

1 RUSS, AUGUST & KABAT
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8 **UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA**

9 LONGITUDE LICENSING LIMITED,

10 Plaintiff,

11 v.

12 LENOVO GROUP, LIMITED, and
13 LENOVO (UNITED STATES), INC.,

14 Defendants.
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Case No.

**COMPLAINT FOR PATENT
INFRINGEMENT**

JURY TRIAL DEMANDED

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1 1. Plaintiff Longitude Licensing Limited (“Longitude” or “Plaintiff”) for its
2 Complaint against Defendants Lenovo Group Limited (“Lenovo Ltd.”) and Lenovo
3 (United States), Inc. (“Lenovo U.S.”) (Lenovo Ltd. and Lenovo U.S. are collectively
4 referred to as “Lenovo” or “Defendants”), hereby alleges as follows:

5 **PARTIES**

6 2. Longitude is an entity formed under the laws of Ireland with its principal place
7 of business at Plaza 255 Suite 2A, Blanchardstown Corporate Park 2, Dublin D15
8 YH6H, Ireland.

9 3. On information and belief, Defendant Lenovo Group Limited is a publicly
10 owned company organized under the laws of China, with its principal place of
11 business at 23rd Fl., Lincoln House Taikoo Place, 979 King’s Road, Quarry Bay,
12 Hong Kong. Lenovo Ltd. does substantial business on an ongoing basis in the United
13 States, including in this State and in this District. On information and belief, Lenovo
14 Ltd. causes and controls the sale, offer for sale, and distribution of its products in
15 the State of California and in this District.

16 4. On information and belief, Defendant Lenovo (United States), Inc is a
17 Delaware corporation with its principal place of business at 8001 Development Dr.,
18 Morrisville, North Carolina, 27560. Lenovo U.S. is a wholly owned subsidiary of
19 Lenovo Ltd., and imports the accused products into the United States for Lenovo
20 Ltd.

21 **NATURE OF THE ACTION**

22 5. This is a civil action for the infringement of United States Patent Nos.
23 7,697,369 (the “’369 patent”), 9,379,233 (the “’233 patent”), and RE43,539 the
24 “’539 Patent) (collectively, the “Patents-in-Suit”) under the patent laws of the United
25 States, 35 U.S.C. § 1, et seq.

26 6. This action involves Defendants’ manufacture, use, sale, offer for sale, and/or
27 importation into the United States of infringing products, methods, processes,
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1 services and systems that incorporate certain memory chips and components that
2 infringe one or more of the claims of the Patents-in-Suit.

3 **JURISDICTION AND VENUE**

4 7. This Court has original jurisdiction over the subject matter of this Complaint
5 under 28 U.S.C. §§ 1331 and 1338(a) because this action arises under the patent laws
6 of the United States, including 35 U.S.C. §§ 271, et seq.

7 8. Defendants are subject to personal jurisdiction in this judicial district because
8 Defendants regularly transact business in this judicial district by, among other
9 things, offering Defendants’ products and services to customers, business affiliates
10 and partners located in this judicial district. In addition, Defendants have committed
11 acts of direct infringement of one or more of the claims of one or more of the Patents-
12 in-Suit in this judicial district.

13 9. Venue in this district is proper under 28 U.S.C. §§ 1400(b) and 1391(b)
14 and (c), because Defendants are subject to personal jurisdiction in this district and
15 have committed acts of infringement in this district. Lenovo U.S. has a regular and
16 established place of business in this District. Specifically, Lenovo U.S. has job
17 postings recruiting employees to work in Los Angeles. Additionally, LinkedIn
18 profiles of several Lenovo employees indicated that they reside in this District.
19 Lenovo Ltd. is a foreign corporation organized under the laws of China, with a
20 principal place of business in Hong Kong. Accordingly, venue is proper in this
21 District over Lenovo Ltd.

22 **FACTUAL BACKGROUND**

23 10. Longitude operates in one of the most dynamic segments of the international
24 knowledge-based economy. Longitude operates by partnering with patent owners to
25 prosecute and license patent portfolios. The company has also formed customized
26 arrangements that combine exclusive licensing rights and ownership positions, and
27 it also has acquired patents outright from other global patent owners. Longitude has
28 the licensing rights to portfolios totaling nearly 4,000 semiconductor and computer

1 memory patents and patent applications originally filed by well-known technology
2 companies.

3 11. Longitude is the owner by assignment of the patents-in-suit.

4 12. Longitude has licensed the patents-in-suit to a majority of the worldwide
5 memory industry responsible for solid state memory devices used in products sold
6 in the United States, including SK Hynix, Kingston, Winbond, Micron, Samsung
7 Electronics and Kioxia (formerly the memory division of Toshiba).

8 13. One major player in the industry that has refused to license the Patent-in-Suit
9 is Western Digital Corporation (“Western Digital”). Western Digital is a computer
10 hard disk drive manufacturer and data storage company. Western Digital designs,
11 manufactures, and sells data technology products, including storage devices, data
12 center systems, and cloud storage services. Longitude is informed and believes that
13 Western Digital acquired SanDisk in 2016.

14 14. Since February 2018, Longitude has requested that Western Digital negotiate
15 licenses for patents (including the Patents-in-Suit) that it is infringing, but Western
16 Digital has refused to negotiate, claiming that Longitude may not assert its licensing
17 rights as a result of covenants in two contracts between Western Digital and third
18 parties that have never owned any of the patents-in-suit. Those contracts do not
19 apply to Longitude, but Western Digital nonetheless contended that it could only be
20 sued after every other market participant (apparently including Western Digital’s
21 customers) was sued.

22 15. Longitude initiated an arbitration claim against Western Digital for
23 declaratory relief concerning Western Digital’s interpretation of the agreements.
24 Western Digital objected to the jurisdiction of the arbitration tribunal to avoid any
25 consideration of the merits of contract arguments.

26 16. After the arbitration against Western Digital was dismissed on jurisdictional
27 grounds, Longitude gave notice to Defendants that they were infringing the patents-
28 in-suit by letter dated September 6, 2022. This letter included a table that identified

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1 a number of products that were believed to infringe the patents. Among other things,
2 the letter stated:

3 A number of Lenovo products incorporate and use features and
4 functionality covered by Longitude patents, including, for example,
5 the patents and exemplary products identified in the attached table
6 (“Table 1”). In reviewing the Table, you will note that the infringing
7 products contain devices manufactured by Western Digital
8 Corporation (“Western Digital”). While our normal approach is to
9 engage with, and license, suppliers such as Western Digital rather than
10 their customers, Western Digital has refused to engage in any
11 licensing discussions. Consequently, we are contacting Western
12 Digital customers who are selling products that infringe Longitude
13 patents.

14 17. Defendants did not take a license following receipt of this letter and continued
15 to infringe as stated in the letter. As of the filing of this Complain, Defendants have
16 not responded in any manner to Longitude.

17 18. Among the other products referenced in the letter was the Lenovo IdeaPad 3
18 computer as well as numerous other Lenovo computers, laptops, and tablets having
19 Western Digital SSDs.

20 THE PATENTS-IN-SUIT

21 19. Longitude is the owner by assignment of the Patents-in-Suit. Longitude owns
22 all rights to the Patents-in-Suit, including the right to enforce the Patents-in-Suit.

23 20. All maintenance fees for the Patents-in-Suit have been timely paid, and there
24 are no fees currently due.

25 21. United States Patent No. 7,697,369, entitled "System with Controller and
26 Memory," issued on April 13, 2010 from United States Patent Application No.
27 11/759,862 filed on June 7, 2007.

28 22. United States Patent No. RE43,539, entitled “Output Buffer Circuit and
Integrated Semiconductor Circuit Device With Such Output Buffer Circuit,” issued
on July 24, 2012 from United States Patent Application No. 11/798,773 filed on May
16, 2007. The ‘539 Patent is a re-issue of U.S. Patent No. 6,894,547, which issued
on May 17, 2005 from United States Patent Application No. 10/320,059 filed
December 16, 2002.

1 23. United States Patent No. 9,379,233, entitled “Semiconductor Device,” issued
2 on June 28, 2016 from United States Patent Application No. 14/872,844 filed
3 October 1, 2015.

4 **COUNT I**

5 **(DEFENDANTS' INFRINGEMENT OF THE '369 PATENT)**

6 24. Paragraphs 1 through 23 are incorporated by reference as if fully restated
7 herein.

8 25. United States Patent No. 7,697,369, entitled "System with Controller and
9 Memory," issued on April 13, 2010 from United States Patent Application No.
10 11/759,862 filed on June 7, 2007.

11 26. Longitude is the owner of the '369 patent with full rights to pursue recovery
12 of royalties for damages for infringement, including full rights to recover past and
13 future damages.

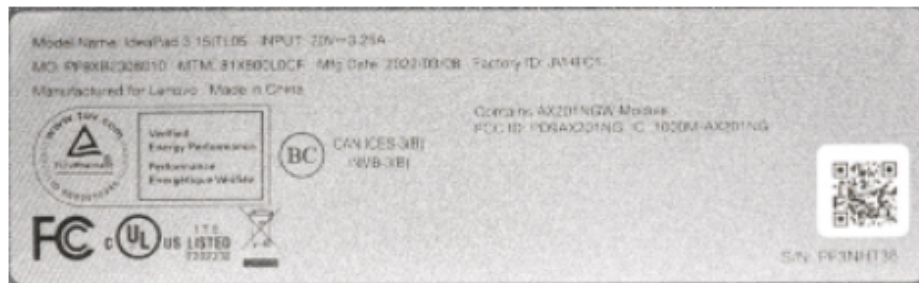
14 27. Each claim of the '369 patent is valid, enforceable, and patent-eligible.

15 28. Longitude and its predecessors in interest have satisfied the requirements of
16 35 U.S.C. § 287(a) with respect to the '369 patent, and Longitude is entitled to
17 damages for Defendants' past infringement. Among other things, Longitude
18 provided actual notice of infringement to the component supplier, Western Digital.

19 29. Defendants have directly infringed (literally and equivalently) and induced
20 others to infringe the '369 patent by making, using, selling, offering for sale, or
21 importing products that infringe the claims of the '369 patent and by inducing others
22 to infringe the claims of the '369 patent without a license or permission from
23 Longitude. These products include without limitation all Lenovo IdeaPad 3
24 computers (e.g., model 81X800L0CF), all other Lenovo computers, laptops, and
25 tablets having Western Digital PC SN530 NVMe SSDs, Western Digital SSDs,
26 and/or Western Digital NAND memory chips and all versions and variations of them
27 offered for sale since the issuance of the '369 patent.

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1 30. A non-limiting example of Defendants' infringement is the Lenovo IdeaPad
2 3 computer which infringes at least claim 1 of the '369 patent. Exemplary
3 photographs of the Lenovo IdeaPad 3 computer, and its packaging are set forth
4 below:



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1 31.The Lenovo IdeaPad 3 computer includes the Western Digital PC SN530
2 NVMe SSD as shown below:

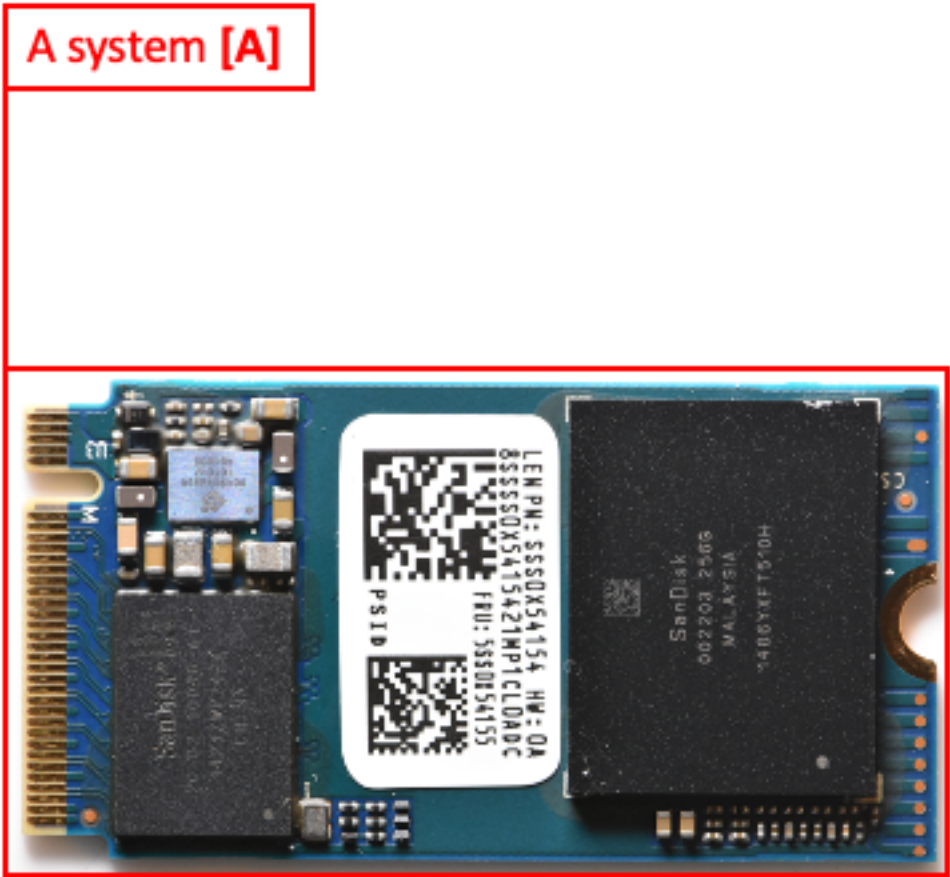


25 32.Longitude is informed and believes that the Western Digital PC SN530 NVMe
26 SSD Operates in Compliance with the Open NAND Flash Interface Specification,
27 Revision 4.0 dated April 2, 2014 (ONFI Standard).

28 33.The Western Digital PC SN530 NVMe SSD is a system:

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34. The Western Digital PC SN530 NVMe SSD includes a controller:

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35. The Western Digital PC SN530 NVMe SSD includes a controller that is adapted to send out a first strobe signal and a write data signal in a write operation, the write data signal being synchronized with the first data strobe signal:

Signal Name	Input / Output	Description
ALE_x	I	Address Latch Enable The Address Latch Enable signal is one of the signals used by the host to indicate the type of bus cycle (command, address, data). Refer to section 4.3.
WE_x_n	I	Write Enable The Write Enable signal controls the latching of commands, addresses, and input data in the SDR data interface. The Write Enable signal controls the latching of commands and addresses in the NV-DDR2 or NV-DDR3 data interface. Data, commands, and addresses are latched on the rising edge of WE_x_n. This signal shares the same pin as CLK_x in the NV-DDR data interface.
CLK_x	I	Clock The Clock signal is used as the clock in the NV-DDR data interface. This signal shares the same pin as WE_x_n in the SDR, NV-DDR2, and NV-DDR3 data interface.
WP_x_n	I	Write Protect The Write Protect signal disables Flash array program and erase operations. See section 2.19 for requirements.
I/O_0 - I/O7_0 (DQ0_0 - DQ7_0)	I/O	I/O Port 0, bits 0-7 The I/O port is an 8-bit wide bidirectional port for transferring address, command, and data to and from the device. Also known as DQ0_0 - DQ7_0 for the NV-DDR, NV-DDR2, and NV-DDR3 data interfaces.
DQS_x_t (DQS_x_t)	I/O	Data Strobe (True) The data strobe signal that indicates the data valid window for the NV-DDR and NV-DDR2 data interfaces.
DQS_x_c	I/O	Data Strobe Complement The Data Strobe Complement signal is the complementary signal to Data Strobe True, optionally used in the NV-DDR2 or NV-DDR3 data interface. Specifically, Data Strobe Complement has the opposite value of Data Strobe True when CE_n is low, i.e. if DQS_x_t is high then DQS_x_c is low; if DQS_x_t is low then DQS_x_c is high.
I/O8 - I/O15	I/O	I/O Port 0, bits 8-15 These signals are used in a 16-bit wide target configuration. The signals are the upper 8 bits for the 16-bit wide bidirectional port used to transfer data to and from the device. These signals are only used in the SDR data interface.

adapted to send out a first data strobe signal [C]

and a write data signal [D]

ONFI Standard at 30.

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SanDisk 002203
256GB toggle
NAND Flash
memory

a memory [K]



39. The Western Digital PC SN530 NVMe SSD further includes a memory adapted to receive the write data signal in synchronization with the first data strobe signal in the write operation:

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adapted to receive the write data signal in synchronization with the first data strobe signal in the write operation [L]

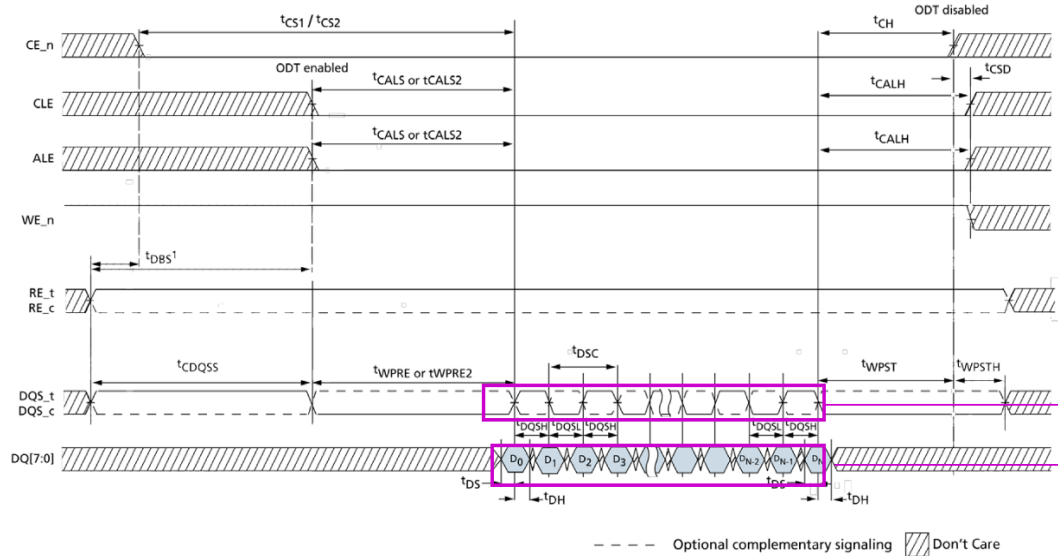


Figure 71 Data input cycle timing

40. The Western Digital PC SN530 NVMe SSD further includes a memory adapted, in the read operation, to output the read data strobe signal in response to the second data strobe signal and to send the read data signal synchronized with the read data strobe signal:

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in the read operation, to output the read data strobe signal in response to the second data strobe signal and to send the read data signal synchronized with the read data strobe signal [M]

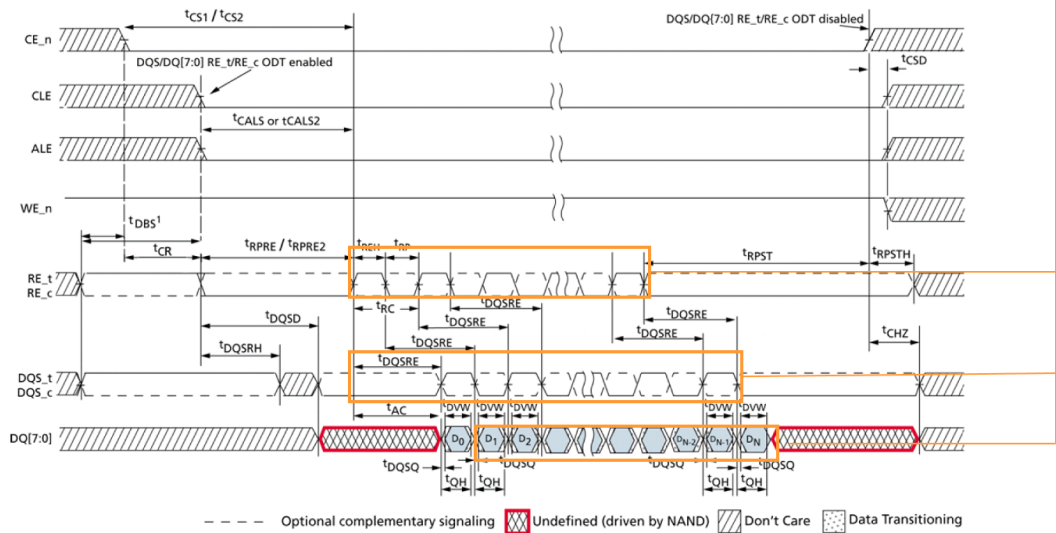


Figure 72 Data output cycle timing

41. Defendants actively, knowingly, and intentionally induce, and continue to actively, knowingly, and intentionally induce, infringement of the '369 patent under 35 U.S.C. §271(b) by their customers and end users.

42. Defendants have had knowledge of and notice of the '369 patent and their infringement since at least September 6, 2022 when Longitude gave Defendants notice of their infringing actions. In any event, Defendants have had knowledge and notice of the '369 patent since at least the filing of this complaint.

43. Defendants have induced their customers and end users to infringe the '369 patent by using their products as shown above. For example, Defendants encourage their customers and end users to perform infringing methods by the very nature of the products.

44. Defendants specifically intend their customers and/or end users infringe the '369 patent, either literally or by the doctrine of equivalents, because Defendants have known about the '369 patent and how Defendants' products infringe the claims of the '369 patent but Defendants have not taken steps to prevent infringement by

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1 their customers and/or end users. Accordingly, Defendants have acted with the
2 specific intent to induce infringement of the ‘369 patent.

3 45. Accordingly, Defendants have induced, and continue to induce, infringement
4 of the ‘369 patent under 35 U.S.C. §271(b).

5 46. As discussed above, Defendants have had knowledge of and notice of the ‘369
6 patent and its infringement since at least September 6, 2022. Despite this
7 knowledge, Defendants continue to commit tortious conduct by way of patent
8 infringement.

9 47. Defendants have been and continue to infringe one or more of the claims of
10 the ‘369 patent through the aforesaid acts.

11 48. Defendants have committed these acts of infringement without license or
12 authorization.

13 49. Plaintiff is entitled to recover damages adequate to compensate for the
14 infringement.

15 50. Defendants have and continue to infringe the ‘369 patent, acting with an
16 objectively high likelihood that their actions constitute infringement of the ‘369
17 patent. Defendants have known or should have known of this risk at least as early
18 as September 6, 2022. Accordingly, Defendants’ infringement of the ‘369 patent has
19 been and continues to be willful.

20 **COUNT II**

21 **(DEFENDANTS' INFRINGEMENT OF THE '539 PATENT)**

22 51. Paragraphs 1 through 50 are incorporated by reference as if fully restated
23 herein.

24 52. United States Patent No. RE43,539, entitled “Output Buffer Circuit and
25 Integrated Semiconductor Circuit Device With Such Output Buffer Circuit,” issued
26 on July 24, 2012 from United States Patent Application No. 11/798,773 filed on May
27 16, 2007. The ‘539 Patent is a re-issue of U.S. Patent No. 6,894,547, which issued
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on May 17, 2005 from United States Patent Application No. 10/320,059 filed December 16, 2002.

53. Longitude is the owner of the '539 patent with full rights to pursue recovery of royalties for damages for infringement, including full rights to recover past and future damages.

54. Each claim of the '539 patent is valid, enforceable, and patent-eligible.

55. Longitude and its predecessors in interest have satisfied the requirements of 35 U.S.C. § 287(a) with respect to the '539 patent, and Longitude is entitled to damages for Defendants' past infringement. Among other things, Longitude provided actual notice of infringement to the component supplier, Western Digital.

56. Defendants have directly infringed (literally and equivalently) and induced others to infringe the '539 patent by making, using, selling, offering for sale, or importing products that infringe the claims of the '539 patent and by inducing others to infringe the claims of the '539 patent without a license or permission from Longitude. These products include without limitation all Lenovo IdeaPad 3 computers (e.g., model 81X800L0CF), all other Lenovo computers, laptops, and tablets having Western Digital PC SN530 NVMe SSDs, Western Digital SSDs, and/or Western Digital NAND memory chips and all versions and variations of them offered for sale since the issuance of the '369 patent.

57. A non-limiting example of Defendants' infringement is the Lenovo IdeaPad 3 computer which infringes at least claim 1 of the '539 patent. Exemplary photographs of the Lenovo IdeaPad 3, and its packaging are set forth below:

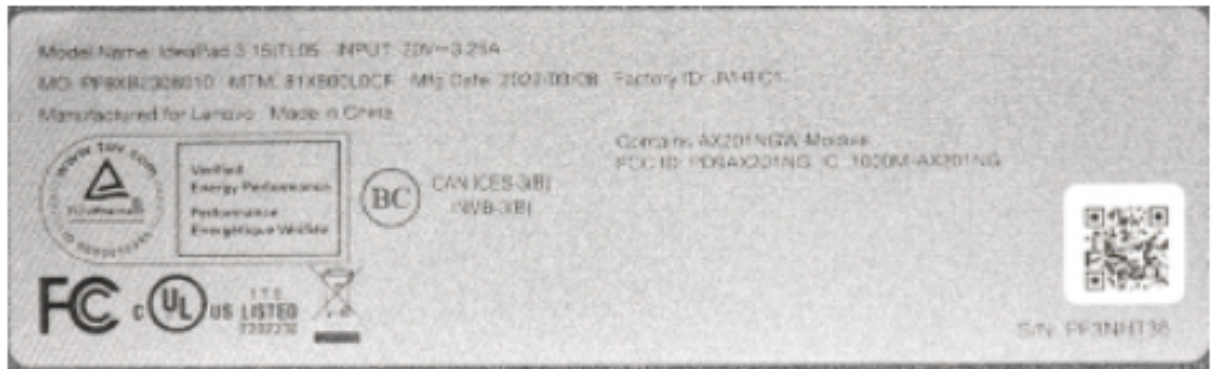
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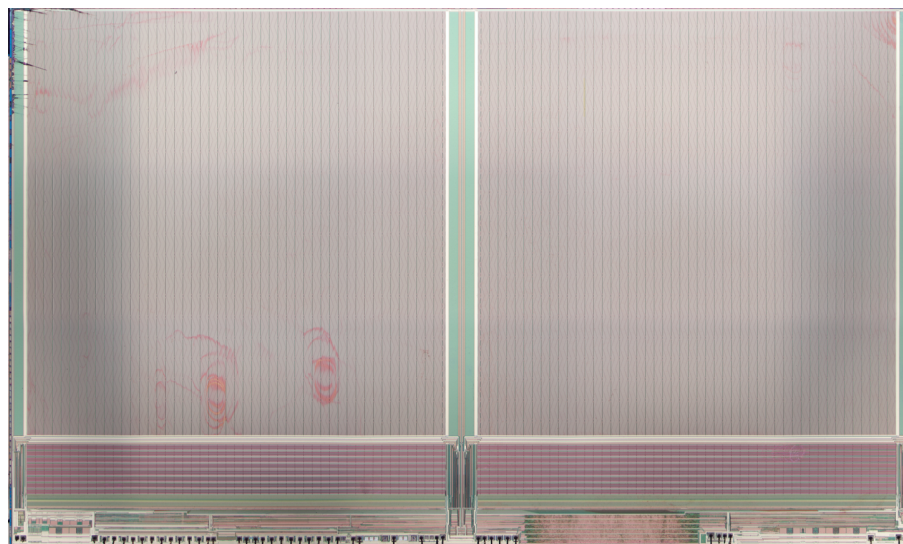
58. The Lenovo IdeaPad 3 includes the Western Digital PC SN530 NVMe SSD as shown below:

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1 59. The below image shows the pin layout and corners of the SanDisk
2 memory chip used in the Western Digital PC SN530 NVMe SSD:



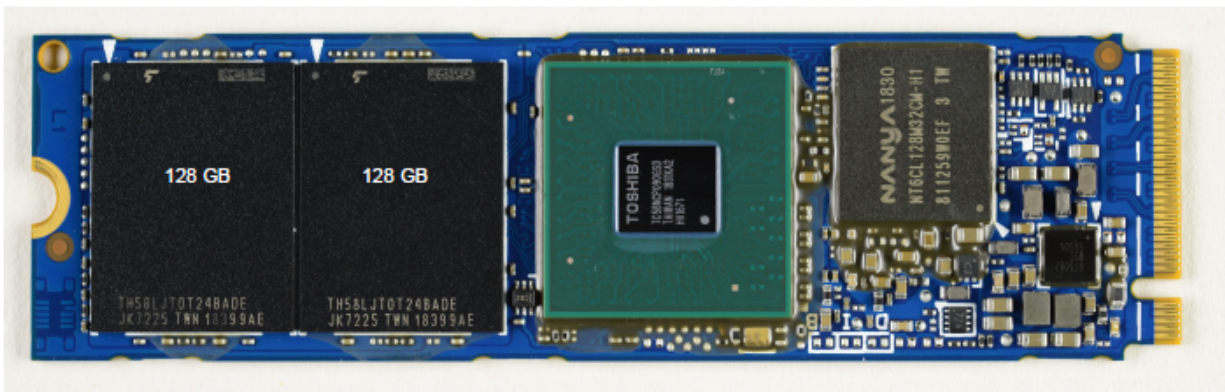
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13 60. On information and belief, the Western Digital PC SN530 NVMe SSD
14 used in the Lenovo IdeaPad 3 computer is substantially similar to the Toshiba
15 KXG60ZNV256G SSD Package (“Toshiba SSD”) for all matters relevant to this
16 complaint. The Toshiba SSD is depicted below:

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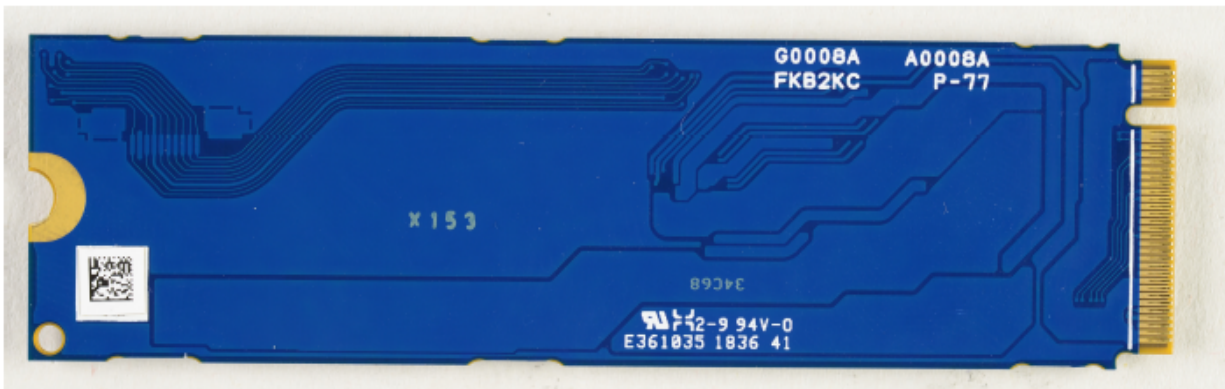
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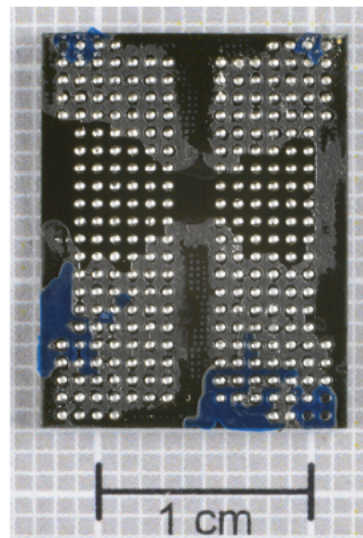
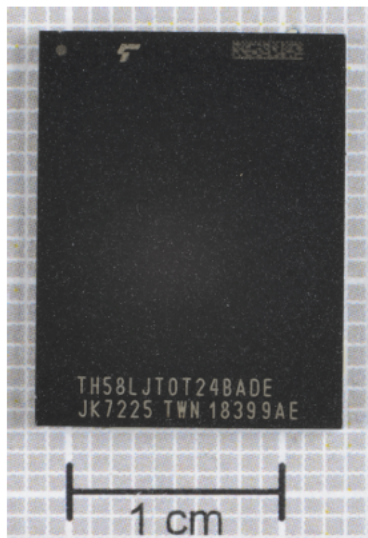


Toshiba KXG60ZNV256G SSD Package – Top



Toshiba KXG60ZNV256G SSD Package – Bottom

61. The memory chip of the Toshiba SSD, the Toshiba TH58LJT0T24BADE Package is depicted in the images below:



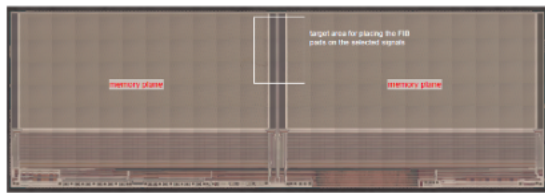
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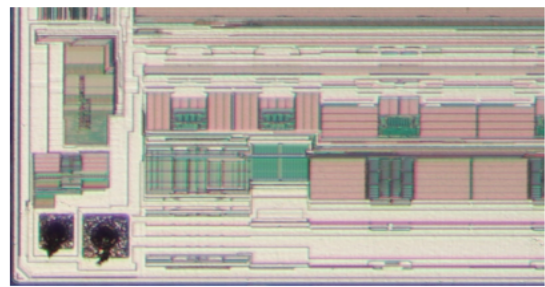
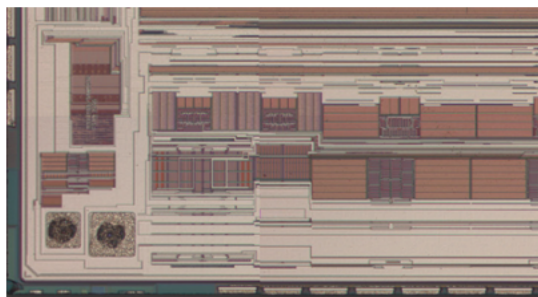
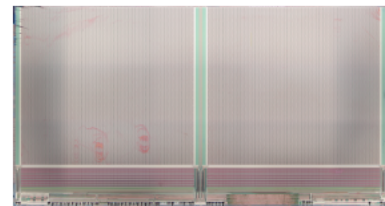


Toshiba 256 Gb 96L 3D NAND Flash Memory Die Photograph

62. A side-by-side comparison of the SanDisk memory chip used in the Western Digital PC SN530 NVMe SSD and the Toshiba TH58LJT0T24BADE Package used in the Toshiba SSD is depicted below:



Toshiba 256 Gb 96L 3D NAND Flash Memory Die Photograph

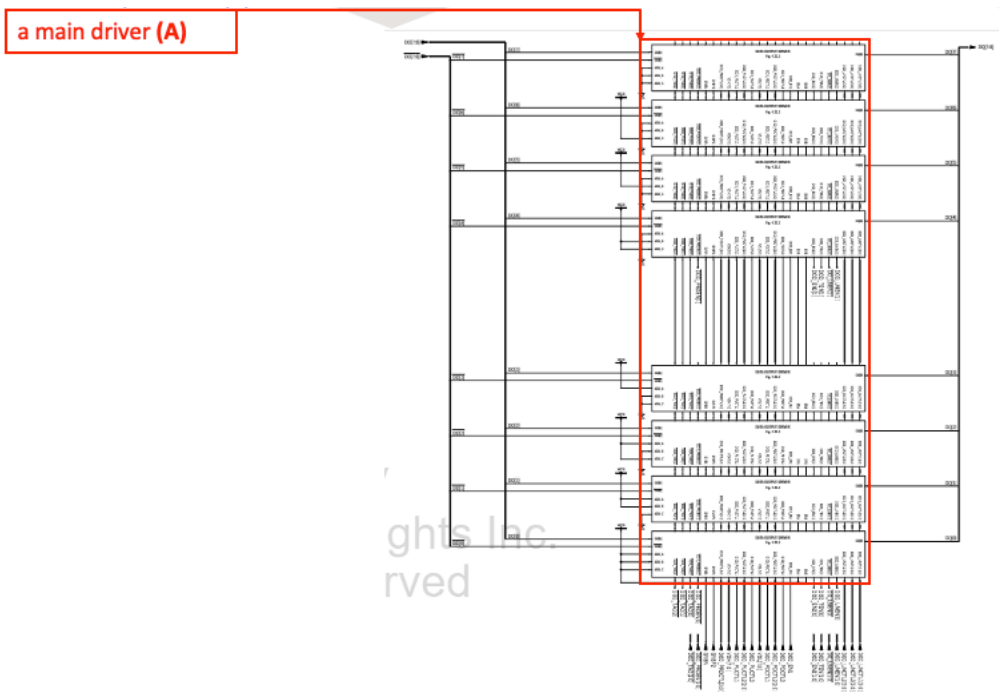


63. Based at least on the above, Longitude is informed and believes, that the corners of the dies of the SanDisk memory chip used in the Western Digital PC SN530 NVMe SSD and the Toshiba TH58LJT0T24BADE Package are substantially the same. Among other things, the corners are substantially the same. Accordingly, Longitude is informed and believes that the various I/Os and peripheral circuits are the same between the Toshiba and Western Digital/SanDisk chips. Furthermore,

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1 Longitude is informed and believes that Toshiba and Western Digital shared the
2 designs for 96 layer chips. Accordingly, the SanDisk memory chip is substantially
3 the same as the Western Digital PC SN530 NVMe SSD and the Toshiba
4 TH58LJT0T24BADE Package. For this reason, Longitude is informed and believes
5 that technical documents and other analysis concerning the Toshiba
6 TH58LJT0T24BADE Package also describe the layout and functionality of the
7 Western Digital PC SN530 NVMe SSD.

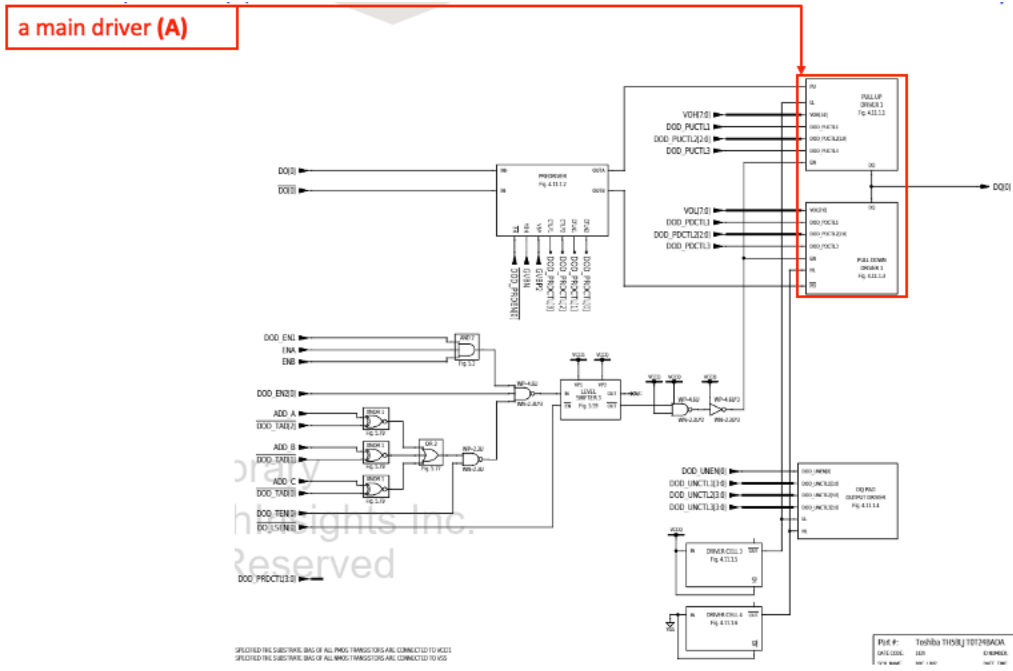
8 64. The Western Digital PC SN530 NVMe SSD used in the Lenovo
9 IdeaPad 3 computer includes an output buffer circuit for outputting data in the form
10 of an input pulse train at a predetermined output impedance and slew rate comprising
11 a main driver:



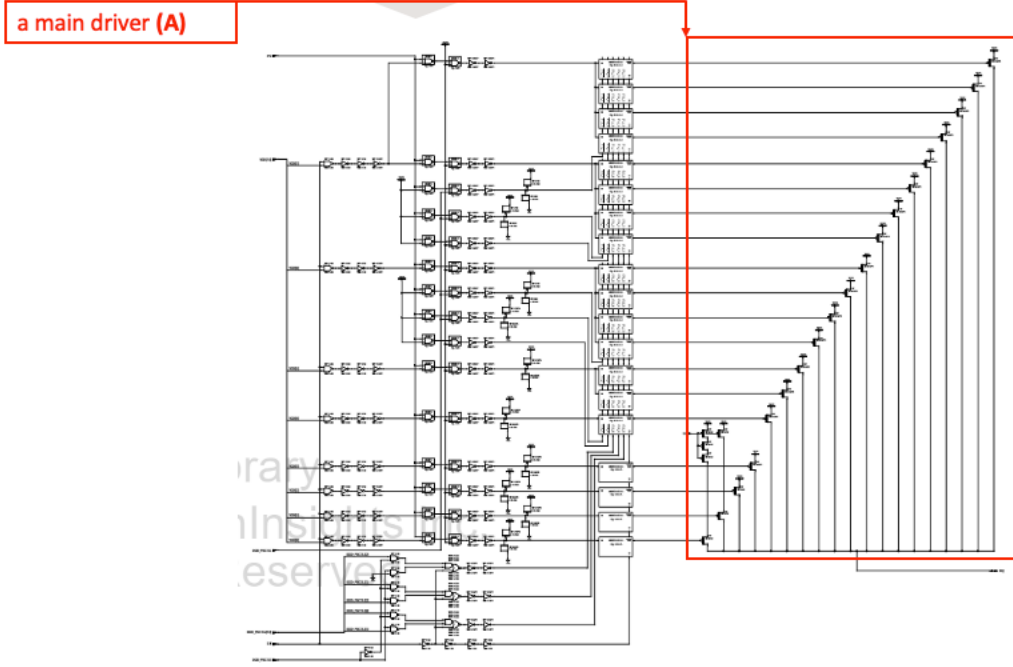
Source: [TechInsights Report ID#: CAR-1902-801](#) Figure 4.11 DATA OUTPUT DRIVERS

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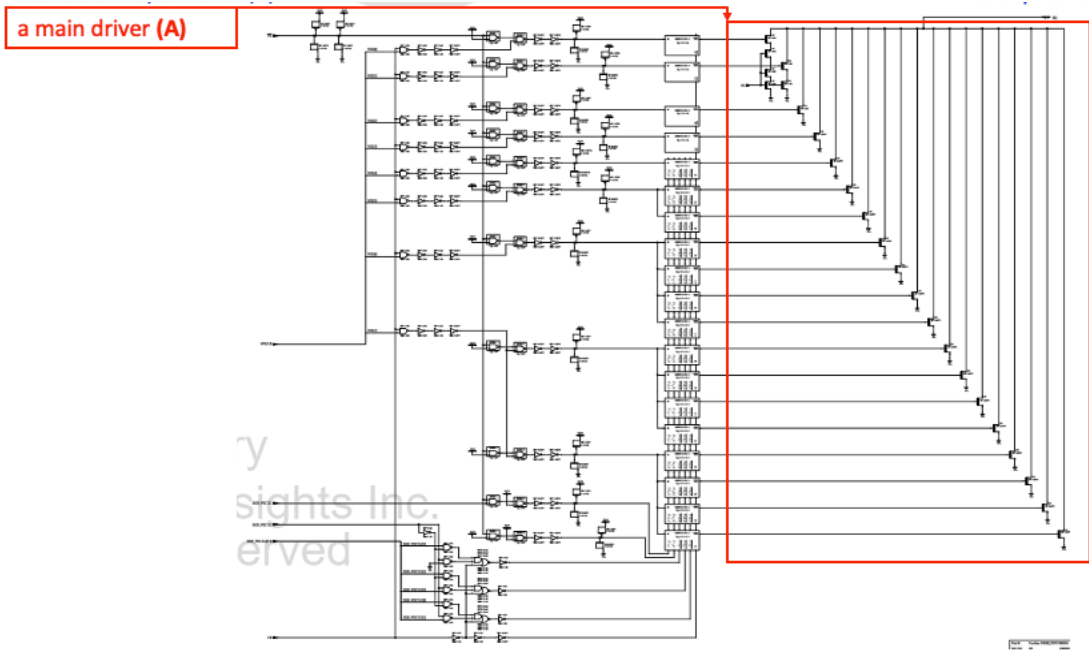
Source: Technights Report ID#: CAR-1902-801 Figure 4.11.1 DATA OUTPUT DRIVER



Source: Technights Report ID#: CAR-1902-801 Figure 4.11.1.1 PULL UP DRIVER 1

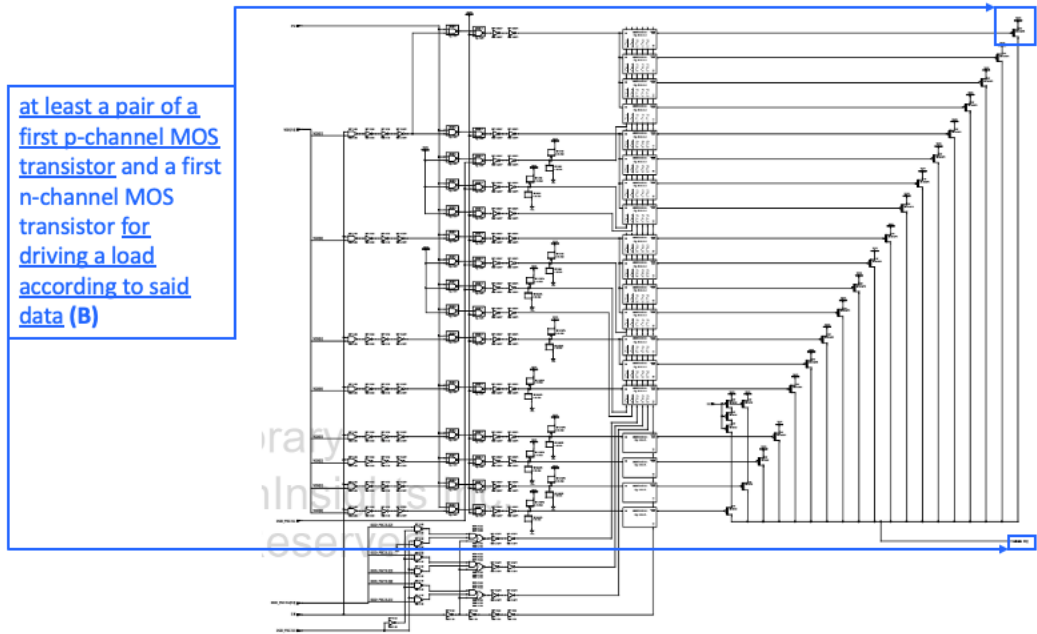
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Source: TechInsights Report ID#: CAR-1902-801 Figure 411.13 PULL DOWN DRIVER 1

65. The Western Digital PC SN530 NVMe SSD used in the Lenovo IdeaPad 3 computer further includes at least a pair of a first p-channel MOS transistor and a first n-channel MOS transistor for driving a load according to said data:

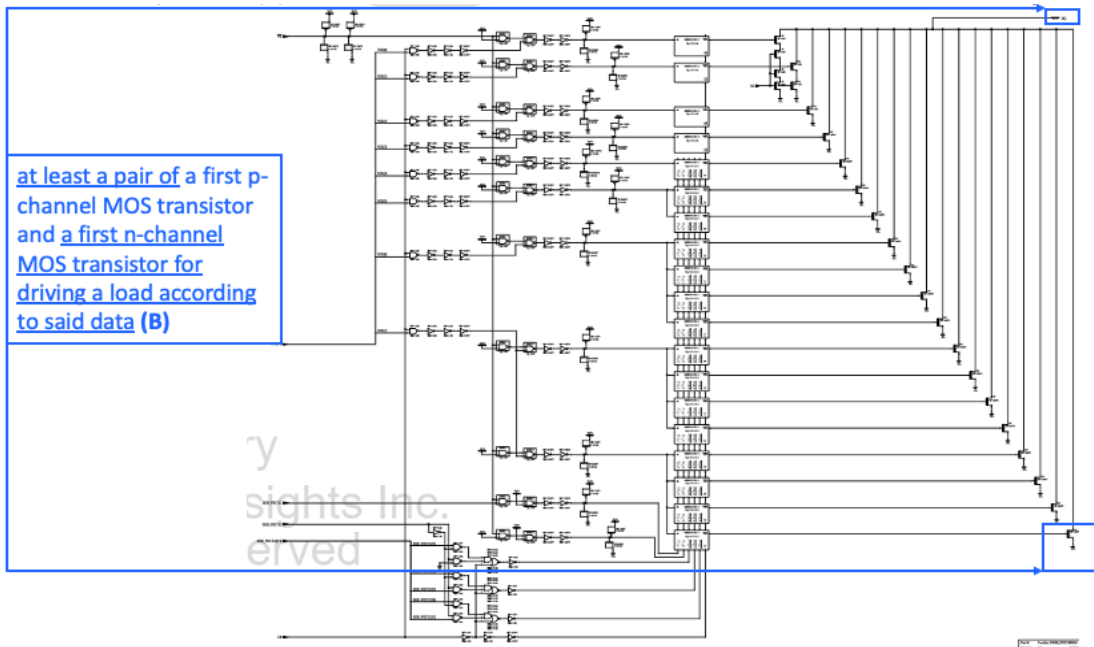


at least a pair of a first p-channel MOS transistor and a first n-channel MOS transistor for driving a load according to said data (B)

Source: TechInsights Report ID#: CAR-1902-801 Figure 411.11 PULL UP DRIVER 1

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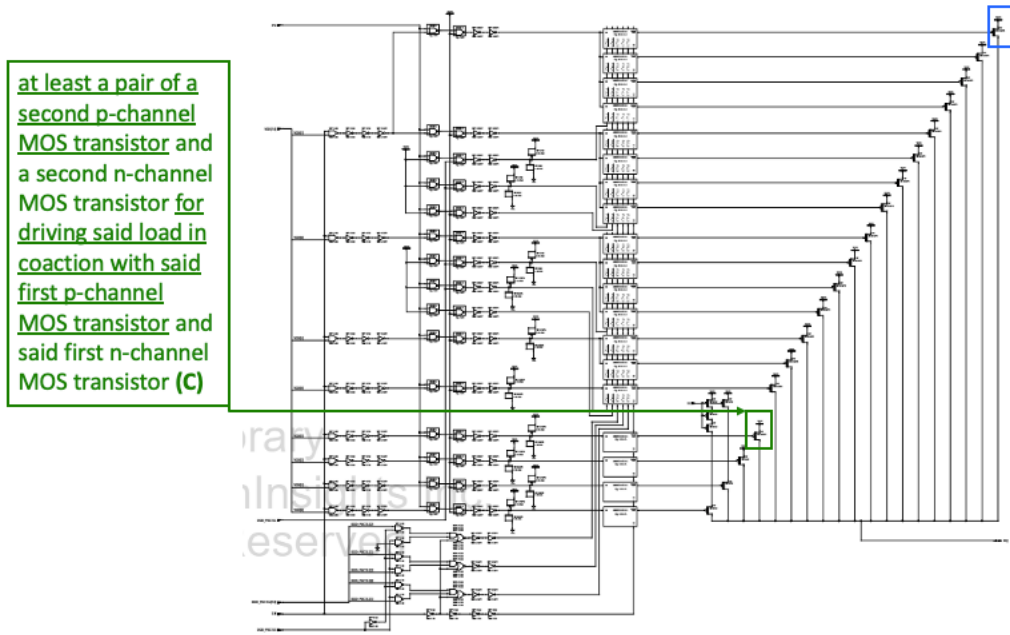
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at least a pair of a first p-channel MOS transistor and a first n-channel MOS transistor for driving a load according to said data (B)

Source: [Technights Report ID#: CAR-1902-801](#) Figure 4.11.1.3 PULL DOWN DRIVER 1

66. The Western Digital PC SN530 NVMe SSD used in the Lenovo IdeaPad 3 computer further includes at least a pair of a second p-channel MOS transistor and a second n-channel MOS transistor for driving said load in coaction with said first p-channel MOS transistor and said first n-channel MOS transistor:



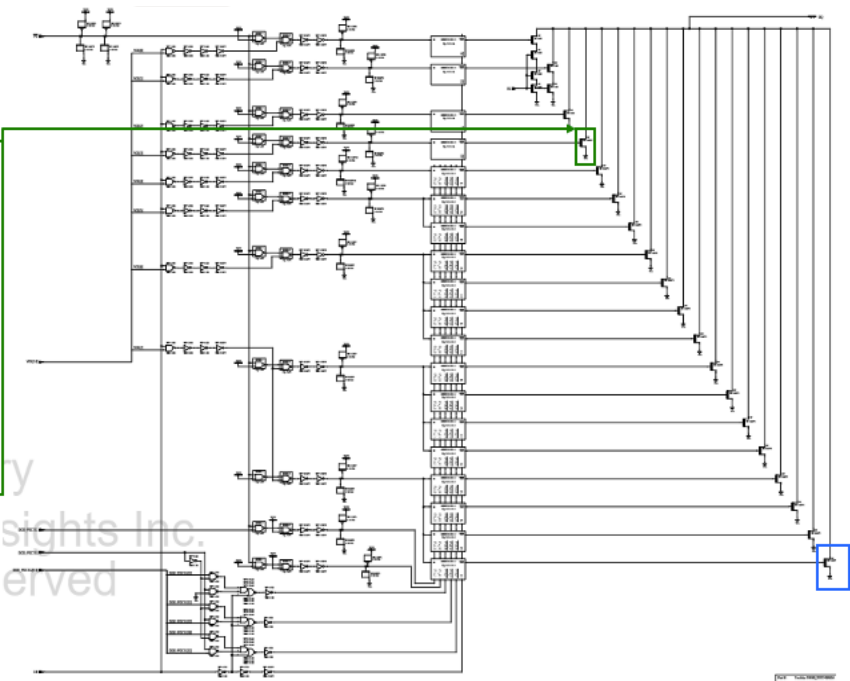
at least a pair of a second p-channel MOS transistor and a second n-channel MOS transistor for driving said load in coaction with said first p-channel MOS transistor and said first n-channel MOS transistor (C)

Source: [Technights Report ID#: CAR-1902-801](#) Figure 4.11.1.1 PULL UP DRIVER 1

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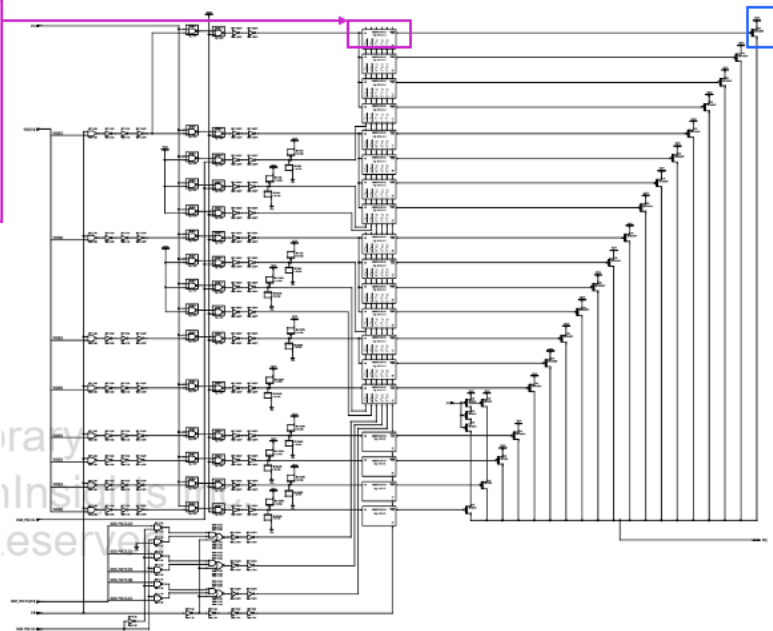
at least a pair of a second p-channel MOS transistor and a second n-channel MOS transistor for driving said load in coaction with said first p-channel MOS transistor and said first n-channel MOS transistor (C)



Source: TechInsights Report ID#: CAR-1902-801 Figure 4.11.13 PULLDOWN DRIVER 1

67. The Western Digital PC SN530 NVMe SSD used in the Lenovo IdeaPad 3 computer includes a predriver with outputs for driving only said first n-channel MOS transistor and only said first p-channel MOS transistor:

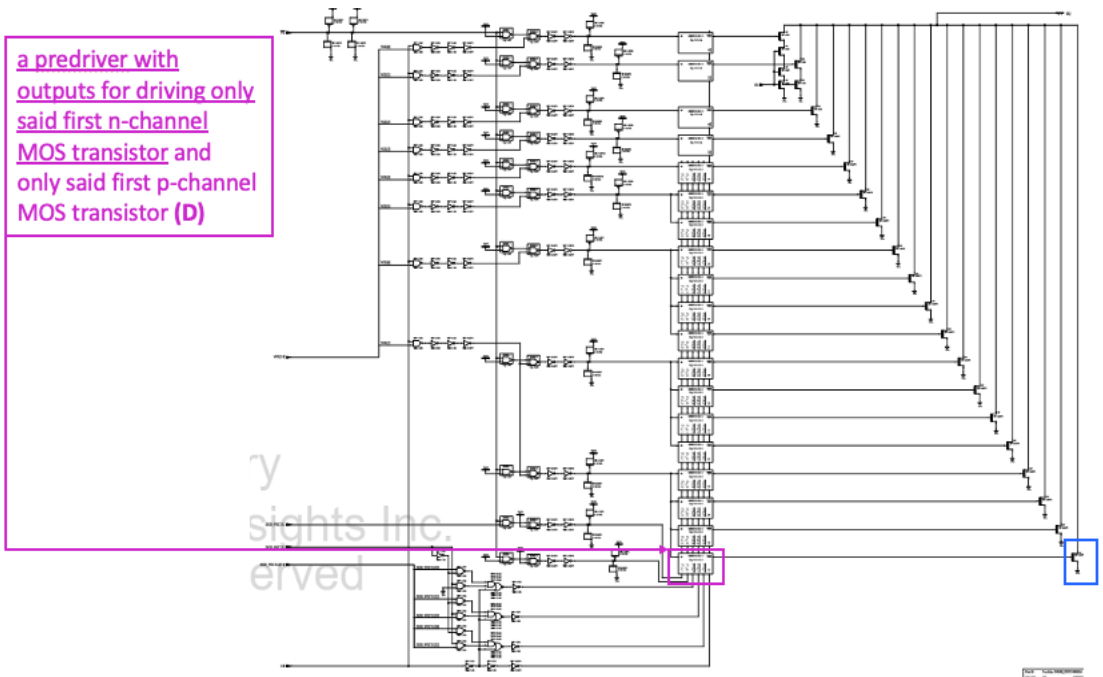
a predriver with outputs for driving only said first n-channel MOS transistor and only said first p-channel MOS transistor (D)



Source: TechInsights Report ID#: CAR-1902-801 Figure 4.11.11 PULLUP DRIVER 1

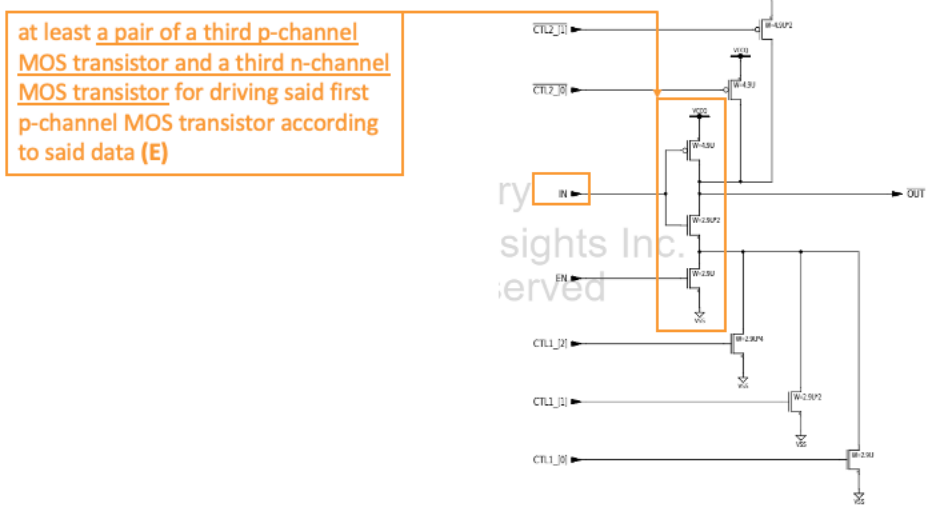
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Source: TechInsights Report ID#: CAR-1902-801 Figure 4.11.1.3 PULL DOWN DRIVER 1

68. The Western Digital PC SN530 NVMe SSD used in the Lenovo IdeaPad 3 computer further comprises at least a pair of a third p-channel MOS transistor and a third n-channel MOS transistor for driving said first p-channel MOS transistor according to said data:

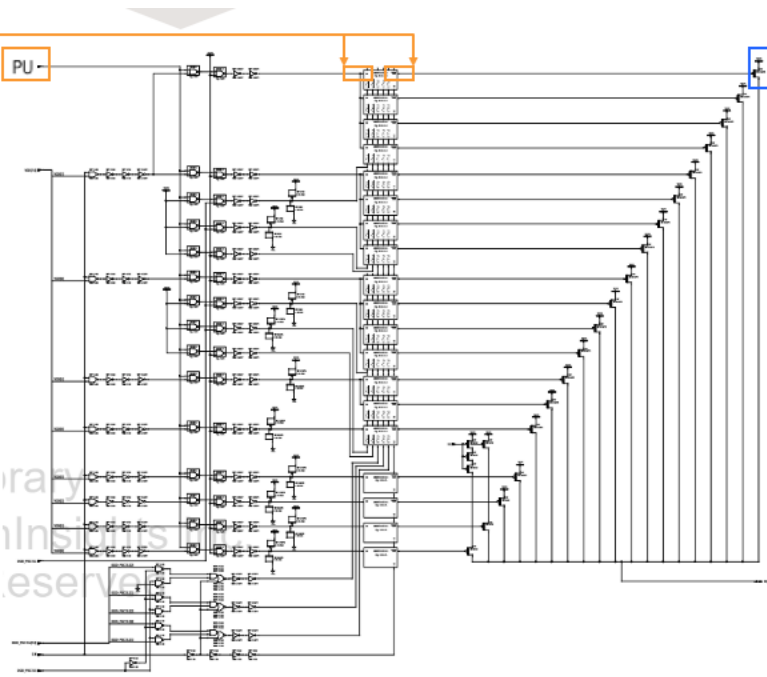


Source: TechInsights Report ID#: CAR-1902-801 Figure 4.11.1.1 DRIVER CELL 1

RUSS, AUGUST & KABAT

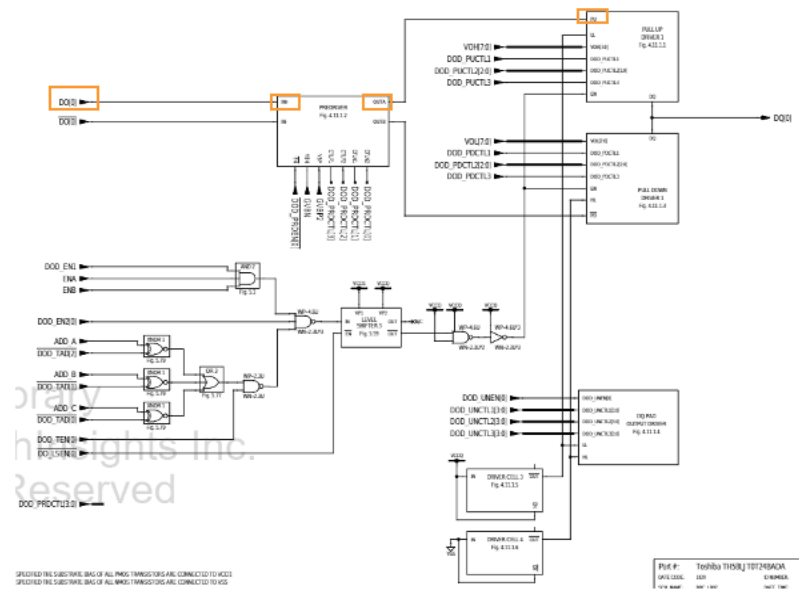
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at least a pair of a third p-channel MOS transistor and a third n-channel MOS transistor for driving said first p-channel MOS transistor according to said data (E)



Source: TechInsights Report ID#: CAR-1902-801 Figure 4.11.11 PULLUP DRIVER 1

at least a pair of a third p-channel MOS transistor and a third n-channel MOS transistor for driving said first p-channel MOS transistor according to said data (E)



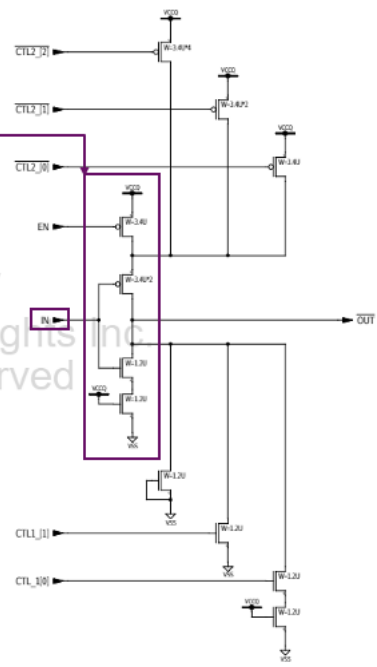
Source: TechInsights Report ID#: CAR-1902-801 Figure 4.11.11 PULLUP DRIVER 1

69. The Western Digital PC SN530 NVMe SSD used in the Lenovo IdeaPad 3 computer further includes at least a pair of fourth p-channel MOS transistor and a fourth n-channel MOS transistor for driving said first n-channel MOS transistor according to said data:

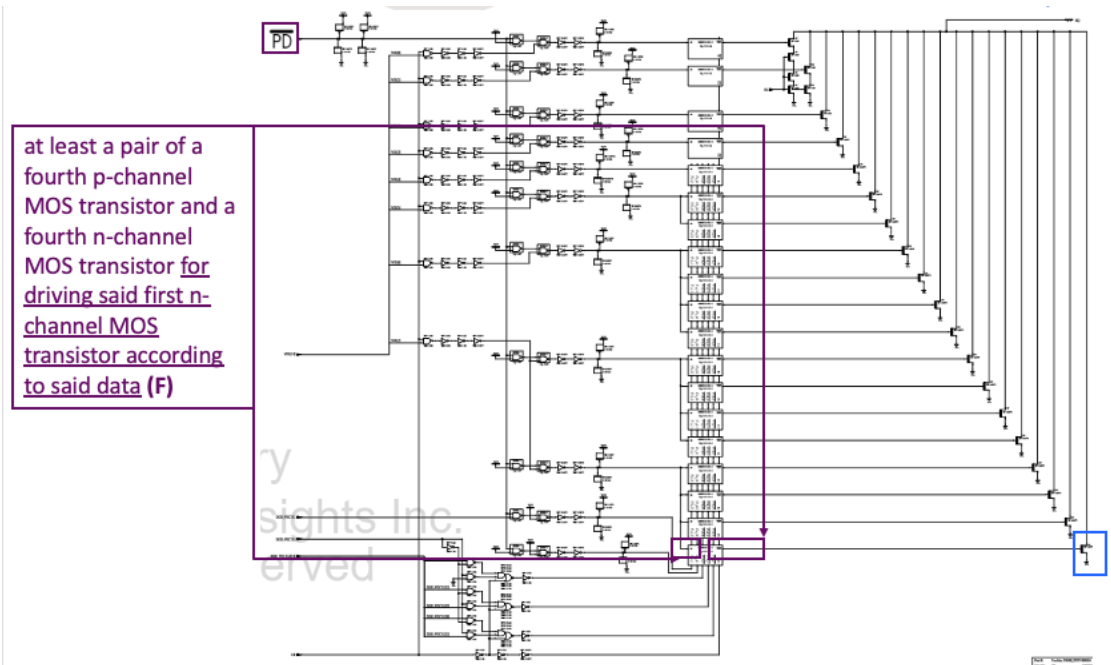
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at least a pair of a fourth p-channel MOS transistor and a fourth n-channel MOS transistor for driving said first n-channel MOS transistor according to said data (F)



Source: TechInsights Report ID#: CAR-1902-801 Figure 4.11.13.1 DRIVER CELL 2



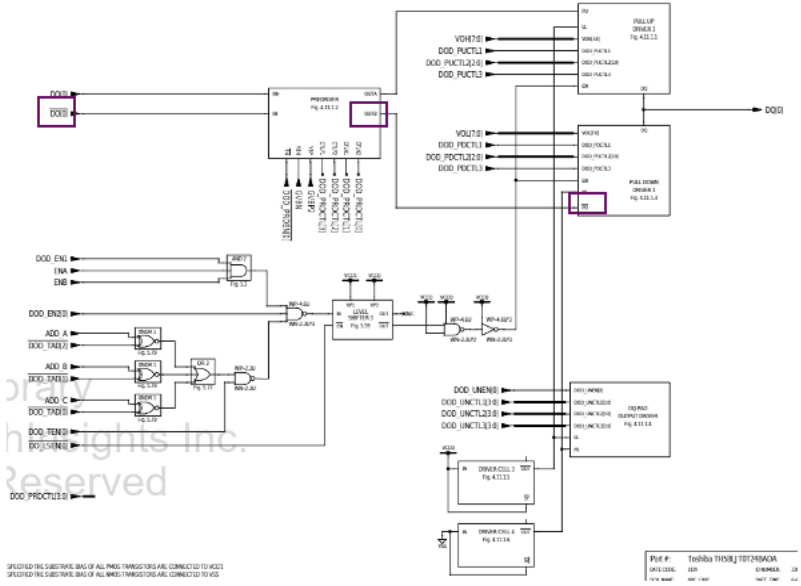
at least a pair of a fourth p-channel MOS transistor and a fourth n-channel MOS transistor for driving said first n-channel MOS transistor according to said data (F)

Source: TechInsights Report ID#: CAR-1902-801 Figure 4.11.13 PULL DOWN DRIVER 1

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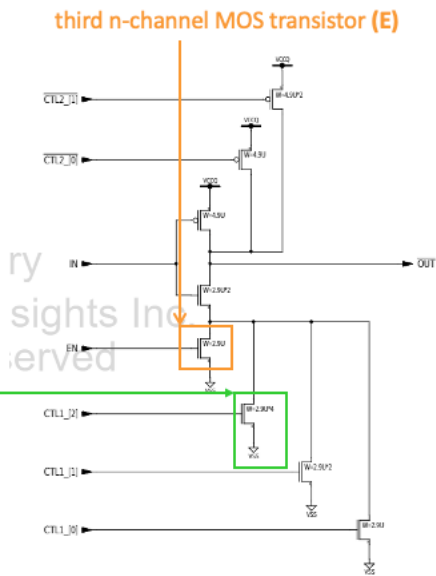
at least a pair of a fourth p-channel MOS transistor and a fourth n-channel MOS transistor for driving said first n-channel MOS transistor according to said data (F)



Source: TechInsights Report ID#: CAR-1902-801 Figure 4.11.1.1 PULL UP DRIVER 1

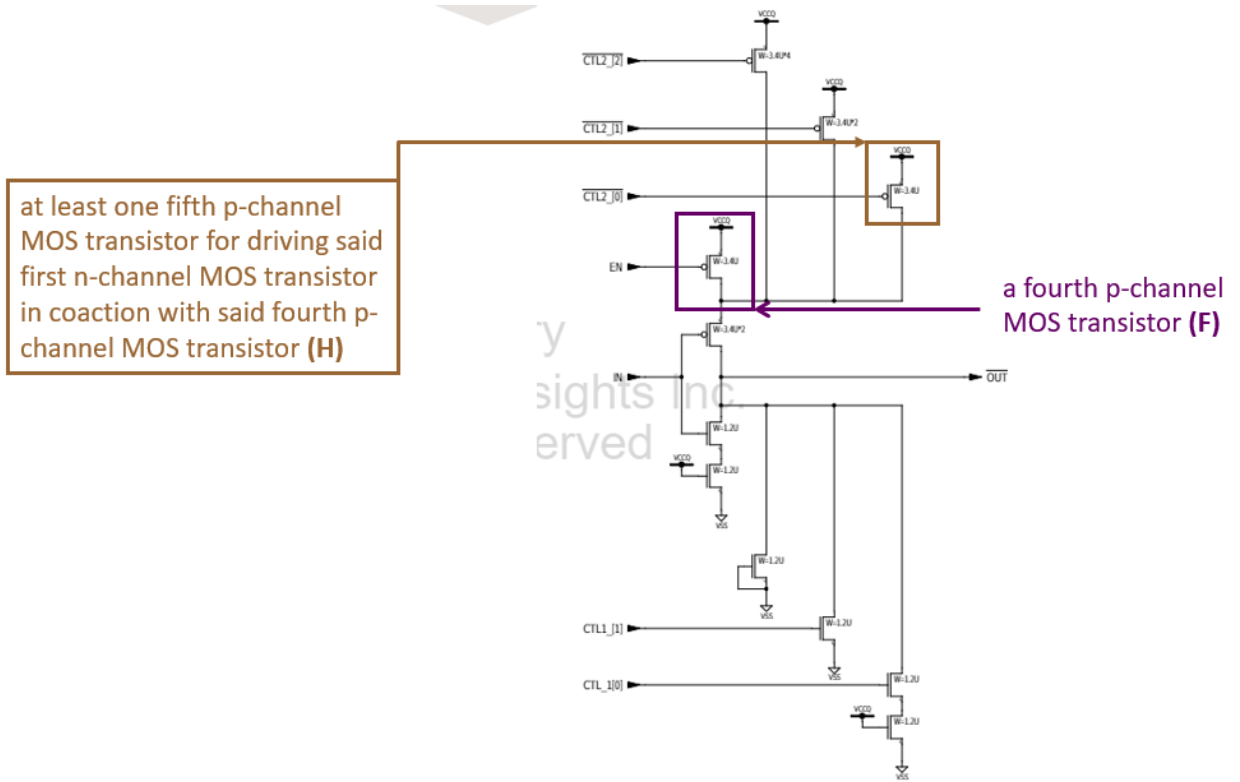
70. The Western Digital PC SN530 NVMe SSD used in the Lenovo IdeaPad 3 computer further includes at least one fifth n-channel MOS transistor for driving said first p-channel MOS transistor in coaction with said third n-channel MOS transistor:

at least one fifth n-channel MOS transistor for driving said first p-channel MOS transistor in coaction with said third n-channel MOS transistor (G)



Source: TechInsights Report ID#: CAR-1902-801 Figure 4.11.1.1.1 DRIVER CELL 1

1 71. The Western Digital PC SN530 NVMe SSD used in the Lenovo
 2 IdeaPad 3 computer further includes at least one fifth p-channel MOS transistor in
 3 coaction with said fourth p-channel MOS transistor:



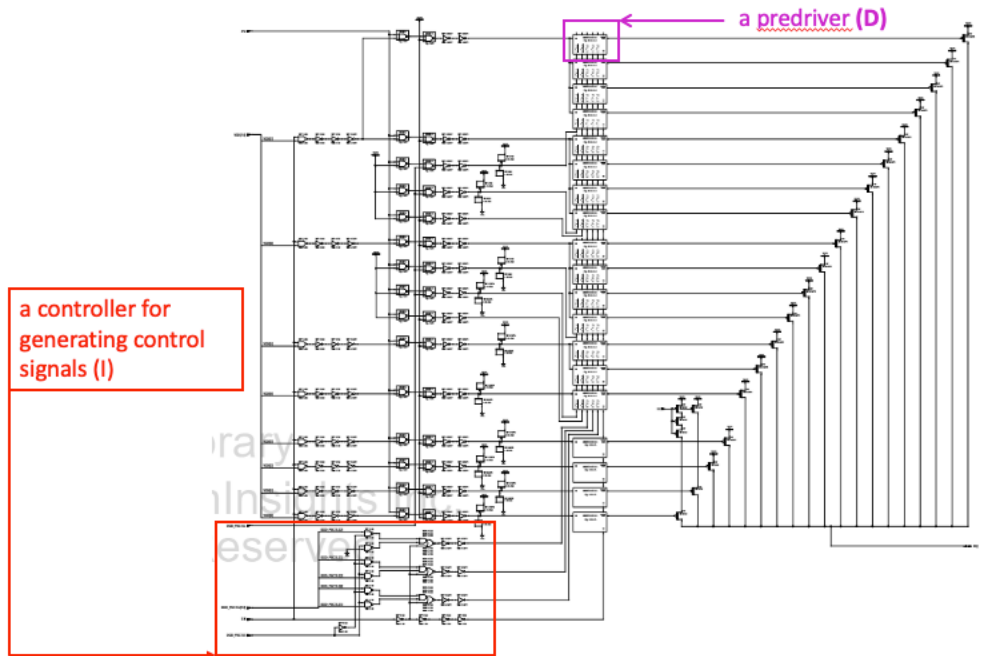
Source: [TechInsights](#) Report ID#: CAR-1902-801 Figure 4.11.1.3.1 DRIVER CELL 2

18 72. The Western Digital PC SN530 NVMe SSD used in the Lenovo
 19 IdeaPad 3 computer further includes a controller for generating control signals:

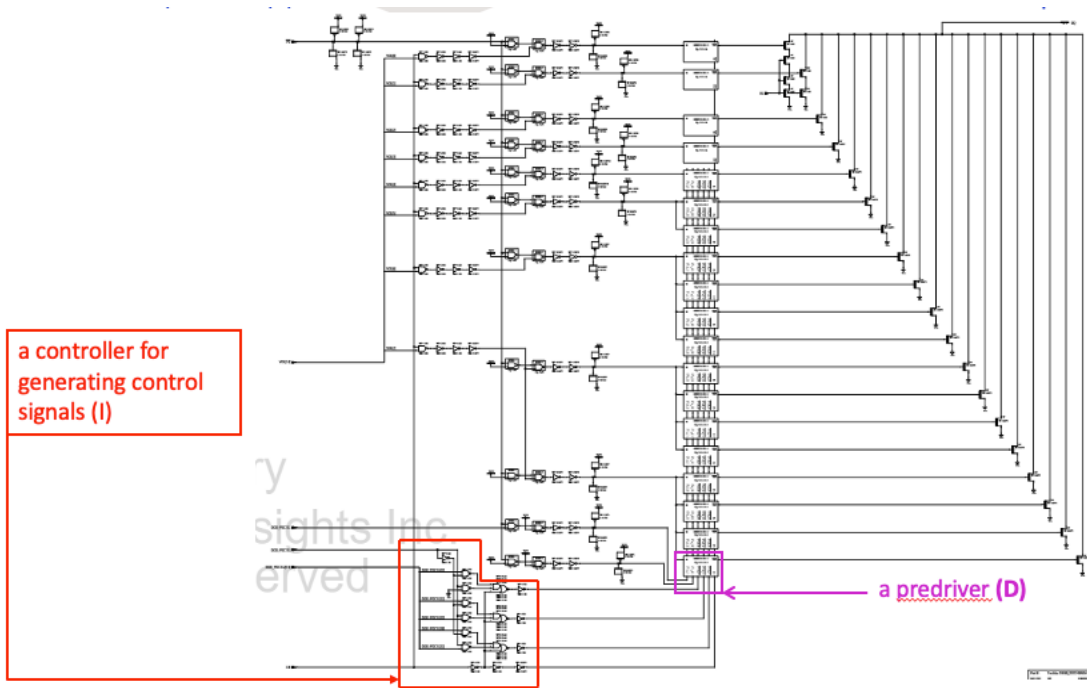
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Source: TechInsights Report ID#: CAR-1902-801 Figure 4.11.1 PULL UP DRIVER 1

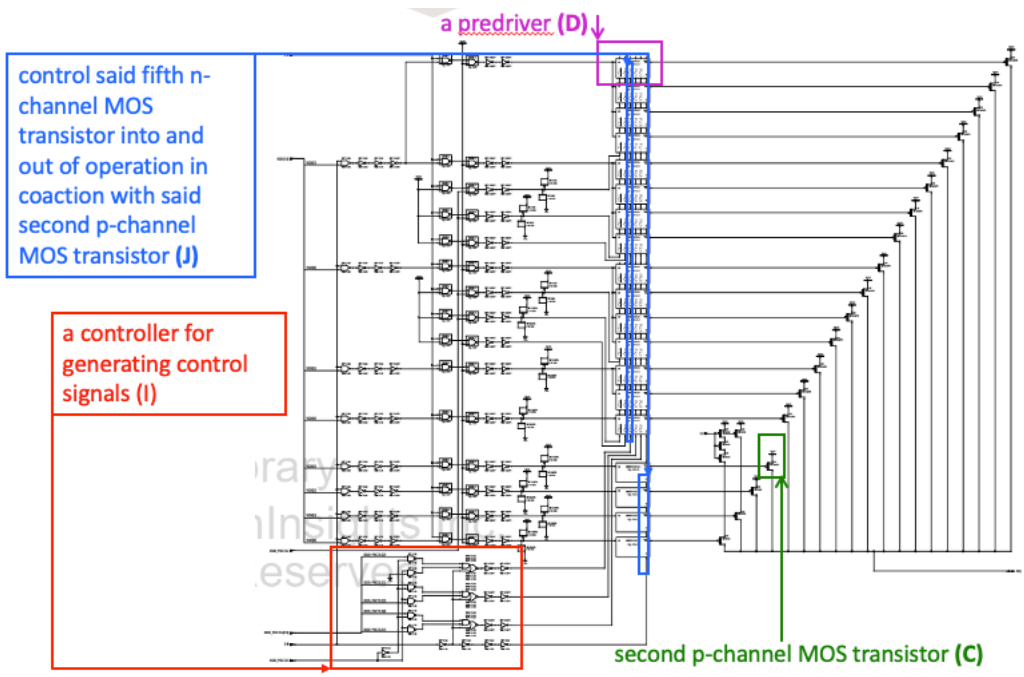


Source: TechInsights Report ID#: CAR-1902-801 Figure 4.11.3 PULL DOWN DRIVER 1

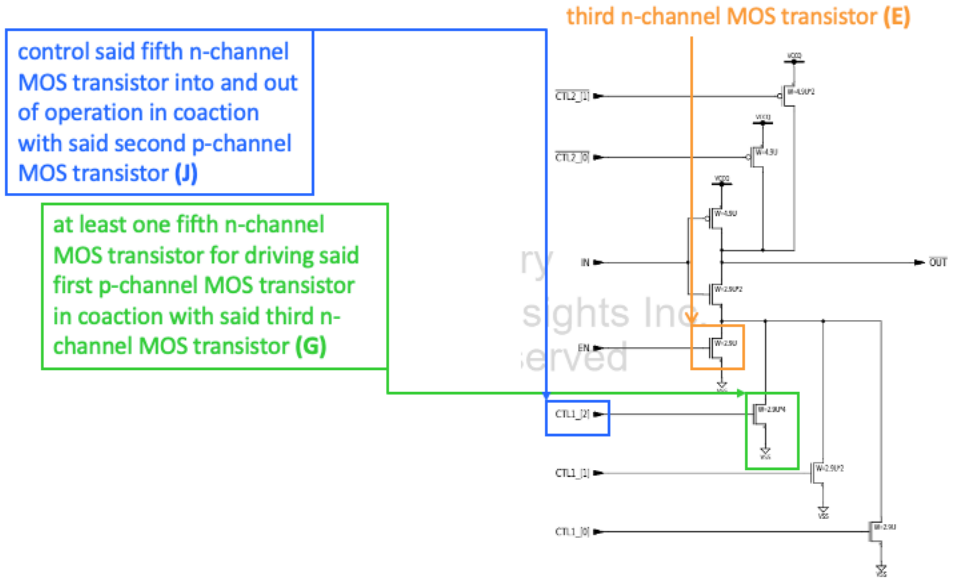
73. The Western Digital PC SN530 NVMe SSD used in the Lenovo IdeaPad 3 computer further includes a controller for generating control signals to control said fifth n-channel MOS transistor into and out of operation in coaction with said second p-channel MOS transistor:

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Source: TechInsights Report ID#: CAR-1902-801 Figure 411.1.1 PULL UP DRIVER

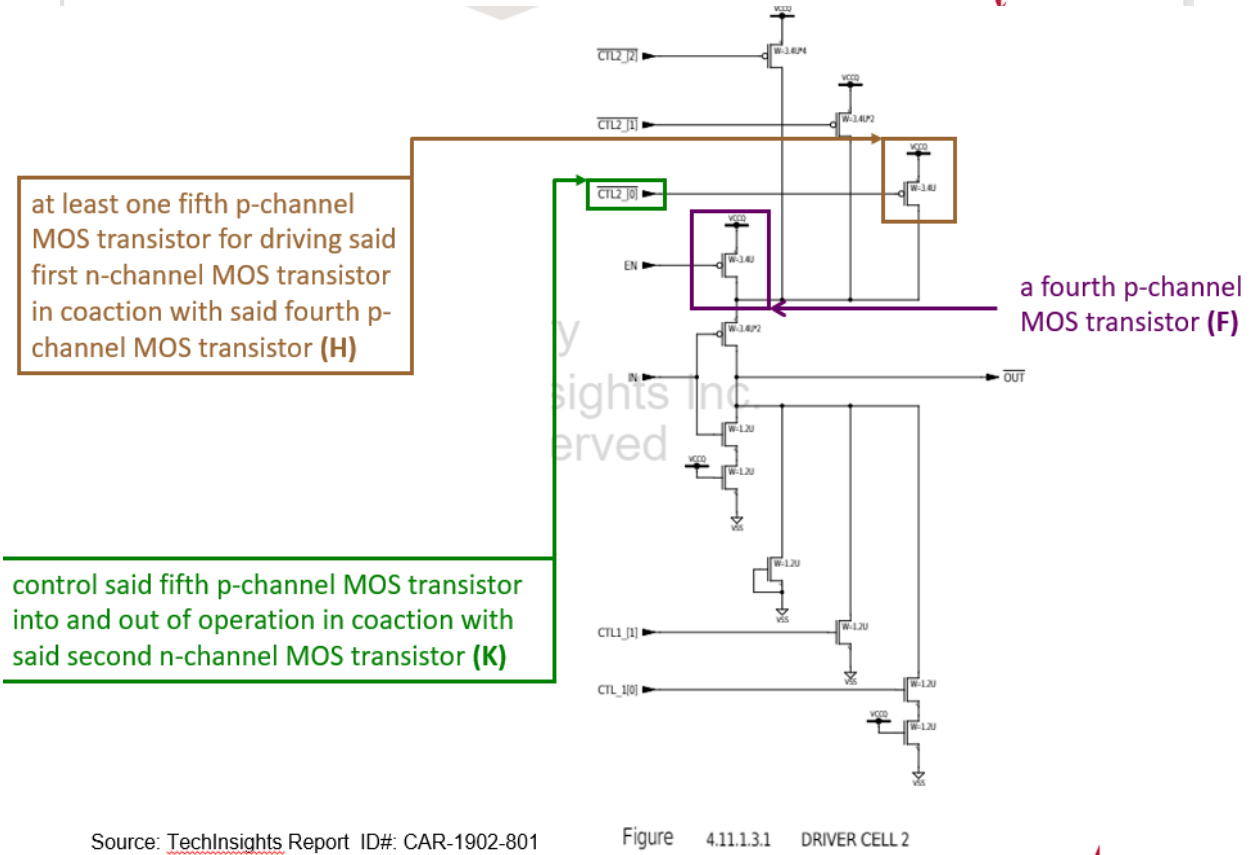
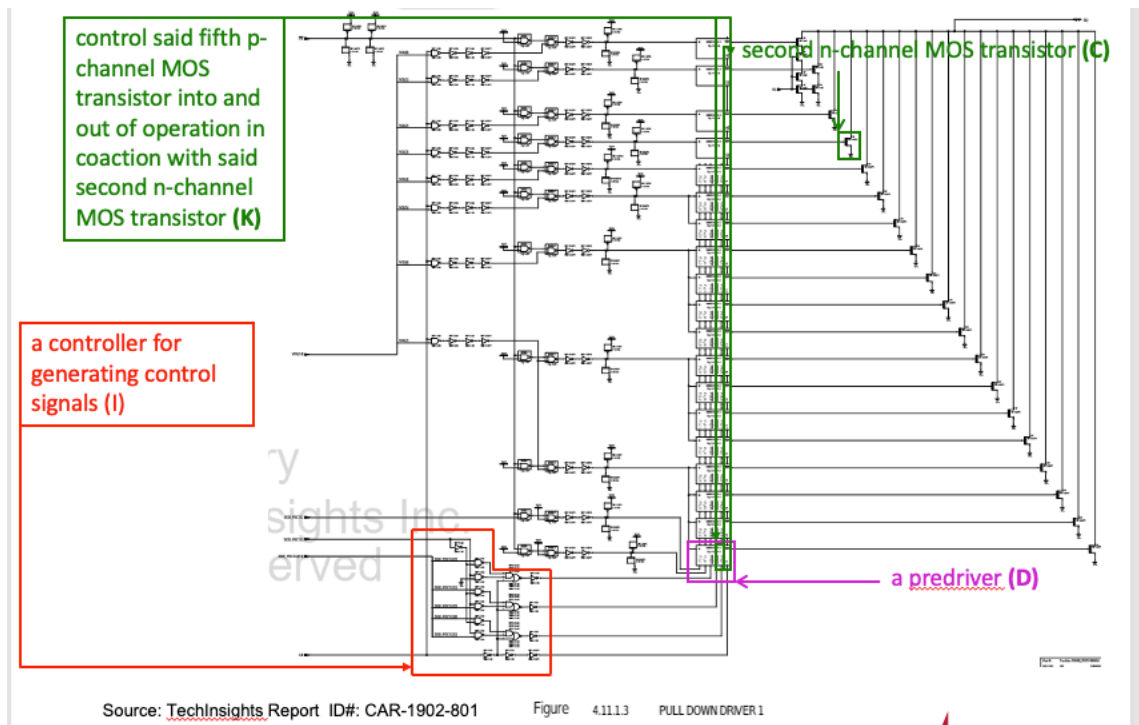


Source: TechInsights Report ID#: CAR-1902-801 Figure 411.1.1.1 DRIVER CELL 1

74. The Western Digital PC SN530 NVMe SSD used in the Lenovo IdeaPad 3 computer further includes a controller for generating control signals to control said fifth p-channel MOS transistor into and out of operation in coaction with said second n-channel MOS-transistor:

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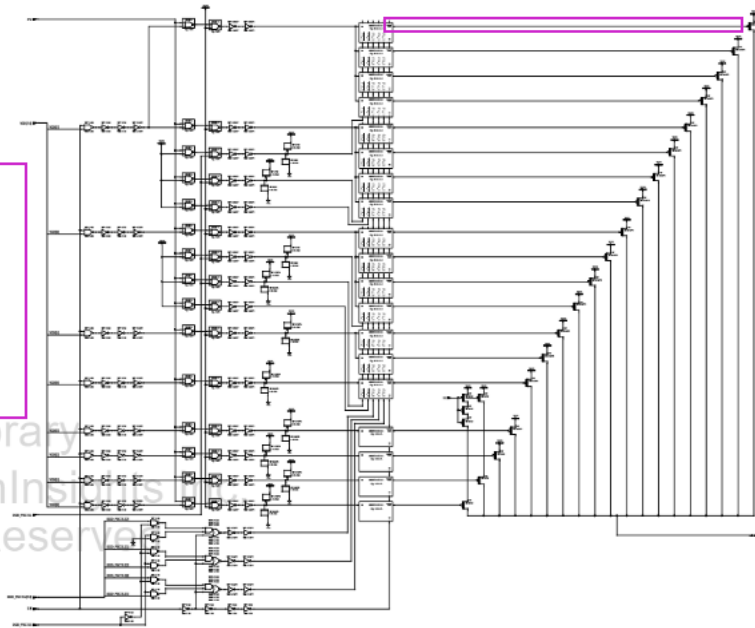


75. The Western Digital PC SN530 NVMe SSD used in Lenovo IdeaPad 3 computer further includes a controller wherein the output of the predriver is directly

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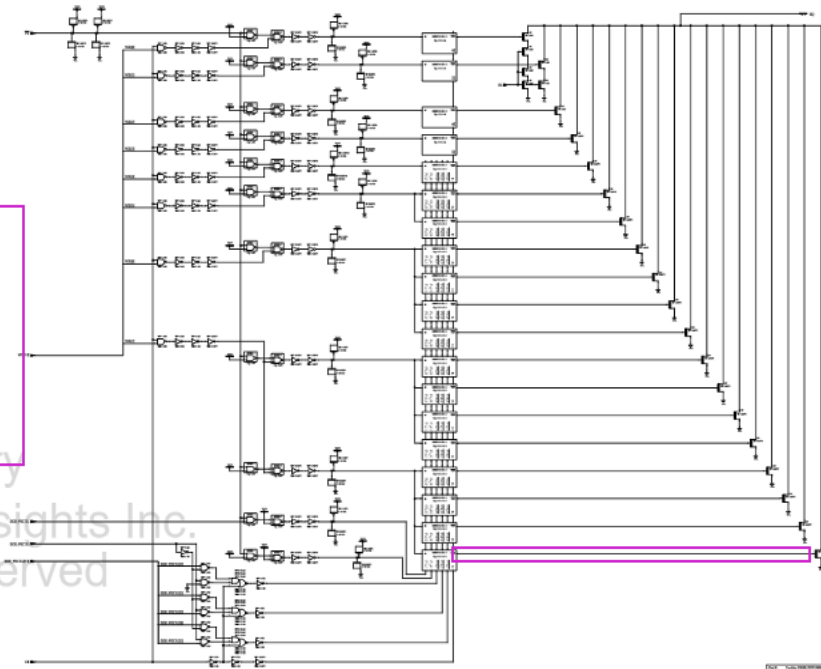
1 connected only to said first p-channel MOS transistor and said first n-channel MOS
 2 transistor of said main driver:

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 6 the output of the
 7 predriver is directly
 8 connected only to
 9 said first p-channel
 10 MOS transistor and
 11 said first n-channel
 12 MOS transistor of
 13 said main driver (L)



Source: TechInsights Report ID#: CAR-1902-801 Figure 4.11.11 PULL UP DRIVER 1

14
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 17 the output of the
 18 predriver is directly
 19 connected only to
 20 said first p-channel
 21 MOS transistor and
 22 said first n-channel
 23 MOS transistor of
 24 said main driver (L)



Source: TechInsights Report ID#: CAR-1902-801 Figure 4.11.13 PULL DOWN DRIVER 1

25
 26 76. Defendants actively, knowingly, and intentionally induce, and continue
 27 to actively, knowingly, and intentionally induce, infringement of the '539 patent
 28 under 35 U.S.C. §271(b) by their customers and end users.

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1 77. Defendants have had knowledge of and notice of the '539 patent and their
2 infringement since at least September 6, 2022 when Longitude gave Defendants
3 notice of their infringing actions. In any event, Defendants have had knowledge and
4 notice of the '539 patent since at least the filing of this complaint.

5 78. Defendants have induced their customers and end users to infringe the '539
6 patent by using their products as shown above. For example, Defendants encourage
7 their customers and end users to perform infringing methods by the very nature of
8 the products.

9 79. Defendants specifically intend their customers and/or end users infringe the
10 '539 patent, either literally or by the doctrine of equivalents, because Defendants
11 have known about the '539 patent and how Defendants' products infringe the claims
12 of the '539 patent but Defendants have not taken steps to prevent infringement by
13 their customers and/or end users. Accordingly, Defendants have acted with the
14 specific intent to induce infringement of the '369 patent.

15 80. Accordingly, Defendants have induced, and continue to induce, infringement
16 of the '539 patent under 35 U.S.C. §271(b).

17 81. As discussed above, Defendants have had knowledge of and notice of the '539
18 patent and its infringement since at least September 6, 2022. Despite this
19 knowledge, Defendants continue to commit tortious conduct by way of patent
20 infringement.

21 82. Defendants have been and continue to infringe one or more of the claims of
22 the '539 patent through the aforesaid acts.

23 83. Defendants have committed these acts of infringement without license or
24 authorization.

25 84. Plaintiff is entitled to recover damages adequate to compensate for the
26 infringement.

27 85. Defendants have and continue to infringe the '539 patent, acting with an
28 objectively high likelihood that their actions constitute infringement of the '539

1 patent. Defendants have known or should have known of this risk at least as early
2 as September 6, 2022. Accordingly, Defendants’ infringement of the ’539 patent has
3 been and continues to be willful.

4 **COUNT III**

5 **(DEFENDANTS’ INFRINGEMENT OF THE ‘233 PATENT)**

6 86.Paragraphs 1 through 85 are incorporated by reference as if fully restated
7 herein.

8 87.United States Patent No. 9,379,233, entitled “Semiconductor Device,” issued
9 on June 28, 2016 from United States Patent Application No. 14/872,844 filed
10 October 1, 2015.

11 88.Longitude is the owner of the ’233 patent with full rights to pursue recovery
12 of royalties for damages for infringement, including full rights to recover past and
13 future damages.

14 89.Each claim of the ’233 patent is valid, enforceable, and patent-eligible.

15 90.Longitude and its predecessors in interest have satisfied the requirements of
16 35 U.S.C. § 287(a) with respect to the ’233 patent, and Longitude is entitled to
17 damages for Defendants’ past infringement. Among other things, Longitude
18 provided actual notice of infringement to the component supplier, Western Digital.

19 91.Defendants have directly infringed (literally and equivalently) and induced
20 others to infringe the ’233 patent by making, using, selling, offering for sale, or
21 importing products that infringe the claims of the ’233 patent and by inducing others
22 to infringe the claims of the ’233 patent without a license or permission from
23 Longitude. These products include without limitation all Lenovo IdeaPad 3
24 computers (e.g., model 81X800L0CF), all other Lenovo computers, laptops, and
25 tablets having Western Digital PC SN530 NVMe SSDs, Western Digital SSDs,
26 and/or Western Digital 3D NAND memory chips and all versions and variations of
27 them offered for sale since the issuance of the ‘369 patent.

28

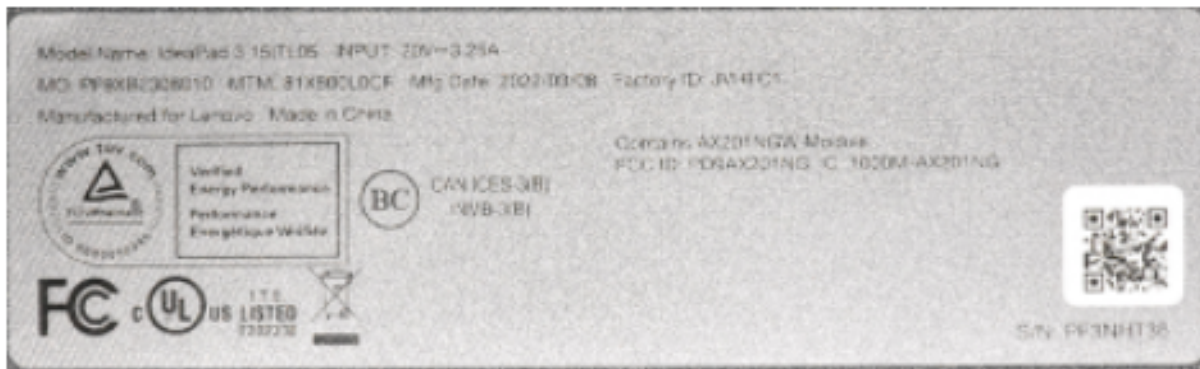
1 92. A non-limiting example of Defendants' infringement is the SanDisk memory
2 chip contained within the Lenovo IdeaPad 3 computer which infringes at least claim
3 1 of the '369 patent. Exemplary photographs of the Lenovo IdeaPad 3, and its
4 packaging are set forth below:
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93. The Lenovo IdeaPad 3 includes the Western Digital PC SN530 NVMe SSD as shown below:

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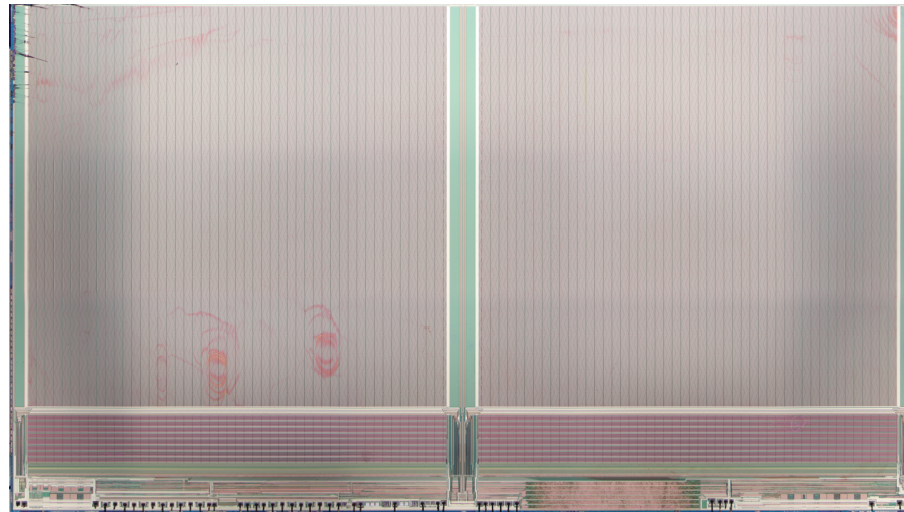
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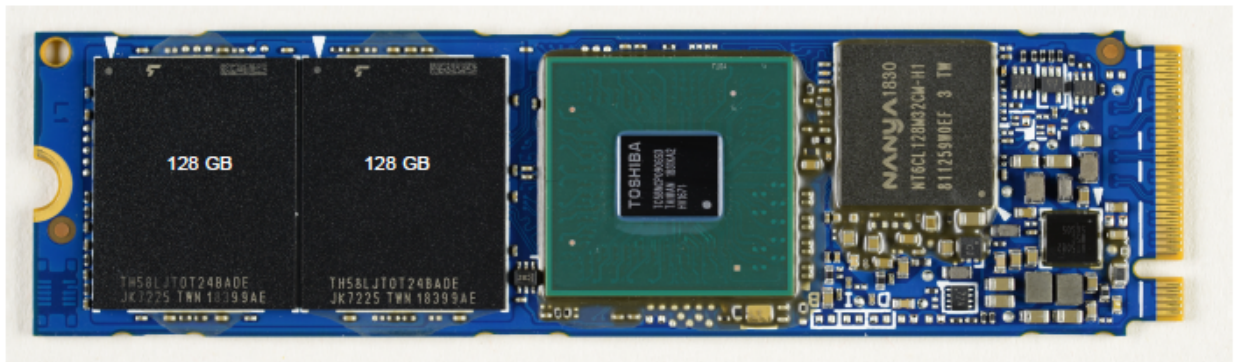
94. The below image shows the pin layout and corners of the SanDisk memory chip used in the Western Digital PC SN530 NVMe SSD:

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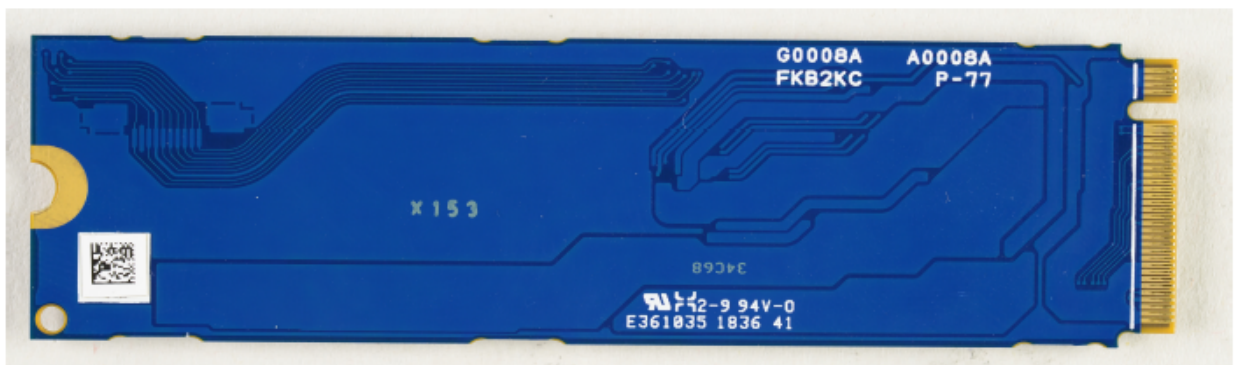
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95. On information and belief, the Western Digital PC SN530 NVMe SSD used in the Lenovo IdeaPad 3 is substantially similar to the Toshiba KXG60ZNV256G SSD Package (“Toshiba SSD”) for all matters relevant to this complaint. The Toshiba SSD is depicted below:



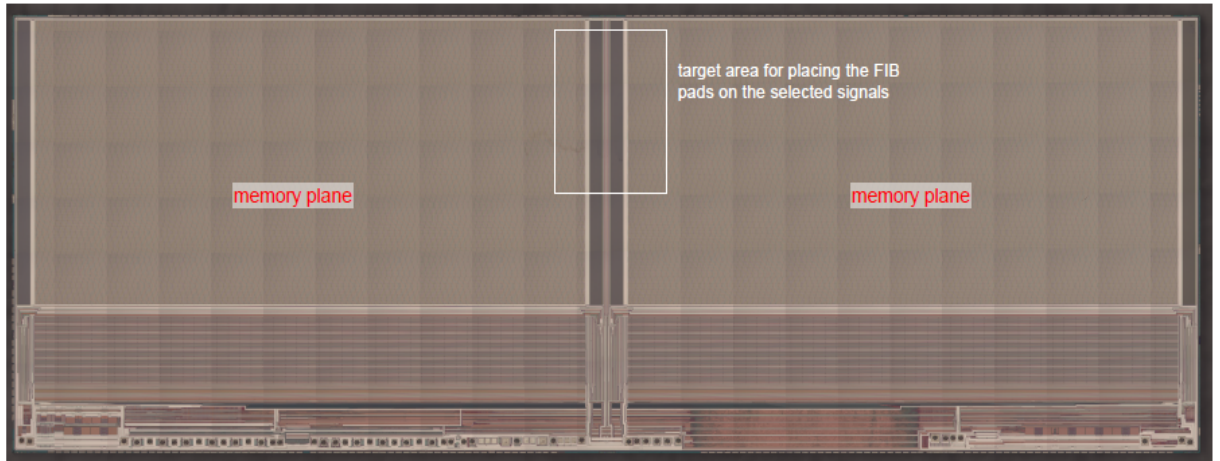
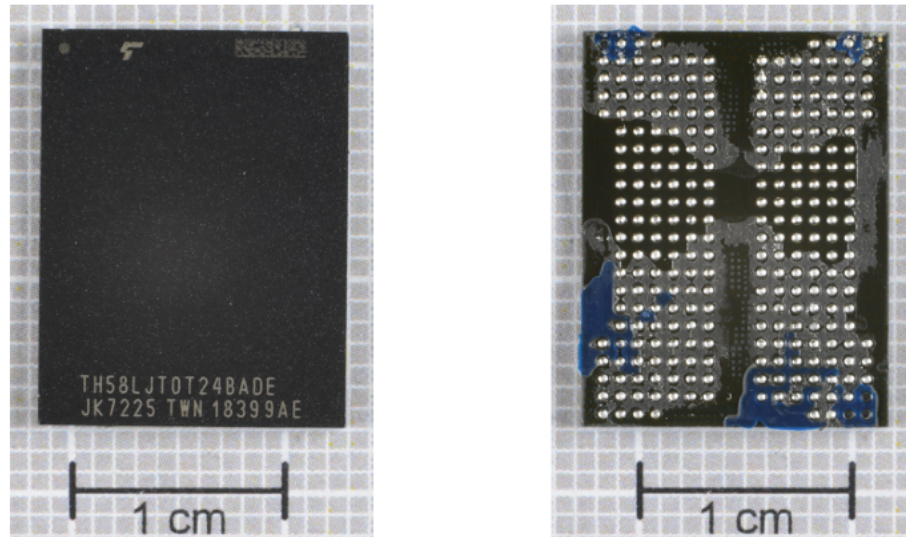
Toshiba KXG60ZNV256G SSD Package – Top



Toshiba KXG60ZNV256G SSD Package – Bottom

96. The memory chip of the Toshiba SSD, the Toshiba TH58LJT0T24BADE Package, is depicted in the images below:

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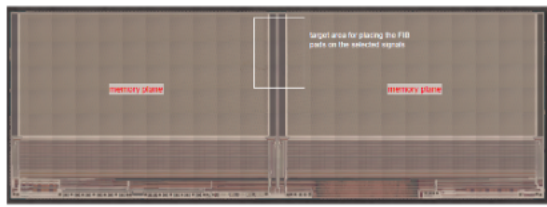


Toshiba 256 Gb 96L 3D NAND Flash Memory Die Photograph

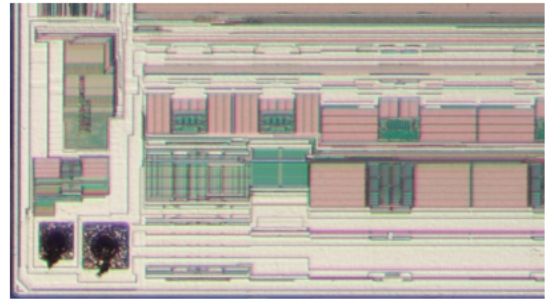
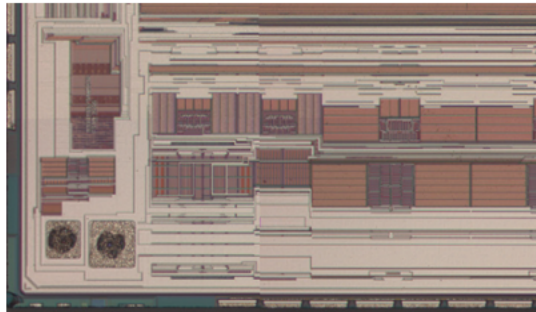
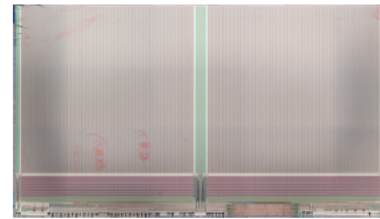
97. A side-by-side comparison of the SanDisk memory chip used in the Western Digital PC SN530 NVMe SSD and the Toshiba TH58LJT0T24BADE Package used in the Toshiba SSD is depicted below:

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Toshiba 256 Gb 96L 3D NAND Flash Memory Die Photograph

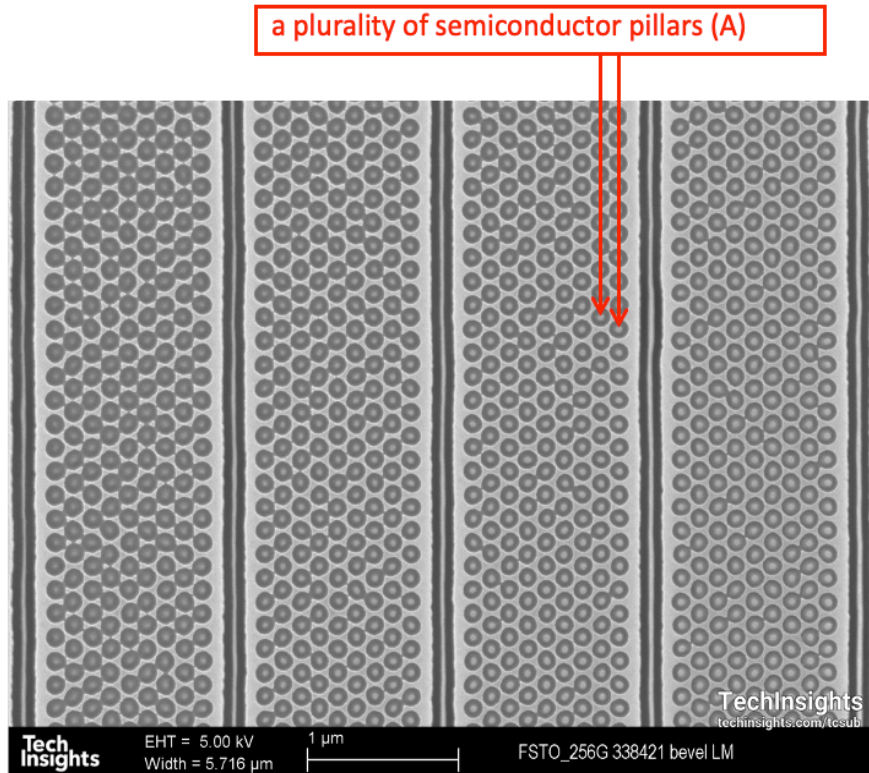
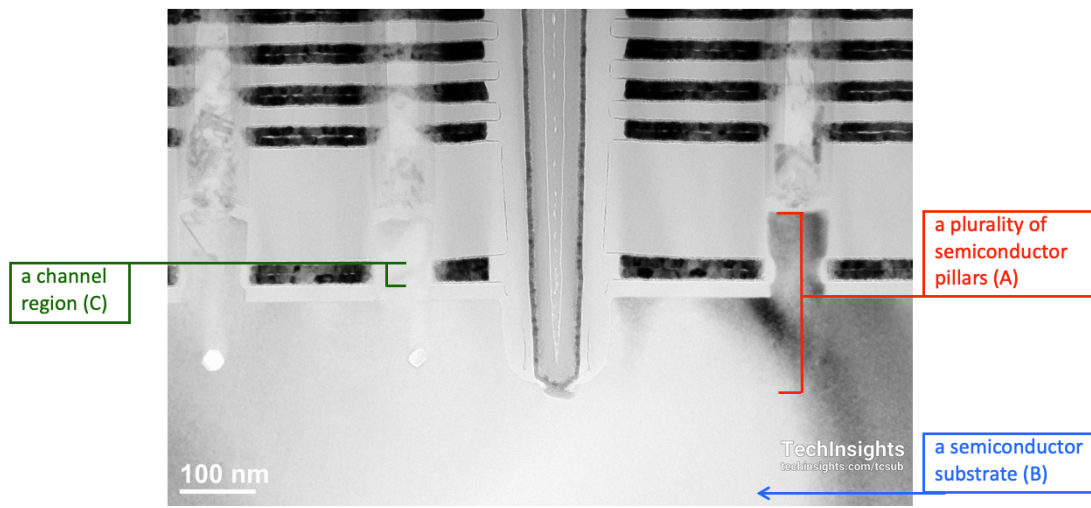


98. Based at least on the above, Longitude is informed and believes that the corners of the dies of the SanDisk memory chip used in the Western Digital PC SN530 NVMe SSD and the Toshiba TH58LJT0T24BADE Package are substantially the same. Accordingly, Longitude is informed and believes that the various I/Os and peripheral circuits are the same between the Toshiba and Western Digital/SanDisk chips. Furthermore, Longitude is informed and believes that Toshiba and Western Digital shared the designs for 96 layer chips. As shown above, the SanDisk memory chip is substantially the same as the Western Digital PC SN530 NVMe SSD and the Toshiba TH58LJT0T24BADE Package. For this reason, Longitude is informed and believes that technical documents and other analysis concerning the Toshiba TH58LJT0T24BADE Package also describe the layout and functionality of the Western Digital PC SN530 NVMe SSD and the SanDisk memory chip therein.

99. The SanDisk memory chip used in the Western Digital PC SN530 NVMe SSD is a semiconductor device comprising a plurality of semiconductor pillars provided to stand from a semiconductor substrate, each of the semiconductor pillars comprising a channel region:

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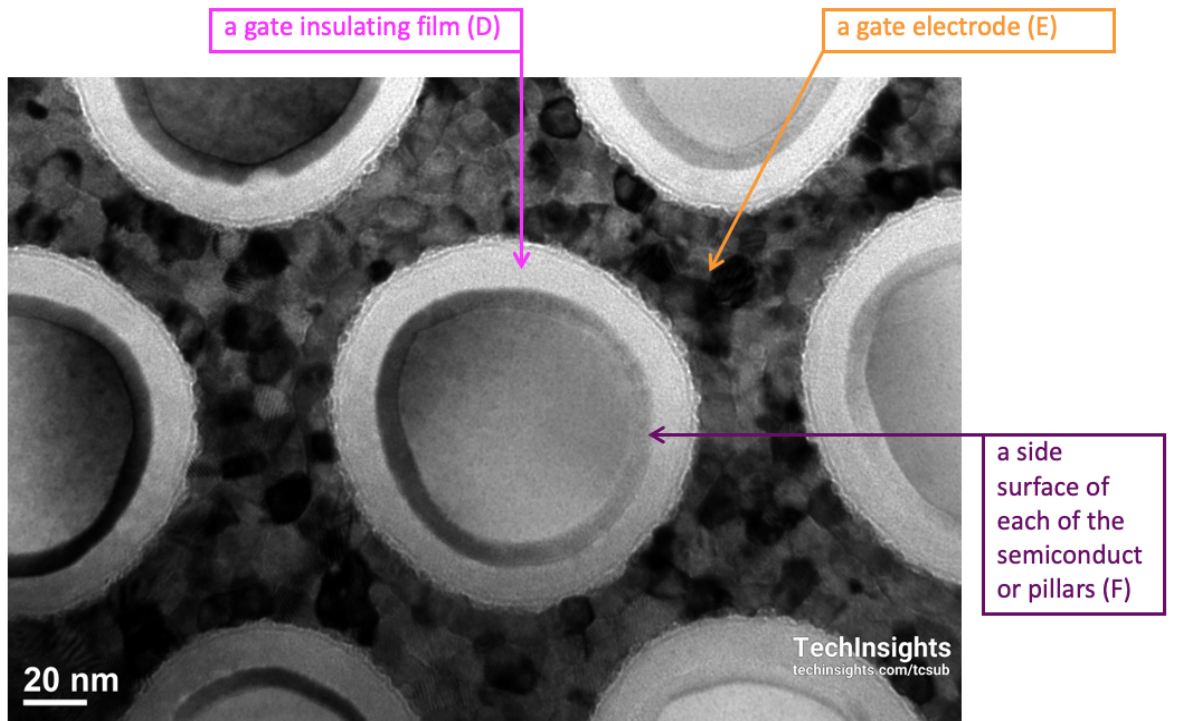
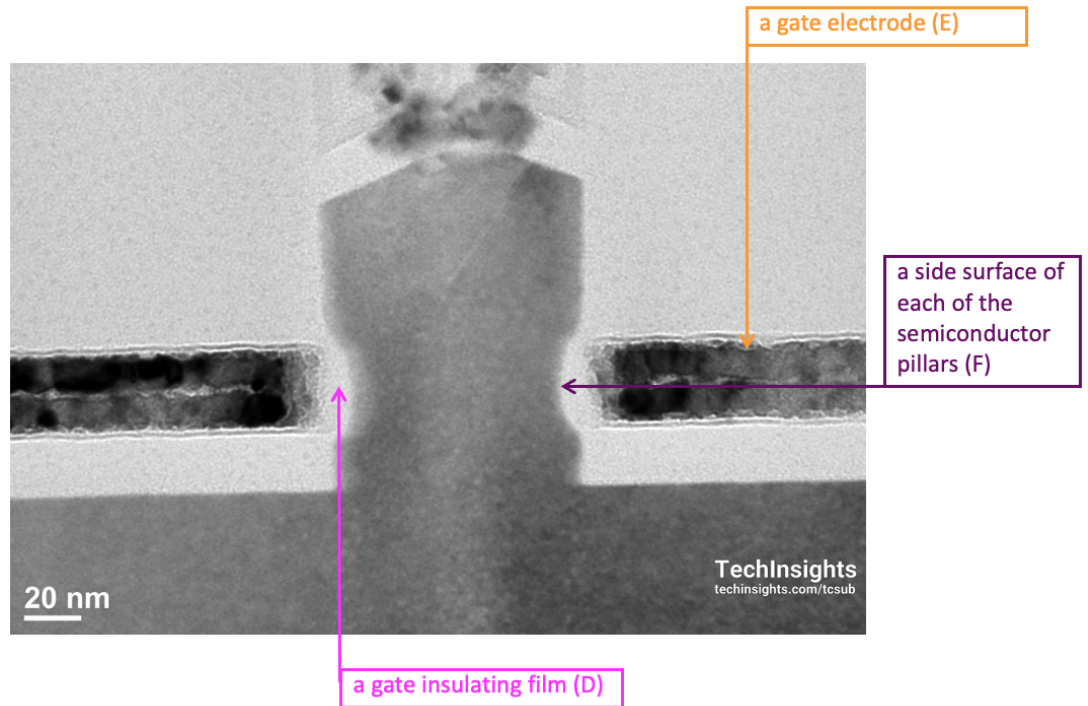
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100. The SanDisk memory chip used in the Western Digital PC SN530 NVMe SSD is a semiconductor device comprising a gate insulating film and a gate electrode provided over a side surface of each of the semiconductor pillars:

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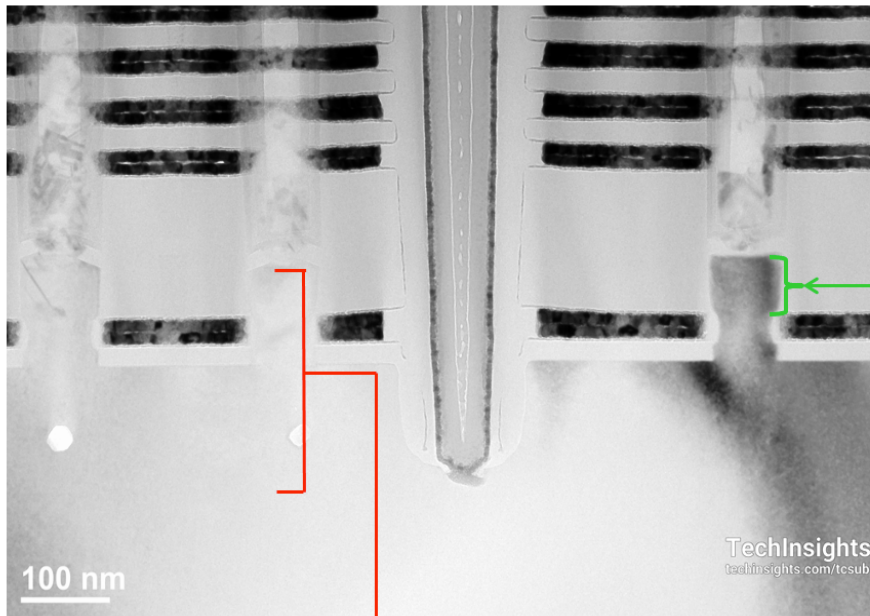
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101. The SanDisk memory chip used in the Western Digital PC SN530 NVMe SSD is a semiconductor device comprising an upper diffusion layer provided at an upper end of each of the semiconductor pillars to serve as one of a source and a drain:

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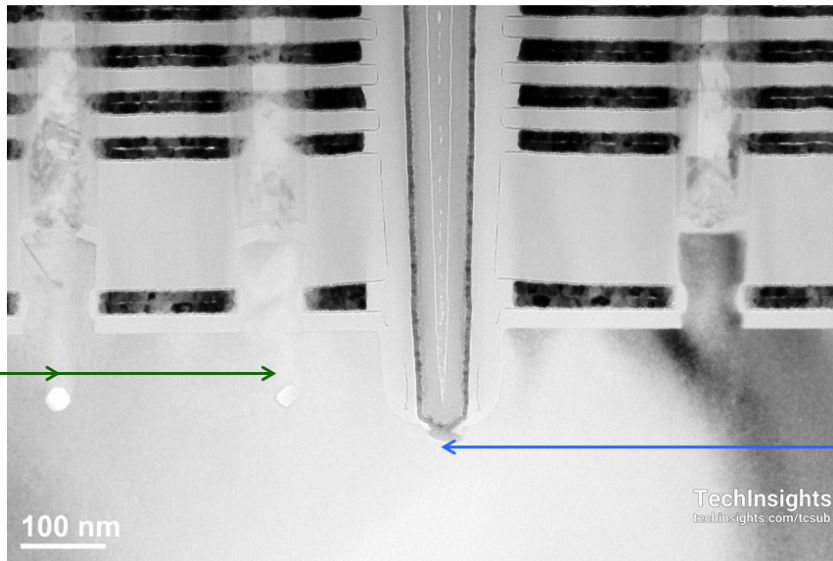
a plurality of semiconductor pillars (A)

an upper end of each of the semiconductor pillars (H)

an upper diffusion layer (G)

one of a source and a drain (I)

102. The SanDisk memory chip used in the Western Digital PC SN530 NVMe SSD is a semiconductor device comprising a lower diffusion layer operatively coupled to a lower end of each of the semiconductor pillars to serve as the other of the source and the drain:



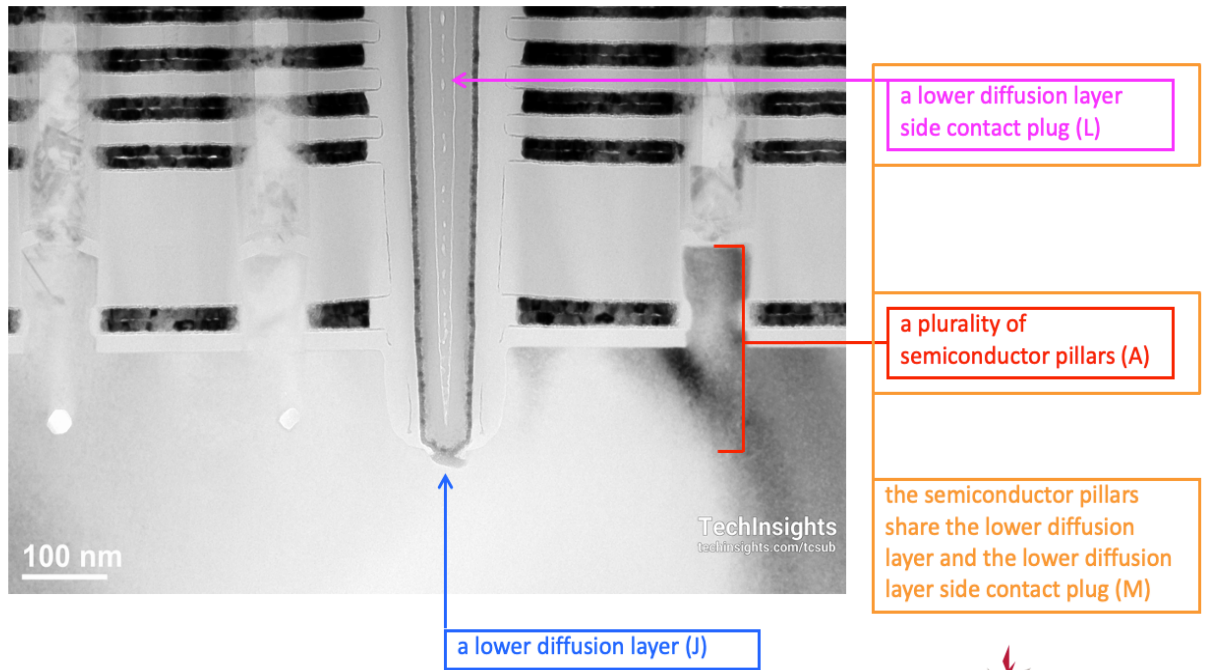
a lower end of each of the semiconductor pillars (K)

a lower diffusion layer (J)

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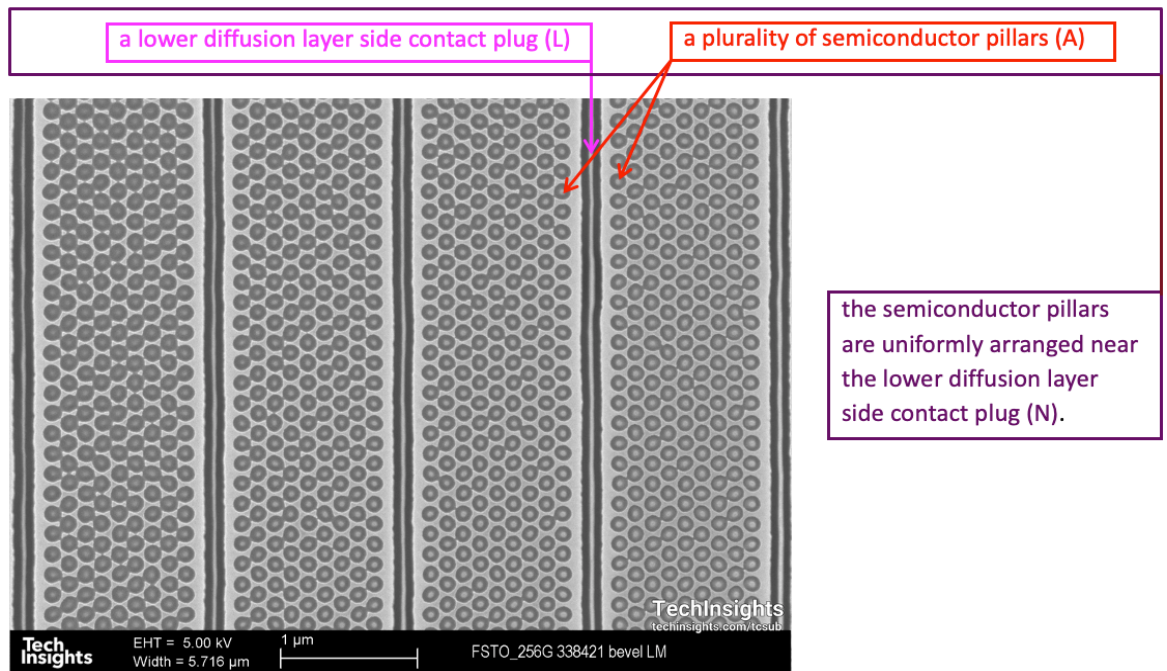
103. The SanDisk memory chip used in the Western Digital PC SN530 NVMe SSD is a semiconductor device comprising a lower diffusion layer side contact plug connected to the lower diffusion layer, wherein the semiconductor pillars share the lower diffusion layer and the lower diffusion layer side contact plug:



104. The SanDisk memory chip used in the Western Digital PC SN530 NVMe SSD is a semiconductor device wherein the semiconductor pillars are uniformly arranged near the lower diffusion side contact:

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105. Defendants actively, knowingly, and intentionally induce, and continue to actively, knowingly, and intentionally induce, infringement of the '233 patent under 35 U.S.C. §271(b) by their customers and end users.

106. Defendants have had knowledge of and notice of the '233 patent and their infringement since at least September 6, 2022 when Longitude gave Defendants notice of their infringing actions. In any event, Defendants have had knowledge and notice of the '233 patent since at least the filing of this complaint.

107. Defendants have induced their customers and end users to infringe the '233 patent by using their products as shown above. For example, Defendants encourage their customers and end users to perform infringing methods by the very nature of the products.

108. Defendants specifically intend their customers and/or end users infringe the '233 patent, either literally or by the doctrine of equivalents, because Defendants have known about the '233 patent and how Defendants' products infringe the claims of the '233 patent but Defendants have not taken steps to prevent infringement by their customers and/or end users. Accordingly, Defendants have acted with the specific intent to induce infringement of the '233 patent.

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1 109. Accordingly, Defendants have induced, and continue to induce,
2 infringement of the '233 patent under 35 U.S.C. §271(b).

3 110. As discussed above, Defendants have had knowledge of and notice of
4 the '233 patent and its infringement since at least September 6, 2022. Despite this
5 knowledge, Defendants continue to commit tortious conduct by way of patent
6 infringement.

7 111. Defendants have been and continue to infringe one or more of the
8 claims of the '233 patent through the aforesaid acts.

9 112. Defendants have committed these acts of infringement without license
10 or authorization.

11 113. Plaintiff is entitled to recover damages adequate to compensate for the
12 infringement.

13 114. Defendants have and continue to infringe the '233 patent, acting with
14 an objectively high likelihood that their actions constitute infringement of the '233
15 patent. Defendants have known or should have known of this risk at least as early
16 as September 6, 2022. Accordingly, Defendants' infringement of the '233 patent has
17 been and continues to be willful.

18 **PRAYER FOR RELIEF**

19 Wherefore, Longitude, respectfully requests the following relief:

- 20 a) A judgment that Defendants have infringed the '369 patent;
21 b) A judgment that Defendants have infringed the '539 patent;
22 c) A judgement that Defendants have infringed the '233 patent;
23 d) A judgment that awards Plaintiff all appropriate damages under 35 U.S.C. §
24 284 for Defendants' past infringement, and any continuing or future
25 infringement of the Patents-in-Suit, up until the date such judgment is entered,
26 including interest, costs, and disbursements as justified under 35 U.S.C. § 284
27 to adequately compensate Plaintiff for Defendants' infringement;
28

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- 1 e) An adjudication that Defendants' infringement of the Patents-in-Suit has been
- 2 willful and deliberate;
- 3 f) An adjudication that Plaintiff be awarded treble damages and pre-judgment
- 4 interest under 35 U.S.C. § 284 as a result of Defendants' willful and deliberate
- 5 infringement of the Patents-in-Suit;
- 6 g) An adjudication that this case is exceptional within the meaning of 35 U.S.C.
- 7 § 285;
- 8 h) An adjudication that Plaintiff be awarded the attorneys' fees, costs, and
- 9 expenses it incurs in prosecuting this action; and
- 10 i) An adjudication that Plaintiff be awarded such further relief at law or in equity
- 11 as the Court deems just and proper.

JURY TRIAL DEMANDED

Plaintiff hereby demands a trial by jury of all issues so triable.

Respectfully submitted,

DATED: January 9, 2023

RUSS, AUGUST & KABAT

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