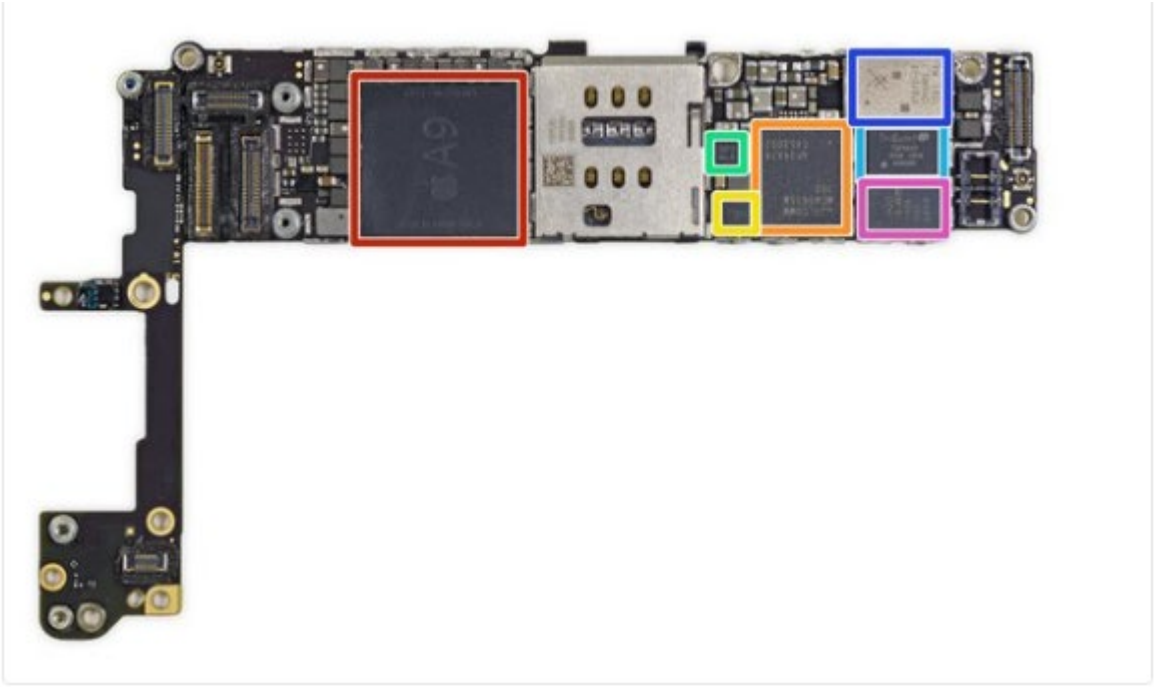
https://web.archive.org/web/20170221013647/https://support.apple.com/kb/sp726?locale=en_US.

69. The iPhone 6s uses an A9 processor (also referred to as a System-on-Chip ("SoC"), which includes CPUs and GPUs), which is mounted on a motherboard.

Chip

- A9 chip with 64-bit architecture
- Embedded M9 motion coprocessor

https://web.archive.org/web/20170221013647/https://support.apple.com/kb/sp726?locale=en_US.



- Apple A9 APL0898 SoC + Samsung 2 GB LPDDR4 RAM (as denoted by the markings K3RG1G10BM-BGCH)
- Qualcomm MDM9635M LTE Cat. 6 Modem (vs. the MDM9625M found in the iPhone 6)
- InvenSense MP67B 6-axis Gyroscope and Accelerometer Combo (also found in iPhone 6)
- Bosch Sensortec 3P7 LA 3-axis Accelerometer (likely BMA280)
- TriQuint TQF6405 Power Amplifier Module
- Skyworks SKY77812 Power Amplifier Module
- Avago AFEM-8030 Power Amplifier Module

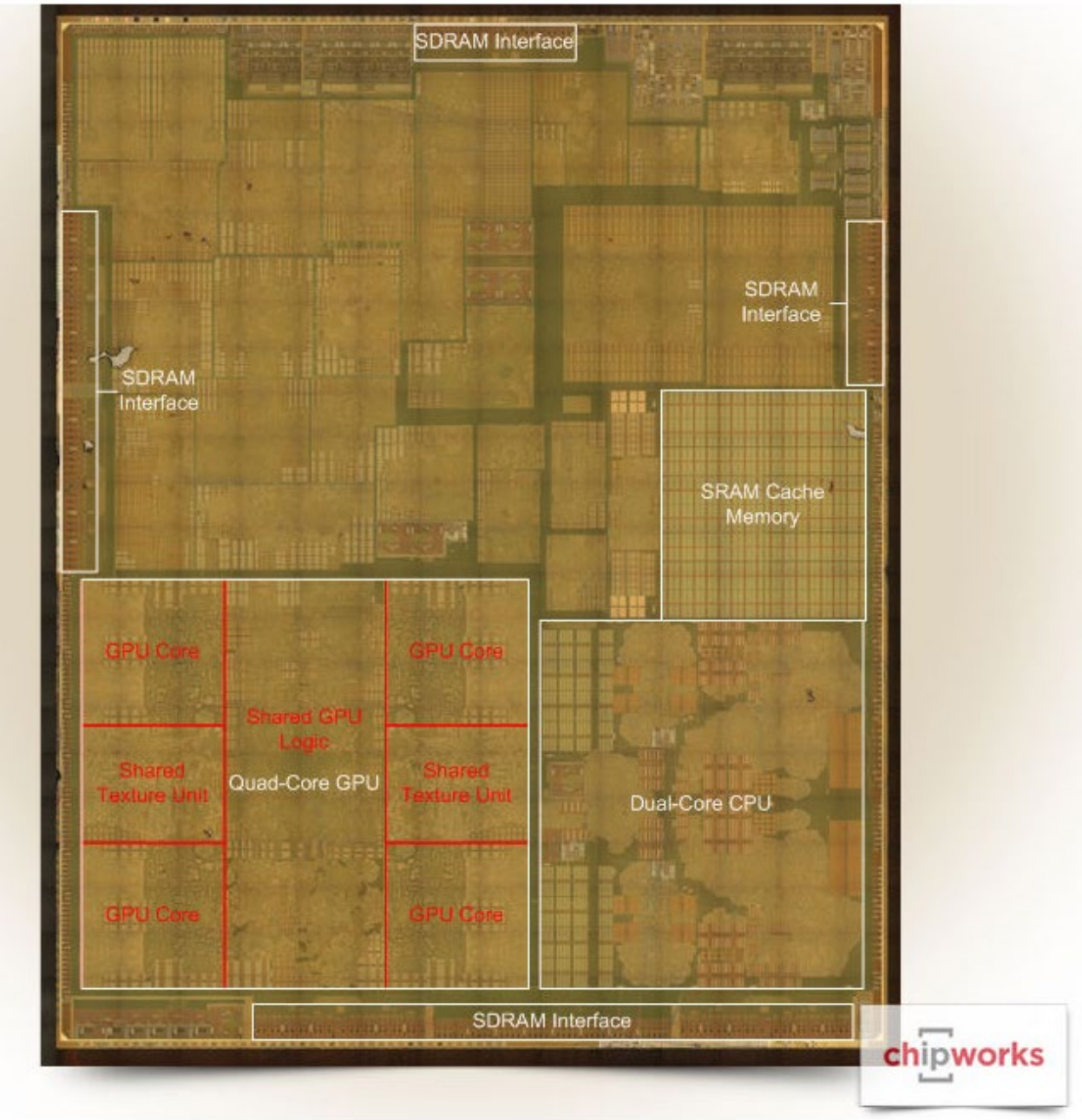
https://web.archive.org/web/20230226002714/https://www.ifixit.com/Teardown/iPhone+6s+Teardown/48170.

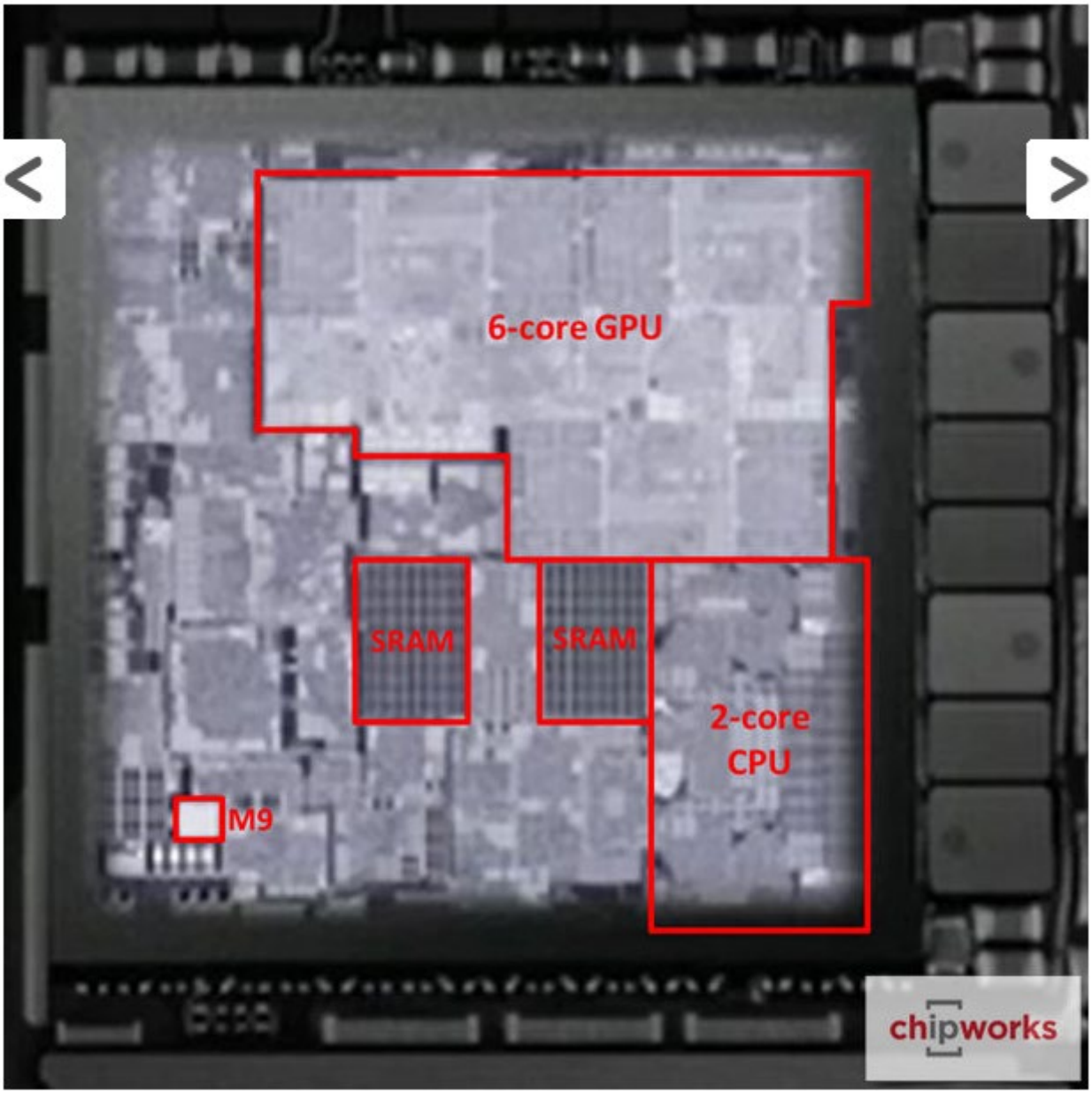
70. Each iPhone 6s unit is made with one of two A9 SoCs: one produced by Samsung (codenamed "Maui"), and one produced by TSMC (codenamed "Malta"). On information and belief, the two A9 SoCs are not distinct in material ways with respect to the claims of the ACQIS Patents.

Processor Speed:	1.8 GHz*	Processor Type:	Apple A9*
Details:	*Apple officially reports that the iPhone 6s uses an "A9 chip with 64-bit architecture" as well as an "embedded M9 motion coprocessor" with an unspecified clockspeed, but third-party analysis has determined that it runs around 1.8 GHz. Furthermore, investigation from Chipworks determined that there actually are two different processors in use in the iPhone 6s. Some have a 14 nm Samsung-produced APL0898 processor and others have a 16 nm TSMC-produced APL1022 processor with slight variation in heat and battery life. Also see: How fast are the iPhone 6s and iPhone 6s Plus compared to one another and earlier iPhone models?		

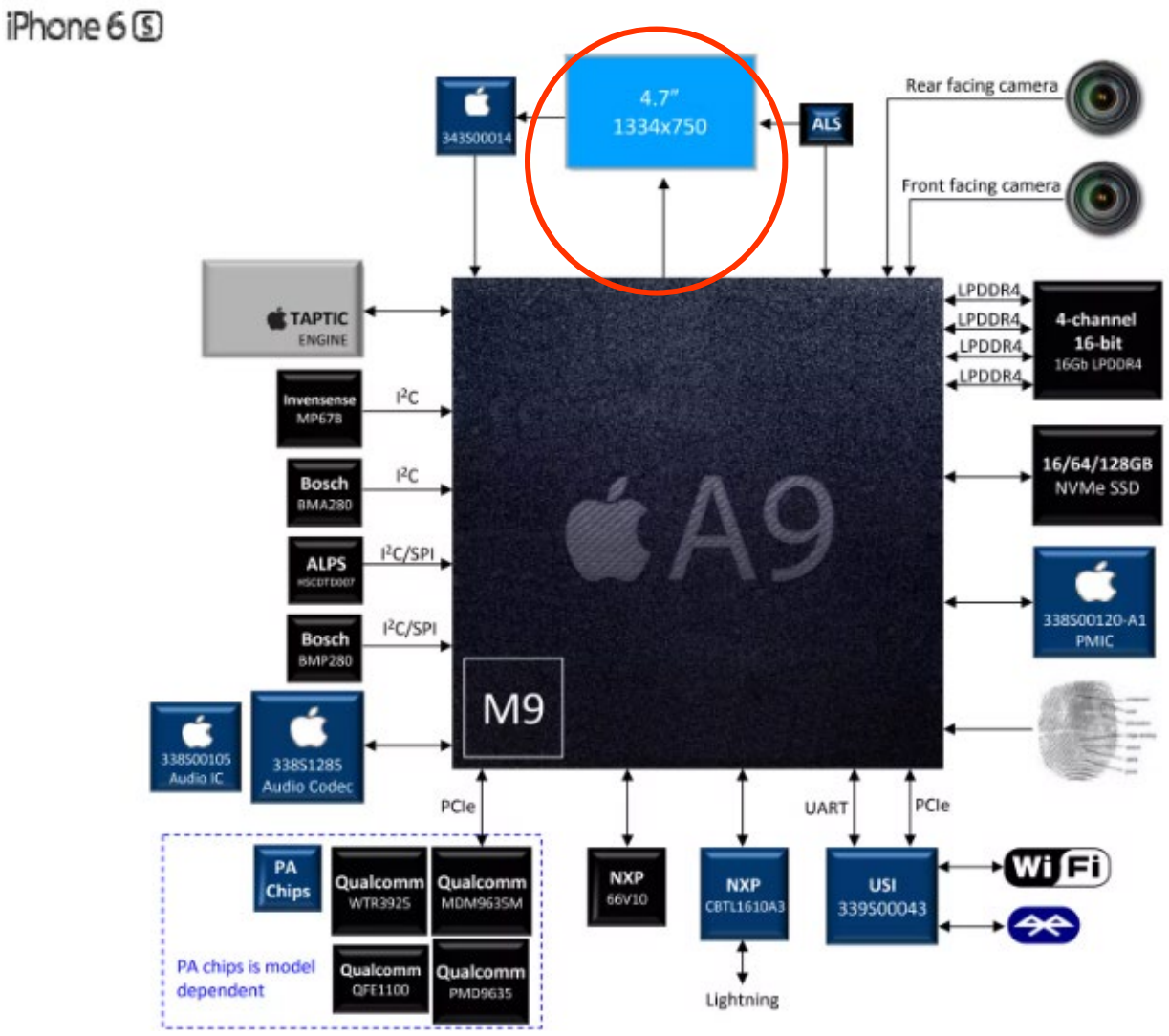
https://web.archive.org/web/20170223231650/https://everymac.com/systems/apple/iphone/specs/apple-iphone-6s-a1633-4.7-inch-att-specs.html; *see also* https://web.archive.org/web/20160917230303/http://www.chipworks.com/about-chipworks/overview/blog/a9-is-tsmc-16nm-finfet-and-samsung-fabbed; https://en.wikipedia.org/wiki/List_of_Apple_codenames#Apple-designed_processors.

71. The A9 SoCs employed in the iPhone 6s integrate the central processing unit (CPU) with a graphics controller on a single chip.


SDRAM Interface
SDRAM Interface
SDRAM Interface
SRAM Cache Memory
GPU Core
GPU Core
Shared GPU Logic
Shared Texture Unit
Quad-Core GPU
Shared Texture Unit
Dual-Core CPU
GPU Core
GPU Core
SDRAM Interface
chipworks



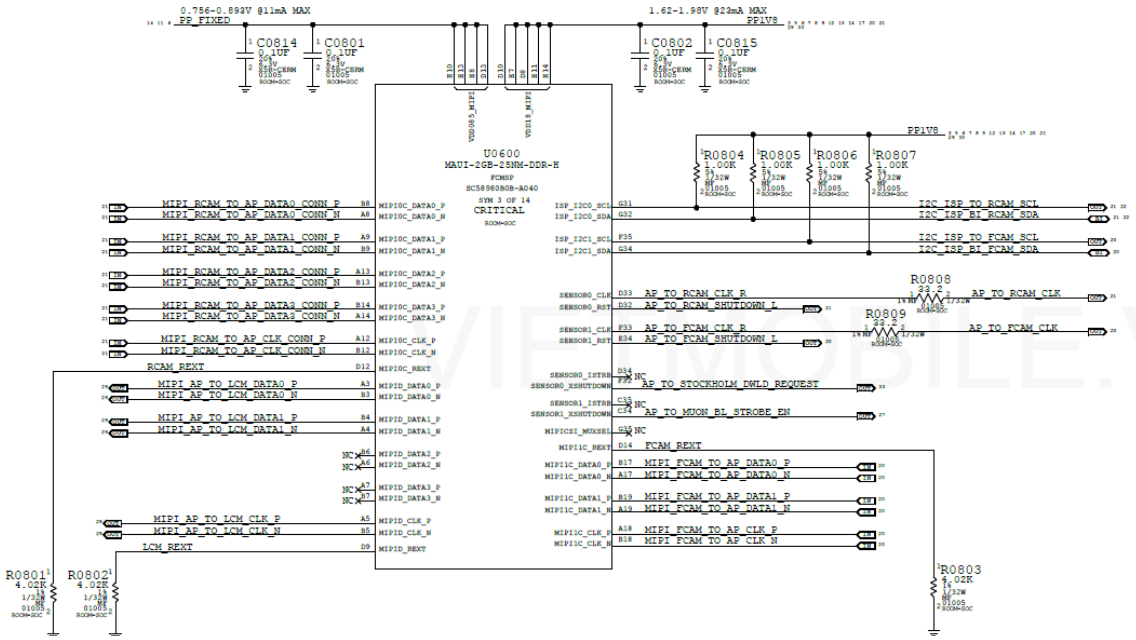
https://web.archive.org/web/20170203083215/http://www.chipworks.com/about-chipworks/overview/blog/inside-the-iphone-6s.



https://www.slideshare.net/jjwu6266/apple-a9-series-application-processor, at 14; *see also* https://smartkingcel.files.wordpress.com/2017/05/iphone-6s-schematic.pdf, at 11 (depicting CPU, GPU, and SoC rails in A9 processor).

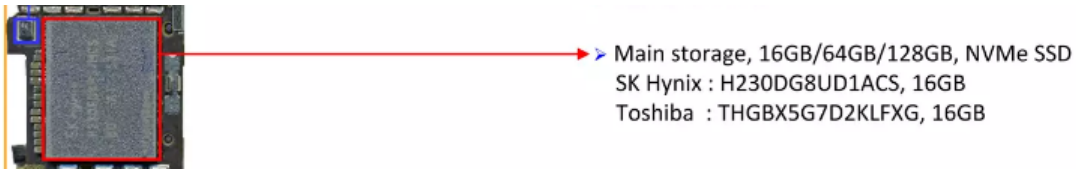
72. The graphics controllers integrated with the A9 SoCs employed in the iPhone 6s operate in accordance with the MIPI DSI standard, which uses LVDS.

MAUI – CAMERA & DISPLAY INTERFACES

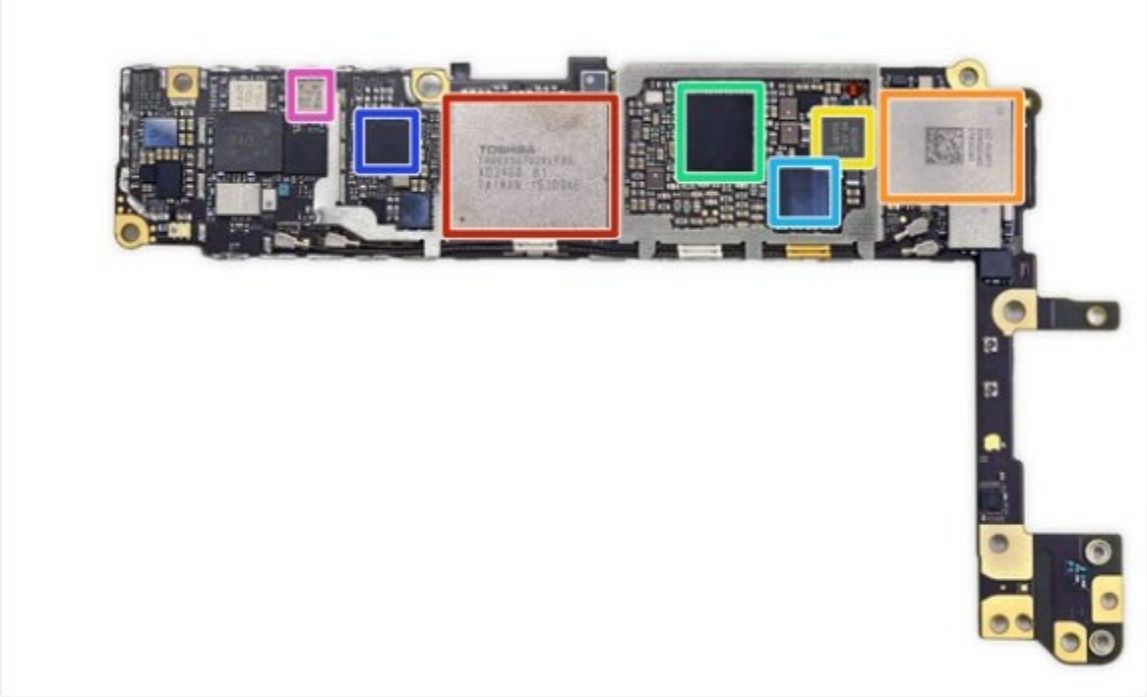


https://smartkingcel.files.wordpress.com/2017/05/iphone-6s-schematic.pdf, at 8; *see also* MIPI Alliance. Specification for D-PHY Version 1.2, 01 August 2014, MIPI Board Adopted 10 September 2014,page 60.

73. The A9 SoCs employed in the iPhone 6s connects directly to flash storage via PCIe channels.



https://www.slideshare.net/jjwu6266/apple-a9-series-application-processor, at 13.



- Toshiba THGBX5G7D2KLFXG 16 GB 19 nm NAND Flash
- Universal Scientific Industrial 339S00043 Wi-Fi Module
- NXP 66V10 NFC Controller (vs. 65V10 found in iPhone 6)
- Apple/Dialog 338S00120 Power Management IC
- Apple/Cirrus Logic 338S00105 Audio IC
- Qualcomm PMD9635 Power Management IC
- Skyworks SKY77357 Power Amplifier Module (likely an iteration of the SKY77354)

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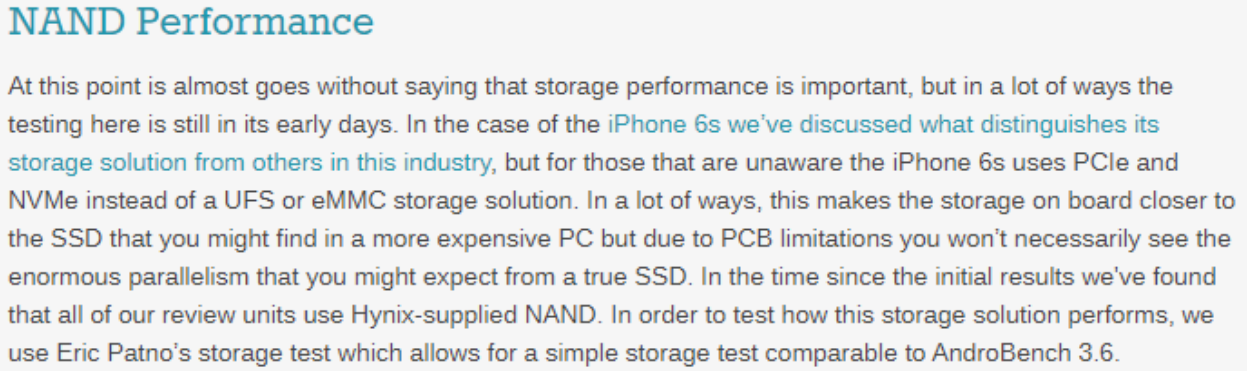
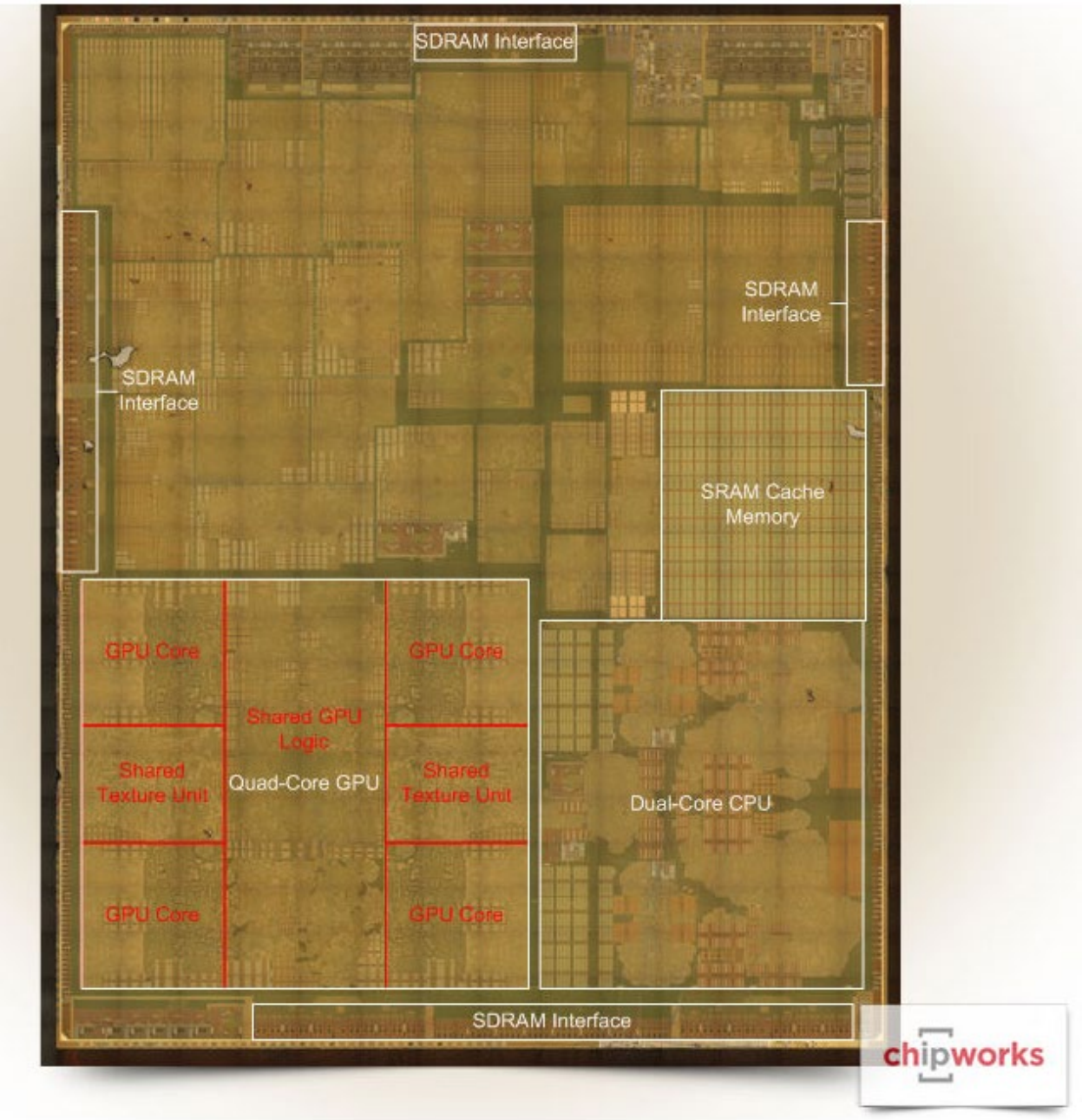


NAND Performance

At this point is almost goes without saying that storage performance is important, but in a lot of ways the testing here is still in its early days. In the case of the iPhone 6s we've discussed what distinguishes its storage solution from others in this industry, but for those that are unaware the iPhone 6s uses PCIe and NVMe instead of a UFS or eMMC storage solution. In a lot of ways, this makes the storage on board closer to the SSD that you might find in a more expensive PC but due to PCB limitations you won't necessarily see the enormous parallelism that you might expect from a true SSD. In the time since the initial results we've found that all of our review units use Hynix-supplied NAND. In order to test how this storage solution performs, we use Eric Patno's storage test which allows for a simple storage test comparable to AndroBench 3.6.

https://web.archive.org/web/20151105083313/https://www.anandtech.com/show/9686/the-apple-iphone-6s-and-iphone-6s-plus-review/7; *see also* https://smartkingcel.files.wordpress.com/2017/05/iphone-6s-schematic.pdf, at 7 (depicting PCIe interfaces in A9 SoC).

74. The A9 SoCs employed in the iPhone 6s integrate one or more integrated interface controllers to drive the PCIe channels connected to the processor. Because the A9 SoCs employed in the iPhone 6s have at least memory, USB and/or PCIe channels, and can send and receive data on those channels, they necessarily have integrated interface controllers to control data transmission through those interfaces.


SDRAM Interface
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GPU Core
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Shared GPU Logic
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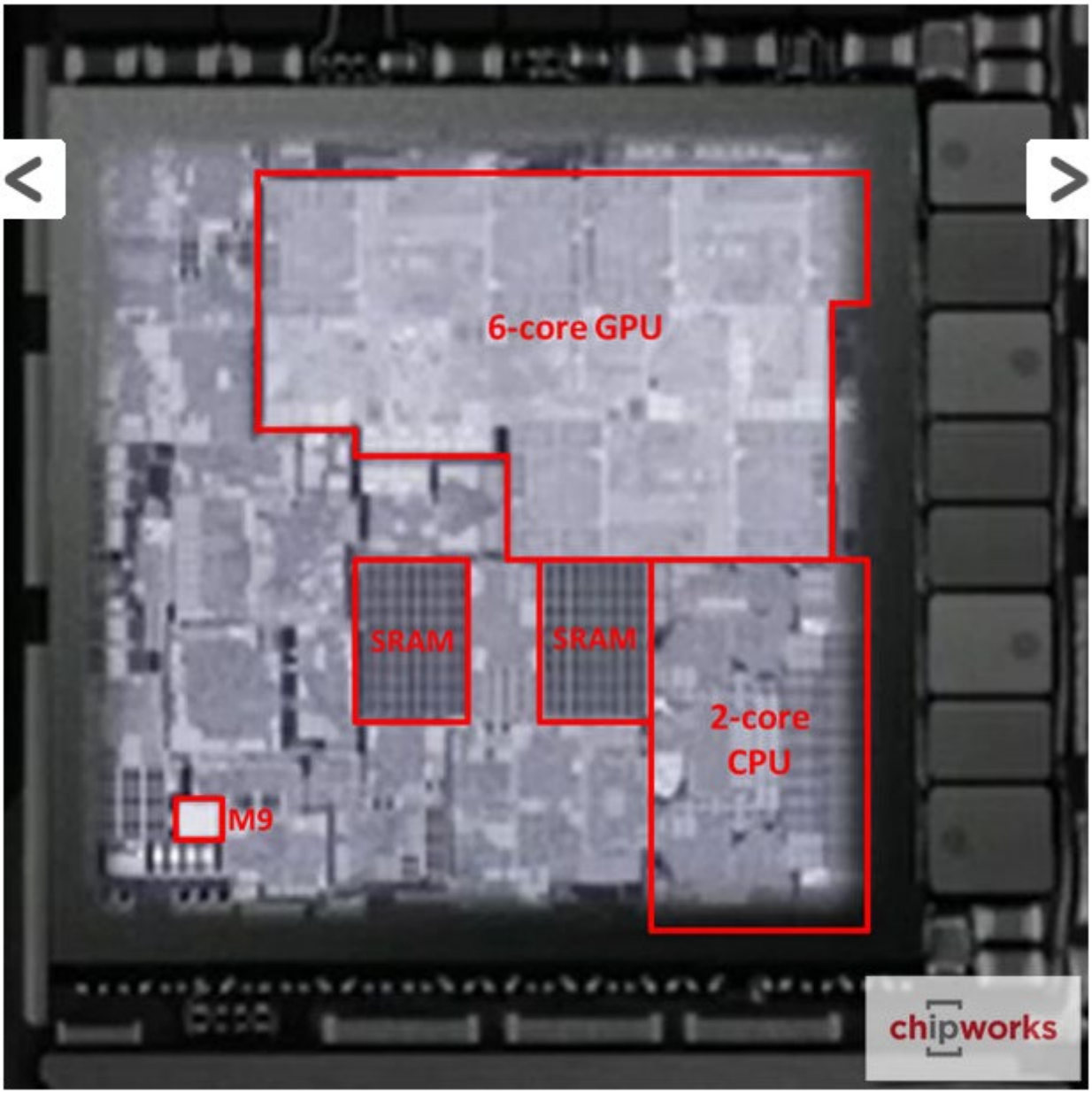
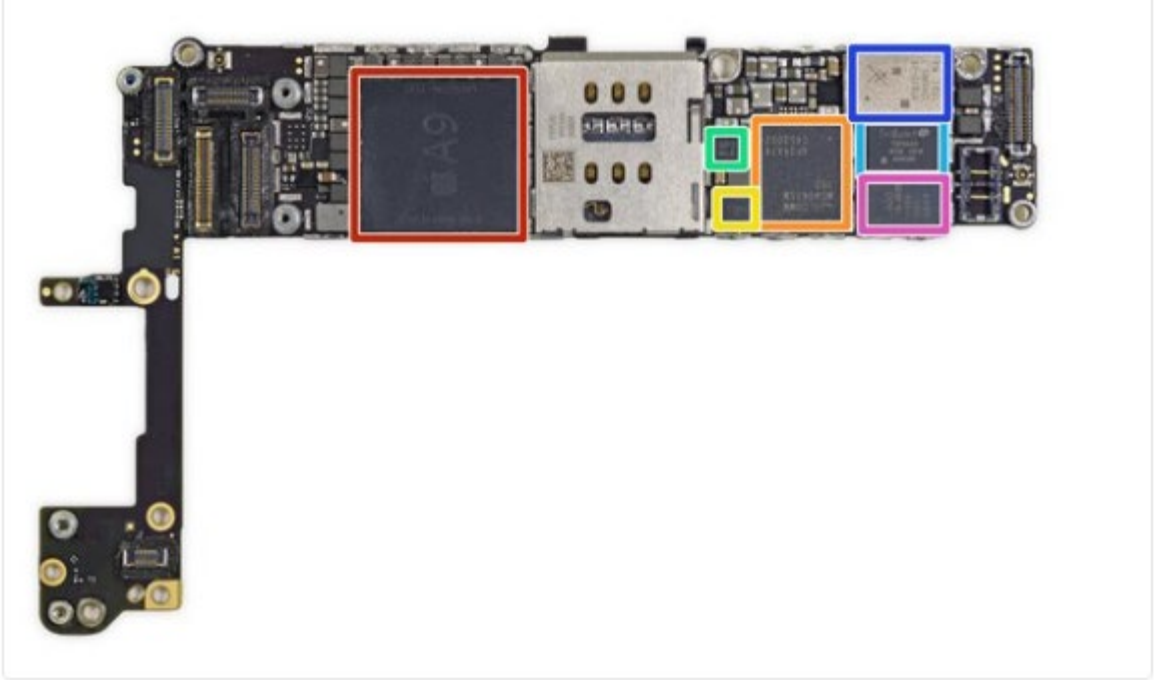
Quad-Core GPU
Shared Texture Unit
Dual-Core CPU
GPU Core
GPU Core
SDRAM Interface
chipworks



https://web.archive.org/web/20170203083215/http://www.chipworks.com/about-chipworks/overview/blog/inside-the-iphone-6s.



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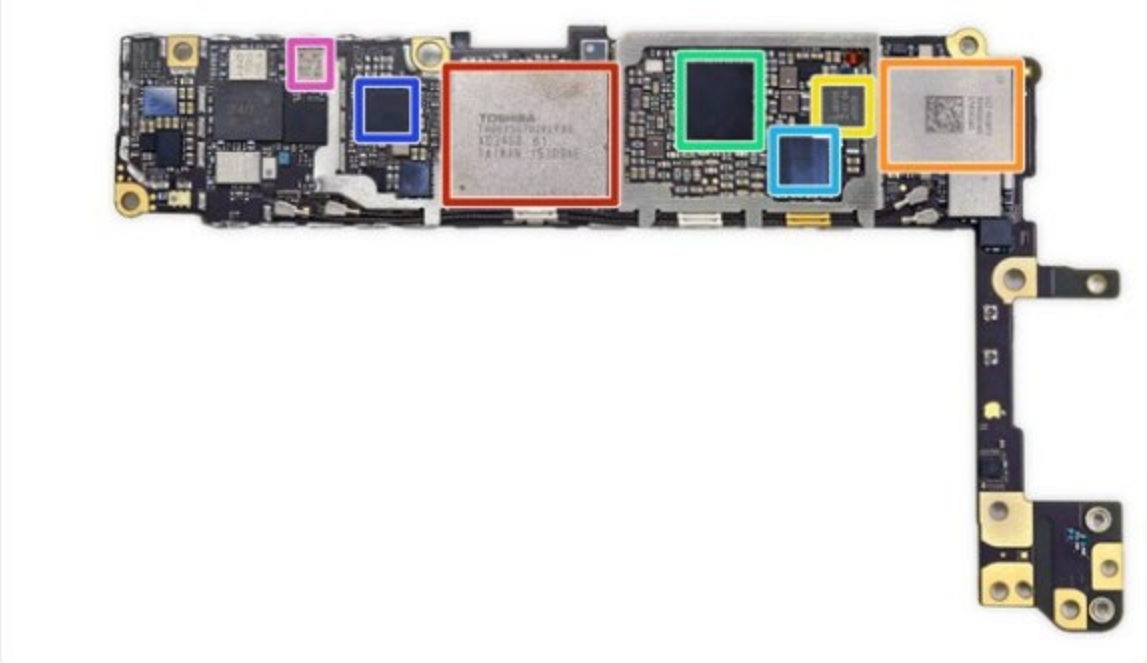

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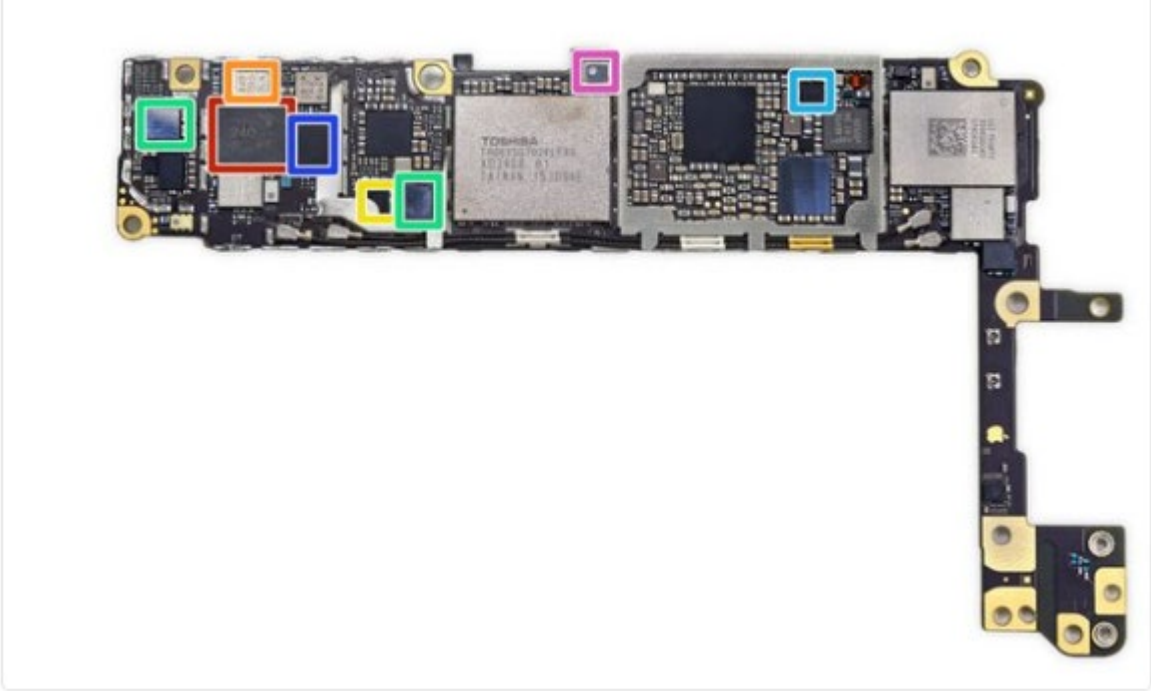
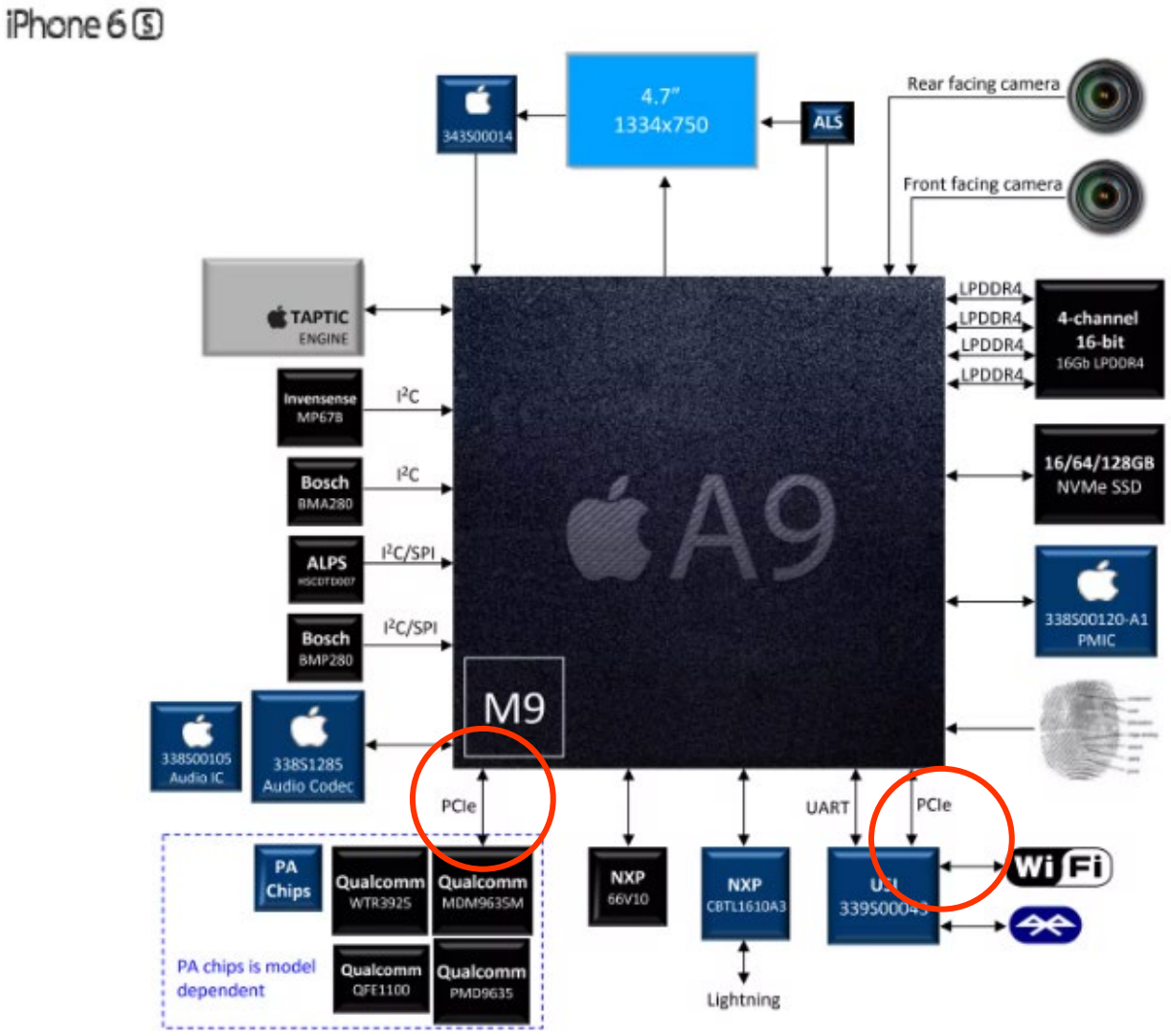


- Murata 240 Front-End Module
- RF Micro Devices RF5150 Antenna Switch
- NXP 1610A3 (likely an iteration of the 1610A1 found in the iPhone 5s and 5c)
- Apple/Cirrus Logic 338S1285 Audio IC (likely an iteration of the 338S1202 audio codec found in the iPhone 5s)
- Texas Instruments 65730AOP Power Management IC
- Qualcomm WTR3925 Radio Frequency Transceiver
- Possibly a Bosch Sensortec Barometric Pressure Sensor (BMP280)

https://web.archive.org/web/20230226002714/https://www.ifixit.com/Teardown/iPhone+6s+Teardown/48170.



https://www.slideshare.net/jjwu6266/apple-a9-series-application-processor at 14; *see also* https://smartkingcel.files.wordpress.com/2017/05/iphone-6s-schematic.pdf, at 6 (depicting USB interfaces in A9 SoC), 7 (depicting PCIe interfaces in A9 SoC).

75. The A9 SoCs employed in the iPhone 6s connects directly to a variety of LVDS channels that convey data bits in a serial stream using unidirectional pairs of lanes transmitting data in opposite direction, including at least the PCIe , USB, and MIPI DSI interfaces. *See* https://smartkingcel.files.wordpress.com/2017/05/iphone-6s-schematic.pdf, at 6 (depicting USB interfaces in A9 SoC), 7 (depicting PCIe interfaces in A9 SoC), 8 (depicting MIPI DSI in A9

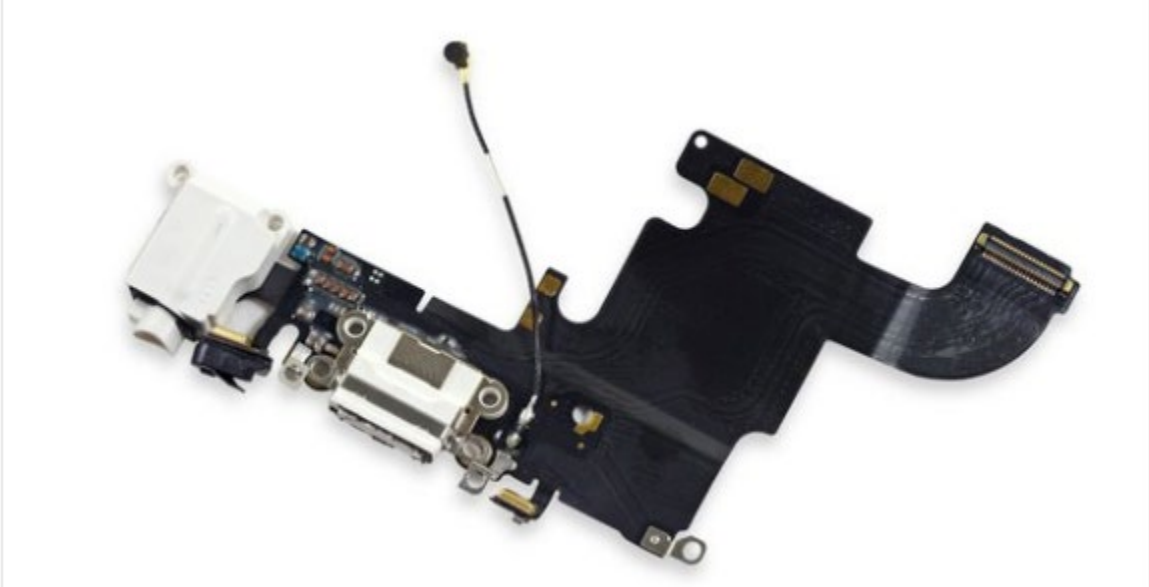
SoC).

76. The iPhone 6s comprises a chassis or enclosure which houses a connector that can couple to components of other computer systems and consoles, in particular the Lightning port.

External Buttons and Connectors

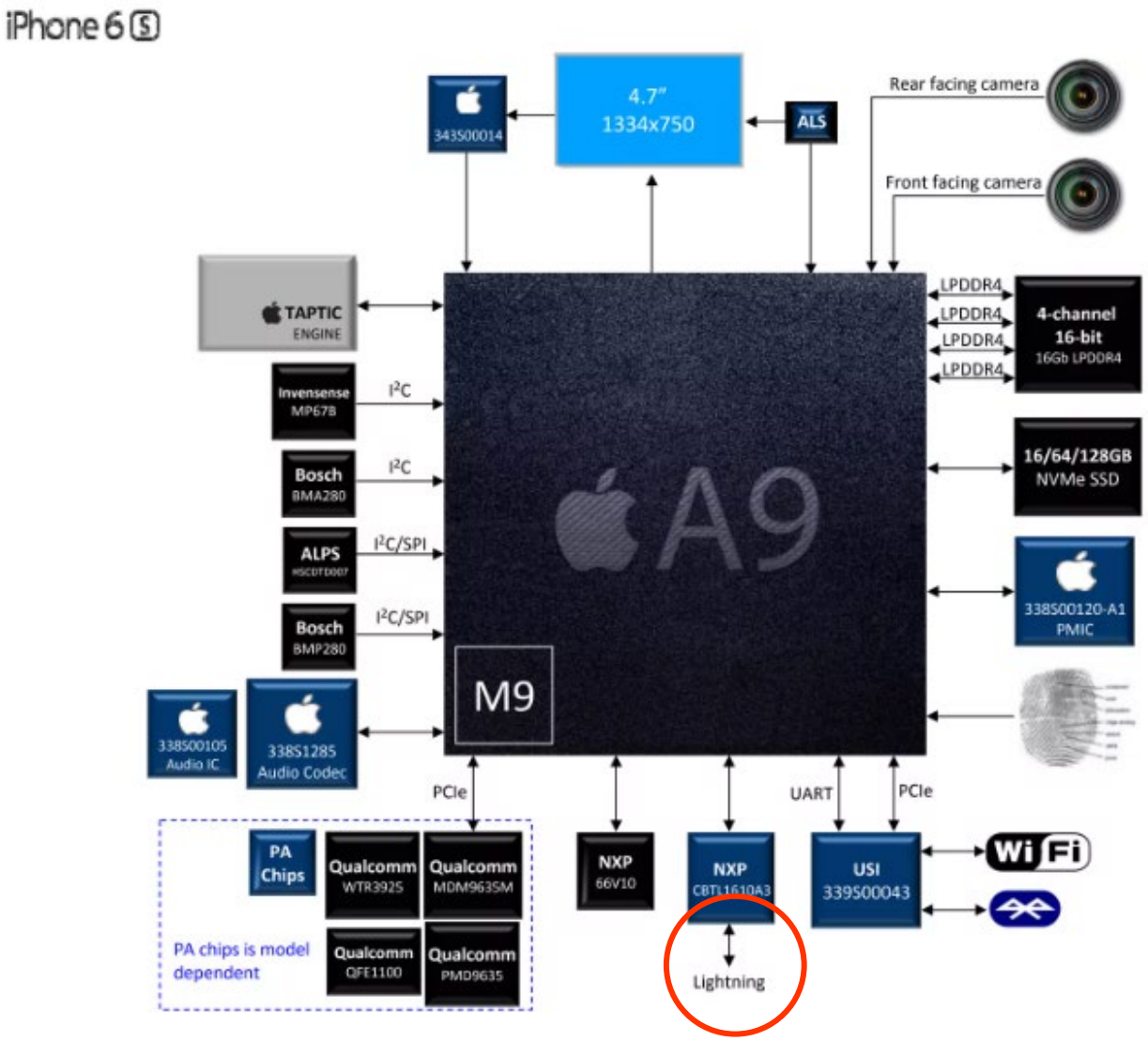
- Touch ID sensor
- Volume up/down
- Ring/Silent
- On/Off – Sleep/Wake
- 3.5 mm headphone jack
- Lightning connector
- Microphones
- Built-in speaker

https://web.archive.org/web/20170221013647/https://support.apple.com/kb/sp726?locale=en_US.



- And now, the famous "everything cable" (a.k.a. the Lightning cable assembly), featuring not one, but *two* microphones!

https://web.archive.org/web/20230226002714/https://www.ifixit.com/Teardown/iPhone+6s+Teardown/48170.



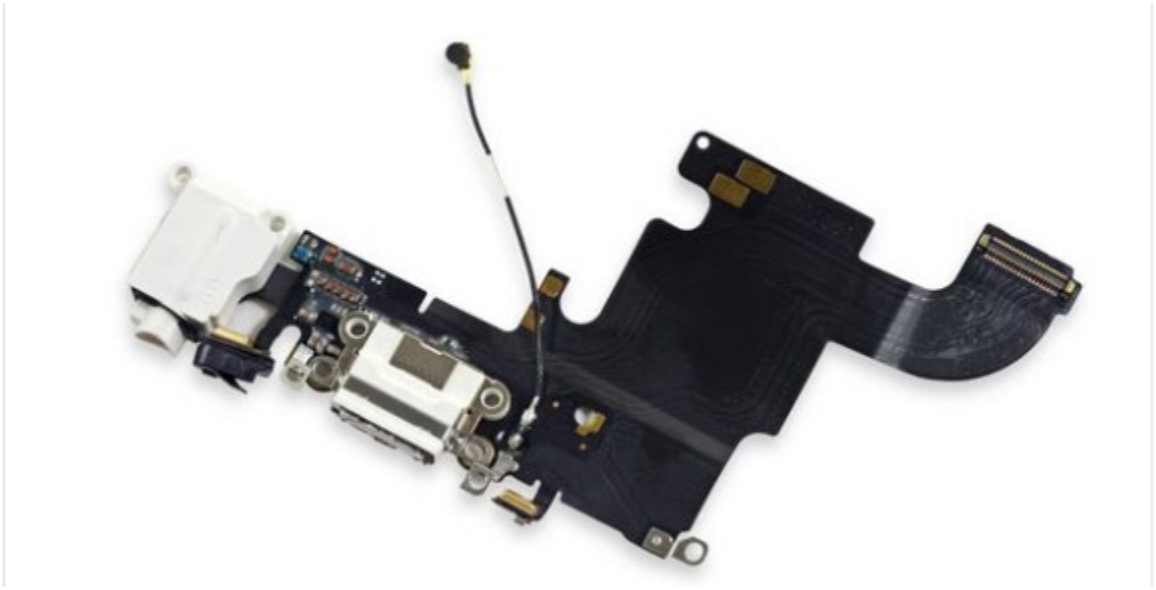
https://www.slideshare.net/jjwu6266/apple-a9-series-application-processor at 14.

77. The A9 SoCs employed in the iPhone 6s also connect directly to a variety of differential signal channels that output digital video signals through a connector, in particular the Lightning port. For example, the Lightning port can be used in connection with a Lightning digital AV adapter to output video to a TV. *See* https://www.apple.com/shop/product/MD826AM/A/lightning-digital-av-adapter#:~:text=It%20also%20outputs%20video%20content,HDMI%20cable%20(sold%20separately).

External Buttons and Connectors

- Touch ID sensor
- Volume up/down
- Ring/Silent
- On/Off – Sleep/Wake
- 3.5 mm headphone jack
- Lightning connector
- Microphones
- Built-in speaker

https://web.archive.org/web/20170221013647/https://support.apple.com/kb/sp726?locale=en_US.



- And now, the famous "everything cable" (a.k.a. the Lightning cable assembly), featuring not one, but *two* microphones!

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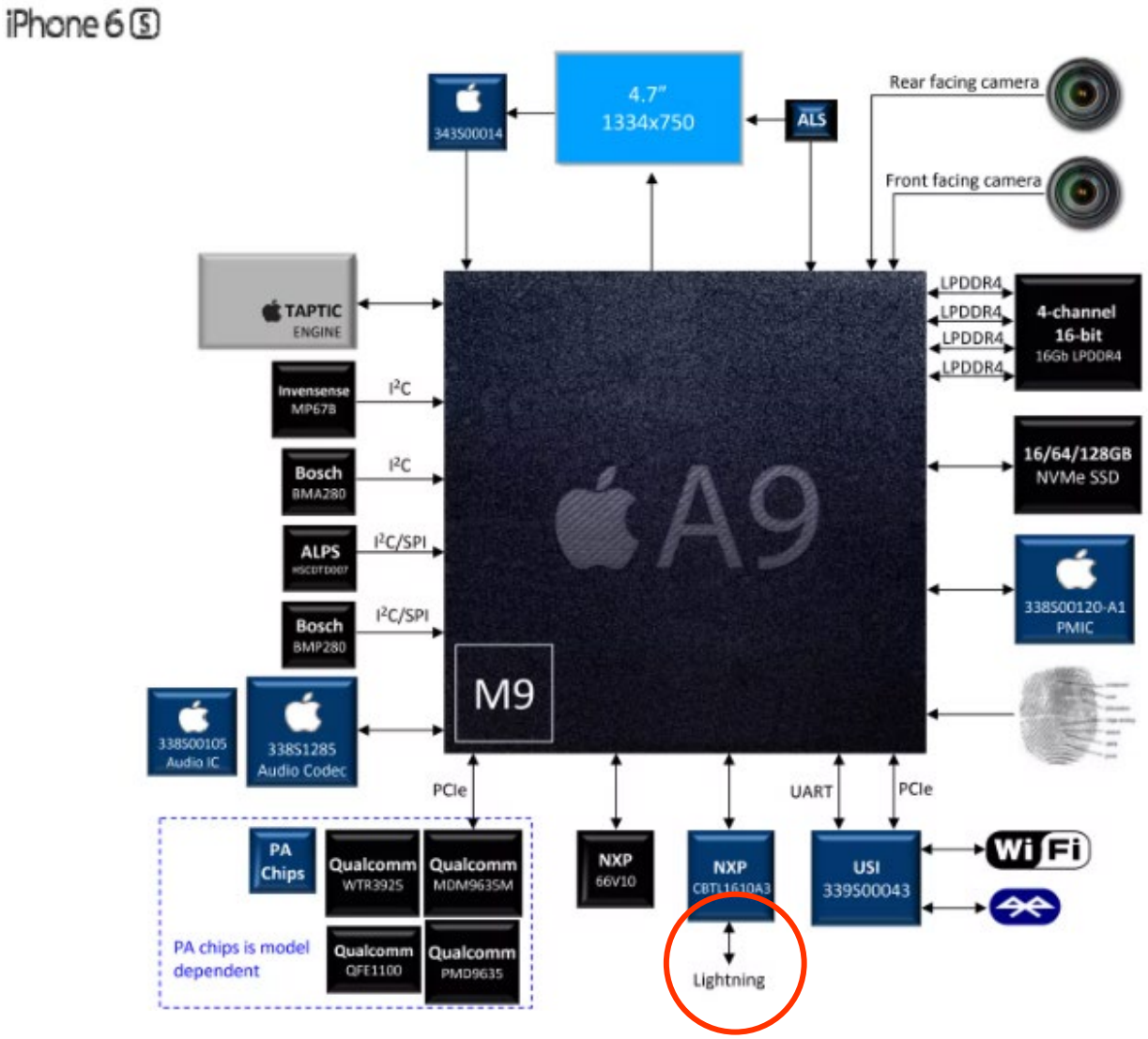


https://www.slideshare.net/jjwu6266/apple-a9-series-application-processor at 14.

78. The iPhone 6s supports Lightning connectors. Users can use USB cables to connect the iPhone 6s through the Lightning end of the connector to a computer's USB port for syncing and charging. *See, e.g.*, https://www.apple.com/shop/product/MXLY2AM/A/lightning-to-usb-cable-1-m. Cables such as these comprise a connector for external peripheral data communication that can convey Universal Serial Bus (USB) protocol data through the connector. *See also* https://smartkingcel.files.wordpress.com/2017/05/iphone-6s-schematic.pdf, at 6 (depicting USB interfaces in A9 SoC).

79. In view of the foregoing facts concerning the technical features and functionalities of the Accused Hon Hai Smartphones (*see* paragraphs 67-80), when Hon Hai or another party manufactures the Accused Hon Hai Smartphones, it improves the speed and performance of the peripheral data communication in its computer products by using a method of manufacturing that includes the following steps: (a) obtaining a CPU with a graphics controller in a single chip; (b) connecting one or more unidirectional differential signal channels to the CPU to output digital video data; (c) providing a connector with an LVDS channel to facilitate data communication with external peripherals; (d) providing multiple LVDS channels, connecting them to the CPU, which use one or more pairs of unidirectional lanes that convey address, data, and/or byte enable bits of PCIe bus transaction data in serial bit streams in opposite directions; (e) connecting the CPU directly to a peripheral bridge on a circuit board; and (f) directly connecting to the peripheral bridge one or more LVDS channels with pairs of unidirectional lanes that convey data in serial bit streams in opposite directions.

80. On information and belief, Hon Hai or another party performs the foregoing manufacturing steps outside the United States to make at least certain of the Accused Hon Hai Smartphones, and Hon Hai then imports those Accused Hon Hai Smartphones into the United States to be marketed and sold.

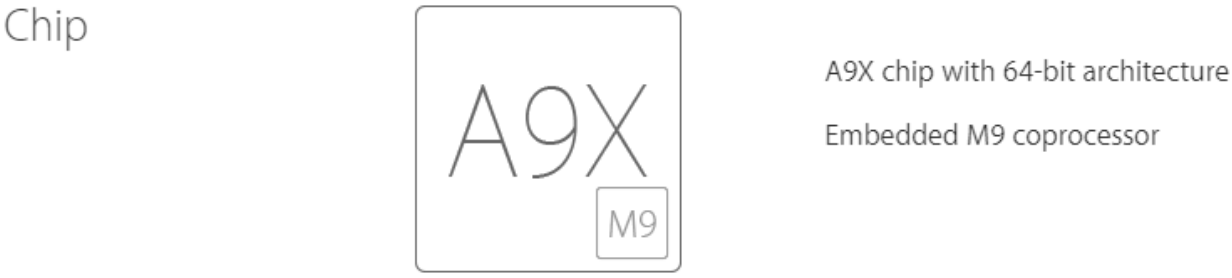
The Accused Hon Hai Tablets

81. On information and belief, all of the Accused Hon Hai Tablets are configured and operate in substantially the same way as explained below using the product manufactured by Hon Hai that is ultimately known as the iPad Pro (12.9”) as an example for illustrative purposes.

82. The iPad Pro (12.9”) is a computer system that runs the iOS operating system.

https://web.archive.org/web/20170303061508/http://www.apple.com/ipad-pro/specs/.

83. The iPad Pro (12.9") uses an A9X SoC, which is mounted on a motherboard.



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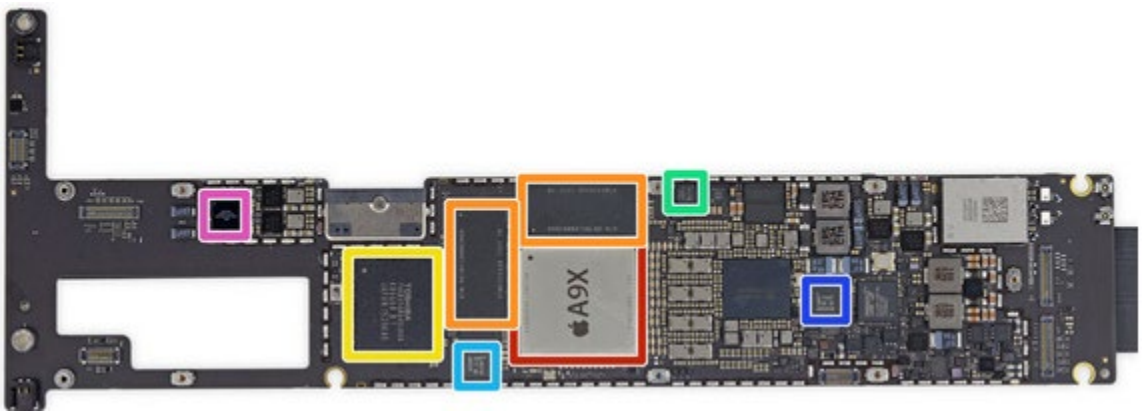
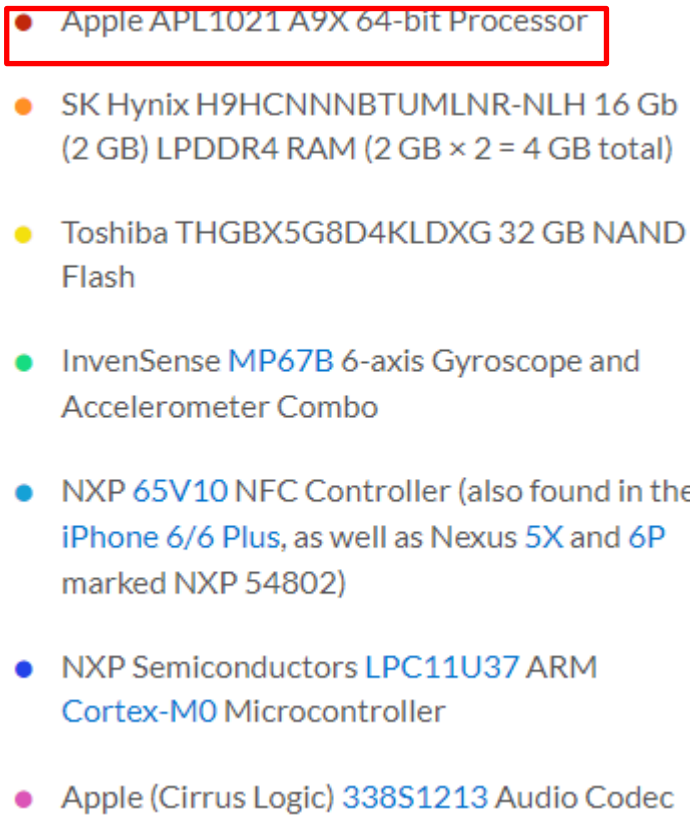
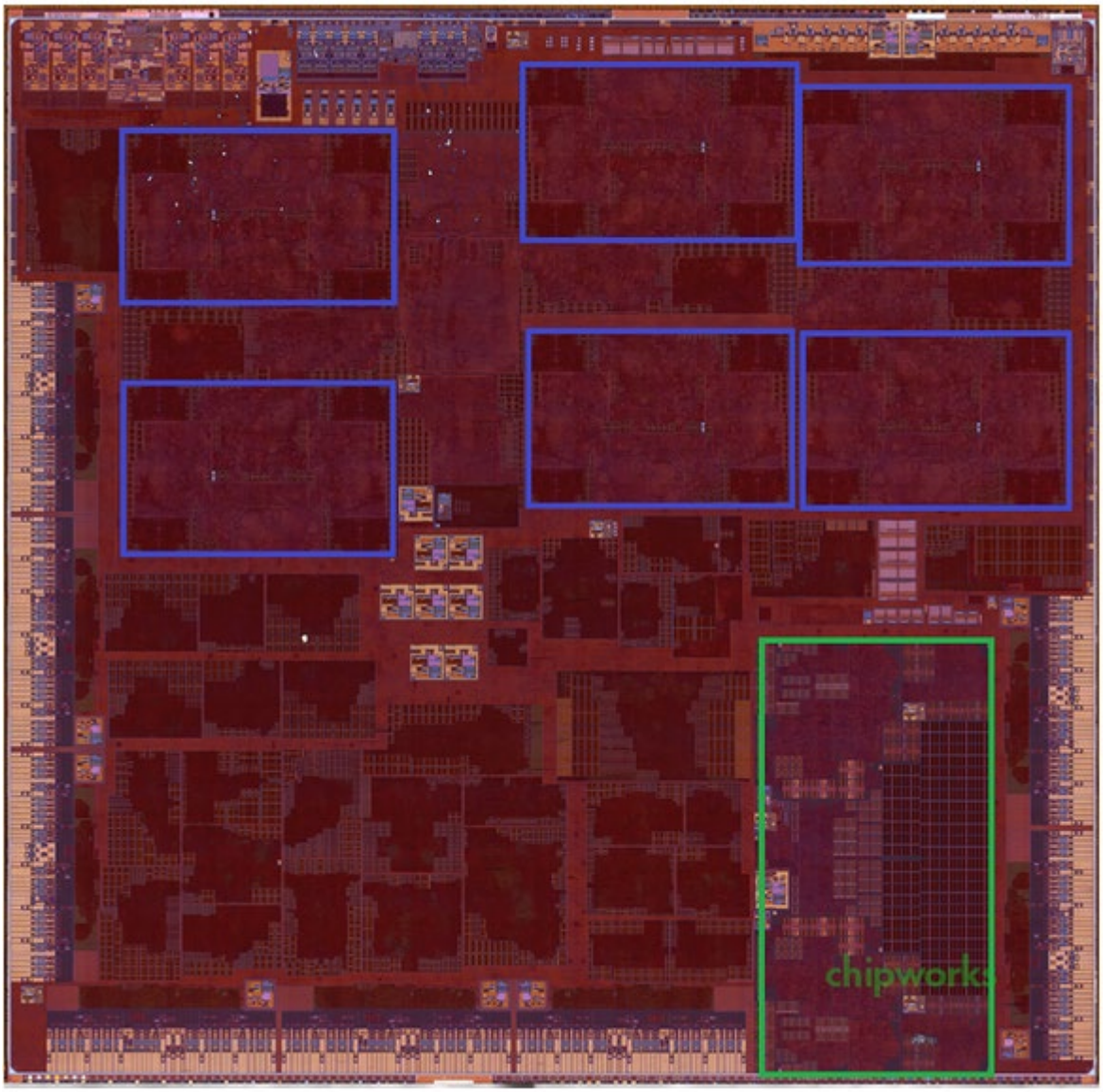




https://web.archive.org/web/20161128221957/https://www.ifixit.com/Teardown/iPad+Pro+12.9-Inch+Teardown/52599.

84. The A9X SoCs employed in the iPad Pro (12.9") integrate the central processing unit (CPU) with a graphics controller on a single chip.

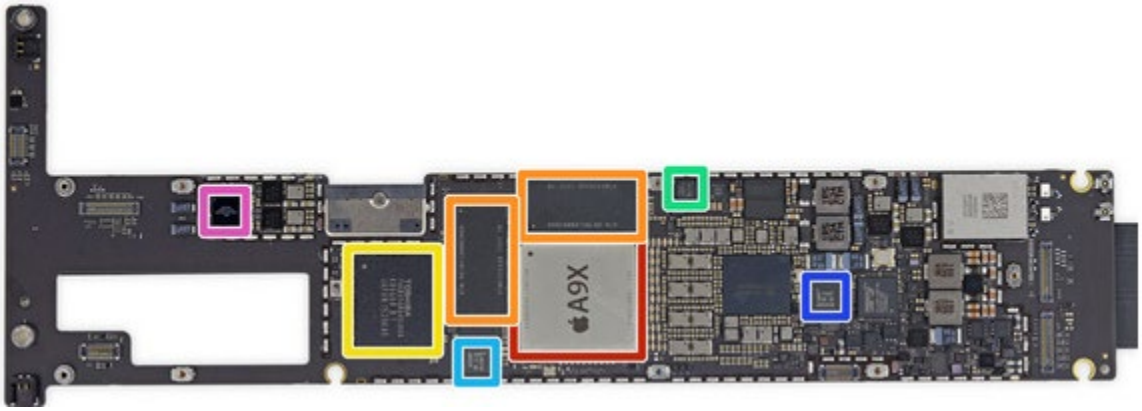


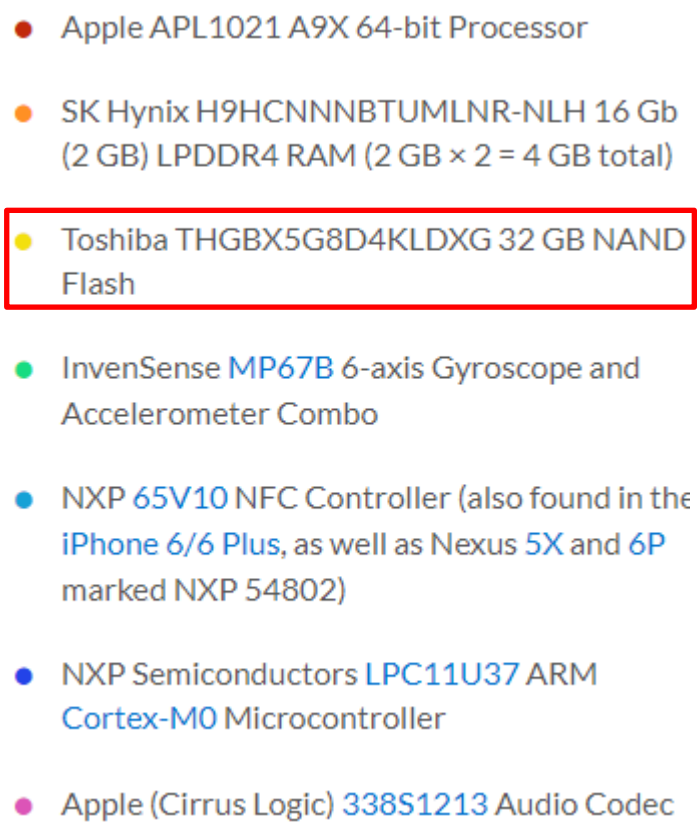
Chipworks' Dick James tells me that he sees a 12-cluster GPU, two CPU cores, and an absence of the level-three cache memory found inside the A9 chip (I'll explain why I think Apple didn't include it later in this article). I agree with his assessment. The two CPU cores can be seen in the green box, and I believe that inside of each blue box are two GPU clusters, for a total of 12 clusters.

https://web.archive.org/web/20151128012548/https://www.fool.com/investing/general/2015/11/27/inside-the-apple-inc-a9x-chip.aspx; *see also* https://web.archive.org/web/20151113034317/https://www.anandtech.com/show/9780/taking-notes-with-ipad-pro/2.

85. On information and belief, the graphics controllers integrated in the A9X SoCs employed in the iPad Pro (12.9") operate as MIPI DSI, low power DisplayPort ("LPDP"), or other channels which use LVDS. As described above, A9 SoCs employed in the iPhone 6s utilize MIPI DSI, while the A9 SoCs employed in the iPad (5th Gen.) utilize LPDP. *See* http://laptop-schematics.com/view/12640/. On information and belief, the graphics controllers integrated in the A9X SoCs employed in the iPad Pro (12.9") continued this trend and utilize LVDS. *See, e.g.*, http://www.laptop-schematics.com/view/12645/ (identifying LPDP used in Aruba processor in later iPad Pro).

86. On information and belief, the A9X SoCs employed in the iPad Pro (12.9") connect directly to flash storage via PCIe channels, in the same manner as described above with respect to the A9 SoCs employed in the iPhone 6s.





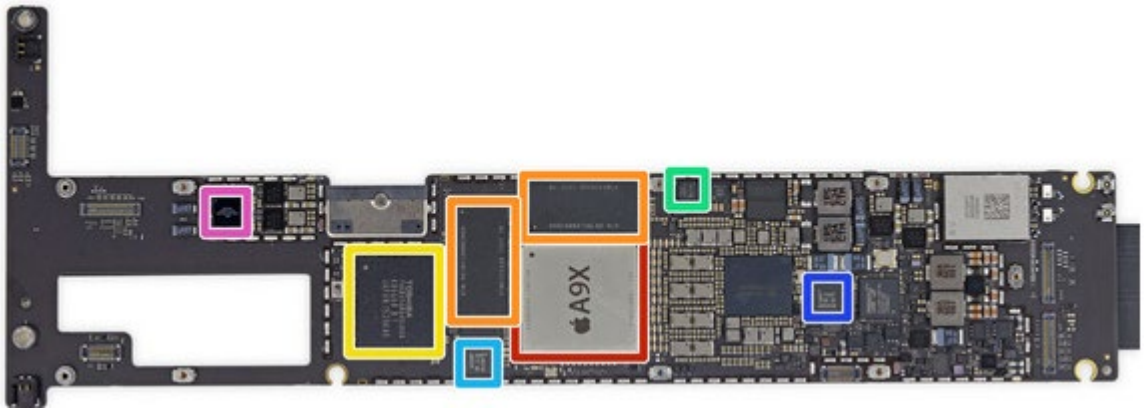
https://web.archive.org/web/20161128221957/https://www.ifixit.com/Teardown/iPad+Pro+12.9-Inch+Teardown/52599.

> In the case of the iPad Pro, Apple claims that they've implemented a storage controller comparable to some desktop SSDs. It turns out that this controller is a familiar one, as the storage controller identifies itself as the APPLE SSD AP0128K in the case of this review unit. It turns out that everything about this SSD is identical to what we saw in the iPhone 6s as well, down the use of Hynix for at least one of the NAND vendors and the hybrid SLC/TLC architecture discussed in previous articles. In order to test how this storage solution performs we once again use Eric Patno's StorageBench, which provides a rough analogue to AndroBench 3.6.

https://web.archive.org/web/20160124182003/http://www.anandtech.com/show/9766/the-apple-ipad-pro-review/6.

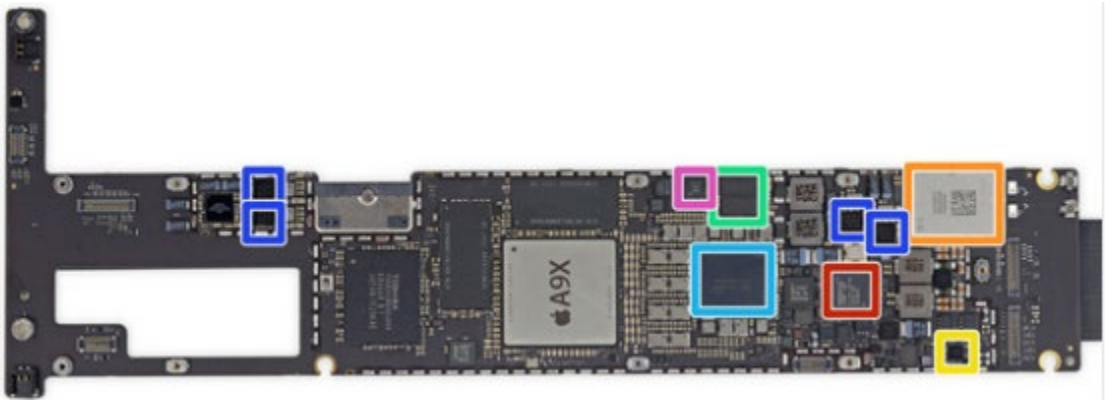
87. The A9X SoCs employed in the iPad Pro (12.9") integrate one or more integrated interface controllers to drive the PCIe channels connected to the processor. On information and belief, and for similar reasons as described above with respect to the A9 SoCs employed in the iPhone 6s, because the A9X SoCs employed in the iPad Pro (12.9") have at least memory, USB

3.x, and/or PCIe channels, and can send and receive data on those channels, they necessarily have integrated interface controllers to control data transmission through those interfaces.



- Apple APL1021 A9X 64-bit Processor
- SK Hynix H9HCNNNBTUMLNR-NLH 16 Gb (2 GB) LPDDR4 RAM (2 GB × 2 = 4 GB total)
- Toshiba THGBX5G8D4KLDXG 32 GB NAND Flash
- InvenSense MP67B 6-axis Gyroscope and Accelerometer Combo
- NXP 65V10 NFC Controller (also found in the iPhone 6/6 Plus, as well as Nexus 5X and 6P marked NXP 54802)
- NXP Semiconductors LPC11U37 ARM Cortex-M0 Microcontroller
- Apple (Cirrus Logic) 338S1213 Audio Codec

https://web.archive.org/web/20161128221957/https://www.ifixit.com/Teardown/iPad+Pro+12.9-Inch+Teardown/52599.



- Fresco Logic FL1100SX 2-port USB 3.0 Host Controller
- Universal Scientific Industrial 339S00045 Wi-Fi Module
- NXP 1610A3 (also found in iPhone 6s/6s Plus, likely an iteration of the 1610A1 found in the iPad Mini 4)
- Dialog Semiconductor 343S00025-A1
- Dialog Semiconductor 343S00052-A1
- Maxim Integrated MAX98721CEWV (likely an iteration of the MAX98721BEWV found in the iPad Air 2)
- Fairchild Semiconductor FDMC 6683 power management chip

https://web.archive.org/web/20161128221957/https://www.ifixit.com/Teardown/iPad+Pro+12.9-Inch+Teardown/52599; *see also,* e.g., https://cpu-comparison.com/apple-a9x/ (identifying A9X SoCs utilize PCIe channels to connect with memory).

88. On information and belief, and for similar reasons as described above with respect to the A9 SoCs employed in the iPhone 6s, the A9X SoCs employed in the iPad Pro (12.9") connects directly to a variety of LVDS channels that convey data bits in a serial stream using unidirectional pairs of lanes transmitting data in opposite direction, including at least the PCIe and USB 3.x interfaces described above.

89. The iPad Pro (12.9") comprises a chassis or enclosure which houses a connector that can couple to components of other computer systems and consoles, in particular the Lightning port.

Silver, Gold, Space Gray

https://web.archive.org/web/20170303061508/http://www.apple.com/ipad-pro/specs/.

90. The A9X SoCs employed in the iPad Pro (12.9") also connect directly to a variety of differential signal channels that output digital video signals through a connector, in particular the Lightning port.

> Video mirroring and video out support: Up to 1080p through Lightning Digital AV Adapter and Lightning to VGA Adapter (adapters sold separately)

https://web.archive.org/web/20170303061508/http://www.apple.com/ipad-pro/specs/.

91. The A9X SoCs employed in the iPad Pro (12.9") also connect to LVDS channels that convey USB 3.x data packets through pairs of unidirectional differential signal paths in opposite directions. The iPad Pro (12.9") includes a USB 3.x controller and supports Lightning connectors. Users can use USB cables to connect the iPad Pro (12.9") through the Lightning end of the connector to a computer's USB port for syncing and charging. *See, e.g.*, https://www.apple.com/shop/product/MXLY2AM/A/lightning-to-usb-cable-1-m. Cables such as these comprise a connector for external peripheral data communication that can convey Universal Serial Bus (USB) protocol data through the connector.

92. In view of the foregoing facts concerning the technical features and functionalities of the Accused Hon Hai Tablets (*see* paragraphs 81-93), when Hon Hai or another party manufactures the Accused Hon Hai Tablets, it improves the speed and performance of the peripheral data communication in its computer products by using a method of manufacturing that includes the following steps: (a) obtaining a CPU with a graphics controller in a single chip; (b) connecting one or more unidirectional differential signal channels to the CPU to output digital video data; (c) providing a connector with an LVDS channel to facilitate data communication with external peripherals; (d) providing multiple LVDS channels, connecting them to the CPU, which use one or more pairs of unidirectional lanes that convey USB protocol data and/or address, data, and/or byte enable bits of PCIe bus transaction data in serial bit streams in opposite directions; (e)

connecting the CPU directly to a peripheral bridge on a circuit board; and (f) directly connecting to the peripheral bridge one or more LVDS channels with pairs of unidirectional lanes that convey data in serial bit streams in opposite directions.

93. On information and belief, Hon Hai or another party performs the foregoing manufacturing steps outside the United States to make at least certain of the Accused Hon Hai Tablets, and Hon Hai then imports those Accused Hon Hai Tablets into the United States to be marketed and sold.

The Accused Hon Hai Laptops

94. On information and belief, all of the Accused Hon Hai Laptops are configured and operate in substantially the same way as explained below using the product manufactured by Hon Hai that is ultimately known as MacBook Pro (13-inch, 2017) as an example for illustrative purposes.

95. The MacBook Pro (13-inch, 2017) is a computer system that runs the MacOS operating system.

https://web.archive.org/web/20170806220029/https://support.apple.com/kb/SP754?locale=e

n_US.

96. The MacBook Pro (13-inch, 2017) uses an Intel® Core processor, such as 2.3GHz dual-core Intel Core i5 processor, which is mounted on a motherboard.

Processor

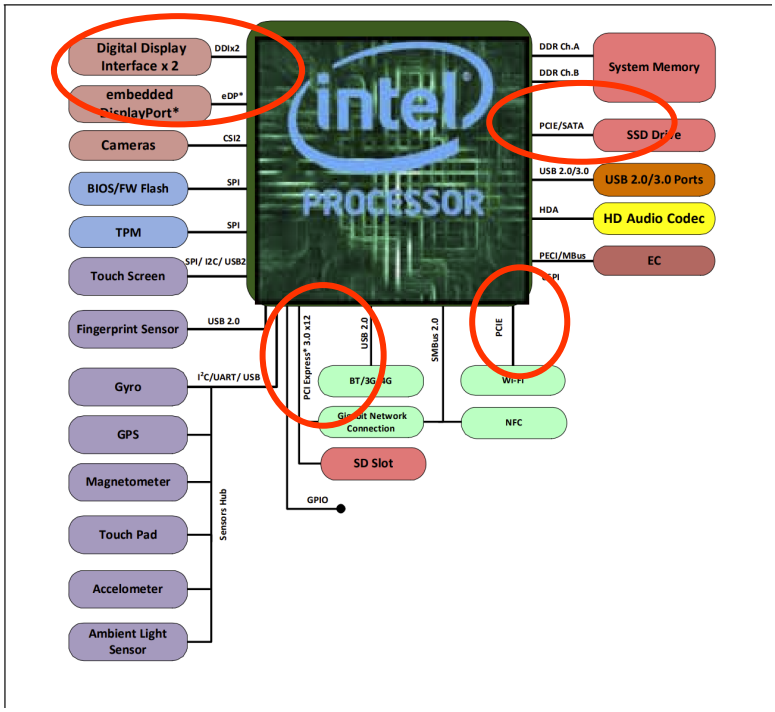
- 2.3GHz dual-core Intel Core i5, Turbo Boost up to 3.6GHz, with 64MB of eDRAM
  Configurable to 2.5GHz dual-core Intel Core i7, Turbo Boost up to 4.0GHz, with 64MB of eDRAM

https://web.archive.org/web/20170806220029/https://support.apple.com/kb/SP754?locale=en_US.

97. These processors are also known as the "Kaby Lake" family of processors, Intel's 7th Generation Intel® Core™ i5 Processors. *See, e.g.*, https://everymac.com/systems/apple/macbook_pro/specs/macbook-pro-core-i5-2.3-13-mid-2017-retina-display-no-touch-bar-specs.html (identifying Intel's 5th Generation "Kaby Lake" 2.3GHz Intel "Core i5" 7360U processors in this product); https://en.wikipedia.org/wiki/MacBook_Pro#Touch_Bar_(2016%E2%80%932020) (identifying "Kaby Lake" processor in this product); https://ark.intel.com/content/www/us/en/ark/products/97535/intel-core-i57360u-processor-4m-cache-up-to-3-60-ghz.html (specifications for the Intel® Core™ i5-7360U processors, and identifying them as 7th Generation Intel® Core™ i5 Processors, products formerly known as "Kaby Lake").

98. The 7th Generation Intel® Core™ i5-7360U processors integrate the central processing unit (CPU) with a graphics subsystem and an interface controller on a single chip. On information and belief, the Intel Core processors integrate one or more integrated interface controllers to drive the PCIe channels connected to the processor.

Figure 1-1. KBL Y/U/U 4-Core and AML-Y22 Processor Line Platforms



https://www.intel.com/content/www/us/en/content-details/334661/7th-generation-intel-processor-families-for-u-y-platforms-datasheet-volume-1-of-2.html, at 12; *see also id.* at 37.

Graphics

- Intel Iris Plus Graphics 640

https://web.archive.org/web/20170806220029/https://support.apple.com/kb/SP754?locale=en_US.

Processor Graphics

Processor Graphics ‡	Intel® Iris® Plus Graphics 640
Graphics Base Frequency	300 MHz
Graphics Max Dynamic Frequency	1.00 GHz
Graphics Video Max Memory	32 GB
eDRAM	64 MB
Graphics Output	eDP/DP/HDMI/DVI

https://ark.intel.com/content/www/us/en/ark/products/97535/intel-core-i57360u-processor-4m-cache-up-to-3-60-ghz.html.

Expansion Options	
PCI Express Revision	3.0
PCI Express Configurations ‡	1x4, 2x2, 1x2+2x1 and 4x1
Max # of PCI Express Lanes	12

https://ark.intel.com/content/www/us/en/ark/products/97535/intel-core-i57360u-processor-4m-cache-up-to-3-60-ghz.html.

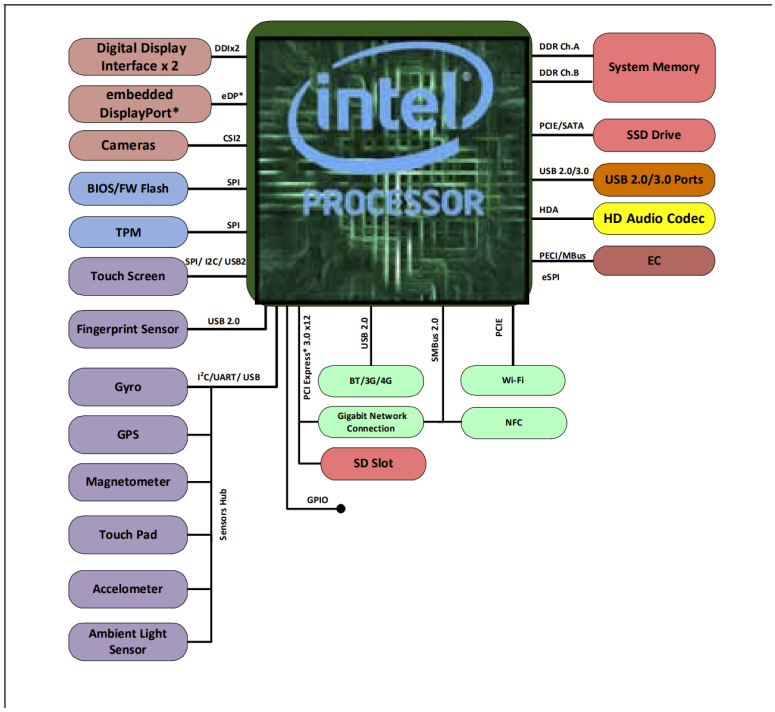
99. The MacBook Pro (13-inch, 2017) comprises a chassis or enclosure which houses one or more connectors that can couple to components of other computer systems and consoles, including the USB-C[34] ports.

https://web.archive.org/web/20170806220029/https://support.apple.com/kb/SP754?locale=e

[34] USB Type C connectors can convey both USB protocol data as well as DisplayPort digital video. *See* https://www.usb.org/sites/default/files/D2T1-4%20-%20VESA%20DP%20Alt%20Mode%20over%20USB%20Type-C.pdf; https://www.displayport.org/displayport-over-usb-c-7-reasons/; https://www.androidauthority.com/what-is-usb-type-c-594575/.

n_US.

Figure 1-1. KBL Y/U/U 4-Core and AML-Y22 Processor Line Platforms



https://www.intel.com/content/www/us/en/content-details/334661/7th-generation-intel-processor-families-for-u-y-platforms-datasheet-volume-1-of-2.html, at 12; (identifying DDI, USB 3.x, and eDP channels extending from the SoC); *id.* at 34 (explaining that the DDI channels can be configured as DisplayPort, HDMI, or DVI).

Charging and Expansion

Two Thunderbolt 3 (USB–C) ports with support for:

- Charging
- DisplayPort
- Thunderbolt (up to 40 Gbps)
- USB 3.1 Gen 2 (up to 10 Gbps)

Video Support
Simultaneously supports full native resolution on the built-in display at millions of colors and:

- One display with 5120-by-2880 resolution at 60Hz at over a billion colors
- Up to two displays with 4096-by-2304 resolution at 60Hz at millions of colors
- Up to two displays with 3840-by-2160 resolution at 60Hz at over a billion colors

Thunderbolt 3 digital video output

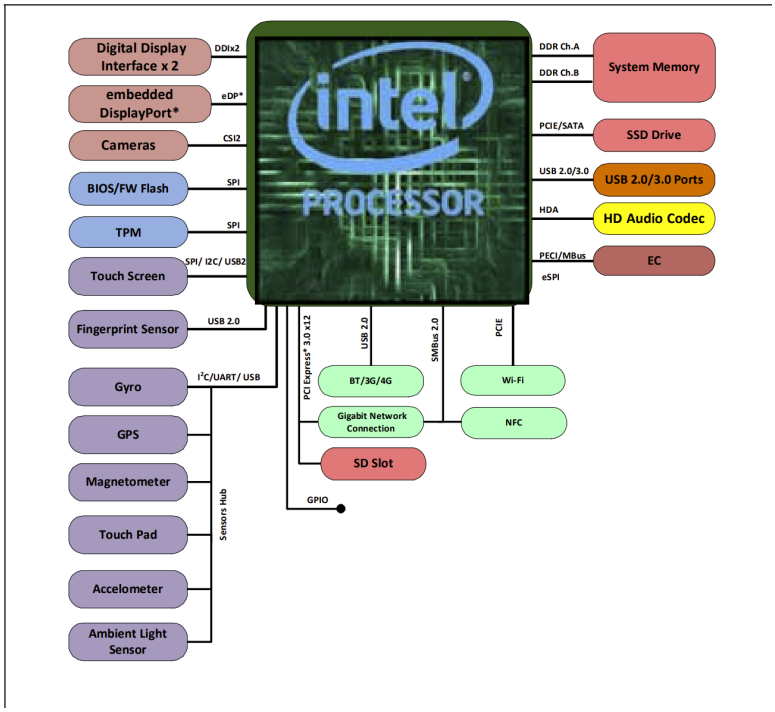
- Native DisplayPort output over USB-C
- VGA, HDMI, and Thunderbolt 2 output supported using adapters (sold separately)

https://web.archive.org/web/20170806220029/https://support.apple.com/kb/SP754?locale=en_US.

100. The Intel processors employed in the MacBook Pro (13-inch, 2017) connect directly to a variety of LVDS channels that convey data bits in a serial stream using unidirectional pairs of lanes transmitting data in opposite direction, including Intel's OPI[35] and PCIe channels, and the directly-connected PCIe channels connect the CPU to a mass storage device.

[35] When Intel connects the processor to a chipset on the same platform as a SoC, it connects these components via OPI interface. *See* https://en.wikichip.org/wiki/intel/microarchitectures/kaby_lake#Sockets.2FPlatform (disclosing OPI connection between dies on SoC of the Kaby Lake U series processors).

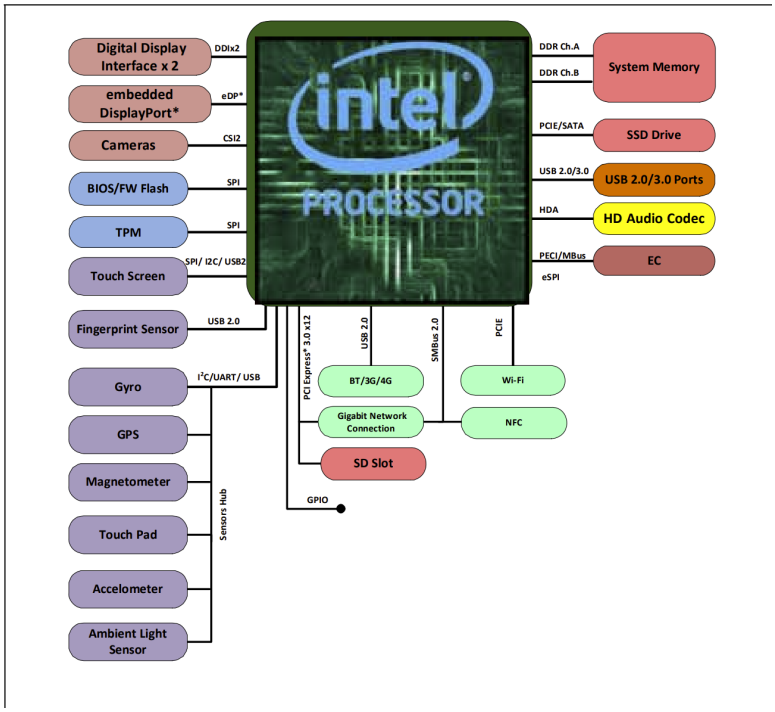
Figure 1-1. KBL Y/U/U 4-Core and AML-Y22 Processor Line Platforms



https://www.intel.com/content/www/us/en/content-details/334661/7th-generation-intel-processor-families-for-u-y-platforms-datasheet-volume-1-of-2.html, at 12.

101. The Intel processors employed in the MacBook Pro (13-inch, 2017) also connect directly to a variety of differential signal channels that output digital video signals through a connector, including Thunderbolt and DisplayPort.

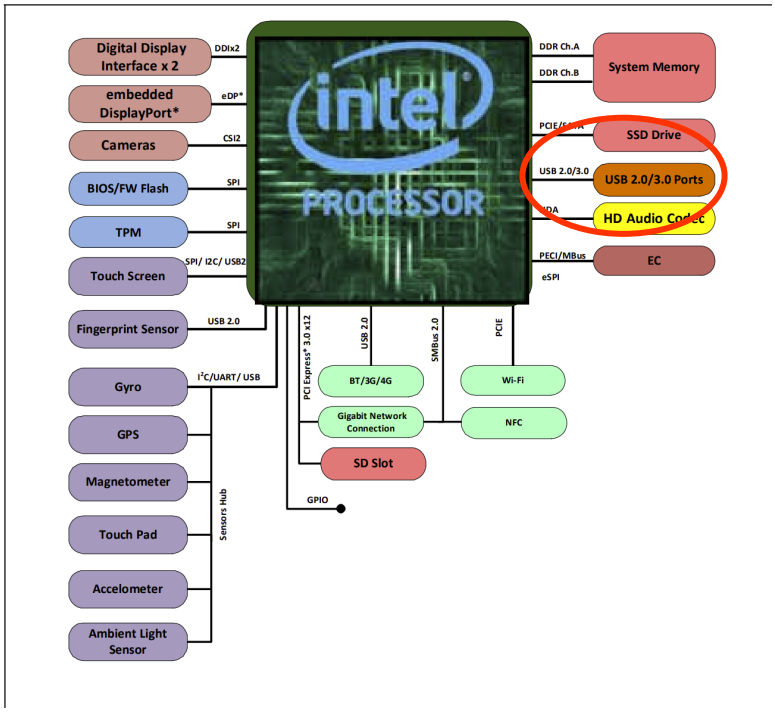
Figure 1-1. KBL Y/U/U 4-Core and AML-Y22 Processor Line Platforms



https://www.intel.com/content/www/us/en/content-details/334661/7th-generation-intel-processor-families-for-u-y-platforms-datasheet-volume-1-of-2.html, at 12; *id.* at 34 (explaining that the DDI channels can be configured as DisplayPort, HDMI, or DVI); *see also* https://web.archive.org/web/20170806220029/https://support.apple.com/kb/SP754?locale=en_US (disclosing Thunderbolt and DisplayPort ports on the product).

102. The Intel processors employed in the MacBook Pro (13-inch, 2017) also connect to LVDS channels that convey USB data packets through pairs of unidirectional differential signal paths in opposite directions—USB 3.x ports.

Figure 1-1. KBL Y/U/U 4-Core and AML-Y22 Processor Line Platforms



https://www.intel.com/content/www/us/en/content-details/334661/7th-generation-intel-processor-families-for-u-y-platforms-datasheet-volume-1-of-2.html, at 12.

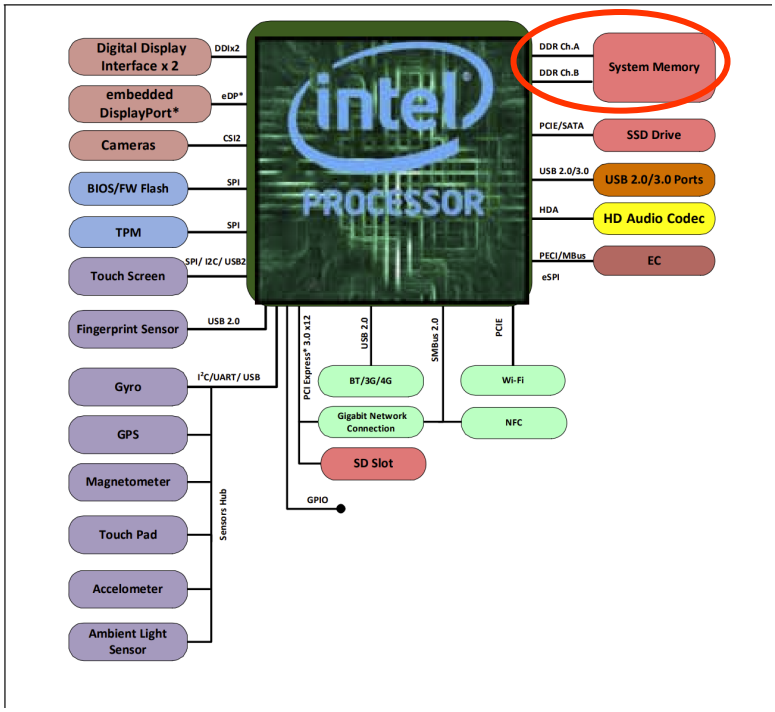
103. The MacBook Pro (13-inch, 2017) has DDR3 system memory connected directly to the CPU.

Memory

- 8GB of 2133MHz LPDDR3 onboard memory
  Configurable to 16GB of memory

https://web.archive.org/web/20170806220029/https://support.apple.com/kb/SP754?locale=en_US.

Figure 1-1. KBL Y/U/U 4-Core and AML-Y22 Processor Line Platforms



https://www.intel.com/content/www/us/en/content-details/334661/7th-generation-intel-processor-families-for-u-y-platforms-datasheet-volume-1-of-2.html, at 12.

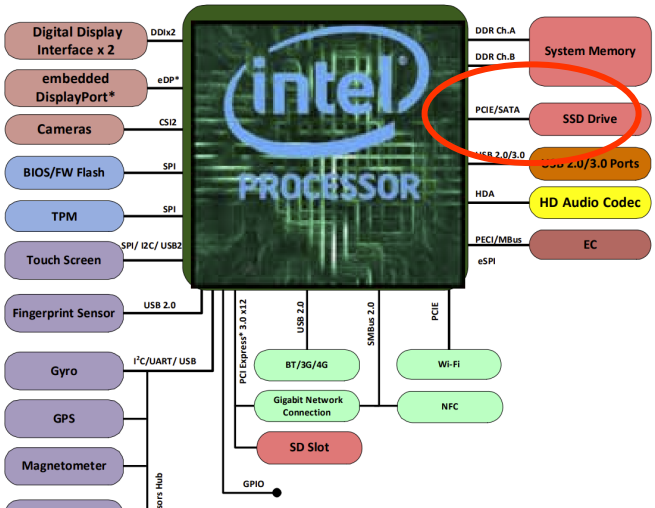
104. The MacBook Pro (13-inch, 2017) has a mass storage SSD coupled to the CPU using PCIe.

Storage[1]

- **128GB**
  128GB PCIe-based onboard SSD
  Configurable to 256GB, 512GB, or 1TB SSD
- **256GB**
  256GB PCIe-based onboard SSD
  Configurable to 512GB or 1TB SSD

https://web.archive.org/web/20170806220029/https://support.apple.com/kb/SP754?locale=en_US.

Figure 1-1. KBL Y/U/U 4-Core and AML-Y22 Processor Line Platforms



https://www.intel.com/content/www/us/en/content-details/334661/7th-generation-intel-processor-families-for-u-y-platforms-datasheet-volume-1-of-2.html, at 12.

105. In view of the foregoing facts concerning the technical features and functionalities of the Accused Hon Hai Laptops (*see* paragraphs 94-108), when Hon Hai or another party abroad manufactures the Accused Hon Hai Laptops, it improves the speed and performance of the peripheral data communication in its computer products by using a method of manufacturing that includes the following steps: (a) obtaining a CPU with a graphics controller in a single chip; (b) connecting one or more unidirectional differential signal channels to the CPU to output digital video data; (c) providing a connector with an LVDS channel to facilitate data communication with external peripherals; (d) providing multiple LVDS channels, connecting them to the CPU, which use one or more pairs of unidirectional lanes that convey USB protocol data and/or address, data, and/or byte enable bits of PCIe bus transaction data in serial bit streams in opposite directions;

and (e) directly connecting to the peripheral bridge one or more LVDS channels with pairs of unidirectional lanes that convey data in serial bit streams in opposite directions.

106. On information and belief, Hon Hai or another party performs the foregoing manufacturing steps outside the United States to make at least certain of the Accused Hon Hai Laptops, and Hon Hai then imports those Accused Hon Hai Laptops into the United States to be marketed and sold.

107. Through importing into the United States, and/or using, selling, and/or offering for sale, the Accused Hon Hai Products with the features and functionalities alleged above, Hon Hai has infringed one or more of the claims in each of the ACQIS Patents.

108. Hon Hai's infringing conduct has caused injury and damage to ACQIS and ACQIS' licensees.

COUNT I
INFRINGEMENT OF U.S. PATENT NO. 9,703,750

109. ACQIS incorporates by this reference the allegations set forth in paragraphs 1-108 of this Complaint in support of its third cause of action as though fully set forth herein.

110. Pursuant to 35 U.S.C. § 282, the claims of the '750 patent are presumed valid.

111. In view of the foregoing facts and allegations, including paragraphs 67-108 above, Hon Hai has directly infringed one or more claims of the '750 patent in violation of 35 U.S.C. § 271(g) by importing into, or selling, offering to sell, or using in, the United States the Accused Hon Hai Products that were manufactured by one or more of the methods claimed in the '750 patent.

112. The Accused Hon Hai Products are not trivial or nonessential components of other products and are not materially changed by subsequent processes.

113. Hon Hai's infringement of the '750 patent through its importation into, and/or use,

offers to sell, or sales in, the United States of the Accused Hon Hai Tablets is shown by way of the exemplary tablet, the iPad Pro (12.9”), as set forth in paragraphs 81-93 above. These paragraphs demonstrate that the exemplary tablet was necessarily manufactured according to at least claim 50 of the ’750 patent:

(a) Hon Hai or another party performs a method of improving external peripheral data communication of a computer when manufacturing the exemplary tablet;

(b) when manufacturing the exemplary tablet, Hon Hai or another party obtains an integrated obtains an integrated CPU and graphics controller as a single chip, because the exemplary tablet uses an A9X SoC;

(c) when manufacturing the exemplary tablet, Hon Hai or another party connects a first unidirectional, differential signal pair channel directly to the integrated CPU and graphics controller, because the A9X SoC employed in the exemplary tablet directly connects to at least MIPI DSI or LPDP channels;

(d) when manufacturing the exemplary tablet, Hon Hai or another party provides a connector for external peripheral data communication, because the exemplary tablet has a connector for external peripherals, in particular the Lightning port; and

(e) when manufacturing the exemplary tablet, Hon Hai or another party provides an LVDS channel to convey USB protocol data through a connector that uses two unidirectional, serial bit channels that transmit data in opposite directions, because the exemplary tablet has a Lightning connector that conveys USB 3.x data.

114. On information and belief, the Accused Hon Hai Tablets are in relevant part substantially similar to the exemplary tablet, in particular with regard to the manner in which the Accused Hon Hai Tablets include and utilize PCIe and/or USB 3.x functionality. This Section is

thus illustrative of the manner in which Hon Hai infringes the claims of the '750 patent as to each of the Accused Hon Hai Tablets.

115. ACQIS' infringement allegations against the Accused Hon Hai Tablets are not limited to claim 50 of the '750 patent, and additional infringed claims will be identified through infringement contentions and discovery.

116. Hon Hai's infringement of the '750 patent through its importation into, and/or use, offers to sell, or sales in, the United States of the Accused Hon Hai Laptops is shown by way of the exemplary laptop, the MacBook Pro (13-inch, 2017) laptop as set forth in paragraphs 94-108 above. These paragraphs demonstrate that the exemplary laptop was necessarily manufactured according to at least claim 50 of the '750 patent:

(a) Hon Hai or another party performs a method of improving external peripheral data communication of a computer when manufacturing the exemplary laptop;

(b) when manufacturing the exemplary laptop, Hon Hai or another party obtains an integrated obtains an integrated CPU and graphics controller as a single chip, because the exemplary laptop uses a uses a 7th Generation Intel® Core™ i5 ("Kaby Lake") Processor;

(c) when manufacturing the exemplary laptop, Hon Hai or another party connects a first unidirectional, differential signal pair channel directly to the integrated CPU and graphics controller to output digital video data, because the 7th Generation Intel® Core™ i5 ("Kaby Lake") Processor employed in the exemplary laptop directly connects to at least DDI and eDP channels;

(d) when manufacturing the exemplary laptop, Hon Hai or another party provides a connector for external peripheral data communication, because the exemplary laptop

has a variety of connectors for external peripherals, including USB-C ports; and

(e) when manufacturing the exemplary laptop, Hon Hai or another party provides an LVDS channel to convey USB protocol data through a connector that uses two unidirectional, serial bit channels that transmit data in opposite directions, because the exemplary laptop has USB-C ports that convey/output USB data.

117. On information and belief, the Accused Hon Hai Laptops are in relevant part substantially similar to the exemplary laptop, in particular with regard to the manner in which the Accused Hon Hai Laptops include and utilize PCIe and/or USB 3.x functionality. This Section is thus illustrative of the manner in which Hon Hai infringes the claims of the '750 patent as to each of the Accused Hon Hai Laptops.

118. ACQIS' infringement allegations against the Accused Hon Hai Laptops are not limited to claim 50 of the '750 patent, and additional infringed claims will be identified through infringement contentions and discovery.

119. The above-described acts of infringement committed by Hon Hai have caused injury and damage to ACQIS and ACQIS' licensees.

120. ACQIS is entitled to recover all damages sustained as a result of Hon Hai's wrongful acts of infringement, but in no event less than a reasonable royalty pursuant to 35 U.S.C. § 284.

COUNT II
INFRINGEMENT OF U.S. PATENT NO. 8,977,797

121. ACQIS incorporates by this reference the allegations set forth in paragraphs 1-108 of this Complaint in support of its third cause of action as though fully set forth herein.

122. Pursuant to 35 U.S.C. § 282, the claims of the '797 patent are presumed valid.

123. In view of the foregoing facts and allegations, including paragraphs 67-108 above, Hon Hai has directly infringed one or more claims of the '797 patent in violation of 35 U.S.C. § 271(g) by importing into, or selling, offering to sell, or using in, the United States the Accused Hon Hai Products that were manufactured by one or more of the methods claimed in the '797 patent.

124. The Accused Hon Hai Products are not trivial or nonessential components of other products and are not materially changed by subsequent processes.

125. Hon Hai's infringement of the '797 patent through its importation into, and/or use, offers to sell, or sales in, the United States of the Accused Hon Hai Smartphones is shown by way of the exemplary smartphone, the iPhone 6s as set forth paragraphs 67-80 above. These paragraphs demonstrate that the exemplary smartphone was necessarily manufactured according to at least claim 36 of the '797 patent:

(a) Hon Hai or another party performs a method of improving data throughput on a motherboard when manufacturing the exemplary smartphone, which contains a motherboard;

(b) when manufacturing the exemplary smartphone, Hon Hai or another party mounts an integrated CPU and interface controller as a single chip on the motherboard, because the A9 SoC employed in the exemplary smartphone includes interface controllers (*e.g.*, to drive/control PCIe channels) and the CPU integrated as a single chip;

(c) when manufacturing the exemplary smartphone, Hon Hai or another party connects an LVDS channel directly to the interface controller, which LVDS channel comprises two unidirectional, serial channels to transmit data in opposite directions because the A9 SoCs employed in the exemplary smartphone directly connect to PCIe channels;

(d) when manufacturing the exemplary smartphone, Hon Hai or another party increases data throughput in the serial channels by providing each channel with multiple differential signal line pairs, because the PCIe channels have pairs of differential signal lanes;

(e) when manufacturing the exemplary smartphone, Hon Hai or another party configures the interface controller to adapt to different numbers of differential signal line pairs to convey encoded address and data bits of a PCI bus transaction in serial form, because the interface controller integrated with the CPU is configured to convey PCIe data signals through PCIe channels having differential signal line pairs; and

(f) when manufacturing the exemplary smartphone, Hon Hai or another party couples the integrated CPU and interface device to a peripheral device such as flash storage, which is attached to the motherboard through a PCIe channel.

126. On information and belief, the Accused Hon Hai Smartphones are in relevant part substantially similar to the exemplary smartphone, in particular with regard to the manner in which the Accused Hon Hai Smartphones include and utilize PCIe functionality. This Section is thus illustrative of the manner in which Hon Hai infringes the claims of the '797 patent as to each of the Accused Hon Hai Smartphones.

127. ACQIS' infringement allegations against the Accused Hon Hai Smartphones are not limited to claim 36 of the '797 patent, and additional infringed claims will be identified through infringement contentions and discovery.

128. Hon Hai's infringement of the '797 patent through its importation into, and/or use, offers to sell, or sales in, the United States of the Accused Hon Hai Tablets is shown by way of the exemplary tablet, the iPad Pro (12.9") as set forth in paragraphs 81-93 above. These paragraphs

demonstrate that the exemplary tablet was necessarily manufactured according to at least claim 36 of the '797 patent:

(a) Hon Hai or another party performs a method of improving data throughput on a motherboard when manufacturing the exemplary tablet, which contains a motherboard;

(b) when manufacturing the exemplary tablet, Hon Hai or another party mounts an integrated CPU and interface controller as a single chip on the motherboard, because the A9X SoC employed in the exemplary tablet includes interface controllers (*e.g.*, to drive/control PCIe channels) and the CPU integrated as a single chip;

(c) when manufacturing the exemplary tablet, Hon Hai or another party connects an LVDS channel directly to the interface controller, which LVDS channel comprises two unidirectional, serial channels to transmit data in opposite directions because the A9X SoCs employed in the exemplary tablet are directly connected to PCIe channels;

(d) when manufacturing the exemplary tablet, Hon Hai or another party increases data throughput in the serial channels by providing each channel with multiple differential signal line pairs, because the PCIe channels have pairs of differential signal lanes;

(e) when manufacturing the exemplary tablet, Hon Hai or another party configures the interface controller to adapt to different numbers of differential signal line pairs to convey encoded address and data bits of a PCI bus transaction in serial form, because an interface controller integrated with the CPU is configured to convey PCIe data signals through PCIe channels having differential signal line pairs; and

(f) when manufacturing the exemplary tablet, Hon Hai or another party couples the integrated CPU and interface device to a peripheral device such as flash storage,

which is attached to the motherboard through a PCIe channel.

129. On information and belief, the Accused Hon Hai Tablets are in relevant part substantially similar to the exemplary tablet, in particular with regard to the manner in which the Accused Hon Hai Tablets include and utilize PCIe functionality. This Section is thus illustrative of the manner in which Hon Hai infringes the claims of the '797 patent as to each of the Accused Hon Hai Tablets.

130. ACQIS' infringement allegations against the Accused Hon Hai Tablets are not limited to claim 36 of the '797 patent, and additional infringed claims will be identified through infringement contentions and discovery.

131. Hon Hai's infringement of the '797 patent through its importation into, and/or use, offers to sell, or sales in, the United States of the Accused Hon Hai Laptops is shown by way of the exemplary laptop, the MacBook Pro (13-inch, 2017) laptop as set forth in paragraphs 94-108 above. These paragraphs demonstrate that the exemplary laptop was necessarily manufactured according to at least claim 36 of the '797 patent:

(a) Hon Hai or another party performs a method of improving data throughput on a motherboard when manufacturing the exemplary laptop, which contains a motherboard;

(b) when manufacturing the exemplary laptop, Hon Hai or another party mounts an integrated CPU and interface controller as a single chip on the motherboard, because the Intel processor employed in the exemplary laptop includes interface controllers (*e.g.*, to drive/control PCIe channels) and the CPU integrated as a single chip;

(c) when manufacturing the exemplary laptop, Hon Hai or another party connects a LVDS channel directly to the interface controller, which LVDS channel uses two

unidirectional, serial channels to transmit data in opposite directions because the Intel processors employed in the exemplary laptop are directly connected to PCIe channels and an OPI interface;

(d) when manufacturing the exemplary laptop, Hon Hai or another party increases data throughput in the serial channels by providing each channel with multiple differential signal line pairs, because the PCIe and OPI channels have multiple differential signal line pairs;

(e) when manufacturing the exemplary laptop, Hon Hai or another party configures the interface controller to adapt to different numbers of differential signal line pairs to convey encoded address and data bits of a PCI bus transaction in serial form, because an interface controller integrated with the CPU is configured to convey PCIe data signals through PCIe channels having differential signal line pairs; and

(f) when manufacturing the exemplary laptop, Hon Hai or another party couples the integrated CPU and interface device to a peripheral device such as a mass storage device, which is attached to the motherboard through a PCIe channel.

132. On information and belief, the Accused Hon Hai Laptops are in relevant part substantially similar to the exemplary laptop, in particular with regard to the manner in which the Accused Hon Hai Laptops include and utilize PCIe functionality. This Section is thus illustrative of the manner in which Hon Hai infringes the claims of the ’797 patent as to each of the Accused Hon Hai Laptops.

133. ACQIS’ infringement allegations against the Accused Hon Hai Laptops are not limited to claim 36 of the ’797 patent, and additional infringed claims will be identified through infringement contentions and discovery.

134. The above-described acts of infringement committed by Hon Hai have caused injury and damage to ACQIS and ACQIS' licensees.

135. ACQIS is entitled to recover all damages sustained as a result of Hon Hai's wrongful acts of infringement, but in no event less than a reasonable royalty pursuant to 35 U.S.C. § 284.

COUNT III
INFRINGEMENT OF U.S. PATENT NO. 9,529,769

136. ACQIS incorporates by this reference the allegations set forth in paragraphs 1-108 of this Complaint in support of its third cause of action as though fully set forth herein.

137. Pursuant to 35 U.S.C. § 282, the claims of the '769 patent are presumed valid.

138. In view of the foregoing facts and allegations, including paragraphs 67-108 above, Hon Hai has directly infringed one or more claims of the '769 patent in violation of 35 U.S.C. § 271(g) by importing into, or selling, offering to sell, or using in, the United States the Accused Hon Hai Products that were manufactured by one or more of the methods claimed in the '769 patent.

139. The Accused Hon Hai Products are not trivial or nonessential components of other products and are not materially changed by subsequent processes.

140. Hon Hai's infringement of the '769 patent through its importation into, and/or use, offers to sell, or sales in, the United States of the Accused Hon Hai Tablets is shown by way of the exemplary tablet, the iPad Pro (12.9") as set forth in paragraphs 81-93 above. These paragraphs demonstrate that the exemplary tablet was necessarily manufactured according to at least claim 19 of the '769 patent:

(a) Hon Hai or another party performs a method of improving external peripheral data communication in a computer when manufacturing the exemplary tablet;

(b) when manufacturing the exemplary tablet, Hon Hai or another party obtains an integrated CPU and graphics controller as a single chip, because the exemplary tablet uses an A9X SoC;

(c) when manufacturing the exemplary tablet, Hon Hai or another party connects a unidirectional signal channel directly to the integrated CPU and graphics controller to output digital video data, because the A9X SoCs employed in the exemplary tablet are directly connected to MIPI DSI or LPDP channels;

(d) when manufacturing the exemplary tablet), Hon Hai or another party provides a connector for external peripheral data communication, because the exemplary tablet has a connector for external peripherals, in particular the Lightning port;

(e) when manufacturing the exemplary tablet, Hon Hai or another party provides an LVDS channel to convey USB protocol data through a connector that uses two unidirectional, serial bit channels that transmit data in opposite directions, because the exemplary tablet has a Lightning connector that conveys USB 3.x data; and

(f) when manufacturing the exemplary tablet, Hon Hai or another party provides a second LVDS channel to convey digital video data through a connector, because the exemplary tablet uses LPDP or MIPI DSI channels and has a Lightning port that can convey/output digital video data signals.

141. On information and belief, the Accused Hon Hai Tablets are in relevant part substantially similar to the exemplary tablet, in particular with regard to the manner in which the Accused Hon Hai Tablets include and utilize PCIe and/or USB 3.x functionality. This Section is thus illustrative of the manner in which Hon Hai infringes the claims of the ’769 patent as to each of the Accused Hon Hai Tablets.

142. ACQIS' infringement allegations against the Accused Hon Hai Tablets are not limited to claim 19 of the '769 patent, and additional infringed claims will be identified through infringement contentions and discovery.

143. Hon Hai's infringement of the '769 patent through its importation into, and/or use, offers to sell, or sales in, the United States of the Accused Hon Hai Laptops is shown by way of the exemplary laptop, the MacBook Pro (13-inch, 2017) laptop as set forth in paragraphs 94-108 above. These paragraphs demonstrate that the exemplary laptop was necessarily manufactured according to at least claim 19 of the '769 patent:

(a) Hon Hai or another party performs a method of improving external peripheral data communication in a computer when manufacturing the exemplary laptop;

(b) when manufacturing the exemplary laptop, Hon Hai or another party obtains an integrated CPU and graphics controller as a single chip, because the exemplary laptop uses a 7th Generation Intel® Core™ i5 ("Kaby Lake") Processor;

(c) when manufacturing the exemplary laptop, Hon Hai or another party connects a unidirectional signal channel directly to the integrated CPU and graphics controller to output digital video data, because the 7th Generation Intel® Core™ i5 ("Kaby Lake") Processors employed in the MacBook Pro (13-inch, 2017) directly connect to DDI, eDP, and/or DisplayPort channels;

(d) when manufacturing the exemplary laptop, Hon Hai or another party provides a connector for external peripheral data communication, because the exemplary laptop has a variety of connectors for external peripherals, including USB-C ports;

(e) when manufacturing the exemplary laptop, Hon Hai or another party provides an LVDS channel to convey USB protocol data through a connector that uses two

unidirectional, serial bit channels that transmit data in opposite directions, because the exemplary laptop has a USB-C port that conveys USB 3.x data; and

(f) when manufacturing the exemplary laptop, Hon Hai or another party provides a second LVDS channel to convey digital video data through a connector, because the exemplary laptop has USB-C ports that can convey/output DisplayPort and Thunderbolt digital video data signals.

144. On information and belief, the Accused Hon Hai Laptops are in relevant part substantially similar to the exemplary laptop, in particular with regard to the manner in which the Accused Hon Hai Laptops include and utilize PCIe and/or USB 3.x functionality. This Section is thus illustrative of the manner in which Hon Hai infringes the claims of the '769 patent as to each of the Accused Hon Hai Laptops.

145. ACQIS' infringement allegations against the Accused Hon Hai Laptops are not limited to claim 19 of the '769 patent, and additional infringed claims will be identified through infringement contentions and discovery.

146. The above-described acts of infringement committed by Hon Hai have caused injury and damage to ACQIS and ACQIS' licensees.

147. ACQIS is entitled to recover all damages sustained as a result of Hon Hai's wrongful acts of infringement, but in no event less than a reasonable royalty pursuant to 35 U.S.C. § 284.

COUNT IV
INFRINGEMENT OF U.S. PATENT NO. RE45,140

148. ACQIS incorporates by this reference the allegations set forth in paragraphs 1-108 of this Complaint in support of its third cause of action as though fully set forth herein.

149. Pursuant to 35 U.S.C. § 282, the claims of the '140 patent are presumed valid.

150. In view of the foregoing facts and allegations, including paragraphs 67-108 above, Hon Hai has directly infringed one or more claims of the '140 patent in violation of 35 U.S.C. § 271(g) by importing into, or selling, offering to sell, or using in, the United States the Accused Hon Hai Products that were manufactured by one or more of the methods claimed in the '140 patent.

151. The Accused Hon Hai Products are not trivial or nonessential components of other products and are not materially changed by subsequent processes.

152. Hon Hai's infringement of the '140 patent through its importation into, and/or use, offers to sell, or sales in, the United States of the Accused Hon Hai Smartphones is shown by way of the exemplary smartphone, the iPhone 6s as set forth in paragraphs 67-80 above. These paragraphs demonstrate that the iPhone 6s was necessarily manufactured according to at least claim 30 of the '140 patent:

(a) Hon Hai or another party performs a method of improving performance of a computer when manufacturing the exemplary smartphone;

(b) when manufacturing the exemplary smartphone, Hon Hai or another party obtains an integrated CPU and graphics controller as a single chip, because the exemplary smartphone uses an A9 SoC;

(c) when manufacturing the exemplary smartphone, Hon Hai or another party connects an LVDS channel directly to the integrated CPU and graphics controller that uses two unidirectional, serial bit channels that transmit data in opposite directions, because the A9 SoCs employed in the iPhone 6s connect directly to at least PCIe channels;

(d) when manufacturing the exemplary smartphone, Hon Hai or another party conveys serially encoded address and data of a PCI bus transaction through the LVDS channel

(*e.g.*, through PCIe channels directly connected to the A9 SoCs employed in the iPhone 6s);

(e) when manufacturing the exemplary smartphone, Hon Hai or another party connects a differential signal channel directly to the integrated CPU and graphics controller to output digital video data, because the A9 SoCs employed in the exemplary smartphone connect directly to MIPI DSI channels; and

(f) when manufacturing the exemplary smartphone, Hon Hai or another party connects memory directly to the integrated CPU and graphics controller, because the A9 SoCs employed in the iPhone 6s connect directly to DDR4 memory.

153. On information and belief, the Accused Hon Hai Smartphones are in relevant part substantially similar to the exemplary smartphone, in particular with regard to the manner in which the Accused Hon Hai Smartphones include and utilize PCIe and/or USB 3.x functionality. This Section is thus illustrative of the manner in which Hon Hai infringes the claims of the '140 patent as to each of the Accused Hon Hai Smartphones.

154. ACQIS' infringement allegations against the Accused Hon Hai Smartphones are not limited to claim 35 of the '140 patent, and additional infringed claims will be identified through infringement contentions and discovery.

155. Hon Hai's infringement of the '140 patent through its importation into, and/or use, offers to sell, or sales in, the United States of the Accused Hon Hai Tablets is shown by way of the exemplary tablet, the iPad Pro (12.9") as set forth in paragraphs 81-93 above. These paragraphs demonstrate that the iPad Pro (12.9") was necessarily manufactured according to at least claim 30 of the '140 patent:

(a) Hon Hai or another party performs a method of improving performance of a computer

when manufacturing the exemplary tablet;

(b) when manufacturing the exemplary tablet, Hon Hai or another party obtains an integrated CPU and graphics controller as a single chip, because the exemplary tablet uses an A9X SoC;

(c) when manufacturing the exemplary tablet, Hon Hai or another party connects an LVDS channel directly to the integrated CPU and graphics controller that uses two unidirectional, serial bit channels that transmit data in opposite directions, because the A9X SoCs employed in the exemplary tablet connect directly to at least PCIe channels;

(d) when manufacturing the exemplary tablet, Hon Hai or another party conveys serially encoded address and data of a PCI bus transaction through the LVDS channel (*e.g.*, through PCIe channels directly connected to the A9X SoCs employed in exemplary tablet);

(e) when manufacturing the exemplary tablet, Hon Hai or another party connects a differential signal channel directly to the integrated CPU and graphics controller to output digital video data, because the A9X SoCs employed in the exemplary tablet connect directly to MIPI DSI or LPDP channels; and

(f) when manufacturing the exemplary tablet, Hon Hai or another party connects memory directly to the integrated CPU and graphics controller, because the A9X SoCs employed in the iPad Pro (12.9") connect directly to DDR4 memory.

156. On information and belief, the Accused Hon Hai Tablets are in relevant part substantially similar to the exemplary tablet, in particular with regard to the manner in which the Accused Hon Hai Tablets include and utilize PCIe and/or USB 3.x functionality. This Section is

thus illustrative of the manner in which Hon Hai infringes the claims of the '140 patent as to each of the Accused Hon Hai Tablets.

157. ACQIS' infringement allegations against the Accused Hon Hai Tablets are not limited to claim 35 of the '140 patent, and additional infringed claims will be identified through infringement contentions and discovery.

158. Hon Hai's infringement of the '140 patent through its importation into, and/or use, offers to sell, or sales in, the United States of the Accused Hon Hai Laptops is shown by way of the exemplary laptop, the MacBook Pro (13-inch, 2017) laptop as set forth in paragraphs 94-108 above. These paragraphs demonstrate that the exemplary laptop was necessarily manufactured according to at least claim 30 of the '140 patent:

(a) Hon Hai or another party performs a method of improving performance of a computer when manufacturing the exemplary laptop;

(b) when manufacturing the exemplary laptop, Hon Hai or another party obtains an integrated CPU and graphics controller as a single chip, because the exemplary laptop, 2017 uses a 7th Generation Intel® Core™ i5 ("Kaby Lake") Processor;

(c) when manufacturing the exemplary laptop, Hon Hai or another party connects an LVDS channel directly to the integrated CPU and graphics controller that uses two unidirectional, serial bit channels that transmit data in opposite directions, because the 7th Generation Intel® Core™ i5 ("Kaby Lake") Processors employed in the exemplary laptop connect directly to at least PCIe channels;

(d) when manufacturing the exemplary laptop, Hon Hai or another party conveys serially encoded address and data of a PCI bus transaction through the LVDS channel (*e.g.*, through PCIe channels directly connected to the A7th Generation Intel® Core™ i5

("Kaby Lake") Processors employed in the exemplary laptop);

(e) when manufacturing the exemplary laptop, Hon Hai or another party connects a differential signal channel directly to the integrated CPU and graphics controller to output digital video data, because the 7th Generation Intel® Core™ i5 ("Kaby Lake") Processors employed in the exemplary laptop connect directly to at least DDI and eDP channels; and

(f) when manufacturing the exemplary laptop Hon Hai or another party connects memory directly to the integrated CPU and graphics controller, because the 7th Generation Intel® Core™ i5 ("Kaby Lake") Processors employed in the exemplary laptop connect directly to DDR3 memory.

159. On information and belief, the Accused Hon Hai Laptops are in relevant part substantially similar to the exemplary laptop, in particular with regard to the manner in which the Accused Hon Hai Laptops include and utilize PCIe and/or USB 3.x functionality. This Section is thus illustrative of the manner in which Hon Hai infringes the claims of the '140 patent as to each of the Accused Hon Hai Laptops.

160. ACQIS' infringement allegations against the Accused Hon Hai Laptops are not limited to claim 35 of the '140 patent, and additional infringed claims will be identified through infringement contentions and discovery.

161. The above-described acts of infringement committed by Hon Hai have caused injury and damage to ACQIS and ACQIS' licensees.

162. ACQIS is entitled to recover all damages sustained as a result of Hon Hai's wrongful acts of infringement, but in no event less than a reasonable royalty pursuant to 35 U.S.C. § 284.

COUNT V
INFRINGEMENT OF U.S. PATENT NO. RE44,654

163. ACQIS incorporates by this reference the allegations set forth in paragraphs 1-108 of this Complaint in support of its third cause of action as though fully set forth herein.

164. Pursuant to 35 U.S.C. § 282, the claims of the ’654 patent are presumed valid.

165. In view of the foregoing facts and allegations, including paragraphs 67-108 above, Hon Hai has directly infringed one or more claims of the ’654 patent in violation of 35 U.S.C. § 271(g) by importing into, or selling, offering to sell, or using in, the United States the Accused Hon Hai Products that were manufactured by one or more of the methods claimed in the ’654 patent.

166. The Accused Hon Hai Products are not trivial or nonessential components of other products and are not materially changed by subsequent processes.

167. Hon Hai’s infringement of the ’654 patent through its importation into, and/or use, offers to sell, or sales in, the United States of the Accused Hon Hai Tablets is shown by way of the exemplary tablet, the iPad Pro (12.9”) as set forth in paragraphs 81-93 above. These paragraphs demonstrate that the exemplary tablet was necessarily manufactured according to at least claim 20 of the ’654 patent:

(a) Hon Hai or another party performs a method of increasing external data communication speed of a computer when manufacturing the exemplary tablet;

(b) when manufacturing the exemplary tablet, Hon Hai or another party provides an integrated CPU and graphics controller on a printed circuit board, because the exemplary tablet uses an A9X SoC;

(c) when manufacturing the exemplary tablet, Hon Hai or another party connects a first LVDS channel directly to the integrated CPU and graphics controller, which uses

two unidirectional, serial channels to transmit data in opposite directions, because the A9X SoCs employed in the exemplary tablet directly connect to PCIe channels;

(d) when manufacturing the exemplary tablet, Hon Hai or another party provides a connector to connect the computer to a console, because the exemplary tablet has a connector port, in particular the Lightning port;

(e) when manufacturing the exemplary tablet, Hon Hai or another party provides a second LVDS channel using two unidirectional, serial channels to transmit data in opposite directions through the connector to the console, because the exemplary tablet has a USB 3.x controller and Lightning port; and

(f) when manufacturing the exemplary tablet, Hon Hai or another party enables the transmission of USB protocol data through the second LVDS channel via the Lightning port.

168. On information and belief, the Accused Hon Hai Tablets are in relevant part substantially similar to the exemplary tablet, in particular with regard to the manner in which the Accused Hon Hai Tablets include and utilize PCIe and/or USB 3.x functionality. This Section is thus illustrative of the manner in which Hon Hai infringes the claims of the ’654 patent as to each of the Accused Hon Hai Tablets.

169. ACQIS’ infringement allegations against the Accused Hon Hai Tablets are not limited to claim 20 of the ’654 patent, and additional infringed claims will be identified through infringement contentions and discovery.

170. Hon Hai’s infringement of the ’654 patent through its importation into, and/or use, offers to sell, or sales in, the United States of the Accused Hon Hai Laptops is shown by way of the exemplary laptop, the MacBook Pro (13-inch, 2017) laptop as set forth in paragraphs 94-108

above. These paragraphs demonstrate that the exemplary laptop was necessarily manufactured according to at least claim 20 of the '654 patent:

(a) Hon Hai or another party performs a method of increasing external data communication speed of a computer when manufacturing the exemplary laptop;

(b) when manufacturing the exemplary laptop, Hon Hai or another party provides an integrated CPU and graphics controller on a printed circuit board, because the exemplary laptop uses a 7th Generation Intel® Core™ i5 ("Kaby Lake") Processor;

(c) when manufacturing the exemplary laptop, Hon Hai or another party connects an LVDS channel directly to the integrated CPU and graphics controller, which uses two unidirectional, serial channels to transmit data in opposite directions, because the 7th Generation Intel® Core™ i5 ("Kaby Lake") Processors employed in the exemplary laptop directly connect to PCIe channels and OPI channels;

(d) when manufacturing the exemplary laptop, Hon Hai or another party provides a connector to connect the computer to a console, because the exemplary laptop has USB-C ports;

(e) when manufacturing the exemplary laptop, Hon Hai or another party provides a second LVDS channel using two unidirectional, serial channels to transmit data in opposite directions through the connector to the console, because the exemplary laptop has USB-C 3.x ports, which use LVDS channels; and

(f) when manufacturing the exemplary laptop, Hon Hai or another party enables the transmission of USB protocol data through the second LVDS channel via a USB 3.x port and channel.

171. On information and belief, the Accused Hon Hai Laptops are in relevant part substantially similar to the exemplary laptop, in particular with regard to the manner in which the Accused Hon Hai Laptops include and utilize PCIe and/or USB 3.x functionality. This Section is thus illustrative of the manner in which Hon Hai infringes the claims of the '654 patent as to each of the Accused Hon Hai Laptops.

172. ACQIS' infringement allegations against the Accused Hon Hai Laptops are not limited to claim 20 of the '654 patent, and additional infringed claims will be identified through infringement contentions and discovery.

173. The above-described acts of infringement committed by Hon Hai have caused injury and damage to ACQIS and ACQIS' licensees.

174. ACQIS is entitled to recover all damages sustained as a result of Hon Hai's wrongful acts of infringement, but in no event less than a reasonable royalty pursuant to 35 U.S.C. § 284.

175. The above-described acts of infringement committed by Hon Hai have caused injury and damage to ACQIS and ACQIS' licensees.

176. ACQIS is entitled to recover all damages sustained as a result of Hon Hai's wrongful acts of infringement, but in no event less than a reasonable royalty pursuant to 35 U.S.C. § 284.

JURY TRIAL DEMANDED

ACQIS LLC hereby demands a trial by jury on all claims and issues so triable.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff ACQIS LLC respectfully requests that this Court grant the following relief to ACQIS LLC:

A. enter judgment that Hon Hai has infringed one or more claims of each of the

ACQIS Patents through: (1) the manufacture, use, offering to sell, and/or sale in the United States, and/or the importation into the United States, of infringing Hon Hai computer products; (2) the practice of claimed methods of the ACQIS Patents by manufacturing, using, and/or testing Hon Hai computer products in the United States; and (3) the importation into the United States of Hon Hai computer products made abroad using patented processes claimed in the ACQIS Patents;

B. enter judgment awarding ACQIS monetary relief pursuant to 35 U.S.C. § 284 in an amount adequate to compensate for Hon Hai's infringement of the ACQIS Patents to be determined at trial, but not less than a reasonable royalty, and awarding ACQIS all pre- and post-judgment interest and costs; and

C. enter an order awarding to ACQIS such other and further relief, whether at law or in equity, that this Court seems just, equitable, and proper.

Dated: April 10, 2023.

Respectfully submitted,

By: */s/ Andrea L. Fair*

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