

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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SAMSUNG ELECTRONICS CO., LTD., SAMSUNG ELECTRONICS  
AMERICA, INC., SAMSUNG SEMICONDUCTOR, INC., and SAMSUNG  
AUSTIN SEMICONDUCTOR LLC.,  
Petitioner,

v.

W&WSENS DEVICES INC.,  
Patent Owner.

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Case PGR2025-00082  
U.S. Patent No. 12,243,948

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**PETITIONERS' UPDATED EXHIBIT LIST**

Pursuant to 37 C.F.R. § 42.63(e), Petitioners Samsung Electronics Co., Ltd.; Samsung Electronics America, Inc.; Samsung Semiconductor, Inc.; and Samsung Austin Semiconductor LLC hereby submits a current listing of Petitioner’s exhibits. Exhibits 1084-1095 are being filed today.

| Exhibit | Description                                                                                                                                                                                |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1001    | U.S. Patent No. 12,243,948 B2 to Wang et al. (“’948 Patent”).                                                                                                                              |
| 1002    | Declaration of Dr. Michael Lebby                                                                                                                                                           |
| 1003    | Prosecution History of the ’948 Patent (downloaded from Public PAIR).                                                                                                                      |
| 1004    | U.S. Patent Application Publication No. 2012/0049044 A1 to Kuboi (“ <i>Kuboi</i> ”).                                                                                                       |
| 1005    | U.S. Patent Application Publication No. 2012/0012741 A1 to Vasylyev (“ <i>Vasylyev</i> ”).                                                                                                 |
| 1006    | U.S. Patent Application Publication No. 2012/0033119 A1 to Shinohara (“ <i>Shinohara</i> ”).                                                                                               |
| 1007    | European Patent Application EP 2 172 974 A1 to NXP B.V. (“ <i>NXP</i> ”).                                                                                                                  |
| 1008    | Zhihong Huang et al., <i>Microstructured silicon photodetector</i> , Applied Physics Letters, Vol. 89 (2006), pp. 033506-1 to -3.                                                          |
| 1009    | Richard A. Myers et al., <i>Enhancing near-infrared avalanche photodiode performance by femtosecond laser microstructuring</i> , Applied Optics, Vol. 45, No. 35 (Dec. 2006), pp. 8825-31. |
| 1010    | Abbas El Gamal et al., <i>CMOS Image Sensors</i> , IEEE Circuits & Devices Magazine (May/June 2005), pp. 6-20.                                                                             |
| 1011    | <i>Electrical Engineering Dictionary – CRCnetBase 2000</i> (Phillip A. Laplante editor-in-chief, CRC Press LLC 2000), pp. 1-11.                                                            |
| 1012    | S.M. Sze et al., <i>Semiconductor Devices - Physics and Technology</i> (John Wiley & Sons, Inc. 3d ed. 2012), pp. 6-9, 205-10, 325-30, 392-406, 416-17, 466-67.                            |

| Exhibit | Description                                                                                                                                                                                                                                              |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1013    | John P. Uyemura, <i>CMOS Logic Circuit Design</i> (Kluwer Academic Publishers 2002), pp. 64, 74-102, 315-17, 458-60.                                                                                                                                     |
| 1014    | Khalil Jumah Tawfiq Hamam, <i>Organic Solar Cells Based on High Dielectric Constant Materials: An Approach to Increase Efficiency</i> (June 2013) (Ph.D. dissertation, Western Michigan University), pp. 1-122.                                          |
| 1015    | P. Kalugasalam et al., <i>Dielectric and AC Conduction Studies of Lead Phthalocyanine Thin Film</i> , Chalcogenide Letters, Vol. 6, No. 9 (Sept. 2009), pp. 469-76.                                                                                      |
| 1016    | Matthew Saucedo, <i>Porphyrin Thin Film Dielectrics</i> , SUNFEST Technical Report TR-CST01NOV04, Center for Sensor Technologies, Univ. of Pennsylvania, Philadelphia, PA (2004), pp. 181-98.                                                            |
| 1017    | N. Venkatramaiah et al., <i>Spectroscopic and dielectric studies of meso-tetrakis(p-sulfonatophenyl) porphyrin doped hybrid borate glasses</i> , Journal of Alloys and Compounds, Vol. 509 (2011), pp. 2797-803.                                         |
| 1018    | Tom J. Savenije, <i>Photogeneration and transport of charge carriers in a porphyrin p/n heterojunction</i> , Physical Review B, Vol. 55, No. 15 (Apr. 1997), pp. 9685-92.                                                                                |
| 1019    | Ümit Salan et al., <i>Synthesis, characterization, electrical and dielectric permittivity measurements of 2,9,16,23-tetra(4-ferrocenylimino-3-nitrophenoxy)phthalocyanines</i> , Journal of Porphyrins and Phthalocyanines, Vol. 10 (2006), pp. 1263-70. |
| 1020    | Teresa M. Figueira-Duarte et al., <i>Pyrene-Based Materials for Organic Electronics</i> , Chemical Reviews, Vol. 111 (2011), pp. 7260-314.                                                                                                               |
| 1021    | Jurgen Michel et al., <i>Advances in fully CMOS integrated photonic devices</i> , Proceedings of SPIE, Vol. 6477 (2007), pp. 64770P-1 to -11.                                                                                                            |
| 1022    | Mark Beals et al., <i>Process Flow Innovations for Photonic Device Integration in CMOS</i> , Proceedings of SPIE, Vol. 6898 (2008), pp. 689804-1 to -14.                                                                                                 |

| Exhibit | Description                                                                                                                                                                                      |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1023    | Donald A. Neaman, <i>Semiconductor Physics and Devices – Basic Principles</i> (McGraw Hill 3d ed. 2003), pp. 247-50, 260-61.                                                                     |
| 1024    | Laurent Frey et al., <i>Color filters including infrared cut-off integrated on CMOS image sensor</i> , Optics Express, Vol. 19, No. 14 (2011), pp. 13073-80.                                     |
| 1025    | U.S. Patent Application Publication No. 2012/0153124 A1 to Yu et al.                                                                                                                             |
| 1026    | U.S. Patent No. 8,390,036 B2 to Goto.                                                                                                                                                            |
| 1027    | U.S. Patent Application Publication No. 2008/0157141 A1 to Han.                                                                                                                                  |
| 1028    | Horst Zimmermann, <i>Integrated Silicon Optoelectronics</i> (Springer. 2d ed. 2010), pp. 1-7.                                                                                                    |
| 1029    | Ran Aharoni et al., <i>Basic model of absorption depth and injection levels in silicon under intermediate illumination levels</i> , Optics Communications, Vol. 291 (2013), pp. 1-6.             |
| 1030    | M.M. El-Nahass et al., <i>Structural and optical properties of Ni (II) tetraphenyl porphyrin thin films</i> , Eur. Phys. J. Appl. Phys., Vol. 57 (2012), pp. 30201-p1 to -p13.                   |
| 1031    | Martin A. Green, <i>Self-consistent optical parameters of intrinsic silicon at 300K including temperature coefficients</i> , Solar Energy Materials & Solar Cells, Vol. 92, (2008), pp. 1305-10. |
| 1032    | P.A. Lane et al., <i>Electroabsorption studies of phthalocyanine/perylene solar cells</i> , Solar Energy Materials & Solar Cells, Vol. 63 (2000), pp. 3-13.                                      |
| 1033    | Connie J. Chang-Hasnain et al., <i>High-contrast gratings for integrated optoelectronics</i> , Advances in Optics and Photonics, Vol. 4 (2012), pp. 379-440.                                     |
| 1034    | H.H. Li, <i>Refractive Index of Silicon and Germanium and Its Wavelength and Temperature Derivatives</i> , J. Phys. Chem. Ref. Data, Vol. 9, No. 3 (1980), pp. 561-658.                          |
| 1035    | U.S. Patent No. 8,378,339 B2 to Nomura et al.                                                                                                                                                    |
| 1036    | M.M. El-Nahass et al., <i>Structural and optical properties of thermally evaporated zinc phthalocyanine thin films</i> , Proc. 2 <sup>nd</sup> Saudi Sci. Conf. (Mar. 2004), pp. 277-93.         |

| Exhibit | Description                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1037    | M.E. Azim-Araghi et al., <i>Electrical and optical properties of an organic semiconductor metal-free phthalocyanine (C<sub>32</sub>H<sub>18</sub>N<sub>8</sub>)</i> , Eur. Phys. J. Appl. Phys., Vol. 58 (2012), pp. 30201-p1 to -p6.                                                                                                                                                                                                                     |
| 1038    | International Patent Publication No. WO 2011/085297 A1 to Han et al. (“Han”).                                                                                                                                                                                                                                                                                                                                                                             |
| 1039    | J.S. Arney et al., <i>Color Properties of Specular Reflections</i> , IS&T’s NIP20: 2004 International Conference on Digital Printing Technologies, pp. 445-49.                                                                                                                                                                                                                                                                                            |
| 1040    | Andrew Blakers et al., <i>Thin Single Crystalline Elongate Silicon Solar Cells</i> , Energy Procedia, Vol. 15 (2012), pp. 58-66.                                                                                                                                                                                                                                                                                                                          |
| 1041    | A. El Amrani et al., <i>Solar Module Fabrication</i> , International Journal of Photoenergy, Article ID 27610 (2007), pp. 1-5.                                                                                                                                                                                                                                                                                                                            |
| 1042    | Ji-Tao Liu et al., <i>Curing Determination of EVA for Solar Panel Application by DSC</i> , Application Note, PerkinElmer (2010), pp. 1-3.                                                                                                                                                                                                                                                                                                                 |
| 1043    | Chen ShuoFu et al., <i>A comprehensive consideration of bias voltage and temperature to extract the intrinsic frequency response of photodiodes</i> , Chinese Science Bulletin, Vol. 55, No. 32 (2010), pp. 3727-33.                                                                                                                                                                                                                                      |
| 1044    | Richard S. Quimby, <i>Photonics and Lasers - An Introduction</i> (John Wiley & Sons, Inc. 2006), pp. 249-79.                                                                                                                                                                                                                                                                                                                                              |
| 1045    | U.S. Patent No. 8,013,238 B2 to Hockaday.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 1046    | A. Vandenbroucke et al., <i>Influence of temperature and bias voltage on the performance of a high resolution PET detector built with position sensitive avalanche photodiodes</i> , IOP Publishing for Sissa Medialab (2012), pp. 1-30.                                                                                                                                                                                                                  |
| 1047    | U.S. Patent No. 8,274,122 B2 to Shimotsusa.                                                                                                                                                                                                                                                                                                                                                                                                               |
| 1048    | Renato Turchetta et al., <i>Introduction to CMOS Image Sensors</i> , Molecular Expressions™ Optical Microscopy Primer: Digital Imaging in Optical Microscopy (July 16, 2004), pp. 1-9, available at <a href="https://web.archive.org/web/20120508153832/https://micro.magnet.fsu.edu/primer/digitalimaging/cmosimagesensors.html">https://web.archive.org/web/20120508153832/https://micro.magnet.fsu.edu/primer/digitalimaging/cmosimagesensors.html</a> |

| Exhibit   | Description                                                                                                                                                                                                                       |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1049      | U.S. Patent Application Publication No. 2025/0194293 A1 to Wang et al. (“’948 Divisional”).                                                                                                                                       |
| 1050      | Prosecution History of the ’948 Divisional (downloaded from Public PAIR).                                                                                                                                                         |
| 1051      | Christopher Chase et al., <i>Size effect of high contrast gratings in VCSELs</i> , Optics Express, Vol. 17, No. 26 (Dec. 2009), pp. 24002-07.                                                                                     |
| 1052      | Eric R. Fossum, <i>CMOS Image Sensors: Electronic Camera-On-A-Chip</i> , IEEE Transactions on Electron Devices, Vol. 44, No. 10 (Oct. 1997), pp. 1689-98.                                                                         |
| 1053      | U.S. Patent Application Publication No. 2008/0259981 A1 to Wang et al.                                                                                                                                                            |
| 1054      | Sunetra Mendis et al., <i>CMOS Active Pixel Image Sensor</i> , IEEE Transactions on Electron Devices, Vol. 41, No. 3 (Mar. 1994), pp. 452-53.                                                                                     |
| 1055      | U.S. Patent Application Publication No. 2008/0055432 A1 to Koseki.                                                                                                                                                                |
| 1056      | Certified English translation of Japanese Published Unexamined Patent Application No. P2007-129024A to Hasegawa (“Hasegawa”).                                                                                                     |
| 1057-1083 | Reserved.                                                                                                                                                                                                                         |
| 1084      | Table Listing Public Availability Dates for Sensors.                                                                                                                                                                              |
| 1085      | M. Alarcon et al., Samsung Galaxy S5 Teardown, TechInsights Inc. (Apr. 11, 2014), <a href="https://www.techinsights.com/blog/samsung-galaxy-s5-teardown">https://www.techinsights.com/blog/samsung-galaxy-s5-teardown</a> .       |
| 1086      | Dick James and Daniel Yang, Samsung Galaxy S6 Teardown, TechInsights Inc. (Apr. 2, 2015), <a href="https://www.techinsights.com/blog/samsung-galaxy-s6-teardown">https://www.techinsights.com/blog/samsung-galaxy-s6-teardown</a> |
| 1087      | <i>W&amp;Wens Devices Inc. v. Samsung Elecs. Co.</i> , Case No. 2:24-cv-00854-JRG, Complaint for Patent Infringement, Dkt. 1 (E.D. Tex. Oct. 21, 2024).                                                                           |

| Exhibit | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1088    | <i>W&amp;Wens Devices Inc. v. Samsung Elecs. Co.</i> , Case No. 2:24-cv-00854-JRG, Joint Motion for Entry of an Order of Partial Dismissal Without Prejudice, Dkt. 82 (E.D. Tex. Oct. 7, 2025).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 1089    | <i>W&amp;Wens Devices Inc. v. Samsung Elecs. Co.</i> , Case No. 2:24-cv-00854-JRG, Order Granting Joint Motion for Partial Dismissal Without Prejudice, Dkt. 84 (E.D. Tex. Oct. 17, 2025).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 1090    | <i>W&amp;Wens Devices Inc. v. Samsung Elecs. Co.</i> , Case No. 2:24-cv-00854-JRG, First Amended Complaint for Patent Infringement, Dkt. 52 (E.D. Tex. Apr. 16, 2025).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 1091    | FPO IP Research & Communities search string (Nov. 25, 2025), <a href="https://www.freepatentsonline.com/search.html">https://www.freepatentsonline.com/search.html</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 1092    | FPO IP Research & Communities results of search string (Nov. 25, 2025), <a href="https://www.freepatentsonline.com/result.html?p=1&amp;edit_alert=&amp;srch=xprtsrch&amp;query_txt=%28PD%2F01%2F01%2F1789-%3E05%2F21%2F2013%29+AND+%28%E2%80%9Chole%0D%0Asemiconductor+elongated%E2%80%9D%7E20%29+OR+%28%E2%80%9Chole%0D%0Asemiconductor+vertical%E2%80%9D%7E20%29%29+AND+%28photoelectric%0D%0AOR+photodiode+OR+photodetect*%29&amp;uspat=on&amp;usapp=on&amp;date_range=all&amp;stemming=on&amp;sort=relevance&amp;search=Search">https://www.freepatentsonline.com/result.html?p=1&amp;edit_alert=&amp;srch=xprtsrch&amp;query_txt=%28PD%2F01%2F01%2F1789-%3E05%2F21%2F2013%29+AND+%28%E2%80%9Chole%0D%0Asemiconductor+elongated%E2%80%9D%7E20%29+OR+%28%E2%80%9Chole%0D%0Asemiconductor+vertical%E2%80%9D%7E20%29%29+AND+%28photoelectric%0D%0AOR+photodiode+OR+photodetect*%29&amp;uspat=on&amp;usapp=on&amp;date_range=all&amp;stemming=on&amp;sort=relevance&amp;search=Search</a> . |
| 1093    | Prosecution History of U.S. Patent Application No. 19/036,506.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 1094    | Excerpts of Prosecution History of U.S. Patent Application No. 16/042,535.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 1095    | <i>Samsung Elecs. Co. v. W&amp;Wsens Devices Inc.</i> , IPR2025-00997, Order Granting Joint Motion to Terminate Proceeding, Paper 12 (PTAB Nov. 7, 2025).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

Respectfully submitted,

Dated: December 5, 2025

By: / Joshua L. Goldberg /  
Joshua L. Goldberg, Reg. No. 59,369  
Lead Counsel for Petitioner

**CERTIFICATE OF SERVICE**

The undersigned certifies that a copy of the foregoing **Petitioner's Updated Exhibit List** and **Exhibits 1084-1095** were served electronically via email on December 5, 2025, in their entirety on the following:

James Hannah  
Aaron M. Frankel  
Jeffrey H. Price  
Jeffrey Eng  
Jenna Fuller  
HERBERT SMITH FREEHILLS KRAMER (US) LLP  
333 Twin Dolphin Drive,  
Suite 700  
Redwood Shores, CA 94065  
james.hannah@hsfkramer.com  
aaron.frankel@hsfkramer.com  
jeffrey.price@hsfkramer.com  
jeffrey.eng@hsfkramer.com  
jenna.fuller@hsfkramer.com  
svdocketingus@hsfkramer.com

Patent Owner has consented to service by email.

Dated: December 5, 2025

/ William Esper /  
William Esper  
Senior Litigation Paralegal  
Finnegan, Henderson, Farabow,  
Garrett & Dunner LLP