IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
MIDLAND/ODESSA DIVISION

PALISADE TECHNOLOGIES, LLP, *Plaintiff* v. MICRON TECHNOLOGY, INC. and MICRON SEMICONDUCTOR PRODUCTS, INC., *Defendants*.	Case No. 7:24-cv-00262-DC-DTG **Jury Trial Demanded**

DEFENDANTS' FINAL INVALIDITY CONTENTIONS FOR
U.S. PATENT NOS. 8,996,838; AND 9,524,974

I. Introduction 1

II. Reservations 2

III. U.S. Patent No. 8,996,838 ("'838 Patent") 6

A. Invalidity Contentions Under 35 U.S.C. §§ 102 And 103 6

1. Identification of Prior Art 6

2. Primary References 8

3. Secondary References 9

4. Obvious Combinations 10

B. Invalidity Contentions Under 35 U.S.C. § 112 30

1. Indefiniteness Under 35 U.S.C. § 112(b) 30

2. Lack of Enablement/Lack of Written Description Under 35 U.S.C. § 112(a) 31

IV. U.S. Patent No. 9,524,974 ("'974 Patent") 32

A. Invalidity Contentions Under 35 U.S.C. §§ 102 And 103 32

1. Identification of Prior Art 32

2. Primary References 34

3. Secondary References 35

4. Obvious Combinations 36

B. Invalidity Contentions Under 35 U.S.C. § 112 54

1. Indefiniteness Under 35 U.S.C. § 112(b) 54

2. Lack of Enablement/Lack of Written Description Under 35 U.S.C. § 112(a) 56

V. Document Production 57

I. Introduction

Defendants Micron Technology, Inc. and Micron Semiconductor Products, Inc. (collectively, "Defendants" or "Micron") submit its Final Invalidity Contentions for U.S. Patent Nos. 8,996,838; and 9,524,974 ("Invalidity Contentions") to Plaintiff Palisade Technologies, LLP ("Plaintiff" or "Palisade") pursuant to the Court's Order Governing Proceedings in Patent Cases.

In Plaintiff's First Amended Infringement Contentions ("Infringement Contentions"), served May 9, 2025, as modified by the Court's Order Regarding Defendants Micron's Motion to Strike Infringement Contentions, ECF No. 53 (the "Motion to Strike Order"), Plaintiff asserted the following claims of each patent against Micron.

U.S. Patent No.	Asserted Claim(s)
8,996,838	1-2, 8, 11-13, 20
9,524,974	1-2, 4, 6, 11, 12-16

Micron's Invalidity Contentions address only those claims asserted in Plaintiff's Infringement Contentions, as modified by the Motion to Strike Order. Micron provides these Invalidity Contentions without waiving any argument about the sufficiency or substance of Plaintiff's Infringement Contentions.

Based on its investigation to date, Micron hereby: (a) identifies each item of prior art that anticipates each asserted claim or renders it obvious; (b) specifies whether each such item of prior art anticipates each asserted claim or renders it obvious and, if a combination of items of prior art makes a claim obvious, identifies each such combination and the motivation to combine

such items; (c) provides a chart identifying where specifically in each item of prior art each element of each asserted claim is found, including for each element that is governed by 35 U.S.C. § 112(f), the identity of the structure(s), act(s), or material(s) in each item of prior art that performs the claimed function; (d) identifies any grounds of invalidity of the asserted claims based on indefiniteness under 35 U.S.C. § 112(b), or enablement or written description under 35 U.S.C. § 112(a); and (e) identifies any grounds of invalidity of the asserted claims directed to ineligible subject matter under 35 U.S.C. § 101.

In addition, based on its investigation to date, Micron has produced or is producing documents concurrently with these Invalidity Contentions.

II. Reservations

Defendants reserve the right to amend these Invalidity Contentions. The information and documents that Defendants produce are based on information available to date and are subject to further revision.

The information and documents that Defendants produce are based on Defendants' present understanding of Plaintiff's infringement theories as advanced by Plaintiff in its Infringement Contentions. Plaintiff's Infringement Contentions are deficient in numerous respects. For example, although Plaintiff lists hundreds of product models as accused products in its Infringement Contentions, the accompanying claim charts include analysis for only two models. Thus, Plaintiff has failed to identify specifically where each element of each asserted claim is found within each accused instrumentality. If Plaintiff attempts or is permitted to cure such deficiencies, amends its contentions, or provides additional information regarding its infringement theories, doing so may lead to further grounds for invalidity, and thus Defendants specifically reserve the right to amend or supplement its Invalidity Contentions.

Further, because discovery (including third-party discovery) is at an early stage, Defendants reserve the right to amend or supplement these Invalidity Contentions. For example, Plaintiff has not produced prior art known to it, including information regarding any known prior art products. As discovery proceeds, Defendants may serve subpoenas on third parties believed to have knowledge, documentation, or corroborating evidence relating to invalidity and/or prior art. It is therefore likely that Defendants will discover additional prior art or additional information relating to known prior art, and Defendants reserve the right to supplement these contentions after becoming aware of additional prior art or information. Defendants further reserve the right to introduce and use such supplemental materials at trial.

Defendants' claim charts attached to these Invalidity Contentions cite particular teachings and disclosures of the prior art as applied to limitations of the asserted claims. However, persons having ordinary skill in the art may view an item of prior art generally in the context of other publications, literature, products, and understanding. Accordingly, the cited portions are only exemplary, and Defendants reserve the right to rely on uncited portions of the prior art references and on other publications and expert testimony as aids in understanding and interpreting the cited portions, as providing context thereto, and as additional evidence that a claim limitation is known or disclosed. Defendants reserve the right to establish what was known to a person having ordinary skill in the art through other publications, products, or testimony. Defendants also reserve the right to rely on uncited portions of the prior art references, other publications, and testimony to establish that a person of skill in the art would have been motivated to combine certain of the cited references so as to render the claims obvious. Citations to figures are inclusive of all discussions of those figures.

IPR2025-01559
Micron Technology and Micron Semiconductor v. Palisade Technologies, LLP
Palisade's Exhibit 2004
Ex. 2004, Page 5

Defendants further reserve the right to argue that the asserted claims are invalid under 35 U.S.C §§ 101, 115(a)–(b) if discovery reveals that the named inventor of the Asserted Patents did not invent the subject matter recited in the asserted claims. If Defendants assert invalidity based on inventorship, Defendants will provide the name of the person(s) from whom, and the circumstances under which, the invention or any part of it was derived.

Defendants further intend to rely on inventor admissions concerning the scope of the asserted claims or of the prior art relevant to the asserted claims found in, *inter alia*, the patent prosecution history and/or reexamination history for each of the Asserted Patents and related patents or patent applications; any deposition testimony of a named inventor of the Asserted Patents; and the papers filed and any evidence submitted by Plaintiff in conjunction with this litigation. Defendants reserve the right to contend that the asserted claims are invalid for failure to name the correct inventor(s), or to contend that Plaintiff lacks standing to bring this litigation with respect to such patents.

Furthermore, nothing stated herein shall be treated as an admission or suggestion that Defendants agree with Plaintiff regarding the scope of any asserted claim or the claim constructions in its Infringement Contentions. To the extent that Defendants' Invalidity Contentions reflect claim constructions consistent with or suggested by Plaintiff's Infringement Contentions, no inference is intended nor should any be drawn that Defendants agree with Plaintiff's claim constructions. By applying any of Plaintiff's apparent claim constructions and interpretations, Defendants do not concede in any way that those constructions and interpretations are correct, but rather assert the fundamental principle that whatever infringes a claim if later in time anticipates if earlier in time. Defendants expressly reserve the right to propose alternative constructions to those that have been or may be advocated by Plaintiff.

Nor shall anything in these Invalidity Contentions be treated as an admission that Defendants' accused products meet any limitation of any asserted claim. Defendants deny that they infringe any claim of the Asserted Patents. To the extent that any prior art contains a claim element that is the same as or similar to an accused product, inclusion of that prior art in Defendants' Invalidity Contentions shall not be deemed a waiver by Defendants of any claim construction or non-infringement position. Defendants expressly reserve the right to contest any claim construction asserted by Plaintiff and expressly reserve all non-infringement arguments.

In its Infringement Contentions, Plaintiff contends that the asserted claims of the Asserted Patents are entitled to the following priority dates.

U.S. Patent No.	Priority Dates
8,996,838	May 8, 2014
9,524,974	July 22, 2015

Defendants reserve the right to challenge Plaintiff's alleged priority dates.[1] Defendants further reserve the right to seek discovery regarding conception and reduction to practice, as appropriate, and to demonstrate earlier invention by other parties under 35 U.S.C. § 102(g), public use or the on-sale bar under 35 U.S.C. § 102(b), or applicants' failure to comply with 35 U.S.C. § 112. In addition, Defendants rely on Plaintiff's alleged priority dates in forming these Invalidity Contentions, and to the extent Plaintiff later argues, or it is determined that, any different priority date applies, Defendants reserve the right to amend these Contentions accordingly.

[1] Based on these priority dates, Defendants have applied post-AIA 35 U.S.C. to U.S. Patent Nos. 8,996,838 and 9,524,974. Throughout these contentions, any citations to either pre-AIA or post-AIA 35 U.S.C. also refer to their corollary, as appropriate.

III. U.S. Patent No. 8,996,838 ("'838 Patent")

A. Invalidity Contentions Under 35 U.S.C. §§ 102 And 103

1. Identification of Prior Art

In addition to the prior art cited on the face of the '838 Patent and related patents, the admitted prior art in the specifications of the '838 Patent and related patents, the prior art cited in any file histories, reexaminations, *inter partes* review proceedings (including without limitation IPR2025-01560 and all filings and exhibits therein), reissue proceedings, or other examination or post-grant proceedings of the '838 Patent and related patents, and the prior art cited in any invalidity contentions or expert reports submitted in any action or proceedings involving the '838 Patent or related patents, Defendants identify the following prior art that anticipates each asserted claim or renders it obvious.

a) Prior Art Patents and Other Printed Publications

The following patents, patent publications, and other printed publications are prior art to the asserted claims under at least 35 U.S.C. §§ 102(a)(1), (a)(2), and/or 35 U.S.C. § 103. The identification of any patent or patent publication shall be deemed to include any counterpart patent or application filed, published, or issued anywhere in the world.

Patent or Publication Number, or Publication Title	Country of Origin	Filing Date	Date of Issue or Publication
U.S. Patent App. Pub. No. 2013/0028027 ("Kim '027")	U.S.	6/19/2012	1/31/2013
U.S. Patent App. Pub. No. 2013/0235667 ("Nam")	U.S.	10/12/2012	9/12/2013
"The Threshold Voltage Variation on Etch angle of Channel-hole in Vertical NAND Flash memories" ("Kang")	n/a	n/a	12/13/2013
U.S. Patent No. 9,864,682 ("Kim '682")	U.S.	3/21/2014 (priority date)	1/9/2018

Patent or Publication Number, or Publication Title	Country of Origin	Filing Date	Date of Issue or Publication
U.S. Patent App. Pub. No. 2013/0107653 (“Kwak”)	U.S.	8/31/2012	5/2/2013
U.S. Patent No. RE47,866 (“Tokiwa ’866”)	U.S.	6/21/2011 (priority date)	2/18/2020
U.S. Patent App. Pub. No. 2012/0254680 (“Oh ’680”)	U.S.	3/27/2012	10/4/2012
U.S. Patent App. Pub. No. 2011/0199833 (“Shim”)	U.S.	1/7/2011	8/18/2011
U.S. Patent. App. Pub. No. 2012/0257455 (“Oh ’455”)	U.S.	8/17/2011	10/11/2012
U.S. Patent App. Pub. No. 2012/0300527 (“Shim ’527”)	U.S.	3/26/2012	11/29/2012
U.S. Patent No. 8,923,060 (“Shim ’060”)	U.S.	12/20/2012	12/30/2014
U.S. Patent App. Pub. No. 2010/0097858 (“Tokiwa ’858”)	U.S.	9/3/2009	4/22/2010
U.S. Patent App. Pub. No. 2012/0300561 (“Yun”)	U.S.	5/21/2012	11/29/2012
U.S. Patent App. Pub. No. 2010/0269000 (“Lee”)	U.S.	4/20/2010	10/21/2010
U.S. Patent App. Pub. No. 2014/0229655 (“Goss”)	U.S.	2/8/2013	4/14/2014
U.S. Patent App. Pub. No. 2015/0221389 (“Kim ’389”)	U.S.	2/6/2014 (priority date)	8/6/2015
U.S. Patent App. Pub. No. 2012/0182804 (“Hung”)	U.S.	9/26/2011	7/19/2012
U.S. Patent No. 9,189,329 (“Zhu”)	U.S.	10/9/2012	11/17/2015
U.S. Patent No. 8,730,738 (“Oh ’738”)	U.S.	8/17/2011	5/20/2014
Booting from NAND Flash Memory, Technical Note, Macronix International Co., Ltd., Rev. 1, December 12, 2013 (“Macronix”)	n/a	n/a	12/12/2013

b) Prior Art Systems

The following systems are prior art under at least post-AIA 35 U.S.C. § 102(a)(1) or (a)(2):

1. Products, components, systems, and methods invented, designed, developed, reduced to practice, and/or in public use or on sale related to the Micron 100 series memory products, including those identified as L06A ("Micron L06A"), as exemplified in the claim chart in Exhibit D9. As part of these Invalidity Contentions, Defendants have produced documents relating to Micron L06A. Based on information available to Defendants, Defendants believe that Micron L06A was conceived and/or reduced to practice by engineers at Micron, at least by May, 2014, without being abandoned, suppressed, or concealed, and it was in public use or on sale before the priority date of the '838 Patent.

2. Products, components, systems, and methods invented, designed, developed, reduced to practice, and/or in public use or on sale related Samsung K9ADGD8S0A V-NAND TCAT Technology Flash Memory, including as incorporated in the Samsung 850 Pro 128 GB SATA III solid state drive and other products containing the Samsung K9HQGY8S5M-CCK0 or K9LPGY8S1M-CCK0 FBGA packages ("Samsung V-NAND"), as exemplified in the claim chart in Exhibit D10. As part of these Invalidity Contentions, Defendants have produced documents relating to Samsung K9ADGD8S0A V-NAND TCAT Technology Flash Memory. Based on information available to Defendants, Defendants believe that Samsung V-NAND was conceived and/or reduced to practice by engineers at Samsung, at least by August 6, 2013, without being abandoned, suppressed, or concealed, and it was in public use or on sale before the priority date of the '838 Patent.

Defendants' investigation into publicly-available prior art systems that teach and/or render obvious each element of any asserted claims is ongoing. Fact discovery is at an early stage, and Defendants may require discovery from third parties regarding publicly-available prior art systems. Defendants reserve the right to amend its identification of prior art systems as Defendants become aware of the existence, functionality, and/or characteristics of prior art systems as a result of their investigation and forthcoming discovery.

2. Primary References

Defendants contend that the primary prior art references identified below and described in the charts attached as Exhibits D1 to D10, by themselves, anticipate the asserted claims of the

’838 Patent. To the extent that a primary reference is deemed not to anticipate a claim for failing to teach one or more limitations of that claim, Defendants contend that the claim would nonetheless have been obvious to a person of ordinary skill in the art at the time of the invention in view of the prior art reference itself and the knowledge of a person of ordinary skill in the art, as described in the attached charts. Defendants’ prior art charts (attached as Exhibits D1 to D10) set forth the particular claims that are anticipated under 35 U.S.C. § 102 and/or rendered obvious under 35 U.S.C. § 103 by each item of prior art and identify where specifically in each item of prior art each element of each asserted claim is found.

Exhibit	Primary References
D1	U.S. Patent App. Pub. No. 2013/0028027 (“Kim ’027”)
D2	U.S. Patent App. Pub. No. 2013/0235667 (“Nam”)
D3	U.S. Patent No. 8,730,738 (“Oh ’738”)
D4	U.S. Patent No. 9,864,682 (“Kim ’682”)
D5	U.S. Patent App. Pub. No. 2013/0107653 (“Kwak”)
D6	U.S. Patent No. RE47,866 (“Tokiwa ’866”)
D7	U.S. Patent App. Pub. No. 2012/0254680 (“Oh ’680”)
D8	U.S. Patent App. Pub. No. 2011/0199833 (“Shim”)
D9	Micron 100 Series L06A (“Micron L06A”)
D10	Samsung K9ADGD8S0A V-NAND TCAT Technology Flash Memory (“Samsung V-NAND”)

3. Secondary References

Exhibit D-A lists secondary prior art references and identifies, on a limitation-by-limitation basis, where specifically each secondary reference teaches the limitations of the asserted claims. To the extent that a primary reference is deemed, by itself, not to anticipate or

render obvious a claim for failing to teach one or more limitations, the claim would nonetheless have been obvious to a person of ordinary skill in the art at the time of the invention by the combination of the primary reference with one or more of the other primary references listed above and/or the references listed as disclosing those alleged missing limitations in Exhibit D-A.

4. Obvious Combinations

To the extent that a primary reference is deemed, by itself, not to anticipate or render obvious a claim for failing to teach one or more limitations, the claim would nonetheless have been obvious to a person of ordinary skill in the art at the time of the invention by the combination of the primary reference with one or more other primary references and/or the knowledge of someone skilled in the art. For example, a person of ordinary skill in the art would have been motivated to combine any reference in Exhibits D1 to D10 with any other reference(s) in Exhibits D1 to D10 and D-A. Such combinations would be achieved, for example, by merely combining the disclosures described in the respective claim charts for each reference.

Defendants also contend that any of the primary references (or combination of primary references) could be combined with any of the secondary references (or combination of secondary references) in Exhibit D-A to render obvious the asserted claims. Such combinations would be achieved by merely combining the disclosures described in the respective claim charts for each reference.

The obviousness combinations are provided in the alternative to Defendants' anticipation contentions and are not to be construed to suggest that any reference included in the combinations is not itself anticipatory.

a) Exemplary Combinations

Below are examples of prior art references that would have been combined by one of ordinary skill in the art at the time of the alleged invention. These combinations are merely examples. The asserted claims of the ’838 Patent are rendered obvious by:

- Kim ’027 alone or in combination with one or more of Nam, Oh ’738, Kim ’682, Kwak, Tokiwa ’866, Oh ’680, Shim, Micron L06A, Samsung V-NAND, and the references listed in Exhibit D-A. For example:
    - Independent claims 1 and 12 are obvious over Kim ’027 and Kim ’027 in view of one of the following: Nam; Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Shim; Micron L06A; and Samsung V-NAND.
    - Dependent claims 2 and 13 are obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Nam; Oh ’738; Kwak; Tokiwa ’866; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.
    - Dependent claim 8 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Nam; Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.
    - Dependent claims 11 and 20 are obvious over any of the obviousness grounds listed for independent claim 1, and/or further in view of: Nam; Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.
- Nam alone or in combination with one or more of Kim ’027, Oh ’738, Kim ’682,

Kwak, Tokiwa ’866, Oh ’680, Shim, Micron L06A, Samsung V-NAND, and the references listed in Exhibit D-A. For example:

- Independent claims 1 and 12 are obvious over Nam and Nam in view of one of the following: Kim ’027, Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Shim; Micron L06A; and Samsung V-NAND.
- Dependent claims 2 and 13 are obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Kim ’027; Oh ’738; Kwak; Tokiwa ’866; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.
- Dependent claim 8 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Kim ’027; Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.
- Dependent claims 11 and 20 are obvious over any of the obviousness grounds listed for independent claim 1, and/or further in view of: Kim ’027; Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.

- Oh ’738 alone or in combination with one or more of Kim ’027, Nam, Kim ’682, Kwak, Tokiwa ’866, Oh ’680, Shim, Micron L06A, Samsung V-NAND, and the references listed in Exhibit D-A. For example:
  - Independent claims 1 and 12 are obvious over Oh ’738 and Oh ’738 in view of one of the following: Kim ’027, Nam; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Shim; Micron L06A; and Samsung V-NAND.

- Dependent claims 2 and 13 are obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Kim ’027; Nam; Kwak; Tokiwa ’866; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.
- Dependent claim 8 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Kim ’027; Nam; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.
- Dependent claims 11 and 20 are obvious over any of the obviousness grounds listed for independent claim 1, and/or further in view of: Kim ’027; Nam; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.

- Kim ’682 alone or in combination with one or more of Kim ’027, Nam, Oh ’738, Kwak, Tokiwa ’866, Oh ’680, Shim, Micron L06A, Samsung V-NAND, and the references listed in Exhibit D-A. For example:
  - Independent claims 1 and 12 are obvious over Kim ’682 and Kim ’682 in view of one of the following: Kim ’027; Nam; Oh ’738; Kwak; Tokiwa ’866; Oh ’680; Shim; Micron L06A; and Samsung V-NAND.
  - Dependent claims 2 and 13 are obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Kim ’027; Nam; Oh ’738; Kwak; Tokiwa ’866; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.
  - Dependent claim 8 is obvious over any of the obviousness grounds listed

for independent claim 1 and/or further in view of: Kim ’027; Nam; Oh ’738; Kwak; Tokiwa ’866; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.

  - Dependent claims 11 and 20 are obvious over any of the obviousness grounds listed for independent claim 1, and/or further in view of: Kim ’027; Nam; Oh ’738; Kwak; Tokiwa ’866; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.

- Kwak alone or in combination with one or more of Kim ’027, Nam, Oh ’738, Kim ’682, Tokiwa ’866, Oh ’680, Shim, Micron L06A, Samsung V-NAND, and the references listed in Exhibit D-A. For example:
  - Independent claims 1 and 12 are obvious over Kwak and Kwak in view of one of the following: Kim ’027; Nam; Oh ’738; Kim ’682; Tokiwa ’866; Oh ’680; Shim; Micron L06A; and Samsung V-NAND.
  - Dependent claims 2 and 13 are obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Kim ’027; Nam; Oh ’738; Tokiwa ’866; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.
  - Dependent claim 8 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Kim ’027; Nam; Oh ’738; Kim ’682; Tokiwa ’866; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.
  - Dependent claims 11 and 20 are obvious over any of the obviousness grounds listed for independent claim 1, and/or further in view of: Kim

’027; Nam; Oh ’738; Kim ’682; Tokiwa ’866; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.

- Tokiwa ’866 alone or in combination with one or more of Kim ’027, Nam, Oh ’738, Kim ’682, Kwak, Oh ’680, Shim, Micron L06A, Samsung V-NAND, and the references listed in Exhibit D-A. For example:
    - Independent claims 1 and 12 are obvious over Tokiwa ’866 and Tokiwa ’866 in view of one of the following: Kim ’027; Nam; Oh ’738; Kim ’682; Kwak; Oh ’680; Shim; Micron L06A; and Samsung V-NAND.
    - Dependent claims 2 and 13 are obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Kim ’027; Nam; Oh ’738; Kwak; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.
    - Dependent claim 8 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Kim ’027; Nam; Oh ’738; Kim ’682; Kwak; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.
    - Dependent claims 11 and 20 are obvious over any of the obviousness grounds listed for independent claim 1, and/or further in view of: Kim ’027; Nam; Oh ’738; Kim ’682; Kwak; Oh ’680; Shim; Micron L06A; or Samsung V-NAND.
- Oh ’680 alone or in combination with one or more of Kim ’027, Nam, Oh ’738, Kim ’682, Kwak, Tokiwa ’866, Shim, Micron L06A, Samsung V-NAND, and the references listed in Exhibit D-A. For example:

- Independent claims 1 and 12 are obvious over Oh ’680 and Oh ’680 in view of one of the following: Kim ’027; Nam; Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Shim; Micron L06A; and Samsung V-NAND.
- Dependent claims 2 and 13 are obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Kim ’027; Nam; Oh ’738; Kwak; Tokiwa ’866; Shim; Micron L06A; or Samsung V-NAND.
- Dependent claim 8 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Kim ’027; Nam; Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Shim; Micron L06A; or Samsung V-NAND.
- Dependent claims 11 and 20 are obvious over any of the obviousness grounds listed for independent claim 1, and/or further in view of: Kim ’027; Nam; Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Shim; Micron L06A; or Samsung V-NAND.

- Shim alone or in combination with one or more of Kim ’027, Nam, Oh ’738, Kim ’682, Kwak, Tokiwa ’866, Oh ’680, Micron L06A, Samsung V-NAND, and the references listed in Exhibit D-A. For example:
  - Independent claims 1 and 12 are obvious over Shim and Shim in view of one of the following: Kim ’027; Nam; Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Micron L06A; and Samsung V-NAND.
  - Dependent claims 2 and 13 are obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Kim

’027; Nam; Oh ’738; Kwak; Tokiwa ’866; Oh ’680; Micron L06A; or Samsung V-NAND.

  - Dependent claim 8 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Kim ’027; Nam; Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Micron L06A; or Samsung V-NAND.
  - Dependent claims 11 and 20 are obvious over any of the obviousness grounds listed for independent claim 1, and/or further in view of: Kim ’027; Nam; Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Micron L06A; or Samsung V-NAND.

- Micron L06A alone or in combination with one or more of Kim ’027, Nam, Oh ’738, Kim ’682, Kwak, Tokiwa ’866, Oh ’680, Shim, Samsung V-NAND, and the references listed in Exhibit D-A. For example:
  - Independent claims 1 and 12 are obvious over Micron L06A and Micron L06A in view of one of the following: Kim ’027; Nam; Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Shim; and Samsung V-NAND.
  - Dependent claims 2 and 13 are obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Kim ’027; Nam; Oh ’738; Kwak; Tokiwa ’866; Oh ’680; Shim; or Samsung V-NAND.
  - Dependent claim 8 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Kim ’027; Nam; Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Shim; or Samsung V-

NAND.

- Dependent claims 11 and 20 are obvious over any of the obviousness grounds listed for independent claim 1, and/or further in view of: Kim ’027; Nam; Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Shim; or Samsung V-NAND.

- Samsung V-NAND alone or in combination with one or more of Kim ’027, Nam, Oh ’738, Kim ’682, Kwak, Tokiwa ’866, Oh ’680, Shim, Micron L06A, and the references listed in Exhibit D-A. For example:
  - Independent claims 1 and 12 are obvious over Samsung V-NAND and Samsung V-NAND in view of one of the following: Kim ’027; Nam; Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Shim; and Micron L06A.
  - Dependent claims 2 and 13 are obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Kim ’027; Nam; Oh ’738; Kwak; Tokiwa ’866; Oh ’680; Shim; or Micron L06A.
  - Dependent claim 8 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Kim ’027; Nam; Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Shim; or Micron L06A.
  - Dependent claims 11 and 20 are obvious over any of the obviousness grounds listed for independent claim 1, and/or further in view of: Kim ’027; Nam; Oh ’738; Kim ’682; Kwak; Tokiwa ’866; Oh ’680; Shim; or Micron L06A.

b) Motivations to Combine and Expectation of Success

To the extent a finder of fact finds that a primary prior art reference does not disclose one or more limitations of an asserted claim, the asserted claim is nevertheless obvious because the alleged missing limitations contain nothing beyond ordinary improvements that would have been known or obvious to one of ordinary skill in the art. In other words, the claimed subject matter combines known elements to achieve predictable results or chooses between a finite number of clear alternatives known to those of skill in the art, particularly in view of the state of the art as reflected in the relevant prior art.

Moreover, as explained above, it would have been obvious to a person of skill in the art at the time of the alleged invention of the asserted claims to combine any primary reference with any combination of other primary references so as to practice the asserted claims. To the extent that Plaintiff argues that any concept claimed in the asserted claims is not disclosed in a primary reference, it would, at a minimum, have been obvious to adapt the primary reference to include the concept or combine it with other primary references that disclose the concept. Each concept described and claimed in the Asserted Patents was known to those of skill in the art as available design choices for semiconductor memory design and fabrication.

The Supreme Court has held that "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR Int'l Co. v. Teleflex Inc*., 550 U.S. 398, 416 (2007). "When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one." *Id*. at 417. As the Supreme Court made clear, "[f]or the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." *Id*.

To determine whether there is an apparent reason to combine the known elements in the fashion claimed by the patent at issue, a court can "look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art." *Id*. at 418. For example, obviousness can be demonstrated by showing "there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims." *Id*. at 420. "[A]ny need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." *Id*. Common sense also teaches that "familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id*.

However, the Supreme Court in *KSR* held that a claimed invention can be obvious even if there is no explicit teaching, suggestion, or motivation for combining the prior art to produce that invention. In summary, *KSR* holds that patents that are based on new combinations of elements or components already known in a technical field may be found to be obvious. *See, generally*, *KSR*, 550 U.S. 398. Specifically, the Court in *KSR* rejected a rigid application of the "teaching, suggestion, or motivation [to combine]" test. *Id*. at 418. "In determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim." *Id*. at 419. "Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." *Id*. at 420. A key inquiry is whether the "improvement is more than the predictable use of prior art elements according to their established functions." *Id*. at 417.

The rationale to combine or modify prior art references is significantly stronger when, as here, the references seek to solve the same problem, come from the same field, and correspond well to each other. *In re Inland Steel Co*., 265 F.3d 1354, 1362 (Fed. Cir. 2001). The Federal Circuit has held that two references may be combined as invalidating art under similar circumstances, namely "[the prior art] focus[es] on the same problem that the . . . patent addresses: enhancing the magnetic properties of . . . steel. Moreover, both [prior art references] come from the same field . . . . Finally, the solutions to the identified problems found in the two references correspond well." *Id*. at 1364 (concerning patents and prior art relating to improving the magnetic and electrical properties of steel).

In view of the Supreme Court's *KSR* decision, the PTO issued a set of Examination Guidelines. Examination Guidelines for Determining Obviousness Under 35 U.S.C. § 103 in view of the Supreme Court Decision in *KSR International Co. v. Teleflex, Inc*., 72 Fed. Reg. 57526 (October 10, 2007). Those Guidelines summarized the *KSR* decision and identified various rationales for finding a claim obvious, including those based on other precedents. Those rationales include:

> (A) Combining prior art elements according to known methods to yield predictable results;
>
> (B) Simple substitution of one known element for another to obtain predictable results;
>
> (C) Use of known technique to improve similar devices (methods, or products) in the same way;
>
> (D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
>
> (E) "Obvious to try" – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
>
> (F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art;

> (G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

Id. at 57529. The above rationales likewise apply in rendering obvious the asserted claims of the Asserted Patents.

The references disclosed herein, alone or in combination, contain an explicit and/or implicit teaching or motivation to combine them due to the following: (1) the knowledge generally available to a person of ordinary skill in the art; (2) the prior art references as understood by a person of ordinary skill in the art; (3) the nature of the problem to be solved; (4) the fact that each prior art reference addresses similar problems; and (5) the knowledge of those skilled in the art that the disclosed elements had been or could be used together.

As an example of those reasons and motivations to combine the references, Kim '027, Nam, Oh '738, Kim '682, Kwak, Tokiwa '866, Oh '680, Shim, Micron L06A, Samsung V-NAND, and Kang are all directed to three dimensional memory devices including a structure extending through multiple layers of the memory. *See, e.g.*, Kim '027 at Abstract; Nam at Abstract, Figure 4; Oh '738 at 15:31-43, Figures 5, 29; Kim '682 at 3:57-3:15, Figure 4; Kwak at Abstract, ¶ 65, Figure 4; Tokiwa '866 at Abstract; Oh at ¶¶ 6, 20, Figure 5; Shim at ¶¶ 61, 75, Figure 5; Kang at 1, Figure 1. *See also* product prior art diagrams and cross sections reproduced at Exs. D9-D10. The references disclose using similar components and techniques, such as storing and accessing information to account for variations or bad memory cells. *See, e.g.*, Kim '027 at Abstract; Nam at Abstract, ¶ 33; Oh '738 at Abstract; Kim '682 at Abstract; Kwak at ¶¶ 48-49; Tokiwa '866 at Abstract; Oh at ¶¶ 6, 10; Shim at ¶¶ 104-05; Kang at 1; Tokiwa '719 at ¶ 70; Kim '331 at Abstract; Macronix at 4. *See also* product prior art diagrams and cross sections reproduced at Exs. D9-D10. Thus, combining one or more such references merely

involves combining prior art elements according to known methods to yield predictable results, the substitution of one known element for another to obtain predictable results, the use of a known technique to improve similar devices in the same way, or applying a known technique to a known device ready for improvement to yield predictable results.

In addition, below are additional motivations to combine prior art for particular claim limitations. The following discussion of specific claim limitations merely provides examples, which are not limiting.

For example, to the extent that any primary reference is deemed not to anticipate a claim for failing to teach claim limitations 1[a]/12[a] ("a data storage device that includes a memory having a three-dimensional (3D) memory configuration and including a structure extending through multiple layers of the memory" / "a memory having a three-dimensional (3D) memory configuration and including a structure extending through multiple layers of the memory"), it would have been obvious to a person of ordinary skill in the art at the time of the invention to combine the primary reference with any of the prior art that discloses claim limitations 1[a]/12[a] in Exhibits D1 to D10 and D-A. For example, the charted prior art references explicitly describe or implicitly suggest a data storage device having a three-dimensional memory configuration with a structure extending through multiple layers of the memory. *See, e.g.*, Kim '027 at Abstract; Nam at Abstract, Figure 4; Oh '738 at 15:31-43, Figures 5, 29; Kim '682 at 3:57-3:15, Figure 4; Kwak at Abstract, ¶ 65, Figure 4; Tokiwa '866 at Abstract; Oh at ¶¶ 6, 20, Figure 5; Shim at ¶¶ 61, 75, Figure 5. It would have been obvious to combine any primary reference with any of these references or others in Exhibit D-A to satisfy claim limitations 1[a]/12[a]. A person skilled in the art would have recognized that by the priority date of the '838 Patent, 3-dimensional memory, including 3-dimensional memory with a structure extending vertically through multiple

layers of memory was well-known, had been discussed at length at conferences and in scholarship, and that products such as Samsung's V-NAND product were incorporating this technology. A person skilled in the art would have understood that many of the same techniques used in 2D memory and stacked die 3D memory for identifying locations associated with variations in structure—e.g., for purposes of error correction, identifying read/write voltages, identifying bad areas of memory—would be applicable to 3D memory. *See, e.g.*, Tokiwa '719 at ¶ 70; Kim '331 at Abstract (examples of 2D memory techniques that would have been obvious to apply in 3D memory). Moreover, such a person would have understood the benefits of incorporating such techniques into 3D memory, such as increased memory density, better scalability, higher endurance, and lower error rates, leading to better performance, lower latency and faster read/write speeds, lower power consumption, lower cost per bit, and better suitability for inclusion in solid state drives. Thus, a person of ordinary skill in the art would have been motivated to modify any of the primary references to include the claimed features, to the extent it is not disclosed. A person of ordinary skill in the art would also have had a reasonable expectation of success given that, by the alleged priority date of the '838 Patent, three-dimensional memory devices and their benefits were well-known, including how to incorporate techniques and features of traditional 2D memory.

As another example, to the extent that any primary reference is deemed not to anticipate a claim for failing to teach claim limitations 1[b]/12[b] ("[storing information at the data storage device / information that is stored at the memory], the information identifying a location associated with a variation of the structure"), it would have been obvious to a person of ordinary skill in the art at the time of the invention to combine the primary reference with any of the prior art that discloses claim limitation 1[b]/12[b] in Exhibits D1 to D10 and D-A. For example, the

charted prior art references explicitly describe or implicitly suggest storing information at the data storage device, the information identifying a location associated with a variation of the structure. *See, e.g.*, Kim '027 at Abstract; Nam at Abstract, ¶ 33; Oh '738 at Abstract; Kim '682 at Abstract; Kwak at ¶¶ 48-49; Tokiwa '866 at Abstract; Oh at ¶¶ 6, 10; Shim at ¶¶ 104-05; Kang at 1; Tokiwa '719 at ¶ 70; Kim '331 at Abstract; Macronix at 4. *See also* product prior art diagrams and cross sections reproduced at Exs. D9-D10. It would have been obvious to combine any primary reference with any of these references or others in Exhibit D-A to satisfy claim limitation 1[b]. A person skilled in the art would have recognized that a structure extending through the layers of the three-dimensional memory would likely have width variations, and that this would impact the operation of the layers corresponding to those width variations. Thus, a person skilled in the art would have been motivated to account for these width variations in order to account for their impacts on the operation of the layers. It would have been obvious to a person skilled in the art that an essential step in accounting for these width variations would be storing information, where the information stored identifies a location or locations associated with variations in the structure. Thus, a person of ordinary skill in the art would have been motivated to modify any of the primary references to include the claimed features, to the extent it is not disclosed. A person of ordinary skill in the art would also have had a reasonable expectation of success given that, by the alleged priority date of the '838 Patent, width variations in the structure extending through the layers of three-dimensional memory devices were a known problem, and accounting for those variations by storing information associated with the variations was a known solution.

Additionally, to the extent that any primary reference is deemed not to anticipate a claim for failing to teach claim limitation 1[c]/12[b] ("access[ing] [the] information"), it would have

been obvious to a person of ordinary skill in the art at the time of the invention to combine the primary reference with any of the prior art that discloses claim limitation 1[b] in Exhibits D1 to D10 and D-A. For example, the charted prior art references explicitly describe or implicitly suggest accessing the information stored at the data storage device. *See, e.g.*, Kim '027 at Abstract; Nam at Abstract, ¶ 33; Oh '738 at Abstract; Kim '682 at Abstract; Kwak at ¶¶ 48-49; Tokiwa '866 at Abstract; Oh at ¶¶ 6, 10; Shim at ¶¶ 104-05; Kang at 1; Tokiwa '719 at ¶ 70; Kim '331 at Abstract; Macronix at 4. *See also* product prior art diagrams and cross sections reproduced at Exs. D9-D10. It would have been obvious to combine any primary reference with any of these references or others in Exhibit D-A to satisfy claim limitation 1[c]. A person skilled in the art would have recognized that an essential step in accounting for width variations of the structure at each layer of a three-dimensional memory structure is accessing the information that identifies a location associated with the width variations. Thus, if a primary reference is deemed not to anticipate accessing the information, it would have been obvious to a person skilled in the art to combine the reference with a reference that does disclose accessing the information. A person of ordinary skill in the art would also have had a reasonable expectation of success because it was well known at least by the alleged priority date of the '838 Patent that accessing setting information would help account for structural variations, including varying widths of a structure extending through the multiple layers.

Similarly, to the extent that any primary reference is deemed not to anticipate a claim for failing to teach the portion of claims 2 and 13 reading "the structure includes a conductive channel and a charge trap structure," it would have been obvious to a person of ordinary skill in the art at the time of the invention to combine the primary reference with any of the prior art that discloses these limitations in Exhibits D1 to D10 and D-A. For example, the charted prior art

references explicitly describe or implicitly utilizing a charge trap structure. *See, e.g.*, Nam at ¶ 49, Figure 4; Oh '738 at 11:50-63, Figure 7; Kim '682 at 11:4-36; Kwak at ¶¶ 66-67, Figure 5; Tokiwa '866 at 5:39-59, Figure 5; Oh '680 at ¶¶113-15, Figure 6; Shim at ¶¶ 80-81, Figure 6. *See also* product prior art diagrams and cross sections reproduced at Exs. D9-D10. It would have been obvious to combine any primary reference with any of these references or others in Exhibit D-A to satisfy claims 2 and 13. A person skilled in the art would have recognized charge traps structures provide benefits over other similar technologies, such as floating gate structures, especially in 3D NAND memory. For example, charge trap structures provide better scalability since a charge trap does not need precise alignment of the gate material across layers, simplifying vertical stacking and enabling more reliable and cost-effective fabrication of multilayer structures. Moreover, the localized trapping of electrons in a charge trap reduces the risk of leakage and interference between adjacent cells, leading to better data retention over time, especially in high-temperature or low-power environments. Relatedly, charge trap structures do not require electron tunneling through thick insulating layers like floating gate cells do, allowing charge traps to operate at lower voltages, reducing power consumption and heat generation, both of which are particularly important in mobile and SSD applications. Thus, if a primary reference is deemed not to anticipate utilizing a charge trap structure, it would have been obvious to a person skilled in the art to combine the reference with a reference that does disclose utilizing a charge trap structure. A person of ordinary skill in the art would also have had a reasonable expectation of success because charge trap structures, particularly in 3D stacked memory were well-known, their benefits were well-appreciated in the art, and it was well-known how to integrate these structures into 3D memory by the alleged priority date of the '838 Patent.

Furthermore, to the extent that any primary reference is deemed not to anticipate a claim for failing to teach the portion of claim 8 requiring "a controller that is operationally coupled to the memory, . . . and wherein the controller accesses the information from the memory," it would have been obvious to a person of ordinary skill in the art at the time of the invention to combine the primary reference with any of the prior art that discloses these limitations in Exhibits D1 to D10 and D-A. For example, the charted prior art references explicitly describe or implicitly utilize a controller operationally coupled to the memory to access the information from the memory. *See, e.g.,* Kim '027 at ¶ 46, Figure 1; Nam at ¶ 68, Figure 10; Oh '738 at 2:7-20; Kim '682 at 2:43-45, Figure 1; Kwak at ¶¶ 48-49, Figure 21; Tokiwa '866 at Abstract, Figure 8; Oh '680 at ¶ 15, Figure 1; Shim at ¶ 106, Figure 8; Tokiwa '719 at ¶ 109, Figure 8; Kim '331 at Abstract, Figure 1; Macronix at 4. *See also* product prior art diagrams and cross sections reproduced at Exs. D9-D10. It would have been obvious to combine any primary reference with any of these references or others in Exhibit D-A to satisfy claim 8. A person of skill in the art would have recognized that a memory device would use a controller in order to store and access memory setting information from the memory. A person of skill in the art would recognize that when a memory device stores and accesses setting information that a particular component performs those actions, and that the component used to accomplish these tasks is commonly called a controller. Thus, even if a reference is deemed to not disclose a controller, it would have been obvious to a person of skill in the art to combine the reference with one of the references above that does. A person of skill in the art would have had a reasonable expectation of success, because using a controller to store and access memory setting information was well-appreciated in the art by the alleged priority date of the '838 Patent.

As another example, to the extent that any primary reference is deemed not to anticipate a claim for failing to teach the portions of claims 11 and 20 reading "the memory is a non-volatile memory that is monolithically formed in one or more physical levels of arrays of memory cells disposed above a silicon substrate," it would have been obvious to a person of ordinary skill in the art at the time of the invention to combine the primary reference with any of the prior art that discloses these limitations in Exhibits D1 to D10 and D-A. For example, the charted prior art references explicitly describe or implicitly utilize a non-volatile memory that is monolithically formed in one or more physical levels of arrays of memory cells formed above a substrate. *See, e.g.*, Kim '027 at Abstract, Figure 2; Nam at Abstract, Figure 3; Oh '738 at Abstract, Figure 5; Kim '682 at 2:57-3:15, Figure 3; Kwak at Abstract, Figure 3; Tokiwa '866 at Abstract, Figure 1; Oh '680 at Abstract, Figure 5; Shim at ¶ 67, Figure 14. *See also* product prior art diagrams and cross sections reproduced at Exs. D9-D10. It would have been obvious to combine any primary reference with any of these references or others in Exhibit D-A to satisfy claims 11 and 20. A person of skill in the art would have recognized that a memory device that stores memory even when the device is powered off is a non-volatile memory, and that this would be a desirable characteristic for the memory devices described in these references. Furthermore, a person of skill in the art at the time of the alleged invention would know that a monolithically formed memory is one that is formed on a single substrate. Therefore, a person of skill in the art would recognize that a memory device disclosing multiple layers stacked on a single substrate is a "monolithically formed" memory device, even if it is not expressly called such. Additionally, a person of skill in the art at the time of the alleged invention would recognize that silicon is a common, desirable choice to form a substrate. Therefore, a person skilled in the art would have known that a substrate could be or likely was made of silicon, even if it is not expressly described

as such, and would have been motivated to combine the reference with one that expressly or implicitly describes a silicon substrate. A person of skill in the art would have had a reasonable expectation of success, because non-volatile memories monolithically formed in one or more physical levels of arrays of memory cells disposed above a silicon substrate were well known in the art at least by the alleged priority date of the '838 Patent.

B. Invalidity Contentions Under 35 U.S.C. § 112

Defendants include below the grounds on which Defendants contend the asserted claims are invalid for failure to meet the requirements of the first two sections of 35 U.S.C. § 112.

Plaintiff has not yet provided a claim construction for many of the terms and phrases that Defendants anticipate will be in dispute. Defendants, therefore, cannot provide a complete list of its § 112 defenses because Defendants do not know whether Plaintiff will proffer a construction for certain terms and phrases that is broader than, or inconsistent with, the construction that would be supportable by the disclosure set forth in the specification.

To the extent the following contentions reflect constructions of claim limitations consistent with or implicit in Plaintiff's Infringement Contentions, no inference is intended nor should any be drawn that Defendants agree with Plaintiff's claim constructions, and Defendants expressly reserve the right to contest such claim constructions. Defendants offer these contentions in response to Plaintiff's Infringement Contentions and without prejudice to any position it may ultimately take as to any claim construction issues.

Accordingly, Defendants reserve the right to amend or supplement these § 112 Invalidity Contentions as discovery progresses.

1. Indefiniteness Under 35 U.S.C. § 112(b)

35 U.S.C. § 112(b) requires that a patent claim "particularly point[] out and distinctly claim[] the subject matter which the inventor or a joint inventor regards as the invention." 35

U.S.C. § 112(b). Claim terms that fail to inform those skilled in the art "with reasonable certainty . . . about the scope of the invention" fail the definiteness requirement of 35 U.S.C. § 112(b). *Nautilus, Inc. v. Biosig Instruments, Inc*., 572 U.S. 898, 901 (2014).

Each of the asserted claims are invalid as indefinite under 35 U.S.C. § 112 because they fail to particularly point out and distinctly claim the subject matter which the applicant regards as his invention. In particular, the following limitations, read in light of the intrinsic evidence, fail to inform those skilled in the art with reasonable certainty about the scope of the claimed inventions:

- Claims 1 and 12: "information identifying a location associated with a variation of the structure"
- Claim 8: "operationally coupled"
- Claims 11 and 20: "one or more physical levels of arrays of memory cells having an active area disposed above a silicon substrate"

2. Lack of Enablement/Lack of Written Description Under 35 U.S.C. § 112(a)

The asserted claims of the '838 Patent are further invalid under 35 U.S.C. § 112(a) because the specifications do not contain an adequate written description of the subject matter of these claims and would not enable one of skill in the relevant art to make and use the alleged invention.

For a claim to be valid, the specification must contain a written description of the invention. 35 U.S.C. § 112(a). To fulfill the written description requirement, it "must clearly allow persons of ordinary skill in the art to recognize that the inventor invented what is claimed." *Ariad Pharm., Inc. v. Eli Lilly & Co*., 598 F.3d 1336, 1351 (Fed. Cir. 2010) (citation and internal quotation marks omitted). "[T]he applicant must 'convey with reasonable clarity to those skilled

in the art that, as of the filing date sought, he or she was in possession of the invention,' and demonstrate that by disclosure in the specification of the patent." *Carnegie Mellon Univ. v. Hoffmann-La Roche Inc.*, 541 F.3d 1115, 1122 (Fed. Cir. 2008) (quoting *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563–64 (Fed. Cir. 1991)).

The specification must also describe "the manner and process of making and using [the invention], in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains . . . to make and use the" invention. *Ariad*, 598 F.3d at 1343; *see also* 35 U.S.C. § 112(a). "The enablement requirement is satisfied when one skilled in the art, after reading the specification, could practice the claimed invention without undue experimentation." *AK Steel Corp. v. Sollac & Ugine*, 344 F.3d 1234, 1244 (Fed. Cir. 2003) (citation omitted). "[T]he scope of the claims must be less than or equal to the scope of the enablement." *Nat'l Recovery Tech., Inc. v. Magnetic Separation Sys., Inc.*, 166 F.3d 1190, 1196 (Fed. Cir. 1999).

Each of the asserted claims below are invalid because the specifications fail to provide written description and/or an enabling disclosure of at least the following limitations:

- Claims 1 and 12: "information identifying a location associated with a variation of the structure"
- Claim 8: "operationally coupled"
- Claims 11 and 20: "one or more physical levels of arrays of memory cells having an active area disposed above a silicon substrate"

IV. U.S. Patent No. 9,524,974 ("'974 Patent")

A. Invalidity Contentions Under 35 U.S.C. §§ 102 And 103

1. Identification of Prior Art

In addition to the prior art cited on the face of the '974 Patent and related patents, the admitted prior art in the specifications of the '974 Patent and related patents, the prior art cited

in any file histories, reexaminations, *inter partes* review proceedings (including without limitation IPR2025-01559 and all filings and exhibits therein), reissue proceedings, or other examination or post-grant proceedings of the ’974 Patent and related patents, and the prior art cited in any invalidity contentions or expert reports submitted in any action or proceedings involving the ’974 Patent or related patents, Defendants identify the following prior art that anticipates each asserted claim or renders it obvious.

a) Prior Art Patents

The following patents, patent publications, and other printed publications are prior art to the asserted claims under at least 35 U.S.C. §§ 102(a)(1), (a)(2), and/or 35 U.S.C. § 103. The identification of any patent or patent publication shall be deemed to include any counterpart patent or application filed, published, or issued anywhere in the world.

Patent or Publication Number	Country of Origin	Filing Date	Date of Issue or Publication
U.S. Patent App. Pub. No. 2011/0223761 (“Lee”)	U.S.	5/23/2011	9/15/2011
U.S. Patent App. Pub. No. 2008/0014734A1 (“Hong”)	U.S.	6/29/2007	1/17/2008
U.S. Patent App. Pub. No. 2008/0162781A1 (“Haller”)	U.S.	12/29/2006	7/3/2008
U.S. Patent No. 9,595,477 (“Pan”)	U.S.	1/20/2011	3/14/2017
U.S. Patent No. 8,592,978 (“Matsuno”)	U.S.	9/30/2010	11/26/2013
U.S. Patent App. Pub. No. 2015/0162277A1 (“Zhang”)	U.S.	12/5/2013	6/11/2015
U.S. Patent App. Pub. No. 2011/0032763A1 (“Kwak”)	U.S.	10/21/2010	2/10/2011
U.S. Patent No. 6,500,765 (“Kao”)	U.S.	3/23/2001	12/31/2002
U.S. Patent App. Pub. No. 2015/091186A1 (“Yang”)	U.S.	2/26/2014	4/2/2015
U.S. Patent No. 8,026,170	U.S.	3/26/2009	9/27/2011

Patent or Publication Number	Country of Origin	Filing Date	Date of Issue or Publication
("Chandra Sekar")			
"25nm 64Gb 130mm^2 3bpc NAND Flash Memory" ("Goldman")	n/a	n/a	5/25/2011
U.S. Patent App. Pub. No. 2015/0131382 ("Himeno")	U.S.	2/25/2014	5/14/2015
U.S. Patent No. 8,247,291 ("Min")	U.S.	1/19/2011	8/21/2012

b) Prior Art Systems

The following systems are prior art under at least post-AIA 35 U.S.C. § 102(a)(1) or (a)(2):

1. Products, components, systems, and methods invented, designed, developed, reduced to practice, and/or in public use or on sale related to Toshiba/SanDisk 15 nm 16 GB NAND Flash Memory Device: SDSDQ-032G ("SanDisk's NAND"), as exemplified in the claim chart in Exhibit E-A. As part of these Invalidity Contentions, Defendants have produced documents relating to SanDisk's NAND. Based on information available to Defendants, Defendants believes that SanDisk's NAND was conceived and/or reduced to practice by engineers at SanDisk's NAND, at least by July 2012, without being abandoned, suppressed, or concealed, and it was in public use or on sale by the dates identified in the claim chart, which are no later than July 2012.

Defendants' investigation into publicly-available prior art systems that teach and/or render obvious each element of any asserted claims is ongoing. Fact discovery is at an early stage, and Defendants may require discovery from third parties regarding publicly-available prior art systems. Defendants reserve the right to amend its identification of prior art systems as Defendants become aware of the existence, functionality, and/or characteristics of prior art systems as a result of their investigation and forthcoming discovery.

2. Primary References

Defendants contend that the primary prior art references identified below and described in the charts attached as Exhibits E1 to E8, by themselves, anticipate the asserted claims of the

’974 Patent. To the extent that a primary reference is deemed not to anticipate a claim for failing to teach one or more limitations of that claim, Defendants contend that the claim would nonetheless have been obvious to a person of ordinary skill in the art at the time of the invention in view of the prior art reference itself and the knowledge of a person of ordinary skill in the art, as described in the attached charts. Defendants’ prior art charts (attached as Exhibits E1 to E8) set forth the particular claims that are anticipated under 35 U.S.C. § 102 and/or rendered obvious under 35 U.S.C. § 103 by each item of prior art and identify where specifically in each item of prior art each element of each asserted claim is found.

Exhibit	Primary References
E1	U.S. Patent App. Pub. No. 2011/0223761 (“Lee”)
E2	U.S. Patent App. Pub. No. 2008/0014734A1 (“Hong”)
E3	U.S. Patent App. Pub. No. 2008/0162781A1 (“Haller”)
E4	U.S. Patent No. 9,595,477 (“Pan”)
E5	U.S. Patent No. 8,592,978 (“Matsuno”)
E6	U.S. Patent App. Pub. No. 2015/0162277A1 (“Zhang”)
E7	U.S. Patent App. Pub. No. 2011/0032763A1 (“Kwak”)
E8	U.S. Patent No. 8,247,291 (“Min”)

3. Secondary References

Exhibit E-A lists secondary prior art references and identifies, on a limitation-by-limitation basis, where specifically each secondary reference teaches the limitations of the asserted claims. To the extent that a primary reference is deemed, by itself, not to anticipate or render obvious a claim for failing to teach one or more limitations, the claim would nonetheless have been obvious to a person of ordinary skill in the art at the time of the invention by the

combination of the primary reference with one or more of the other primary references listed above and/or the references listed as disclosing those alleged missing limitations in Exhibit E-A.

4. Obvious Combinations

To the extent that a primary reference is deemed, by itself, not to anticipate or render obvious a claim for failing to teach one or more limitations, the claim would nonetheless have been obvious to a person of ordinary skill in the art at the time of the invention by the combination of the primary reference with one or more other primary references and/or the knowledge of someone skilled in the art. For example, a person of ordinary skill in the art would have been motivated to combine any reference in Exhibits E1 to E8 with any other reference(s) in Exhibits E1 to E8 and E-A. Such combinations would be achieved, for example, by merely combining the disclosures described in the respective claim charts for each reference.

Defendants also contend that any of the primary references (or combination of primary references) could be combined with any of the secondary references (or combination of secondary references) in Exhibit E-A to render obvious the asserted claims. Such combinations would be achieved by merely combining the disclosures described in the respective claim charts for each reference.

The obviousness combinations are provided in the alternative to Defendants' anticipation contentions and are not to be construed to suggest that any reference included in the combinations is not itself anticipatory.

a) Exemplary Combinations

Below are examples of prior art references that would have been combined by one of ordinary skill in the art at the time of the alleged invention. These combinations are merely examples. The asserted claims of the '974 Patent are rendered obvious by:

- Lee alone or in combination with one or more of Hong; Haller; Pan; Matsuno;

Zhang; Kwak; Min; Kao; Yang; Chandra Sekar; Goldman; SanDisk's NAND; and Himeno. For example:

- Independent claims 1 and 12 are obvious over Lee and Lee in view of one of the following: Hong; Haller; Pan; Matsuno; Zhang; Kwak; Min; Kao; Yang; Chandra Sekar; Goldman; SanDisk's NAND; or Himeno.
- Dependent claim 2 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Hong; Haller; Pan; Matsuno; Zhang; Kwak; Min; Chandra Sekar; or Himeno.
- Dependent claim 4 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Haller; Matsuno; Zhang; Kwak; Min; Chandra Sekar; or Himeno.
- Dependent claim 6 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Zhang; Yang; Goldman; or SanDisk's NAND.
- Dependent claim 11 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Haller; Zhang; Kwak; Chandra Sekar; Himeno; or SanDisk's NAND.
- Dependent claim 13 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Haller; Pan; Matsuno; Zhang; Kwak; Min; Kao; Chandra Sekar; SanDisk's NAND; or Himeno.
- Dependent claim 14 is obvious over any of the obviousness grounds listed for dependent claim 13 and/or further in view of: Hong; Haller; Zhang; Kwak; Min; Kao; Chandra Sekar; or Himeno.

- Dependent claim 15 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Hong; Haller; Pan; Matsuno; Zhang; Kwak; Min; Chandra Sekar; SanDisk's NAND; or Himeno.
- Dependent claim 16 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Haller; Zhang; Kwak; Min; Chandra Sekar; Goldman; or SanDisk's NAND.

- Hong alone or in combination with one or more of Lee; Haller; Pan; Matsuno; Zhang; Kwak; Min; Kao; Yang; Chandra Sekar; Goldman; SanDisk's NAND; and Himeno. For example:
  - Independent claims 1 and 12 are obvious over Hong and Hong in view of one of the following: Lee; Haller; Pan; Matsuno; Zhang; Kwak; Min; Kao; Yang; Chandra Sekar; Goldman; SanDisk's NAND; or Himeno.
  - Dependent claim 2 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Haller; Pan; Matsuno; Zhang; Kwak; Min; Chandra Sekar; or Himeno.
  - Dependent claim 4 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Haller; Matsuno; Zhang; Kwak; Min; Chandra Sekar; or Himeno.
  - Dependent claim 6 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Zhang; Yang; SanDisk's NAND; or Goldman.
  - Dependent claim 11 is obvious over any of the obviousness grounds listed

for independent claim 1 and/or further in view of: Lee; Haller; Zhang; Kwak; Chandra Sekar; SanDisk's NAND; or Himeno.

  - Dependent claims 13 and 15 are obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Haller; Pan; Matsuno; Zhang; Kwak; Min; Kao; Chandra Sekar; SanDisk's NAND; or Himeno.
  - Dependent claim 14 is obvious over any of the obviousness grounds listed for dependent claim 13 and/or further in view of: Lee; Haller; Zhang; Kwak; Min; Kao; Chandra Sekar; or Himeno.
  - Dependent claim 16 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Haller; Zhang; Kwak; Min; Chandra Sekar; SanDisk's NAND; or Goldman.

- Haller alone or in combination with one or more of Lee; Hong; Pan; Matsuno; Zhang; Kwak; Min; Kao; Yang; Chandra Sekar; Goldman; SanDisk's NAND; and Himeno. For example:
  - Independent claims 1 and 12 are obvious over Haller and Haller in view of one of the following: Lee; Hong; Pan; Matsuno; Zhang; Kwak; Min; Kao; Yang; Chandra Sekar; Goldman; SanDisk's NAND; or Himeno.
  - Dependent claim 2 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Hong; Pan; Matsuno; Zhang; Kwak; Min; Chandra Sekar; or Himeno.
  - Dependent claim 4 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Hong; Matsuno;

Zhang; Kwak; Min; Chandra Sekar; or Himeno.

- Dependent claim 6 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Zhang; Yang; SanDisk's NAND; or Goldman.
- Dependent claim 11 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Hong; Zhang; Kwak; Chandra Sekar; SanDisk's NAND; or Himeno.
- Dependent claim 13 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Pan; Matsuno; Zhang; Kwak; Min; Kao; Chandra Sekar; SanDisk's NAND; or Himeno.
- Dependent claim 14 is obvious over any of the obviousness grounds listed for dependent claim 13 and/or further in view of: Lee; Hong; Zhang; Kwak; Min; Kao; Chandra Sekar; or Himeno.
- Dependent claim 15 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Hong; Pan; Matsuno; Zhang; Kwak; Min; Chandra Sekar; SanDisk's NAND; or Himeno.
- Dependent claim 16 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Zhang; Kwak; Min; Chandra Sekar; SanDisk's NAND; or Goldman.

- Pan alone or in combination with one or more of Lee; Hong; Haller; Matsuno; Zhang; Kwak; Min; Kao; Yang; Chandra Sekar; Goldman; SanDisk's NAND; and Himeno. For example:

- Independent claims 1 and 12 are obvious over Pan and Pan in view of one of the following: Lee; Hong; Haller; Matsuno; Zhang; Kwak; Min; Kao; Yang; Chandra Sekar; Goldman; SanDisk's NAND; or Himeno.
- Dependent claim 2 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Hong; Haller; Matsuno; Zhang; Kwak; Min; Chandra Sekar; or Himeno.
- Dependent claim 4 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Haller; Matsuno; Zhang; Kwak; Min; Chandra Sekar; or Himeno.
- Dependent claim 6 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Zhang; Yang; SanDisk's NAND; or Goldman.
- Dependent claim 11 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Haller; Zhang; Kwak; Chandra Sekar; SanDisk's NAND; or Himeno.
- Dependent claim 13 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Haller; Matsuno; Zhang; Kwak; Min; Kao; Chandra Sekar; SanDisk's NAND; or Himeno.
- Dependent claim 14 is obvious over any of the obviousness grounds listed for dependent claim 13 and/or further in view of: Lee; Hong; Haller; Zhang; Kwak; Min; Kao; Chandra Sekar; or Himeno.
- Dependent claim 15 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Hong; Haller;

Matsuno; Zhang; Kwak; Min; Chandra Sekar; SanDisk's NAND; or Himeno.

  - Dependent claim 16 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Haller; Zhang; Kwak; Min; Chandra Sekar; SanDisk's NAND; or Goldman.

- Matsuno alone or in combination with one or more of Lee; Hong; Haller; Pan; Zhang; Kwak; Min; Kao; Yang; Chandra Sekar; Goldman; SanDisk's NAND; and Himeno. For example:
  - Independent claims 1 and 12 are obvious over Matsuno and Matsuno in view of one of the following: Lee; Hong; Haller; Pan; Zhang; Kwak; Min; Kao; Yang; Chandra Sekar; Goldman; SanDisk's NAND; or Himeno.
  - Dependent claim 2 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Hong; Haller; Pan; Zhang; Kwak; Min; Chandra Sekar; or Himeno.
  - Dependent claim 4 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Haller; Zhang; Kwak; Min; Chandra Sekar; or Himeno.
  - Dependent claim 6 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Zhang; Yang; SanDisk's NAND; or Goldman.
  - Dependent claim 11 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Haller; Zhang; Kwak; Chandra Sekar; SanDisk's NAND; or Himeno.

- Dependent claim 13 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Haller; Pan; Zhang; Kwak; Min; Kao; Chandra Sekar; SanDisk's NAND; or Himeno.
- Dependent claim 14 is obvious over any of the obviousness grounds listed for dependent claim 13 and/or further in view of: Lee; Hong; Haller; Zhang; Kwak; Min; Kao; Chandra Sekar; or Himeno.
- Dependent claim 15 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Hong; Haller; Pan; Zhang; Kwak; Min; Chandra Sekar; SanDisk's NAND; or Himeno.
- Dependent claim 16 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Haller; Zhang; Kwak; Min; Chandra Sekar; SanDisk's NAND; or Goldman.

- Zhang alone or in combination with one or more of Lee; Hong; Haller; Pan; Matsuno; Kwak; Min; Kao; Yang; Chandra Sekar; Goldman; SanDisk's NAND; and Himeno. For example:
  - Independent claims 1 and 12 are obvious over Zhang and Zhang in view of one of the following: Lee; Hong; Haller; Matsuno; Kwak; Min; Kao; Yang; Chandra Sekar; Goldman; SanDisk's NAND; or Himeno.
  - Dependent claim 2 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Hong; Haller; Pan; Matsuno; Kwak; Min; Chandra Sekar; or Himeno.
  - Dependent claim 4 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Haller; Matsuno;

Kwak; Min; Chandra Sekar; or Himeno.

- Dependent claim 6 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Yang; SanDisk's NAND; or Goldman.
- Dependent claim 11 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Haller; Kwak; Chandra Sekar; SanDisk's NAND; or Himeno.
- Dependent claim 13 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Haller; Pan; Matsuno; Kwak; Min; Kao; Chandra Sekar; SanDisk's NAND; or Himeno.
- Dependent claim 14 is obvious over any of the obviousness grounds listed for dependent claim 13 and/or further in view of: Lee; Hong; Haller; Kwak; Min; Kao; Chandra Sekar; or Himeno.
- Dependent claim 15 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Hong; Haller; Pan; Matsuno; Kwak; Min; Chandra Sekar; or Himeno.
- Dependent claim 16 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Haller; Kwak; Min; Chandra Sekar; SanDisk's NAND; or Goldman.

- Kwak alone or in combination with one or more of Lee; Hong; Haller; Matsuno; Zhang; Min; Kao; Yang; Chandra Sekar; Goldman; SanDisk's NAND; and Himeno. For example:

- Independent claims 1 and 12 are obvious over Kwak and Kwak in view of one of the following: Lee; Hong; Haller; Pan; Matsuno; Zhang; Min; Kao; Yang; Chandra Sekar; Goldman; SanDisk's NAND; or Himeno.
- Dependent claim 2 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Hong; Haller; Pan; Matsuno; Zhang; Min; Chandra Sekar; or Himeno.
- Dependent claim 4 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Haller; Matsuno; Zhang; Min; Chandra Sekar; or Himeno.
- Dependent claim 6 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Zhang; Yang; SanDisk's NAND; or Goldman.
- Dependent claim 11 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Haller; Zhang; Chandra Sekar; SanDisk's NAND; or Himeno.
- Dependent claim 13 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Haller; Pan; Matsuno; Zhang; Min; Kao; Chandra Sekar; SanDisk's NAND; or Himeno.
- Dependent claim 14 is obvious over any of the obviousness grounds listed for dependent claim 13 and/or further in view of: Lee; Hong; Haller; Zhang; Min; Kao; Chandra Sekar; or Himeno.
- Dependent claim 15 is obvious over any of the obviousness grounds listed

for independent claim 12 and/or further in view of: Lee; Hong; Haller; Pan; Matsuno; Zhang; Min; Chandra Sekar; SanDisk's NAND; or Himeno.

  - Dependent claim 16 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Haller; Zhang; Min; Chandra Sekar; SanDisk's NAND; or Goldman.

- Min alone or in combination with one or more of Lee; Hong; Haller; Matsuno; Zhang; Kwak; Kao; Yang; Chandra Sekar; Goldman; SanDisk's NAND; and Himeno. For example:
  - Independent claims 1 and 12 are obvious over Min and Min in view of one of the following: Lee; Hong; Haller; Pan; Matsuno; Zhang; Kwak; Kao; Yang; Chandra Sekar; Goldman; SanDisk's NAND; or Himeno.
  - Dependent claim 2 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Hong; Haller; Pan; Matsuno; Zhang; Kwak; Chandra Sekar; or Himeno.
  - Dependent claim 4 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Haller; Matsuno; Zhang; Kwak; Chandra Sekar; or Himeno.
  - Dependent claim 6 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Zhang; Yang; SanDisk's NAND; or Goldman.
  - Dependent claim 11 is obvious over any of the obviousness grounds listed for independent claim 1 and/or further in view of: Lee; Haller; Zhang;

Kwak; Chandra Sekar; SanDisk's NAND; or Himeno.

- Dependent claim 13 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Haller; Pan; Matsuno; Zhang; Kwak; Kao; Chandra Sekar; SanDisk's NAND; or Himeno.
- Dependent claim 14 is obvious over any of the obviousness grounds listed for dependent claim 13 and/or further in view of: Lee; Hong; Haller; Zhang; Kwak; Kao; Chandra Sekar; or Himeno.
- Dependent claim 15 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Hong; Haller; Pan; Matsuno; Zhang; Kwak; Chandra Sekar; SanDisk's NAND; or Himeno.
- Dependent claim 16 is obvious over any of the obviousness grounds listed for independent claim 12 and/or further in view of: Lee; Haller; Zhang; Kwak; Chandra Sekar; SanDisk's NAND; or Goldman.

b) Motivations to Combine and Expectation of Success

To the extent a finder of fact finds that a primary prior art reference does not disclose one or more limitations of an asserted claim, the asserted claim is nevertheless obvious because the alleged missing limitations contain nothing beyond ordinary improvements. In other words, the asserted claim combines known elements to achieve predictable results or chooses between clear alternatives known to those of skill in the art, particularly in view of the state of the art as reflected in the relevant prior art.

Moreover, as explained above, it would have been obvious to a person of skill in the art at the time of the alleged invention of the asserted claims to combine any primary reference with

any combination of other primary references so as to practice the asserted claims. To the extent that Plaintiff argues that any concept claimed in the asserted claims is not disclosed in a primary reference, it would, at a minimum, have been obvious to adapt the primary reference to include the concept or combine it with other primary references that disclose the concept. Each concept described and claimed in the Asserted Patents was known to those of skill in the art as available design choices for semiconductor memory design and fabrication.

The Supreme Court has held that "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR Int'l Co. v. Teleflex Inc*., 550 U.S. 398, 416 (2007). "When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one." *Id*. at 417. As the Supreme Court made clear, "[f]or the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." *Id*.

To determine whether there is an apparent reason to combine the known elements in the fashion claimed by the patent at issue, a court can "look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art." *Id*. at 418. For example, obviousness can be demonstrated by showing "there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims." *Id*. at 420. "[A]ny need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." *Id*. Common sense also teaches that "familiar items may have obvious uses

beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id*.

However, the Supreme Court in *KSR* held that a claimed invention can be obvious even if there is no explicit teaching, suggestion, or motivation for combining the prior art to produce that invention. In summary, *KSR* holds that patents that are based on new combinations of elements or components already known in a technical field may be found to be obvious. *See, generally*, *KSR*, 550 U.S. 398. Specifically, the Court in *KSR* rejected a rigid application of the "teaching, suggestion, or motivation [to combine]" test. *Id*. at 418. "In determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim." *Id*. at 419. "Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." *Id*. at 420. A key inquiry is whether the "improvement is more than the predictable use of prior art elements according to their established functions." *Id*. at 417.

The rationale to combine or modify prior art references is significantly stronger when, as here, the references seek to solve the same problem, come from the same field, and correspond well to each other. *In re Inland Steel Co*., 265 F.3d 1354, 1362 (Fed. Cir. 2001). The Federal Circuit has held that two references may be combined as invalidating art under similar circumstances, namely "[the prior art] focus[es] on the same problem that the . . . patent addresses: enhancing the magnetic properties of . . . steel. Moreover, both [prior art references] come from the same field . . . . Finally, the solutions to the identified problems found in the two references correspond well." *Id*. at 1364 (concerning patents and prior art relating to improving the magnetic and electrical properties of steel).

In view of the Supreme Court's *KSR* decision, the PTO issued a set of Examination Guidelines. Examination Guidelines for Determining Obviousness Under 35 U.S.C. § 103 in view of the Supreme Court Decision in *KSR International Co. v. Teleflex, Inc*., 72 Fed. Reg. 57526 (October 10, 2007). Those Guidelines summarized the *KSR* decision and identified various rationales for finding a claim obvious, including those based on other precedents. Those rationales include:

> (A) Combining prior art elements according to known methods to yield predictable results;
> (B) Simple substitution of one known element for another to obtain predictable results;
> (C) Use of known technique to improve similar devices (methods, or products) in the same way;
> (D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
> (E) "Obvious to try" – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
> (F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art;
> (G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

Id. at 57529. The above rationales likewise apply in rendering obvious the asserted claims of the Asserted Patents.

The references disclosed herein, alone or in combination, contain an explicit and/or implicit teaching or motivation to combine them due to the following: (1) the knowledge generally available to a person of ordinary skill in the art; (2) the prior art references as understood by a person of ordinary skill in the art; (3) the nature of the problem to be solved;

(4) the fact that each prior art reference addresses similar problems; and (5) the knowledge of those skilled in the art that the disclosed elements had been or could be used together.

As an example of those reasons and motivations to combine the references, Lee, Hong, Haller, Pan, Matsuno, Zhang, Kwak, Min, Kao, Yang, Chandra Sekar, and Goldman all describe semiconductor devices or methods of manufacturing semiconductor devices. *See, e.g.*, Lee, ¶14; Hong, ¶2; Haller, ¶16; Pan, 2:30-44, Fig. 1; Matsuno, Abstract, Figs. 1, 3; Zhang, ¶32; Kwak, ¶¶2, 7; Min, Abstract, Figs. 1A-1F; Kao, 1:35-36; Yang, Abstract, ¶3; Chandra Sekar, 1:7-10; Goldman, 1. The references disclose using similar components and techniques, such as sidewall assisted (or self-aligned) double patterning. *Id.* Thus, combining one or more such references merely involves combining prior art elements according to known methods to yield predictable results, the substitution of one known element for another to obtain predictable results, the use of a known technique to improve similar devices in the same way, or applying a known technique to a known device ready for improvement to yield predictable results.

In addition, below are additional motivations to combine prior art for particular claim limitations. The following discussion of specific claim limitations merely provides examples, which are not limiting.

For example, to the extent that any primary reference is deemed not to anticipate a claim for failing to teach claim 13 ("prior to etching the plurality of first trenches and the plurality of second trenches, forming an etch mask that includes a plurality of mask portions, each mask portion comprising a sidewall spacer part that is formed of a first material and a liner part that is formed of a second material"), it would have been obvious to a person of ordinary skill in the art at the time of the invention to combine the primary reference with any of the prior art that discloses claim 13 in Exhibits E1 to E8 and E-A. For example, the charted prior art references

explicitly describe or implicitly suggest a sidewall spacer made of two layers made of different materials. *See, e.g.*, Lee, Figs. 12-14, ¶¶ 18, 28, 34, 40-42; Haller, Abstract, Figs. 4-6, ¶¶ 14-15, 22-24, 27, 30-31, 34, 61; Pan, Figs. 1-4, 8, 1:48-62, 3:32-57, 4:5-49, 6:42-59, 9:60-10:3; Matsuno, Figs. 5-10, 4:60-5:27, 5:37-49; Zhang, ¶¶ 31, 33, 35; Kwak, Figs. 9-10, 12-13, 27, ¶¶ 9, 11, 55, 59-61, 74-75, 83; Min, Figs. 1A-1F, 4:1-13; Kao, Figs. 2-5, 1:40-51, 2:39-43, 2:45-3:3, cl. 9; Chandra Sekar, 7:58-67. It would have been obvious to combine any primary reference with any these references or others in Exhibit E-A to satisfy claim 13. A person skilled in the art would have recognized that having "an etch mask that includes a plurality of mask portions, each mask portion comprising a sidewall spacer part that is formed of a first material and a liner part that is formed of a second material" "prior to etching the plurality of first trenches and the plurality of second trenches" was a common, predictable step for manufacturing certain trench profiles. Further, a person of ordinary skill in the art would have recognized that including such an etch mask has several benefits. For example, adjustments could be made to allow better control of the etching process or to tailor the trench's profile. Even before NAND technology, engineers manufacturing semiconductors knew how to adjust etch selectivity by selecting different materials with different chemistries and etch rates to accomplish specific goals. Etch selectivity is the ratio between two etch rates, usually between a material being etched and a mask. A higher selectivity generally means it will be easier to etch a vertical profile. The selectivity can be adjusted by adjusting the processes or mask material, which affects etch rates. A person of ordinary skill in the art who did not want to inadvertently over-etch into another layer would use an etch stop, which could be in the form of a liner layer. Layers of different materials generally would have different etch rates. By switching chemistries, a person of skill in the art would have more control over the etch process that results in a more precisely etched

trench. Thus, a person of ordinary skill in the art would have been motivated to modify any of the primary references to include the claimed features, to the extent it is not disclosed. A person of ordinary skill in the art would also have had a reasonable expectation of success given that, by the alleged priority date of the ’974 Patent, semiconductor devices were manufactured each year using sidewall transfer processes.

In addition, to the extent that any primary reference is deemed not to anticipate a claim for failing to teach claim 16 (“depositing the metal in the plurality of second trenches to cap air gaps in the plurality of second trenches”), it would have been obvious to a person of ordinary skill in the art at the time of the invention to combine the primary reference with any of the prior art the discloses claim 16 in Exhibits E1 to E8 and E-A. For example, the charted prior art references explicitly describe or implicitly suggest depositing a metal capping layer to seal air gaps in second trenches. *See, e.g.*, Lee, ¶¶49-51; Haller, ¶¶23, 30; Zhang, Abstract, Figs. 6A, 6C, ¶¶9-11, 38, 40-41, 55-56, 60, cls. 1, 9; Kwak, ¶¶57, 66, 69; Min, 17:17-18; Yang, Abstract, Fig. 2C, ¶¶7, 9, 24-25, 30, 38, 40, 48; Goldman, 2-3, Figs. 2-3. A person skilled in the art would have recognized that utilizing a capping layer was a common, predictable option for semiconductor fabrication. Further, a person of ordinary skill in the art would have recognized that placing air gaps between conductive lines—i.e., between first trenches—would reduce the capacitance between the conductive lines. Thus, a person of ordinary skill in the art would have been motivated to modify any of the primary references to include the claimed features, to the extent it is not disclosed. A person of ordinary skill in the art would have had a reasonable expectation of success given that, by the alleged priority date of the ’974 patent, voltage regulators current supply circuits supplying a constant current were widely sold and used. A person of ordinary skill in the art would have understood that these references disclose

interrelated teachings based on routine technologies and would have been amenable to various well-understood and predictable combinations.

B. Invalidity Contentions Under 35 U.S.C. § 112

Defendants include below the grounds on which Defendants contend the asserted claims are invalid for failure to meet the requirements of the first two sections of 35 U.S.C. § 112.

Plaintiff has not yet provided a claim construction for many of the terms and phrases that Defendants anticipate will be in dispute. Defendants, therefore, cannot provide a complete list of its § 112 defenses because Defendants do not know whether Plaintiff will proffer a construction for certain terms and phrases that is broader than, or inconsistent with, the construction that would be supportable by the disclosure set forth in the specification.

To the extent the following contentions reflect constructions of claim limitations consistent with or implicit in Plaintiff's Infringement Contentions, no inference is intended nor should any be drawn that Defendants agree with Plaintiff's claim constructions, and Defendants expressly reserve the right to contest such claim constructions. Defendants offer these contentions in response to Plaintiff's Infringement Contentions and without prejudice to any position it may ultimately take as to any claim construction issues.

Accordingly, Defendants reserve the right to amend or supplement these § 112 Invalidity Contentions as discovery progresses.

1. Indefiniteness Under 35 U.S.C. § 112(b)

35 U.S.C. § 112(b) requires that a patent claim "particularly point[] out and distinctly claim[] the subject matter which the inventor or a joint inventor regards as the invention." 35 U.S.C. § 112(b). Claim terms that fail to inform those skilled in the art "with reasonable certainty . . . about the scope of the invention" fail the definiteness requirement of 35 U.S.C. § 112(b). *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014).

Each of the asserted claims are invalid as indefinite under 35 U.S.C. § 112 because they fail to particularly point out and distinctly claim the subject matter which the applicant regards as his invention. In particular, the following limitations, read in light of the intrinsic evidence, fail to inform those skilled in the art with reasonable certainty about the scope of the claimed inventions:

- Claims 1 and 12: "a plurality of first trenches in the dielectric layer, each first trench being elongated along a first direction and having a first shape in cross section along a plane that is perpendicular to the first direction"
- Claim 1: "a plurality of second trenches in the dielectric layer, each second trench being elongated along the first direction and having a second shape in cross section along the plane, the second shape being different from the first shape"
- Claim 4: "wherein the first shape has a first width at a level of an upper surface of the dielectric layer, the second shape has a second width at the level of the upper surface of the dielectric layer, and the second width is less than the first width"
- Claim 6: "a plurality of air gaps located in the second trenches"
- Claim 11: "wherein the plurality of first trenches have a first depth and the plurality of second trenches have a second depth that is different to the first depth"
- Claim 12: "etching a plurality of second trenches in the dielectric layer, each second trench being elongated along the first direction and having a second shape in cross section along the plane, the second shape being different to the first shape"
- Claim 14: "wherein first trenches are formed at locations corresponding to locations of liner parts of neighboring mask portions"

2. Lack of Enablement/Lack of Written Description Under 35 U.S.C. § 112(a)

The asserted claims of the '974 Patent are further invalid under 35 U.S.C. § 112(a) because the specifications do not contain an adequate written description of the subject matter of these claims and would not enable one of skill in the relevant art to make and use the alleged invention.

For a claim to be valid, the specification must contain a written description of the invention. 35 U.S.C. § 112(a). To fulfill the written description requirement, it "must clearly allow persons of ordinary skill in the art to recognize that the inventor invented what is claimed." *Ariad Pharm., Inc. v. Eli Lilly & Co*., 598 F.3d 1336, 1351 (Fed. Cir. 2010) (citation and internal quotation marks omitted). "[T]he applicant must 'convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention,' and demonstrate that by disclosure in the specification of the patent." *Carnegie Mellon Univ. v. Hoffmann-La Roche Inc*., 541 F.3d 1115, 1122 (Fed. Cir. 2008) (quoting *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563–64 (Fed. Cir. 1991)).

The specification must also describe "the manner and process of making and using [the invention], in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains . . . to make and use the" invention. *Ariad*, 598 F.3d at 1343; *see also* 35 U.S.C. § 112(a). "The enablement requirement is satisfied when one skilled in the art, after reading the specification, could practice the claimed invention without undue experimentation." *AK Steel Corp. v. Sollac & Ugine*, 344 F.3d 1234, 1244 (Fed. Cir. 2003) (citation omitted). "[T]he scope of the claims must be less than or equal to the scope of the enablement." *Nat'l Recovery Tech., Inc. v. Magnetic Separation Sys., Inc*., 166 F.3d 1190, 1196 (Fed. Cir. 1999).

Each of the asserted claims below are invalid because the specifications fail to provide written description and/or an enabling disclosure of at least the following limitations:

- Claim 1: "a plurality of second trenches in the dielectric layer, each second trench being elongated along the first direction and having a second shape in cross section along the plane, the second shape being different from the first shape"
- Claim 12: "etching a plurality of second trenches in the dielectric layer, each second trench being elongated along the first direction and having a second shape in cross section along the plane, the second shape being different to the first shape"
- Claim 14: "wherein the second material has a higher etch rate than the first material and wherein first trenches are formed at locations corresponding to locations of liner parts of neighboring mask portions"
- Claim 16: "depositing the metal in the plurality of second trenches to cap air gaps in the plurality of second trenches"

V. Document Production

Pursuant to the Court's Standing Order Governing Patent and Scheduling Order (Dkt. No. 38), Defendants are concurrently producing the new prior art identified in these Amended Invalidity Contentions.

Defendants reserve the right to supplement these productions with additional documentation, in accordance with the Federal Rules of Civil Procedure, the Local Rules, the Court's Orders and other applicable rules and statutes.

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Respectfully submitted,

/s/ John Kappos

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CERTIFICATE OF SERVICE

Pursuant to the Federal Rules of Civil Procedure, I hereby certify that, on November 26, 2025, all counsel of record who have appeared in this case are being served with a copy of the foregoing via the electronic mail.

/s/ John Kappos
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