

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MICRON TECHNOLOGY INC.,
Petitioner,

v.

SONRAI MEMORY LIMITED,
Patent Owner

Case IPR2023-00904
Patent 6,920,527

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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EXHIBITS

- MTI-1001 U.S. Patent No. 6,920,527 to Cloutier et al. (“the ’527 patent”)
- MTI-1002 Excerpts from the Prosecution History of the ’527 patent
- MTI-1003 Declaration of David Kuan-Yu Liu, Ph.D.
- MTI-1004 U.S. Patent Application Publication No. 2003/0028733 to Tsunoda et al. (“Tsunoda”)
- MTI-1005 U.S. Patent No. 7,069,370 to Sukegawa et al. (“Sukegawa”)
- MTI-1006 Certified translation and original document of Japanese Published Patent Application No. 2001-005723 to Tomio Suzuki (“Tomio”)
- MTI-1007 Certified translation and original document of Japanese Published Patent Application No. 2000-112836 to Shigeo Suzuki (“Shigeo”)
- MTI-1008 U.S. Patent No. 6,353,870 to Mills et al.
- MTI-1009 U.S. Patent No. 6,539,623 to Chen
- MTI-1010 U.S. Patent No. 6,376,283 to Chen
- MTI-1011 Acrylonitrile Butadiene Styrene (ABS), Dynalabcorp.com, https://web.archive.org/web/20031118100126/http://dynalabcorp.com/technical_info_abs.asp
- MTI-1012 U.S. Patent Publication No. 2002/0010827 to Cheng
- MTI-1013 U.S. Patent Publication No. 2002/0147882 to Pua et al.
- MTI-1014 Plastic Products for UL-94 Flame Class, Polymershapes.com, <https://www.polymershapes.com/regulatory/ul-94-flame-class/>
- MTI-1015 UL 94 Classification and Flame-Retardant Thermoplastics, Protolabs.com, <https://www.protolabs.com/resources/blog/flame-retardant-thermoplastics-and-ul-classifications/>

- MTI-1016 Common DIMM Memory Form Factors, Simmtester.com,
<https://www.simmtester.com/News/PublicationArticle/168>
- MTI-1017 U.S. Patent No. 6,567,273 to Liu et al.
- MTI-1018 U.S. Patent Application Publication No. 2004/0017634 to Chin-Lung
et al.
- MTI-1019 U.S. Patent No. 6,490,163 to Pua et al.
- MTI-1020 U.S. Patent Application Publication No. 2004/0017637 to Chang et al.
- MTI-1021 Complaint For Patent Infringement Against Micron Technology, Inc.
in *Sonrai Memory Ltd. v. Micron Technology, Inc.*, Case No. 6:22-cv-
00855 (W.D. Tex. Aug. 2022)
- MTI-1022 U.S. Patent No. 5,887,145 to Harari et al.
- MTI-1023 Excerpt of Callister, “Materials Science and Engineering, An
Introduction,” Fifth Edition, John Wiley & Sons, Inc. (2000)
- MTI-1024 M.2 SSD, TechTarget.com,
<https://www.techtarget.com/searchstorage/definition/M2-SSD>
- MTI-1025 Interim Procedure for Discretionary Denials in AIA Post-Grant
Proceedings with Parallel District Court Litigation, Katherin K. Vidal
(USPTO June 21, 2022)
- MTI-1026 Stipulation
- MTI-1027 Crucial: Computer Memory, Storage, and Tech Advice, *Part 3 of 4 –
Installing a Crucial® 2.5” SSD: Install*, January 4, 2019, available at
<https://www.youtube.com/watch?v=dy7An1DkieQ>
- MTI-1028 Advanced NAND, Impressive QoS, and High Capacities for Data
Center Environments, A Micron® Whitepaper, 2022 Micron
Technology, Inc.
- MTI-1029 Supplemental Declaration of David Kuan-Yu Liu, Ph.D.

- MTI-1030 Samsung MultiMedia Card Product Datasheet Version 3.0, Samsung Electronics (September 22, 2005)
- MTI-1031 MMC Card Specification Version 1.3, Kingmax Digital Inc. (July 8, 2004)
- MTI-1032 How do I safely remove a USB device from my computer?, Tech-Ease, Florida Center for Instructional Technology, College of Education, University of South Florida (2018), available at <https://etc.usf.edu/techease/win/hardware/how-do-i-safely-remove-a-usb-device-from-my-computer/>
- MTI-1033 Safely remove hardware in Windows, Microsoft (2024), available at <https://support.microsoft.com/en-us/windows/safely-remove-hardware-in-windows-1ee6677d-4e6c-4359-efca-fd44b9cec369>
- MTI-1034 Excerpts of New Technology Batteries Guide by William J. Ingram, National Institute of Justice (October 1998)
- MTI-1035 NAND Flash 101: An Introduction to NAND Flash and How to Design it in to Your Next Product, Micron Technology Inc. (2006)
- MTI-1036 32-Mbit 3.0 V Flash Memory S25FL032P Datasheet, Cypress Semiconductor Corporation (May 19, 2017)
- MTI-1037 64 Mb (8 MB) FL-L flash S25FL064L Datasheet, Infineon Technologies AG (April 17, 2023)
- MTI-1038 Excerpt of Infringement Expert Report of Dr. Michael C. Brogioli Exhibit D in *Sonrai Memory Ltd. v. Micron Technology, Inc.*, Case No. 1:23-cv-01407 (W.D. Tex. May 1, 2024)
- MTI-1039 Sonrai Memory Limited's Objections and Responses to Micron Technology, Inc.'s Second Set of Requests for Admission (Nos. 37-43) in *Sonrai Memory Ltd. v. Micron Technology, Inc.*, Case No. 1:23-cv-01407 (W.D. Tex. April 17, 2024)
- MTI-1040 U.S. Patent No. 6,438,638 to Jones et al.
- MTI-1041 Transcript of Deposition of Dr. Michael Brogioli

MTI-1042 Why You Should Always Safely Remove Your USB Devices.
Especially USB Storage Devices., available at
[https://www.downloadsource.net/why-you-should-always-safely-
remove-your-usb-devices-especially-usb-storage-devices/n/9924/](https://www.downloadsource.net/why-you-should-always-safely-remove-your-usb-devices-especially-usb-storage-devices/n/9924/)

I. Introduction

As demonstrated below with reference to evidence including Dr. Liu's testimony, Sonrai's Response (POR) fails to address, much less rebut, positions advanced in Micron's Petition. Indeed, Sonrai relies upon an expert who, unlike Dr. Liu, provides no corroborating evidence or factual analysis in support of his conclusions. *Cf. TQ Delta, LLC v. Cisco Systems Inc.*, 942 F.3d 1352, 1362-63 (Fed. Cir. 2019) (reversing a PTAB finding of obviousness that was based on an "ipse dixit declaration"); 37 C.F.R. §42.65(a) ("Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight."). As explained in the Petition and addressed below, the prior art renders obvious the Challenged Claims. Accordingly, Micron respectfully submits that the Board should find the Challenged Claims unpatentable.

II. Claim construction of "portable memory apparatus" (elements 1[p], 15[a]) and "housing" (element 1[a])

In its POR, Sonrai appears to impose a construction of "portable memory apparatus" that requires it to be "designed to be plugged and unplugged." POR, 8-9. In doing so, Sonrai fails to inform the Board of its own inconsistent claim construction positions in the District Court and the POR. *Compare* POR, 9, 11 (Sonrai arguing that Tomio and Tsunoda's memory modules are not portable because they are not designed to be plugged and unplugged), and 37 (arguing

Tomio's internal memory is not portable) *with* MTI-1039, 5-7 (Sonrai denying that memory apparatuses that are "not designed to be plugged and unplugged" are not portable and denying that "an "internal memory module" is not a portable memory apparatus.). Sonrai is trying to have its cake and eat it too by arguing to the PTAB that portability requires memory modules to be designed to be plugged and unplugged and cannot be internal, while at the same time arguing in District Court that Microns internal drives, that are not designed to be plugged and unplugged, are portable.

In the District Court, Sonrai further accuses Micron's internal SSD drives that are not "designed to be plugged and unplugged" but "can be carried around in the palm of one's hand" of infringing the '527 patent. MTI-1038, 1 (infringement chart for element 1[p] alleging accused devices "can be carried around in the palm of one's hand" and having dimensions 100mm x 70mm x 7mm). At the same time, Sonrai argues in the POR that Tomio's 168 pin dual inline module, which indisputably can be carried around in the palm of one's hand, is not "designed to be plugged and unplugged" and is therefore not a portable memory apparatus as required by the claims of the '527 patent. MTI-1016, 6 (showing 168 pin SDRAM DIMM having dimensions 133.35mm x 40mm that can be carried around in the palm of one's hand); MTI-1041, 55:4-56:4 ("you could hold [Tomio's memory module] in your hand"), 62:6-14.

As expressly noted in the Petition, Micron has applied the prior art to the challenged claims in a manner consistent with the positions taken by Sonrai in the co-pending litigation, as demonstrated by its infringement chart and complaint for infringement. Petition, 52-53; MTI-1038, 1; MTI-1021, 3 (listing accused products as including internal SSD drives, e.g., 7450, 7400, 5400, 5300, 5210, MX500, and BX500); MTI-1027 (demonstrating installation of MX500 internal SSD drive); MTI-1028 (describing the 7450 can be used with Supermicro servers); MTI-1029, ¶8. Sonrai cannot reasonably complain of the Petition’s express application of its litigation interpretations of “portable memory apparatus” and “housing” for purposes of IPR, though to be clear Micron does not agree that those interpretations are correct. POR, 8-9, 39. The Board has held time and again that a petition may rely on a patent owner (PO)’s construction, even if the petitioner believes that construction to be incorrect. *See, e.g., Western Digital Corp. v. SPEX Techs., Inc.*, IPR2018-00084, Paper 14, 10-11 (PTAB April 25, 2018) (“37 C.F.R. §104(b)(3) does not require Petitioner to express its subjective agreement regarding correctness of its proffered claim constructions.”).

Under the Board’s rules, “the purpose of the petitioner’s claim construction is to provide patent owners with notice as to the basis for the challenge to the claims.” *General Electric Co. v. Vestas Wind Systems A/S*, IPR2018-00928, Paper 9, 14 (PTAB Nov. 5, 2018); *10X Genomics, Inc. v. Bio-Rad Labs., Inc.*, IPR2020-

00086, Paper 8, 18 (PTAB Apr. 27, 2020) (“the rule aims to increase efficiency and provide notice to the patentee”). Consistent with that purpose, *an explicit statement of reliance on a PO’s litigation interpretations “suffices* to identify claim constructions Petitioner is adopting for purposes of the requested review in compliance with § 104(b)(3).” *Id.*¹; *Apple Inc. v. CPC Patent Techs. Pty, Ltd.*, IPR2022-00601, Paper 11, 12-14 (PTAB Sep. 28, 2022) (finding petitioner’s application of “constructions proposed by Patent Owner in the related litigation” compliant with §42.104(b)(3)). In *Philip Morris Products, S.A. v. Rai Strategic Holdings, Inc.*, IPR2020-00921, Paper 13, 42-44 (PTAB Aug. 5, 2021), the Board recognized that “[n]umerous decisions have held that [§42.104(b)(3)] does not require a petitioner to express a subjective belief in the correctness of its proffered claim constructions.” Indeed, the Board expressly held that *Petitioner can “rely[] on claim constructions that it believes are incorrect.”* *Id.*; *Google LLC v. AGIS Software Development, LLC*, IPR2018-01085, Paper 10, 10 (PTAB Nov. 19, 2018); *10X Genomics*, 18 (explaining that §42.104(b)(3) “does not prohibit Petitioner from submitting a claim construction it believes is incorrect and relying on that construction to show how the claim is unpatentable”).

The case cited in the POR generally addresses a petitioner’s burden with

¹ Emphasis added throughout unless otherwise noted.

respect to claim construction. POR, 39. The numerous cases cited above more specifically establish that Micron has met this burden by relying on Sonrai's constructions and did not need to endorse Sonrai's interpretations to rely on them in the Petition. Furthermore, Micron's Petition, which Sonrai inaccurately attributes as only applying Sonrai's interpretations, in fact addresses both Micron's and Sonrai's District Court constructions. Micron thus respectfully submits that the Petition has met this burden to show how the challenged claims are unpatentable.

III. Tsunoda renders obvious a portable memory apparatus (Ground 1A, elements 1[p], 15[a])

Sonrai does not dispute that the MMC 1401 shown in Tsunoda's FIG. 14 is a portable memory apparatus as established in the Petition. POR, 14; Petition, 8-11. As such, the Petition has shown that Tsunoda's MMC 1401 is a portable memory apparatus as required by the claims. *Id.*; MTI-1029, ¶9.

Further, contrary to Sonrai's contentions regarding each of the memory apparatuses of Tsunoda's FIGS. 1, 9, 11, and 12 not being portable because it has a SDRAM interface (POR, 11-13), Tsunoda's disclosure of a SDRAM interface is not indicative of whether Tsunoda's memory apparatus is portable. MTI-1029, ¶10. As Tsunoda explains, the "memory apparatus 101[and] 901" of FIGS. 1 and 9, respectively, may be "in a memory card shape such as an MMC." MTI-1004, [0124]. Tsunoda further explains that its invention is applicable "to interfaces of

an SD card...and a memory stick” as shown in FIGS. 11 and 12, respectively.

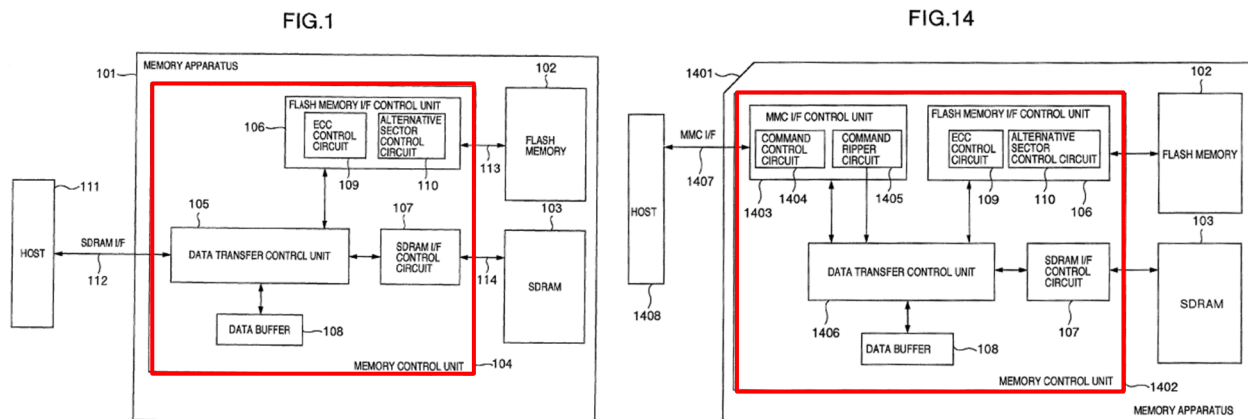
MTI-1004, [0117]. Consistent with Tsunoda’s disclosure, Dr. Liu explains that Tsunoda uses the term SDRAM interface as an example of an interface that allows communication between a SDRAM inside the portable memory apparatus and a host, not to impose any restrictions on the portability of the memory apparatus.

MTI-1029, ¶11; MTI-1004, [0096]-[0097]. The MMC interface shown in Tsunoda’s FIGS. 9 and 14 is another example of an interface that allows the transfer of data between the SDRAM inside the portable memory apparatus (MMC) and the host. *Id.*; MTI-1004, [0121]-[0122]. The SD card interface and the memory stick interface shown in Tsunoda’s FIGS. 11 and 12, respectively, are other examples of interfaces that allow the transfer of data between the SDRAM inside the portable memory apparatus (SD card or memory stick) and the host. MTI-1029, ¶11; MTI-1004, [0118]-[0119]. Thus, Tsunoda renders obvious a portable memory apparatus as claimed. MTI-1029, ¶11.

IV. Tsunoda renders obvious copying data from the flash memory to the SDRAM (Ground 1A, elements 1[f] and 15[c]) when the MMC is coupled to the host system (Ground 1A, element 1[f])

Sonrai acknowledges that Tsunoda teaches copying data from the non-volatile memory to the volatile memory as part of a power up sequence that applies when there is an SDRAM compatible interface. POR, 14-15; MTI-1041, 133:12-17. Sonrai argues, however, that “Tsunoda’s third embodiment does not support a

power up sequence” because “Tsunoda’s third embodiment does not include a Control Unit with a Control Register and a Voltage Detector intended for use with a SDRAM compatible interface” shown in FIG. 24 and “an MMC interface alone would not be capable of providing the required SDRAM compatible interface.” POR, 15-16. However, Sonrai ignores that other embodiments describe the power up sequence being performed by a memory control unit 104 of FIG. 1 (below left), all the components of which are present in the MMC of FIG. 14 (below right). MTI-1004, [0099], [0104], [0131]. Therefore, Tsunoda’s MMC supports a power up sequence in a similar manner as described with respect to FIG. 1. MTI-1004, [0122] (“the memory apparatus 1401 can issue a command for instructing data transfer between the flash memory [102] and the SDRAM 103...**as in the case of the previous embodiments**, the SDRAM 103 can be accessed from the memory control unit 1402”); MTI-1029, ¶¶12-13; MTI-1041, 156:19-159:17.



Further, Sonrai ignores the Petition’s explanation that Tsunoda’s MMC

interface 1407 includes “a power supply terminal (VCC 1) 1004 from the host.”

Petition, 21; MTI-1003, ¶73; MTI-1004, [0114]. When the MMC interface 1407 couples the MMC 1401 and the host 1408, the host 1408 starts supplying power to the MMC 1401 through the power supply terminal 1004 of the MMC interface 1407. *Id.* Using the power supply voltage on the power supply terminal 1004, Tsunoda’s MMC can detect when the MMC is coupled to the host and powered on, and can support a power up sequence. *Id.*; MTI-1029, ¶14; MTI-1004, [0067]-[0068], FIG. 24 (4061-4062), FIG. 25 (4101-4105). As Tsunoda further describes, after the power is turned ON, program data and user data on the flash memory 102 is copied to the SDRAM 103. MTI-1004, [0099], [0131], FIG. 18.

A POSITA would have found it obvious to implement this power up sequence in the MMC 1401, for example, using a memory control unit as described in FIG. 1 or a control unit as described in FIG. 24. MTI-1029, ¶15; MTI-1004, [0067]-[0068], [0099], [0104], [0131]; *Boston Scientific Scimed, Inc. v. Cordis Corp.*, 554 F.3d 982, 991 (Fed. Cir. 2009) (“Combining two embodiments disclosed adjacent to each other in a prior art patent does not require a leap of inventiveness.”). This power up sequence would include copying data from the flash memory to the SDRAM when the MMC is coupled to the host system as required by the claims. *Id.*

V. Tomio renders obvious a portable memory apparatus (elements 1[p], 15[a]) having a housing (element 1[a]) under Sonrai's interpretation in the District Court (Grounds 1B, 2B, 3A, 4A)

Sonrai argues that Tomio is not directed to “a portable memory device in the context of the specification and claims [of] the '527 Patent” because the “memory module in Tomio is not designed to be plugged and unplugged.” POR, 18-21, 35-38, 42-43. Sonrai also takes issue with Micron's reliance on Sonrai's District Court construction of “housing,” without disputing that Tomio's memory module has a housing. POR, 38. As expressly noted in the Petition and as discussed above in Section I, Micron has applied the prior art, including Tomio, to the challenged claims in a manner consistent with the positions taken by Sonrai in the District Court. MTI-1029, ¶¶16-17. Therefore, Sonrai cannot credibly argue that Tomio's memory module, like the accused Micron internal SSD drives that are “not designed to be plugged and unplugged,” is not a portable memory apparatus having a housing. Indeed, Sonrai has not disputed Tomio's teachings regarding elements 1[a]-1[f], and because Tomio meets each of those claim elements, Tomio is a portable memory apparatus under Sonrai's District Court construction. MTI-1041, 87:14-88:11 (“if there's a memory device that, for example, meets the limitations of claim 1, then that would be a portable memory apparatus”), 114:20-116:2.

Tomio indeed suggests that its memory module can be portable by disclosing that “a module formed using a semiconductor memory 8 of the present

invention may be used instead of a conventional floppy disk or CDROM.” MTI-1006, [0037]; *see* Petition, 53-54. As Dr. Liu explains, conventional floppy disks and CDROMs are portable data storage devices as they are designed to be repeatedly inserted into and removed from a computer system. MTI-1029, ¶18; MTI-1001, 1:15-16; MTI-1041, 92:16-21. Tomio’s disclosure that its memory module can be used *instead of* a floppy disk or CDROM indicates that its memory module can be designed to replace a floppy disk or CDROM, including the feature of these devices of being designed to be repeatedly inserted and removed from a computer system. *Id.* A POSITA would have understood that the drives that read these devices would also need to be replaced with a connector designed for repeatedly plugging and unplugging Tomio’s memory module from the computer system. MTI-1029, ¶18.

Sonrai argues that a “POSITA would not look to Tomio for a portable memory apparatus because of the problems that would be encountered plugging and unplugging a portable memory apparatus with this many connections” and because “unplugging memory without previous notification to the host device would create significant problems and could be catastrophic” including, e.g., “corrupt a memory connection,” “corrupt the volatile memory,” and “data loss.” POR, 21-22, 33 (“multiple unacceptable and potentially catastrophic problems”), 38, 40, 43-44, 46. These problems do not distinguish whether a memory device is

or is not portable. MTI-1029, ¶19. These problems can occur not only “in unplugging a memory apparatus with numerous connectors such as Tomio’s memory apparatus,” as Dr. Brogioli contends (POR, 22; EX2012, ¶68), but can also occur in unplugging a portable memory apparatus with 7 contact terminals such as Tsunoda’s MMC or with 4 contact terminals such as Tsunoda-Sukegawa’s USB drive. MTI-1029, ¶19; MTI-1032, 1 (“If you remove the [flash drive or memory card] device without first stopping it the information on it can be corrupted.”); MTI-1033, 1 (“To avoid losing data, it’s important to remove external hardware like hard drives and USB drives safely.”); MTI-1041, 165:7-167:6; MTI-1042, 2 (“if they are suddenly disconnected can actually physically damage the device.”).

To the extent that Sonrai is arguing that Tomio is not analogous art, Tomio is from “the same field of endeavor” as the ’527 patent and thus qualifies as analogous art. *In re Clay*, 966 F.2d 656, 658-59 (Fed. Cir. 1992). By its own terms, the ’527 patent “relates generally to computer storage mediums.” MTI-1001, 1:7-9. Sonrai does not dispute the incontrovertible fact that Tomio’s memory module falls into the general descriptive category of “computer storage mediums.” It follows then that a POSITA considering technical problems involving computer storage mediums would have considered art like Tomio. MTI-1029, ¶20. As such, consistent with the Federal Circuit’s instruction to “construe

the scope of analogous art broadly,” *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1238 (Fed. Cir. 2010) (citing *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 402 (2007)), there is no legitimate basis to exclude Tomio as non-analogous art.

VI. Tomio (Ground 3A) and Tsunoda-Tomio (Ground 1B) and Tsunoda-Sukegawa-Tomio (Ground 2B) render obvious an internal power source (claims 2, 16-17) that is rechargeable through the connector (claim 4)

For Ground 3A, Sonrai does not dispute that Tomio’s memory module includes a rechargeable battery. *See* POR, 35-41. But for Grounds 1B/2B, Sonrai argues that “a POSITA would not be motivated to add an internal power source to Tsunoda’s memory apparatus” because “Tsunoda already discloses a method to ensure data transfer is completed before power is shut off” and adding an internal power source “would unnecessarily add components and complexity.” POR, 23-24. As stated in the Petition, Tsunoda’s method “does not account for the situation where power is abruptly turned off (by unplugging or power outage)” and therefore would not ensure that data transfer from the volatile memory to the nonvolatile memory is completed, or even started, before the power is abruptly turned off. Petition, 45-46; MTI-1003, ¶129; MTI-1041, 161:16-163:8. As such, adding an internal power source would not “unnecessarily” add components and complexity, and a POSITA would have been motivated to include an internal power source in the portable memory apparatus (e.g., Tsunoda’s MMC or Tsunoda-Sukegawa’s USB drive) that continues to supply sufficient power to the portable memory

apparatus to allow the portable memory apparatus to transfer data from the volatile memory to the nonvolatile memory after unplugging without previous notification to the host. MTI-1029, ¶21; Petition, 45-46.

Additionally, for Ground 2B, Sonrai argues that Sukegawa teaches away from modifying Tsunoda with Tomio's teaching of a battery. POR, 32. But Sonrai necessarily fails to establish teaching away. *Depuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) ("criticize, discredit, or otherwise discourage"). Sukegawa's teaching of a USB memory device without volatile memory is irrelevant and does not teach away from the combination, as the Petition relies on Tsunoda's teachings of a memory device with volatile memory in combination with Sukegawa's teachings of a USB interface. Petition, 29-38.

Sonrai further argues that Tsunoda's MMC "is incompatible with Tomio's rechargeable battery because of the physical size limitations of a MultiMediaCard form factor" and because of "a low power electrical interface." POR, 24-25. Even if true, such assertions "are basically irrelevant, the criterion being not whether the references could be physically combined but whether the claimed inventions are rendered obvious by the teachings of the prior art as a whole." *In re Etter*, 756 F.2d at 859); accord *In re Mouttet*, 686 F.3d at 1332; see also *In re Sneed*, 710 F.2d at 1550 (upholding a combination when physical integration was "an insurmountable task"); *Allied Erecting & Dismantling*, 825 F.3d at 1380-81

(upholding a combination when the “suggested modification...would entail design and structural changes”); *Hologic*, 764 Fed. App’x at 880 (“incompatibility would not preclude a motivation to combine...”). A POSITA would have been capable of employing ordinary creativity to carry out an implementation of Tsunoda’s MMC in a manner necessary to achieve the advantages taught by Tomio, for example, by varying the size and shape of the housing and varying the power supplied through the electrical interface to accommodate the rechargeable battery, or by adding a rechargeable battery, or capacitor that acts as a rechargeable battery, custom built for Tsunoda’s MMC form factor. MTI-1029, ¶22 (“a POSITA would have been capable of implementing each of Tsunoda’s MMC or Tsunoda-Sukegawa’s USB drive to include an internal capacitor to act as a battery or charge reservoir for supplying current at a given voltage for a certain limited period of time, dictated by the size of the capacitor.”); MTI-1034, 10 (“very small batteries... can be custom built for devices”).

Further, Sonrai’s alleged design challenges and tradeoffs premised on size, expense, and complexity are not relevant to teaching away and do not undermine a POSITA’s motivation to combine Tsunoda, Sukegawa, and Tomio. “[A] given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.” *Allied Erecting*, 825 F.3d at 1381. Additionally, “obviousness ‘does not require that the motivation be the best

option, only that it be a suitable option from which the prior art did not teach away.” *Bayer Pharma AG v. Watson Labs., Inc.*, 874 F.3d 1316, 1328 (Fed. Cir. 2017); *accord GE v. Raytheon Techs. Corp.*, 983 F.3d 1334, 1351 (Fed. Cir. 2020).

VII. Tomio (Ground 3A) and Tsunoda-Tomio (Ground 1B) and Tsunoda-Sukegawa-Tomio (Ground 2B) and Tomio-Sukegawa (Ground 4A) render obvious when the portable memory apparatus is unplugged from the computer system, the internal power source powers the portable memory apparatus and the portable memory apparatus copies data from the volatile memory to the non-volatile memory (claims 3, 16)

Sonrai argues that “there is no disclosure in Tsunoda, Tomio, or Sukegawa related to a memory device being unplugged.” POR, 33, 22, 40, 46. First, it is not determinative that none of Tsunoda, Tomio, or Sukegawa explicitly disclose the precise claim language. This is an obviousness ground and, therefore, “the question under 35 [U.S.C. §] 103 is not merely what the references expressly teach but what they would have suggested to one of ordinary skill in the art at the time the invention was made.” *Merck & Co. v. Biocraft Labs., Inc.*, 874 F.2d 804, 807-08 (Fed. Cir. 1989) (quoting *In re Lamberti*, 545 F.2d 747, 750 (CCPA 1976) (citation omitted)). As stated in the Petition, in Tomio’s memory module, “rechargeable battery 61 continues to output direct current power supply potentials VDD and VDDQ for a predetermined period of time even when supply of the direct current power supply potential VDD from the direct current power supply 60 has been stopped.” Petition, 51; MTI-1006, [0039], [0027]. Sonrai does not

dispute this disclosure of Tomio. As Dr. Liu explains, in light of Tomio's teachings, a POSITA would have found it obvious that "supply of the direct current power supply potential VDD from the direct current power supply 60 has been stopped" when the module 51 is unplugged from the personal computer or when the personal computer powers off. Petition, 51, 45-46; MTI-1003, ¶¶136, 129-130; MTI-1006, [0038]-[0039], [0022], [0027]-[0028], [0032]. It would have been obvious to a POSITA to supply power from a battery when the external power supply is abruptly stopped by unplugging the memory device from the host. MTI-1003, ¶¶129-130; MTI-1029, ¶23. This modification would have beneficially provided a memory apparatus that retains data even when the external power supply is abruptly stopped. MTI-1003, ¶131; MTI-1029, ¶23.

Sonrai argues that a POSITA would "not be motivated to copy data from the volatile to the non-volatile memory when Tomio's memory apparatus (or one of Tsunoda's SDRAM interface embodiments) was unplugged from the computer" because "unplugging memory without previous notification to the host device would create significant problems and could be catastrophic" including, e.g., "corrupt a memory connection," "corrupt the volatile memory," and "data loss." POR, 21-22, 33 ("multiple unacceptable and potentially catastrophic problems"), 38, 40, 46. As discussed above, these problems can occur not only "in unplugging a memory apparatus with numerous connectors such as Tomio's memory

apparatus,” but can also occur in unplugging a portable memory apparatus with 7 contact terminals such as Tsunoda’s MMC or with 4 contact terminals such as Tsunoda-Sukegawa’s USB drive. MTI-1029, ¶24; MTI-1032, 1 (“If you remove the [flash drive or memory card] device without first stopping it the information on it can be corrupted.”); MTI-1033, 1 (“To avoid losing data, it’s important to remove external hardware like hard drives and USB drives safely.”). These alleged problems would in fact motivate a POSITA to include an internal power source in the portable memory apparatus (e.g., Tsunoda’s MMC and Tsunoda-Sukegawa’s USB drive) that continues to supply sufficient power to the portable memory apparatus to allow the portable memory apparatus to complete processing, to retain its data, and to safely turn off after unplugging without previous notification to the host. MTI-1029, ¶24; Petition, 45-46.

VIII. Tsunoda-Sukegawa (Ground 2A) renders obvious a portable memory apparatus (elements 1[p], 15[a]) with a volatile memory (elements 1[c] and 15[b])

Sonrai first attacks Sukegawa for not disclosing a volatile memory in the USB drive and Tsunoda for not disclosing a USB interface. POR, 27-29. However, Sonrai’s arguments here are inapposite as “[n]onobviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references.” *Bradium Technologies v. Iancu*, 923 F. 3d 1032, 1050 (Fed. Cir. 2019). Instead, each reference “must be read, not

in isolation, but for what it fairly teaches in combination with the prior art as a whole.” *Id.*

As discussed in the Petition, Tsunoda discloses a MMC 1401 having a SDRAM where “connection with the host 1408 is not made through the SDRAM interface 112, but only through the MMC interface 1407.” Petition, 22; MTI-1004, [0121]. In the Tsunoda-Sukegawa Combination, the host accesses the data in the SDRAM through the USB interface in a similar manner as the MMC interface. Petition, 38; MTI-1029, ¶25.

Sonrai argues that a “POSITA would not have been motivated to use a USB interface with Tsunoda’s memory apparatus... [i]n view of the differences between an MMC interface and a USB interface” and “[m]odifying Tsunoda’s memory apparatus with a USB interface would not have been within the level of a POSITA.” POR, 29-30. Sonrai’s alleged design challenges and tradeoffs premised on differences between interfaces do not undermine a POSITA’s motivation to combine Tsunoda and Sukegawa. “[A] given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.” *Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016). Additionally, “obviousness ‘does not require that the motivation be the best option, only that it be a suitable option from which the prior art did not teach away.’” *Bayer Pharma*

AG v. Watson Labs., Inc., 874 F.3d 1316, 1328 (Fed. Cir. 2017); *accord GE v. Raytheon Techs. Corp.*, 983 F.3d 1334, 1351 (Fed. Cir. 2020). There is no legitimate question on this record as to whether Sukegawa's USB interface is "a suitable option," and Sonrai has not alleged that the prior art "teach[es] away."

Sukegawa's teachings alone are sufficient to establish the suitability of a USB interface in the context of Tsunoda. Sukegawa makes clear that the USB 2.0 standard provides "bandwidth for multimedia and storage applications" and "has a raw data rate at 480 Mbps." MTI-1005, 1:25-35. By comparison, the MMC interface at the time provided a maximum data rate up to 52 Mbps, which is much slower than the USB 2.0 interface. MTI-1030, 6; MTI-1031, 10. Further, a USB interface for connecting MMC cards to a host came into existence almost immediately after the USB and MMC standards were available in the marketplace, attesting to their complementary and compatible nature and the obviousness of modifying Tsunoda's MMC card to include a USB interface. MTI-1029, ¶¶26-27; MTI-1040, 8:24-61, FIG. 6.

Sonrai errs further by limiting the POSITA to someone who "can only perform combinations of a puzzle element A with a perfectly fitting puzzle element B," which "[t]he rationale of *KSR* does not support." *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1219 (Fed. Cir. 2016). "[A] person of ordinary skill is also a person of ordinary creativity, not an automaton,' so the fact that it would take some

creativity to carry out the combination does not defeat a finding of obviousness.”

Facebook, Inc. v. Windy City Innovations, LLC, 973 F.3d 1321, 1343 (Fed. Cir. 2020) (quoting *KSR*, 550 U.S. at 421)). Accordingly, the Federal Circuit reversed the Board in *GE v. Raytheon Technologies Corporation* because the Board’s conclusion of nonobviousness was premised on the fact that the proposed combination “would likely lead to changes to other components.” 983 F.3d at 1352. Here, for example, the POSITA would have resolved Sonrai’s concern regarding compatibility of Sukegawa’s USB interface with Tsunoda’s SDRAM using a POSITA’s general knowledge and creativity by, for example, including a USB 2.0 interface control unit that, like Tsunoda’s MMC interface control unit in the MMC, allows communication of data between the SDRAM and host through the USB 2.0 interface. MTI-1029, ¶28; *see, e.g.*, MTI-1005, 5:38-65 (“...For example, the protocol engine 250 facilitates with any serial to parallel conversion...”); MTI-1040, 8:24-61 (“Converter chip 40 generates the appropriate USB-interface signals to transfer the data [from the MMC] to host PC 20”).

Sonrai additionally argues that “Tsunoda’s teachings of additional components were incompatible with Sukegawa’s teachings of minimally sized flash drive.” POR, 28, 30. The *en banc* Federal Circuit firmly rejected an approach resembling Sonrai’s argument that the size, shape, and components of Sukegawa’s USB drive would be incompatible with Tsunoda’s components. In the

Court’s words, such assertions “are basically irrelevant, the criterion being not whether the references could be physically combined but whether the claimed inventions are rendered obvious by the teachings of the prior art as a whole.” *In re Etter*, 756 F.2d 852, 859 (Fed. Cir. 1985) (en banc); *accord In re Mouttet*, 686 F.3d 1322, 1332 (Fed. Cir. 2012); *see also In re Sneed*, 710 F.2d 1544, 1550 (Fed. Cir. 1983) (upholding a combination when physical integration was “an insurmountable task”); *Allied Erecting & Dismantling*, 825 F.3d at 1380-81 (Fed. Cir. 2016) (upholding a combination when the “suggested modification...would entail design and structural changes”); *Hologic, Inc. v. Minerva Surgical, Inc.*, 764 Fed. App’x 873, 880 (Fed. Cir. 2019) (“incompatibility would not preclude a motivation to combine...”). As stated in the Petition at the outset of this IPR, a “POSITA would have been capable of employing ordinary creativity to carry out an implementation of the USB flash drive in a manner necessary to achieve the advantages taught by Sukegawa by, for example, varying the size and shape of the housing to accommodate the electronic components.” Petition, 35; MTI-1003, ¶106.

IX. Tomio-Sukegawa renders obvious a portable memory apparatus (elements 1[p], 15[a]) with a volatile memory (elements 1[c] and 15[b])

Sonrai first attacks Tomio as directed to a non-portable memory (addressed above in Section V) and Sukegawa for not disclosing a volatile memory in the USB drive. POR, 42-44. However, Sonrai’s arguments here are inapposite as

“[n]onobviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references.” *Bradium Technologies*, 923 F. 3d at 1050. Instead, each reference “must be read, not in isolation, but for what it fairly teaches in combination with the prior art as a whole.” *Id.* As established in the Petition, the combination of Tomio and Sukegawa provides a memory apparatus with a volatile memory and a USB interface. Petition, 68-82. Sonrai’s alleged design challenges and tradeoffs premised on size, number of components, and transfer speeds do not undermine a POSITA’s motivation to combine Tomio and Sukegawa. POR, 44-45; MTI-1029, ¶¶29-31; MTI-1003, ¶187; Petition, 76.

Sukegawa’s teachings alone are sufficient to establish the suitability of a USB interface in the context of Tomio. Sukegawa makes clear that the USB 2.0 standard provides “bandwidth for multimedia and storage applications” and “has a raw data rate at 480 Mbps... 40 times faster than its predecessor interface, USB 1.1., which tops at 12 Mbps.” MTI-1005, 1:25-35. Contrary to Dr. Brogioli’s contentions (POR, 45; EX2012, ¶75), this 480 Mbps USB 2.0 transmission rate is faster than the flash memory access rate, which for examples of flash memory around the time of the ’527 patent, and even now, is at most 62 Mbps. MTI-1029, ¶32; MTI-1035, 5; MTI-1036, 1; MTI-1037, 3. And for similar reasons as discussed above in Sections V and VII, the alleged “data corruption and loss

issues” would not have undermined the motivation to combine Tomio and Sukegawa. POR, 45.

X. Shigeo is analogous art to the ’527 patent (Grounds 1C, 2C, 3B, 4B)

Other than the arguments already addressed above, Sonrai’s only additional argument is that Shigeo is “neither analogous to or applicable to a portable memory apparatus.” POR, 25-27, 34, 41-42, 46-48. “Prior art is analogous if it is from the same field of endeavor or if it is reasonably pertinent to the particular problem the inventor is trying to solve.” *Circuit Check Inc. v. QXQ Inc.*, 795 F.3d 1331, 1335 (Fed. Cir. 2015). Shigeo is at least reasonably pertinent to the particular problem with which the invention is involved, i.e., the invention of claims 13 and 20 of the ’527 patent. MTI-1029 ¶33. The ’527 patent “relates generally to computer storage mediums,” and Shigeo discloses that it “also relates to an information storage method and a storage medium.” MTI-1001, 1:7-9; MTI-1007, [0001]. Indeed, Sonrai does not dispute that Shigeo addresses the same problems as claims 13 and 20, that if the external power supply is abruptly stopped and the battery is not sufficiently charged and does not have enough power to power the RAM and the flash memory for the writing of data to the flash memory, the data stored in the RAM would be lost. Petition, 87; MTI-1003, ¶¶219-221. A POSITA considering technical problems involving minimization of data loss in low battery conditions would have considered art like Shigeo. MTI-1029, ¶33. As

such, consistent with the Federal Circuit’s instruction to “construe the scope of analogous art broadly,” *Wyers*, 616 F.3d at 1238, there is no legitimate basis to exclude Shigeo as non-analogous art.

XI. Shigeo’s teachings are applied to the combinations including Sukegawa in the same manner as the combinations without Sukegawa (Grounds 2C, 4B)

Additionally, for Grounds 2C and 4B, Sonrai alleges that Micron “does not explain how Sukegawa would affect this analysis.” POR, 34, 48. Claims 13 and 20 depend from claims 1 and 15, respectively. The manner in which Sukegawa affects the analysis of claims 13 and 20 are provided in the Petition’s analysis of Grounds 2A and 4A. *See* Petition, 28-42, 68-82. While the Petition does not rely on Sukegawa for claims 13 and 20 and therefore there was no need to specifically discuss Sukegawa in Grounds 2C and 4B, Shigeo’s teachings are applied to the combinations including Sukegawa in the same manner as the combinations without Sukegawa.

XII. Conclusion

All challenged claims are unpatentable.

Respectfully submitted,

Dated: June 14, 2024

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CERTIFICATION UNDER 37 CFR § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petitioner's Reply to Patent Owner's Response totals 5,556, which is less than the 5,600 allowed under 37 CFR § 42.24.

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(1) and 42.6(e)(4)(iii), the undersigned certifies that on June 14, 2024, a complete and entire copy of this Petitioner's Reply to Patent Owner's Response and exhibits were provided via email to the Patent Owner by serving the email correspondence addresses of record as follows:

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