

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HANWHA SOLUTIONS CORPORATION,
Petitioner,

v.

MAXEON SOLAR PTE. LTD.,
Patent Owner.

Case No. IPR2024-01198

U.S. Patent No. 11,251,315

**PETITIONERS' REPLY TO PATENT OWNER'S PRELIMINARY
RESPONSE¹**

¹ This Reply was authorized by the Board's December 12, 2024 email (Ex. 1085).

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Pursuant to the Board’s authorization, Petitioner Hanwha Solutions Corporation (“HSC”) submits this Reply to Patent Owner Maxeon Solar Pte. Ltd.’s (“Maxeon”) Preliminary Response regarding *Fintiv*.

I. The *Fintiv* Factors Favor Institution

Contrary to Maxeon’s arguments, each *Fintiv* factor, properly assessed and applied, favors institution of HSC’s petition.

Factor 1 (Stay)—HSC intends to request a stay after institution, and Judge Gilstrap often grants such requests where institution predates *Markman* and the IPR is likely to simplify the issues in the district court. *See, e.g., Resonant Sys., Inc. v. Samsung Elecs. Co.*, 2024 WL 1021023, at *3-4 (E.D. Tex. Mar. 8, 2024) (granting stay where case had not had a *Markman* hearing and “cancellation of some ... claims could result in simplification”); *Foras Techs. Ltd., v. Aptiv PLC*, No. 2:23-cv-00314-JRG, ECF No. 92 (E.D. Tex. July 25, 2024) (same). Both circumstances apply here. The institution decision is expected by February 28, 2025, four months before Hanwha and Maxeon exchange terms for construction and eight months before the *Markman* hearing. EX1087 at 4. Further, HSC’s petition challenges all claims asserted in Maxeon’s infringement contentions, guaranteeing that resolution of the IPR will simplify the issues in the district court.

Factor 2 (Trial Date)—District court trial dates that are later than the statutory deadline for a final written decision generally resolve concerns about timing in favor

of institution. *See, e.g., Cisco Sys., Inc. v. NetSocket, Inc.*, IPR2023-00607, Paper 11 at 16 (P.T.A.B. Sept. 26, 2023) (FWD “one or two months” before trial favors institution); *Peloton Interactive, Inc. v. iFit, Inc.*, IPR2022-00029, Paper 13 at 41 (P.T.A.B. April 22, 2022) (FWD “more than six weeks” before trial). Here, the Final Written Decision is expected by February 27, 2026, more than two months **before** trial. EX1087 at 1.

Maxeon’s reliance on the trial date in its unrelated, co-pending litigation against Canadian Solar, Inc. (“CSI”), POPR at 61, is misplaced. CSI’s IPR petitions rely on different grounds from HSC, with only one overlapping secondary reference (Marvin), and CSI included a stipulation that it will not assert in district court any ground it could have raised in its petition for asserted claims. *Canadian Solar, Inc. v. Maxeon Solar Pte. Ltd.*, IPR2024-01038, Paper 1 at 11 (P.T.A.B. June 25, 2024). Thus, if instituted, the district court trial in that case will **not** address the grounds presented in HSC’s petition. Maxeon’s reliance on *TCO AS v. NCS Multistage Inc.*, POPR at 61, is therefore inapposite. In that case, there was no dispute that an earlier trial in a co-pending litigation would “resolve all of the same invalidity issues that are presented in the Petition.” PGR2020-00077, Paper 16 at 11-12 (P.T.A.B. Feb. 18, 2021). That is not the circumstance here. Where, as here, trial in a co-pending litigation is “unlikely to address all (or a majority of) the issues raised” in a petition, it “does not tip *Fintiv* factor 2 in favor of discretionary denial.” *Intel Corp. v. Besang*

Inc., IPR2023-00991, Paper 12 at 19 (P.T.A.B. Dec. 13, 2023).

Factor 3 (Investment)—HSC diligently filed its petition fewer than four months after Maxeon filed its complaint—before receiving Maxeon’s infringement contentions and entry of a scheduling order—and the district court has not issued any substantive orders relating to the ’315 patent. *See Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 10 (P.T.A.B. March 20, 2020). As Maxeon acknowledges, the district court case “is in its early stages,” POPR at 62, and substantial work remains to be done on invalidity issues: the *Markman* hearing (Nov. 2025), fact discovery (scheduled to close Nov. 2025), expert discovery (scheduled to close Jan. 2026), and dispositive motions (briefing through Feb. 2026) will occur well after institution. *See* EX1087 at 3-4. The Board frequently institutes IPRs even when district court proceedings are significantly more advanced. *See, e.g., Sand Revolution II, LLC v. Cont’l Intermodal Grp. – Trucking LLC*, IPR2019-01393, Paper 24 at 10-11 (P.T.A.B. June 16, 2020) (instituting after exchange of contentions and entry of *Markman* order). Indeed, **none** of the completed or ongoing work in district court identified by Maxeon—including early dismissal of certain parties, HSC’s motion to transfer and venue discovery, and service of Maxeon’s infringement contentions—relates to invalidity. POPR at 62. Maxeon’s reliance on the CSI litigation and *TCO*, POPR at 62, is again inapposite because the CSI trial will not “involve[] the same ... arguments” as Hanwha’s petition. *TCO*, PGR2020-

00077, Paper 16 at 14.

Factor 4 (Overlap of Issues)—At this early stage, overlap between the claims at issue in parallel proceedings is “not persua[sive]” because “the same claims often are at issue” in an IPR proceeding and parallel litigation. *Unified Patents, LLC v. WSOU Invs., LLC*, IPR2021-00378, Paper 14 at 14-15 (P.T.A.B. July 23, 2021). Further, the Challenged Claims (10-20) include claims that do **not** overlap with those asserted in Maxeon’s complaint (10-11, 13-15), EX1005 at 36, Maxeon’s infringement contentions (10, 13-16, 19), EX1086 at 2, and CSI’s petitions (10-16, 19). Hanwha’s trial, CSI’s trial, and CSI’s IPRs will not address the non-overlapping claims. Maxeon’s reliance on HSC’s invalidity counterclaim to show alleged overlap is premature and not informative of the identity of issues between the proceedings, as HSC’s invalidity contentions are not due for nearly two months. Regardless, any overlap between the grounds in HSC’s petition and its eventual invalidity contentions **favors** institution because those grounds will be adjudicated by the Board **before** the district court. Maxeon’s reliance on CSI’s invalidity contentions is inapposite for the reasons explained with respect to Factors 2 and 3.

Factor 5 (Parties)—“This factor favors denial if trial precedes the Board’s Final Written Decision and favors institution if the opposite is true.” *Huawei Tech. Co. v. WSOU Invs., LLC*, IPR2021-00225, Paper 11 at 14 (P.T.A.B. June 14, 2021). Here, the Final Written Decision is expected by February 27, 2026, and trial in the

district court is not scheduled until May 4, 2026. EX1087 at 1. Maxeon’s *Fintiv* arguments extensively rely on its litigation against CSI, but Hanwha is not a party to that litigation, is not a real-party-in-interest to CSI’s IPR petitions, and would not be estopped based on a Final Written Decision in the CSI IPR under 35 U.S.C. § 315(e)(2). Thus, this factor favors institution.

Factor 6 (Merits and Other Circumstances)—The Board need not consider Factor 6 because, as explained above, Factors 1-5 overwhelmingly favor institution. *Commscope Techs. LLC v. Dali Wireless, Inc.*, IPR2022-01242, Paper 23 at 4 (P.T.A.B. Feb. 27, 2023) (precedential). But even if considered, this factor supports institution. HSC’s petition presents compelling merits that are “highly likely” to “prevail with respect to at least one challenged claim.” *Opensky Indus., LLC v. VLSI Tech. LLC*, IPR2021-01064, Paper 102 at 49 (P.T.A.B. Oct. 4, 2022) (precedential). The petition identifies multiple primary references disclosing the claimed solar cell structure, as well as secondary references disclosing the claimed “dopant concentration” and “metal impurities” that provide straightforward motivations to combine. Maxeon’s response points only to immaterial differences between the references (e.g., composition of the passivation layer) and improperly seeks to require bodily incorporation of the secondary references into the primary references. Further, disagreements between experts should be resolved at trial, not at institution without benefit of cross examination.

Date: December 23, 2024

Respectfully submitted,

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CERTIFICATE OF SERVICE

Pursuant to an agreement between Petitioner and Patent Owner, I hereby certify that, on December 23, 2024, I caused a true and correct copy of the following materials:

- Petitioners' Reply to Patent Owner's Preliminary Response
- Updated Table of Exhibits
- Exhibits 1085, 1086 and 1087

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TABLE OF EXHIBITS

No.	Description
1001	U.S. Patent No. 11,251,315 B2 (“USP315”)
1002	File History for U.S. Patent No. 11,251,315 B2 (App. No. 16/877,255) (“USP315FH”)
1003	Declaration of Dr. Zachary Holman Regarding U.S. Patent No. 11,251,315
1004	Declaration of June Munford
1005	Complaint for Patent Infringement, <i>Maxeon Solar Pte. Ltd. v. Hanwha Solutions Corp., et al.</i> , Civil Action No. 2:24-cv-262 (E.D. Tex. Apr. 19, 2024), ECF No. 1 (“Complaint”)
1006	U.S. Patent App. Pub. No. 2014/0311567 (“Choi”)
1007	U.S. Patent No. 8,207,444 (“Cousins”)
1008	D.C. Marvin, S.L. Froedege, Interdigitated Back Contact Solar Cell Analysis and Design Recommendations for Space Use,” Space Systems Division Air Force Systems Command, Report 88D-TR-90-04 (“Marvin”)
1009	RESERVED
1010	F. Granek, High-Efficiency Back Contact Back-Junction Silicon Solar Cells (2009) (Ph.D. Dissertation, Fraunhofer Institute for Solar Energy Systems ISE) (“Granek”)
1011	U.S. Patent App. Pub. No. 2013/0240029 (“Smith”)
1012	A.A. Istratov, H. Väinölä, W. Huber, E. R. Weber, “Gettering in silicon-on-insulator wafers: experimental studies and modelling,” <i>Semicond. Sci. Technol.</i> 20: 568–575 (April 2005) (“Istratov”)
1013	EP1732142A1 (“Froitzheim”)
1014	JP07-106611 (“Okayasu”) (Translation)
1015	Translation Declaration for Okayasu
1016	N. G. Tarr, “A polysilicon emitter solar cell,” <i>IEEE Electron Device Letters</i> , vol. 6, no. 12, pp. 655-658, Dec. 1985 (“Tarr”)

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1017	U.S. Patent No. 6,262,359 (“Meier”)
1018	Zachary C. Holman, Electron Transport in Amorphous Silicon (May 2005) (Thesis Presented to The Division of Mathematics and Natural Sciences, Reed College) (“Holman-Thesis”)
1019	P.J. Verlinden, R.A. Sinton, K. Wickham, R.A. Crane, and R.M. Swanson, “Backside-contact silicon solar cells with improved efficiency for the ’96 world solar challenge,” in Proceedings of the 14th European Photovoltaic Solar Energy Conference, Barcelona, Spain, 96-9 (1997) (“Verlinden”)
1020	R.A. Sinton and R.M. Swanson, “Simplified backside-contact solar cells,” IEEE Transactions on Electron Devices, 37 (2), 348-52, (1990) (“Sinton”)
1021	R.R. King, R.A. Sinton, R.M. Swanson, “Studies of Diffused Phosphorous Emitters: Saturation Current, Surface Recombination Velocity, and Quantum Efficiency,” IEEE Transactions On Electron Devices, Vol. 37, No. 2 (Feb. 1990) (“King”)
1022	W.P. Mulligan, D.H. Rose, M.J. Cudzinovic, D.M. De Ceuster, K.R. McIntosh, D.D. Smith, and R.M. Swanson, Manufacture of solar cells with 21% efficiency, in Proceedings of the 19th European Photovoltaic Solar Energy Conference, Paris, France, 387-90 (2004) (“Mulligan”)
1023	J. Nelson, The Physics of Solar Cells, Imperial College Press, Chapters 1, 3, 4, 7, 9, 10 (2003) (“Nelson”)
1024	R. F. Pierret, Semiconductor Device Fundamentals, Addison-Wesley Publishing Company, Inc., Excerpts from Chapters 1-4 (1996) (“Pierret”)
1025	S.J. Fonash, Solar Cell Device Physics, Elsevier, Excerpts from Chapter 2 (2d Ed. 2010) (“Fonash”)
1026	C. Hu, R.M. White, Solar Cells: From Basics to Advanced Systems, McGraw-Hill, Chapter 3 (1983) (“Hu”)

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1027	O. von Roos, B. Anspaugh, “The Front Surface Field Solar Cell, A New Concept,” Proceedings of the 13th IEEE PVSEC, pp. 1119-1120 (1978) (“von Roos”)
1028	E. van Kerschaver, G. Beaucarne, “Back-contact Solar Cells: A Review,” Prog. Photovolt: Res. Appl. 14:107-123 (2005) (“van Kershaver”)
1029	U.S. Patent No. 8,222,516 B2 (“USP516”)
1030	U.S. Patent No. 4,234,352 (“Swanson-352”)
1031	J. Bultman, I. Cesar, B. Geerligs, Y. Komatsu, W. Sinke, “Methods of emitter formation for crystalline silicon solar cells,” Photovoltaics International 6, pp. 69-80 (2012) (“Bultman”)
1032	U.S. Patent No. 5,444,001 (“Tokuyama”)
1033	I. Perichchaud, “Gettering of impurities in solar silicon,” Solar Energy Materials & Solar Cells 72:315–326 (2002) (“Perichchaud”)
1034	Mark John Kerr, Surface, Emitter and Bulk Recombination in Silicon and Development of Silicon Nitride Passivated Solar Cells (2002) (Ph.D. Thesis, The Australian National University) (“Kerr”)
1035	U.S. Patent App. Pub. No. 2012/0006392 (“Gupta”)
1036	File History for US 9,520,507 B2 (App. No. 14/579,935) (“USPA935FH”)
1037	File History for US 9,899,542 B2 (App. No. 15/213,273) (“USPA273FH”)
1038	File History for US 10,170,642 B2 (App. No. 15/876,927) (“USPA927FH”)
1039	File History for US 10,658,525 B2 (App. No. 16/228,165) (“USPA165FH”)
1040	P. Procel, V. Maccaronio, F. Crupi, G. Cocorullo, M. Zanuccoli, “Analysis of the Impact of Rear Side Geometry on Performance of Back-Contact Back-Junction Solar

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	Cells,” 2014 Fotonica AEIT Italian Conference on Photonics Technologies, Naples, Italy, 2014, pp. 1-4, IEEE (2014) (“Procel”)
1041	M. Hermle, F. Granek, O. Schultz, S. W. Glunz, “Analyzing the effects of front-surface fields on back- junction silicon solar cells using the charge-collection probability and the reciprocity theorem,” J. Appl. Phys. 103, 054507 (2008) (“Hermle”)
1042	J. E. Cotter, J. H. Guo, P. J. Cousins, M. D. Abbott, F. W. Chen, K. C. Fisher, “P-Type Versus n-Type Silicon Wafers: Prospects for High-Efficiency Commercial Silicon Solar Cells,” IEEE TRANSACTIONS ON ELECTRON DEVICES, VOL. 53, NO. 8, (Aug. 2006) (“Cotter”)
1043	S.W. Glunz, R. Preu, D. Biro, “Chapter 1.16: Crystalline Silicon Solar Cells – State-of-the-Art and Future Developments,” Comprehensive Renewable Energy, Elsevier (2012)
1044	P.J. Verlinden, R. M. Swanson, R. A. Crane, “7000 High-efficiency Cells for a Dream,” Progress In Photovoltaics Research and Applications, VOL 2. 143-152 (1994) (“Verlinden-1994”)
1045	U.S. Patent No. 4,665,277 (“Sah”)
1046	M. Green, “Silicon solar cells: evolution, high-efficiency design and efficiency enhancements,” Semiconductor Science & Technology 8 (1993) (“Green”)
1047	A.A. Istratov, H. Hieslmair, E.R.Weber, “Iron contamination in silicon technology,” Appl. Phys. A 70, 489–534 (2000) (“Istratov-2000”)
1048	A. Metz, R. Meyer, B. Kuhlmann, M. Grauvogl, R. Hezel, 18.5% Efficient First-Generation MIS Inversion-Layer Silicon Solar Cells, 26th PVSC (1997) (“Metz”)
1049	D. De Ceuster, P. Cousins, D. Rose, D. Vicente, P. Tipones, W. Mulligan, “Low Cost, High Volume Production of >22% efficiency silicon solar cells,” 22nd European Photovoltaic

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1050	RESERVED
1051	M.D. Lammert and R.J. Schwartz, “The interdigitated back contact solar cell: a silicon solar cell for use in concentrated sunlight,” IEEE Transactions on Electron Devices, ED-24 (4), 337-42, (1977) (“Lammert”)
1052	D. Lysáček, M. Lorenc, L. Válek, “Structure and gettering properties of polycrystalline silicon layers,” Proceedings of the 16th Joint Seminar Development of Materials Science in Research and Education, Czechoslovak Association for Crystal Growth, published by Czech and Slovak Crystallographic Association, Praha 2006 (ISBN 80-901748-7-6) p. 40-41 (“Lysacek”)
1053	K. Ishisaka, H. Tanaka, T. Nakashizu, “Gettering Properties of Silicon Wafer Covered by Polysilicon,” NIPPON STEEL TECHNICAL REPORT No. 59 (Oct. 1993) (“Nippon”)
1054	BP Solar Global Marketing, BP-MSX-120, 120-Watt Multicrystalline Photovolataic Module (“BP-MSX-120”)
1055 – 1056	RESERVED
1057	P. Stradins, A. Dameron, S. Essig, V. Lasalvia, B. Lee, Y. Liu, J. Luo, W. Nemeth, A. Norman, M. Page, “Passivated Tunneling Contacts to N-Type Wafer Silicon and Their Implementation into High Performance Solar Cells,” NREL Conference Paper (Dec. 2014) (“Stradins”)
1058	D. M. Chapin, C. S. Fuller, G. L. Pearson, “A New Silicon p-n Junction Photocell for Converting Solar Radiation into Electrical Power,” Journal of Applied Physics 25, 676 (1954) (“Chapin”)
1059	W. Shockley, H. J. Queisser, “Detailed Balance Limit of Efficiency of pn Junction Solar Cells,” J. Appl. Phys. 32, 510 (1961) (“Shockley”)

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1062	E. J. Mets, “Poisoning and Gettering Effects in Silicon Junctions,” J. Electrochem. Soc. Vol. 112, No. 4, pp. 420-425 (1965) (“Mets”)
1063	Petition for Inter Partes Review of U.S. Patent No. 11,251,315, Canadian Solar Inc. v. Moxone Solar Pte. Ltd., Case No. IPR2024-01038, Paper 1 (June 25, 2024) (“CSI-1038-Petition”)
1064	A. A. Istratov, W. Huber, E. R. Weber, “Experimental evidence for the presence of segregation and relaxation gettering of iron in polycrystalline silicon layers on silicon,” Appl. Phys. Lett. 85, 4472–4474 (2004) (“Istratov-2004”)
1065	KR1020130044982 (“Choi-982”) (Translation)
1066	Translation Declaration for Choi-982
1067	RESERVED
1068	U.S. Patent No. 6,998,288 (“Smith-288”)
1069	CN 1949545A to Li (“Li”) (Translation)
1070	Translation Declaration for Li
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1072	R. J. Komp, Practical Photovoltaics Electricity From Solar Cells, 3rd Ed., Chapters 1-3, 6 (2002) (“Komp”)
1073	T. Krygowski, A. Rohatgi, D. Ruby, Simultaneous P and B Diffusion, IN-SITU Surface Passivation, Impurity Filtering and Gettering for High-Frequency Silicon Solar Cells, 26 IEE Photovoltaic Specialists Conf. 29 September - 03 October, 1997 Anaheim, CA (1997) (“Krygowski”)

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1074	J. Benick, J. Rentsch, Ch. Schetter, C. Voyer, D. Biro, R. Preu, PECVD PSG as a Dopant Source for Industrial Solar Cells, Presented at the 21st European Photovoltaic Solar Energy Conference, September 4-8, 2006, Dresden (2CV.4.26) (“Benick”)
1075	M. Green, Silicon Solar Cells Advanced Principles & Practice, Centre for Photovoltaic Devices and Systems, Chapters 2, 10 (1995) (“Green-1995”)
1076	Petition for Inter Partes Review of U.S. Patent No. 11,251,315, <i>Canadian Solar Inc. v. Moxeon Solar Pte. Ltd.</i> , Case No. IPR2024-01194, Paper 1 (July 19, 2024) (“CSI-1194-Petition”)
1077	B. Paudyal, Y. H. Yoon, D. Cornwell, P. Shaw, F. Machuca, “Identification of metal impurities in crystalline silicon wafers,” IEEE (2011)
1078	S. Pizzini, M. Acciarri, S. Binetti, “From electronic grade to solar grade silicon: chances and challenges in photovoltaics,” <i>phys. stat. sol. (a)</i> 202, No. 15, 2928–2942 (2005) (“Pizzini”)
1079	U.S. Patent No. 9,496,437 (“Harley”)
1080	U.S. Pat. App. Pub. No. 2013/0164879 (“Cousins-2011”)
1081	“Cypress Announces Investment In Designer and Manufacturer Of Ultra-High-Efficiency Silicon Solar Cells” available at https://investors.sunpower.com/static-files/103bae51-d5a4-46f3-ae4c-efc7d65b968a (last accessed Aug. 6, 2024) (“Sunpower-2002”)
1082	“SunPower Announces World’s Most Efficient, Low-Cost Silicon Solar Cell” available at https://investors.sunpower.com/static-files/4e352cd3-71ed-45ca-a441-165e996c8222 (last accessed Aug. 6, 2024) (“Sunpower-2003”)
1083	D.P. Fenning, A.S. Zuschlag, M.I. Bertoni, B. Lai, G. Hahn and T. Buonassisi, Improved iron gettering of contaminated multicrystalline silicon by high-temperature phosphorus

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1084	D.H. Neuhaus and A. Munzer, “Industrial Silicon Wafer Solar Cells,” Advances in OptoElectronics, Vol. 2007, Article ID 24521, 1-15 (2007) (“Neuhaus”)
1085	Email chain between Counsel and Trial Board, dated December 11-12, 2024
1086	Plaintiff Maxeon Solar Pte. Ltd.’s Disclosure of Asserted Claims and Infringement Contentions, <i>Maxeon Solar Pte. Ltd. v. Hanwha Solutions Corp., et al.</i> , Civil Action No. 2:24-cv- 262 (E.D. Tex. Nov. 21, 2024)
1087	Docket Control Order, <i>Maxeon Solar Pte. Ltd. v. Hanwha Solutions Corp., et al.</i> , Civil Action No. 2:24-cv- 262 (E.D. Tex. Nov. 25, 2024), ECF No. 33