

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD. AND
SAMSUNG ELECTRONICS AMERICA, INC.,

Petitioners,

v.

HARBOR ISLAND DYNAMIC, LLC,

Patent Owner.

Patent No. 9,147,609

Filing Date: January 27, 2014

Issue Date: January 26, 2016

Inventors: Hadi Jebory and David J. Howard

Title: THROUGH SILICON VIA STRUCTURE, METHOD AND
FORMATION, AND INTEGRATION IN SEMICONDUCTOR SUBSTRATE

**PATENT OWNER'S OPPOSITION TO
PETITIONER'S MOTION TO EXCLUDE EVIDENCE**

Case No. IPR2024-01404

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EXHIBIT LIST

Exhibit No.	Description of Document
2001	Docket Control Order, Dkt. 38, in <i>Harbor Island Dynamic, LLC v. Samsung Elecs. Co.</i> , Case No. 2:24-cv-00140-JRG-RSP (E.D. Tex. Aug. 5, 2024)
2002	Order Denying Samsung’s Motion to Stay Pending <i>Inter Partes</i> Review, Dkt. 62, in <i>Harbor Island Dynamic, LLC v. Samsung Elecs. Co.</i> , Case No. 2:24-cv-00140-JRG-RSP (E.D. Tex. Dec. 19, 2024)
2003	Defendants’ Invalidity Contentions, served on September 26, 2024, in <i>Harbor Island Dynamic, LLC v. Samsung Elecs. Co.</i> , Case No. 2:24-cv-00140-JRG-RSP (E.D. Tex.)
2004	Merriam-Webster Dictionary definition for the word “taper.”
2005	Dictionary.com definition for the word “tapered.”
2006	Oxford English Dictionary definition for the word “tapered.”
2007	Transcript of June 17, 2025 Deposition of Dr. Scott E. Thompson
2008	<i>Thermal Stresses around Void in Through Silicon Via in 3D SiP</i> by T. Kinoshita, et al., published in the 2014 International Conference on Electronics Packaging (April 2014)
2009	<i>3D-interconnect: Visualization of Extrusion and Voids Induced in Copper-Filled Through-Silicon Vias (TSVs) at Various Temperatures Using X-Ray Microscopy</i> , by Kong et al., published in <i>Microelectronic Engineering</i> 92 (2012),
2010	<i>TSV Cu Filling Failure Modes and Mechanisms Causing the Failures</i> , by J.W. Choi, et al., published in <i>IEEE Transactions on Components, Packaging, and Manufacturing Technology</i> , Vol. 4, No. 4 (April 2014)
2011	<i>Low Stress TSV Arrays for High-Density Interconnection</i> , by Jiao, et al. (2022)
2012	Declaration of Mr. John Berg

I. INTRODUCTION

The Board should deny Petitioner’s Motion (Paper 26, “Mot.”) because the exhibits are sufficiently authenticated and are admissible for the purpose of showing how one of skill in the art would have understood that all voids in through-silicon vias do not decrease thermal stress (as in the case of Exhibit 2008) or that voids and hollow centers are different (as in the case of Exhibits 2010 and 2011). Petitioner, however, would simply exclude the exhibits rather than defend its technical positions.

As discussed below, the challenged exhibits are sufficiently shown to be authentic based on Mr. Berg’s testimony and the indicia on the face of each exhibit. Moreover, the exhibits are relevant to showing the state of the art and knowledge of a person of skill in the art at the time of the invention. The Board should therefore deny the Motion.

II. LEGAL STANDARDS

The Board applies the Federal Rules of Evidence. 37 CFR § 42.62. “Federal Rule of Evidence 901 sets a relatively low bar for authentication.” *Mylan Pharms., Inc. v. Regeneron Pharms., Inc.*, IPR2021-00880, Paper No. 89 at 15 (P.T.A.B. Nov. 9, 2022).

“To satisfy the requirement of authenticating or identifying an item of evidence, the proponent must produce evidence sufficient to support a finding that

the item is what the proponent claims it is.” FRE 901(a). The testimony of a witness with knowledge is sufficient to authenticate a document. FRE 901(b)(1). A document’s own “distinctive characteristics” can further serve to authenticate a document. FRE 901(b)(4) (“The appearance, contents, substance, internal patterns, or other distinctive characteristics of the item, taken together with all the circumstances.”). Documents that are parts of periodicals are self-authenticating, FRE 902(6), as are documents that include “[a]n inscription, sign, tag, or label purporting to have been affixed in the course of business and indicating origin, ownership, or control.” FRE 902(7).

As the movant, Petitioner bears the burden of proving it is entitled to the relief sought, in this case, exclusion. 37 C.F.R. §42.20(c).

III. EXHIBIT 2007 IS AUTHENTIC AND RELEVANT

Patent Owner has provided sufficient evidence that Exhibit 2007 is a paper published by IEEE in 2013. Moreover, Exhibit 2007 is relevant for the purposes of showing the knowledge of one of skill in the art.

A. Exhibit 2008 Is Authentic

As Mr. Berg’s Declaration explains, Exhibit 2008 is a paper entitled “*Thermal Stresses around Void in Through Silicon Via in 3D SiP*” and published in 2014. Ex. 2012, ¶ 50, Ex. 2007. It bears distinctive indicia of authenticity: a publication date

of 2014, an ISBN number (978-4-904090-11-4),¹ it begins on page 105 of a larger volume, and indicates that it is downloaded from and stored on IEEE Xplore.² Ex. 2007. The document is further and currently available for download on IEEE Xplore.³ “Such indicia have been found to be sufficient to support authentication.” *Cont’l Auto. Sys., Inc. v. Intell. Ventures II, LLC*, IPR2022-01130, Paper No. 41 at 12 (P.T.A.B. Dec. 4, 2023); *see also Mercedes-Benz USA, LLC v. Daedalus Prime LLC*, IPR2023-01344, Paper No. 31 at 41 (P.T.A.B. January 25, 2025) (finding IEEE Xplore evidence sufficient to show date of publication).

The document is also self-authenticating under FRE 902. It bears an ISBN number, and is paginated (starting at page 807) showing that it was part of a larger document. *Intel Corp. v. Pact XPP Schweiz AG*, IPR2020-00528, Paper No. 39 at 16 (P.T.A.B. Aug. 9, 2021) (copyright notice, ISBN number, and pagination sufficient

¹ The ISBN Number is available at the document’s IEEE Xplore webpage.

² “IEEE Xplore is the flagship digital platform for discovery and access to scientific and technical content published by the IEEE (Institute of Electrical and Electronics Engineers) and its publishing partners.” *About IEEE Xplore*, <https://ieeexplore.ieee.org/Xplorehelp/overview-of-ieee-xplore/about-ieee-xplore>, last visited Dec. 4, 2025.

³ <https://ieeexplore.ieee.org/document/6826670>

to show that paper was an authentic printed publication). Accordingly, Exhibit 2007 is authentic.

B. Exhibit 2008 Is Relevant

Exhibit 2008 is also relevant to the POSITA's understanding of whether all voids in through-silicon vias decrease thermal stress in the substrate. Petitioner's relevance challenge is premised entirely on Exhibit 2008 being published after the '609 Patent's priority date. Mot. at 3-4. However, Patent Owner does not use Exhibit 2008 for prior art purposes. That the simulation discussed and published in Exhibit 2008 occurred after the priority date does not change the fundamental materials property discussed therein—that not all voids in through-silicon vias decrease thermal stress in the substrate, and that a hollow center in a through-silicon via must be designed to decrease thermal stress in the substrate, as confirmed by other documents relied upon by both experts which predate the priority date of the patent (e.g., *Birner*, Ex. 1022).

Patent Owner uses Exhibit 2008 to illustrate that one of skill in the art at the time of the invention would know that all voids do not decrease thermal stress in the substrate. POR, 24-26. Documents that do not qualify as prior art are nonetheless relevant and probative of the knowledge of one of skill in the art. *Bancorp Servs., L.L.C. v. Hartford Life Ins. Co.*, 359 F.3d 1367, 1375 (Fed. Cir. 2004) (reversing judgment of indefiniteness because District Court improperly refused to consider

non-prior art documents as showing level of knowledge); *Disney Enters., Inc. v. Kappos*, 923 F. Supp. 2d 788, 801 (E.D. Va. 2013) (holding publications published after patent’s priority date “relevant to understanding the state of the art” at the time of the invention); *Yeda Rsch. and Dev. Co. v. Mylan Pharms. Inc.*, 906 F.3d 1031, 1041-42 (Fed. Cir. 2018) (post-priority document permissible as evidence of knowledge of POSITA).

Here, Exhibit 2008 is relevant to showing the knowledge of one of skill in the art at the time of the invention. While published approximately two and a half years after the ’609 Patent’s provisional application date of October 7, 2011,⁴ the materials properties discussed therein, and the POSITA’s knowledge of the properties of hollow centers in through-silicon vias, existed around the time of the invention. Petitioner’s arguments that Exhibit 2008 is dated too late to be probative are properly directed to the weight the Board should give the evidence, not the admissibility. Accordingly, Exhibit 2008 is admissible.

⁴ Per IEEE, the conference at which the paper was distributed was held in April 2014, and Exhibit 2007 was added to IEEE Xplore in June 2014. <https://ieeexplore.ieee.org/document/6826670>.

IV. EXHIBITS 2010 AND 2011 ARE AUTHENTIC AND RELEVANT

Patent Owner has provided sufficient evidence that Exhibit 2010 is a paper published by IEEE in 2014, and that Exhibit 2011 is a paper published by Elsevier in 2024.

Exhibits 2010 and 2011 are relevant for the purposes of showing the knowledge of one of skill in the art.

A. Exhibit 2010 Is Authentic

As with Exhibit 2008, and for the same reasons, Exhibit 2010 is sufficiently shown to be authentic.

As Mr. Berg's Declaration explains, Exhibit 2010 is a paper entitled "TSV Cu Filling Failure Modes and Mechanisms Causing the Failures" and published in 2014. Ex. 2012, ¶ 69 n.2, Ex. 2010. It bears distinctive indicia of authenticity: the ISSN number 2156-3950, an IEEE copyright notice, and publication date of 2014, begins on page 581 of a larger volume, and indicates that it is downloaded from and stored on IEEE Xplore. Ex. 2010. The document is further and currently available for download on IEEE Xplore.⁵ "Such indicia have been found to be sufficient to support authentication." *Cont'l Auto. Sys.*, IPR2022-01130, Paper No. 41 at 12; *see also Mercedes-Benz USA, LLC*, IPR2023-01344, Paper No. 31 at 41 (finding IEEE Xplore evidence sufficient to show date of publication).

⁵ <https://ieeexplore.ieee.org/document/6722913>

The document is also self-authenticating under FRE 902. It bears a copyright notice, ISBN number, and is paginated (starting at page 581) showing that it was part of a larger document. *Intel Corp.*, IPR2020-00528, Paper No. 39 (copyright notice, ISBN number, and pagination sufficient to show that the paper was an authentic printed publication). Accordingly, Exhibit 2010 is authentic.

B. Exhibit 2010 Is Relevant

Exhibit 2010 is also relevant as confirmatory evidence that the POSITA would understand that “voids” are typically referred to as defects in TSVs, not desirable features. Petitioner’s relevance challenge is premised entirely on Exhibit 2010 being published after the ’609 Patent’s priority date. Mot. at 6-7. However, like Exhibit 2008, Patent Owner does not use Exhibit 2010 for prior art purposes.

Instead, Patent Owner uses Exhibit 2010 to illustrate that one of skill in the art at the time of the invention would understand a “void” to be different from a “hollow center.” POR, 27-28 n.3. Documents that do not qualify as prior art are nonetheless relevant and probative of the knowledge of one of skill in the art. *Bancorp Servs.*, 359 F.3d at 1375; *Disney Enters.*, 923 F. Supp. 2d at 801; *Yeda Rsch.*, 906 F.3d at 1041-42.

Here, Exhibit 2010 is relevant to showing the knowledge of one of skill in the art at the time of the invention. While published after the ’609 Patent’s provisional

application date of October 7, 2011,⁶ it can still serve to show what was known at the time of the invention. *In re Epstein*, 32 F.3d 1559, 1563, 1567 (Fed. Cir. 1994) (holding that BPAI did not err in relying on documents years after priority date to show state of the art). Petitioner’s arguments that Exhibit 2010 is dated too late to be probative are properly directed to the weight the Board should give the evidence, not the admissibility. Accordingly, Exhibit 2010 is admissible.

C. Exhibit 2011 Is Authentic

As with Exhibit 2008, and for the same reasons, Exhibit 2011 is sufficiently shown to be authentic.

As Mr. Berg’s Declaration explains, Exhibit 2011 is a paper entitled “Low Stress TSV Arrays for High-Density Interconnection” and published in 2024. Ex. 2012, ¶ 72, Ex. 2011. It bears distinctive indicia of authenticity: the ISSN number 2095-8099, a copyright notice, and publication date of 2024, begins on page 201 of a larger volume, and indicates that it is downloaded from and stored on Elsevier (Science Direct). Ex. 2011. The document is further and currently available for download on Science Direct.⁷ “Such indicia have been found to be sufficient to support authentication.” *Cont’l Auto. Sys.*, IPR2022-01130, Paper No. 41 at 12; *see*

⁶ Per IEEE and the document itself, the paper was published on January 24, 2014 <https://ieeexplore.ieee.org/document/6722913>

⁷ <https://www.sciencedirect.com/science/article/pii/S209580992400153X>

also Mercedes-Benz USA, LLC, IPR2023-01344, Paper No. 31 at 41 (finding IEEE Xplore evidence sufficient to show date of publication).

The document is also self-authenticating under FRE 902. It bears a copyright notice, ISBN, and is paginated (starting at page 201) showing that it was part of a larger document. *Intel Corp.*, IPR2020-00528, Paper No. 39 (copyright notice, ISBN number, and pagination sufficient to show that the paper was an authentic printed publication). Accordingly, Exhibit 2011 is authentic.

D. Exhibit 2011 Is Relevant

Exhibit 2011 is also relevant as confirmatory evidence that the POSITA would understand that “voids” are typically referred to as defects in TSVs, not desirable features. Petitioner’s relevance challenge is premised entirely on Exhibit 2011 being published after the ’609 Patent’s priority date. Mot. at 6-7. However, like Exhibit 2008, Patent Owner does not use Exhibit 2011 for prior art purposes.

Instead, Patent Owner uses Exhibit 2011 to illustrate that one of skill in the art at the time of the invention would understand a “void” to be different from a “hollow center.” POR, 30-31. Documents that do not qualify as prior art are nonetheless relevant and probative of the knowledge of one of skill in the art. *Bancorp Servs.*, 359 F.3d at 1375; *Disney Enters.*, 923 F. Supp. 2d at 801; *Yeda Rsch.*, 906 F.3d at 1041-42.

Here, Exhibit 2011 is relevant to showing the knowledge of one of skill in the art at the time of the invention. While published after the '609 Patent's provisional application date of October 7, 2011,⁸ it can still serve to show what was known at the time of the invention. *In re Epstein*, 32 F.3d at 1563, 1567 (holding that BPAI did not err in relying on documents years after priority date to show state of the art). Petitioner's arguments that Exhibit 2011 is dated too late to be probative are properly directed to the weight the Board should give the evidence, not the admissibility. Accordingly, Exhibit 2011 is admissible.

V. CONCLUSION

For the foregoing reasons, Patent Owner respectfully requests that the Board deny Petitioner's Motion to Exclude in its entirety.

Respectfully submitted,

Dated: December 19, 2025 By: /Joseph M. Mercadante /
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⁸ Per the document itself, Exhibit 2011 was published on April 3, 2024.

CERTIFICATE OF SERVICE

A copy of PATENT OWNER'S OPPOSITION TO PETITIONER'S MOTION TO EXCLUDE EVIDENCE has been served on Petitioner's counsel of record as follows:

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