UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

ALIDOUBLE INC., Plaintiff, v. TAIWAN SEMICONDUCTOR MANUFACTURING COMPANY LIMITED. Defendant.	Case No: 2:22-cv-00298-JRG **JURY TRIAL DEMANDED**

FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff ALIDOUBLE, INC ("Alidouble" or "Plaintiff") files this First Amended Complaint for Patent Infringement[1] against Defendant Taiwan Semiconductor Manufacturing Company Limited ("TSMC" or "Defendant") regarding U.S. Patent Nos. 6,168,965 ("the '965 patent"), 6,169,319 ("the '319 patent"), 9,356,169 ("the '169 patent"), and 9,431,455 ("the '455 patent") ("the Asserted Patents").

PARTIES

1. Alidouble Inc. is a corporation organized and existing under the laws of the State of Texas, having a place of business at 12333 Snowden Road, Suite B, #79525, Houston, Texas 77080. Plaintiff is the assignee and sole owner of the Asserted Patents, and has the right to enforce (including for past infringement) each of the Asserted Patents.

2. TSMC is a company organized and existing under the laws of Taiwan. It has a principal place of business located at 8, Li-Hsin Rd. 6, Hsinchu Science Park, Hsinchu 300-78,

[1] Pursuant to the Court's Docket Control Order, Dkt. No. 39, because Plaintiff filed this First Amended Complaint before August 22, 2023 it is not necessary to seek leave.

Taiwan, R.O.C. TSMC is the parent corporation of Defendant TSMC NA. TSMC engages in business in the State of Texas. Pursuant to § 17.044 of the Texas Civil Practice & Remedies Code, TSMC has designated the Secretary of State as its agent for service of process and may be served with process through the Secretary of State. The Secretary of State may forward service to TSMC at its home office address located at 8, Li-Hsin Rd. 6, Hsinchu Science Park, Hsinchu 300-78, Taiwan, R.O.C. Alternatively, TSMC may be served with process by serving the Registered Agent of TSMC North America ("TSMC NA"), Steven A. Schulman, at 2851 Junction Avenue, San Jose, CA 95134.

JURISDICTION AND VENUE

3. This is an action for infringement of United States patents under 35 U.S.C. §§ 271, et seq. Federal question jurisdiction is conferred to this Court over patent infringement actions under 28 U.S.C. §§ 1331 and 1338(a).

4. Defendant is subject to this Court's specific jurisdiction pursuant to due process and/or the Texas Long Arm Statute, by virtue of having directly or through Defendant's Agents induced its direct and indirect customers to commit acts of infringement in this District and/or throughout the United States. As used in this First Amended Complaint, the term "Defendant's Agents" or "TSMC's Agents" includes, but is not limited to, TSMC Technology, Inc. ("TSMCTI"), which on information and belief[2] is a wholly owned subsidiary of TSMC and which is registered in Texas as a foreign corporation, and which has a registered agent for the service of process in this State; TSMC168, LLC, which on information and belief is a wholly owned subsidiary of TSMC and which is a registered domestic limited liability company in this state, and has a registered agent for the service of process in this State; TSMC North America ("TSMC NA"), which is a wholly owned

[2] As used in this First Amended Complaint, the term "information and belief" means that there is likely to be evidence after an opportunity for discovery and/or further investigation. F. R. Civ. P. 11(b)(3).

subsidiary of TSMC and which lists the same U.S. address as TSMCTI; OmniVision Technologies, Inc., which has for years formed a partnership with TSMC to develop and market products to customers in the United States, and/or to customers who ship products through the stream of commerce into the United States; VisEra, a corporation controlled by TSMC; Xintec, a corporation controlled by TSMC, and/or ON Semiconductor Corp. ("ONsemi"), an Arizona corporation that has partnered with TSMC to develop and market products to customers in the United States, and/or to customers who ship products through the stream of commerce into the United States. *See infra*, ¶¶54-49.

5. Defendant directly and/or through Defendant's Agents has advertised (including through websites), and induced others to offer to sell, sell and/or distribute products made by Plaintiff's patented processes in this District. Further, Defendant directly and/or through its agents, has purposefully and voluntarily placed such products in the stream of commerce knowing and expecting them to be purchased and used by consumers in Texas and in this District.

6. Further, on information and belief, this Court has personal jurisdiction over Defendant TSMC at least by virtue of Federal Rule of Civil Procedure 4(k)(2).

7. Venue is proper against Defendant TSMC in this District pursuant to 28 U.S.C. § 1391(c)(3) and 28 U.S.C. § 1400(b). TSMC is not a resident of the United States and may be sued in any district, including this District.

8. For these reasons, personal jurisdiction exists, and venue is proper in this Court under 28 U.S.C. §§ 1391(b), (c) and/or 28 U.S.C. § 1400(b).

BACKGROUND FACTS

9. Plaintiff is the owner of the entire right, title, and interest in the Asserted Patents. The Asserted Patents are directed to BSI sensors and processes for manufacturing the same, as well as circuits and devices that incorporate the claimed sensors.

U.S. Patent No. 6,168,965

10. U.S. Patent No. 6,168,965 ("the '965 patent") is entitled "Method for Making Backside Illuminated Image Sensor," and was issued by the U.S. Patent and Trademark Office (the "PTO") to inventors Yacov Malinovich and Ephie Koltin on January 2, 2001. A copy of the '965 patent is attached to this complaint as Exhibit A.

11. The PTO's publicly accessible patent assignment records indicate that inventors Yacov Malinovich and Ephie Koltin assigned the entire right, title, and interest in the '965 patent to Tower Semiconductor Ltd. (reel 010171; frame 0466), which assigned its entire right, title and interest to Keystone Intellectual Property Management Limited (reel 057109; frame 0406), which then assigned the '965 patent to Alidouble (reel 058130; frame 0548). As a result, Alidouble owns the entire right, title, and interest in the '965 patent.

12. The '965 patent's claims are directed to patent-eligible subject matter, and the '965 patent is valid and enforceable.

13. Defendant is not licensed to practice the '965 patent in either an express or implied manner.

14. The '965 patent is directed generally to methods of manufacturing BSI sensors, also commonly known as back-illuminated CMOS image sensors. *See* Exhibit A at 1 (Abstract).

15. Claim 1 of the '965 patent is directed to:

> A method of producing backside illuminated image sensors comprising the steps of:
>
> producing a plurality of image sensor circuits on a wafer having first and second surfaces each of the image sensor circuits being formed on the first surface and including a matrix of light-sensitive pixel regions extending into the wafer from the first surface;
>
> securing the wafer onto a protective substrate such that the first surface faces the protective substrate;
>
> removing material from the second surface of the wafer until the

> light-sensitive pixel regions of each image sensor circuit are effectively exposed through the second surface;
>
> securing a transparent substrate onto the second surface of the wafer, thereby producing a waferwise sandwich; and
>
> slicing the waferwise sandwich, thereby defining a plurality of backside illuminated image sensors.

Exhibit A, col. 11:15-33.

16. Claim 7 of the ’965 patent is directed to:

> The method according to claim 1, wherein the step of securing a transparent substrate onto the second surface comprises depositing an adhesive onto the second surface, and then placing the transparent substrate onto the deposited adhesive.

Exhibit A, col. 12:19-23.

17. Claim 8 of the ’965 patent is directed to:

> The method according to claim 7, wherein the step of removing material includes separating each of the plurality of image sensor circuits; and wherein the step of depositing the adhesive onto the second surface further comprises depositing adhesive into interstices located between the plurality of image sensor circuits, thereby protecting the image sensor circuits.

Exhibit A, col. 12:24-31.

18. Claim 10 of the ’965 patent is directed to:

> The method according to claim 1, wherein the step of securing the wafer onto a protective substrate further comprises: forming a passivation layer on the first surface of the wafer; forming openings in the passivation layer; and securing the protective substrate onto the passivation layer.

Exhibit A, col. 12:37-44.

U.S. Patent No. 6,169,319

19. U.S. Patent No. 6,169,319 (“the ’319 patent”) is entitled “Backside Illuminated Image Sensor,” and was issued by the PTO to inventors Yacov Malinovich and Ephie Koltin on January 2,

2001. The ’319 patent is a Division of the ’965 patent. A copy of the ’319 patent is attached to this complaint as Exhibit B.

20. The PTO’s publicly accessible patent assignment records indicate that inventors Yacov Malinovich and Ephie Koltin assigned the entire right, title, and interest in the ’319 patent to Tower Seminconductor Ltd. (reel 010171; frame 0466), which assigned its entire right, title and interest to Keystone Intellectual Property Management Limited (reel 057109; frame 0965), which subsequently assigned the ’319 patent to Alidouble (reel 058130; frame 0548). As a result, Alidouble owns the entire right, title, and interest in the ’319 patent.

21. The ’319 patent’s claims are directed to patent-eligible subject matter, and the ’319 patent is valid and enforceable.

22. Defendant is not licensed to practice the ’319 patent in either an express or implied manner.

23. Claim 1 of the ’319 patent is directed to:

> A backside illuminated image sensor comprising:
>
> a semiconductor substrate having a first surface and a second surface;
>
> a plurality of light-sensitive pixel regions formed on the first surface of the semiconductor substrate and including a photodiode diffusion region extending into the semiconductor substrate from the first surface;
>
> a metal line formed adjacent the first surface of the semiconductor substrate;
>
> a protective substrate secured to the semiconductor substrate such that the metal line is located between the protective substrate and the semiconductor substrate; and
>
> a transparent substrate secured to the second surface of the semiconductor substrate such that the semiconductor substrate is sandwiched between the transparent substrate and the protective substrate;

> wherein the semiconductor substrate has a thickness defined such that the light-sensitive pixel region is effectively exposed through the second surface.

Exhibit B, col. 11:21-42.

24. Claim 2 of the ’319 patent is directed to:

> The backside illuminated image sensor according to claim 1, further comprising a first adhesive layer located between the protective substrate and the semiconductor substrate, and a second adhesive layer located between the transparent substrate and the semiconductor substrate.

Exhibit B, col. 12:1-5.

25. Claim 6 of the ’319 patent is directed to:

> The backside illuminated image sensor according to claim 1, further comprising a plurality of metal leads formed on the protective layer.

Exhibit B, col. 12:37-39.

U.S. Patent No. 9,356,169

26. U.S. Patent No. 9,356,169 (“the ’169 patent”) is entitled “Apparatus, System and Method of Back Side Illumination (BSI) Complementary Metal-Oxide-Semiconductor (CMOS) Pixel Array,” and was issued by the PTO to inventors Assaf Lahav and Amos Fenigstein on May 31, 2016. A copy of the ’169 patent is attached to this complaint as Exhibit C.

27. The PTO’s publicly accessible patent assignment records indicate that inventors Assaf Lahav and Amos Fenigstein assigned the entire right, title, and interest in the ’169 patent to Tower Semiconductor Ltd. (reel 038324; frame 0383), which assigned its entire right, title and interest to Keystone Intellectual Property Management Limited (reel 057110; frame 0159), which subsequently assigned the ’169 patent to Alidouble (reel 058130; frame 0548). As a result, Alidouble owns the entire right, title, and interest in the ’169 patent.

28. The ’169 patent’s claims are directed to patent-eligible subject matter, and the ’169 patent is valid and enforceable.

29. Defendant is not licensed to practice the ’169 patent in either an express or implied manner.

30. Claim 1 of the ’169 patent is directed to:

> A back-side illumination (BSI) complementary metal-oxide-semiconductor (CMOS) pixel array comprising:
>
> a plurality of pixels, a pixel of said plurality of pixels comprising:
>
> one or more Metal-Oxide-Semiconductor (MOS) transistors comprising one or more well regions, a well region of said one or more well regions comprising an N-Well (NW) region or a P-well (PW) region;
>
> a photodiode;
>
> an epitaxial (epi) layer comprising an absorption area and a collection area, said absorption area to absorb incoming photons and to generate electrons responsive to absorbed photons, and said collection area connecting said absorption area to said photodiode to provide said electrons from said absorption area to said photodiode; and
>
> a barrier layer separating said absorption area from said one or more well regions.

Exhibit C, col. 15:42-58.

31. Claim 2 of the ’169 patent is directed to:

> The BSI CMOS pixel array of claim 1, wherein said photodiode comprises a low fill factor (FF) diode.

Exhibit C, col. 15:59-60.

32. Claim 3 of the ’169 patent is directed to:

> The BSI CMOS pixel array of claim 1, wherein said collection area extends from said absorption area to said photodiode through said barrier layer.

Exhibit C, col. 15:61-63.

33. Claim 4 of the ’169 patent is directed to:

> The BSI CMOS pixel array of claim 1, wherein said collection area is configured to perform the functionality of an electrostatic lens to collect said electrons from said absorption area.

Exhibit C, col. 15:64-67.

34. Claim 5 of the ’169 patent is directed to:

> The BSI CMOS pixel array of claim 1, wherein said barrier layer is configured to prevent diffusion of said electrons from said absorption area to said well regions.

Exhibit C, col. 16:1-3.

35. Claim 10 of the ’169 patent is directed to:

> The BSI CMOS pixel array of claim 1 comprising a micro lens, said absorption area is between said micro lens and said barrier layer.

Exhibit C, col. 16:13-15.

36. Claim 11 of the ’169 patent is directed to:

> The BSI CMOS pixel array of claim 10 comprising an anti-reflective coating (ARC) layer, said ARC layer is between said micro lens and said absorption area.

Exhibit C, col. 16:15-18.

37. Claim 12 of the ’169 patent is directed to:

> The BSI CMOS pixel array of claim 1, wherein said one or more MOS transistors comprise one or more transistors selected from a group consisting of one or more P-type MOS (PMOS) transistors and one or more N-type MOS (NMOS) transistors.

Exhibit C, col. 16:19-23.

38. Claim 13 of the ’169 patent is directed to:

> The BSI CMOS pixel array of claim 1, wherein said barrier layer comprises a deep PW implant.

Exhibit C, col. 16:24-25.

39. Claim 14 of the ’169 patent is directed to:

> The BSI CMOS pixel array of claim 1, wherein said barrier layer comprises a boron implant.

Exhibit C, col. 16:26-27.

40. Claim 15 of the ’169 patent is directed to:

> The BSI CMOS pixel array of claim 1, wherein said photodiode comprises a fully pinned diode.

Exhibit C, col. 16:28-29.

U.S. Patent No. 9,431,455

41. U.S. Patent No. 9,431,455 (“the ’455 patent”) is entitled “Back-End Processing Using Low-Moisture Content Oxide Cap Layer,” and was issued by the PTO to inventors Amos Fenigstein, Yakov Roizin, and Avi Strum on August 30, 2016. A copy of the ’455 patent is attached to this complaint as Exhibit D.

42. The PTO’s publicly accessible patent assignment records indicate that inventors Amos Fenigstein, Yakov Roizin, and Avi Strum assigned the entire right, title, and interest in the ’455 patent to Tower Semiconductor Ltd. (reel 034131; frame 0905), which assigned its entire right, title and interest to Keystone Intellectual Property Management Limited (reel 057110; frame 0190), which subsequently assigned the ’455 patent to Alidouble (reel 058130; frame 0548). As a result, Alidouble owns the entire right, title, and interest in the ’455 patent.

43. The ’455 patent’s claims are directed to patent-eligible subject matter, and the ’455 patent is valid and enforceable.

44. Defendant is not licensed to practice the ’455 patent in either an express or implied manner.

45. Claim 1 of the ’455 patent is directed to:

> A method for fabricating a semiconductor integrated circuit,

> the method comprising:
>
> generating front-end structures including one or more doped diffusion regions disposed in a semiconductor substrate, one or more polycrystalline silicon structures disposed over a surface of the substrate, and a pre-metal dielectric layer over the one or more polycrystalline silicon structures;
>
> forming a plurality of metallization layers over the pre-metal dielectric layer,
>
> wherein forming at least one of said metallization layers includes:
>
> forming a patterned metal structure;
>
> forming an interlevel dielectric (ILD) layer comprising a TEOS-based oxide over the patterned metal structure; and
>
> forming a cap layer over the ILD layer over said ILD layer of all of said plurality of metallization layers except an uppermost said metallization layer,
>
> wherein forming the cap layer comprises forming a high-density, low-moisture content oxide material having a minimum thickness of 100 Å

Exhibit D, col. 17:56 – 18:9.

PATENT INFRINGEMENT

46. On information and belief, Defendant TSMC owns and operates a foundry in Taiwan which manufactures semiconductor devices according to the patented method covered by at least Claim 1 of the ‘391 Patent. A foundry manufactures chips for its customers, that sell the chips to other companies for inclusion in other products. For example, TSMC manufactures semiconductor devices at a variety of different process nodes, including 28-nanometer (“28nm”) process nodes. TSMC is a foundry that has contracts with many BSI chip designers to manufacture BSI chips which are eventually sold within the United States, or that are integrated into consumer products that are sold within the United States. On information and belief, TSMC collaborates with and advises its customers in the United States, either directly or through TSMC’s Agents, regarding the design of

the BSI semiconductor devices. For example, TSMC has formed with its US customer, e.g., OmniVision, a research and development alliance to develop 1.4µm pixel node technology specific for BSI sensors in 2009, at the latest.[3]

47. TSMC is publicly traded in the New York Stock Exchange (NYSE: TSM) with an obligation to file annual reports with the U.S. Securities and Exchange Commission. In this regard, TSMC's web page lists TSMC NA under "Business Contacts."[4] TSMC's 2021 Annual Report states, "TSMC provides customer support, account management and engineering services through offices in North America . . . ." TSMC Annual Report at 12. The same report also states "Net revenue by geography calculated mainly on the country in which customers are headquartered, was 65% from North America . . . ." *Id.* at 14.[5] TSMC's Annual Report further includes as "TSMC Major Corporate Functions, "North America * Sales and market development, field technical solutions and business operations for customers in North America." *Id.* at 18. The same report at page 15 states, "Smartphone Platform: TSMC offers customers leading process technologies * * * Furthermore, for premium and mainstream product applications, the Company offers highly competitive, leading-edge specialty technologies to deliver specialty companion chips for customers' logic application processors, including RF, embedded flash memory, emerging memory technologies, power

[3] Jointly published by Omnivision Technologies, Inc. and Taiwan Semiconductor Manufacturing Company (TSMC) in 2009. "The Mass Production of BSI CMOS Image Sensors." Publicly downloadable at https://www.imagesensors.org/Past%20Workshops/2009%20Workshop/2009%20Papers/006_paper_rhodes_omnivision_bsi2.pdf. This joint publication boasts the success of the TSMC and Omnivision alliance in successfully developing 1.4µm pixel node for BSI achieving peak quantum efficiencies of 43.8%, 53.6%, 51.6% has been achieved in the red, green and blue channels respectively, with low crosstalk, excellent Gb/Gr performance, no lag, etc.

[4] https://www.tsmc.com/english/aboutTSMC/business_contacts.

[5] *See also* TSMC's Rule 20-F report filed with the SEC at page 15, available at https://investor.tsmc.com/sites/ir/sec-filings/2021%2020-F.pdf (hereinafter "TSMC's Rule 20-F SEC Report").

management, sensors, and display chips, as well as advanced 3DFabricTM packaging technologies such as industry-leading Integrated Fan-Out (InFO) technology." *Id.* at 15. At page 13 of its Rule 20-F report, filed with the SEC for the year ending December 31, 2021, TSMC states under the heading, "Our Semiconductor Facilities," "We currently operate one 150mm wafer fab, six 200mm wafer fabs, five 300mm wafer fabs, and four advanced backend fabs. * * * [O]ne fab is located in the United States . . . ."[6]

48. As a dedicated semiconductor foundry, TSMC alleges it does not "design, manufacture, or market semiconductor products under its own brand name, ensuring that TSMC does not compete directly with its customers." TSMC 2007 Annual Report at 8 (available at https://investor.tsmc.com/english/annual-reports). In TSMC's 2007-2012, 2014, and 2015 Annual Reports (all of which are publicly available at https://investor.tsmc.com/english/annual-reports), TSMC discusses its design and manufacturing capabilities for BSI sensors and CMOS image sensors, for example, as follows:

- "Color backside illumination image capability was also successfully demonstrated." (2007 Annual Report at 48.)

- CMOS Image Sensor Technology
  A high-performance, 0.11μm 4T CMOS image sensor (CIS) process with back side illumination (BSI) technology was successfully developed by TSMC in 2008. This new process aimed at high-end imaging applications with a small pixel size of 1.4μm and high resolutions of greater than five megapixels. It is compatible with TSMC's 0.13μm CMOS logic, which enables SoC platforms in mobile phones, digital cameras, security sensors, automotive applications and other image sensor markets. Color backside illumination image capability was also successfully demonstrated. This technology can extend to N90 CIS technology with smaller pixel sizes (1.1μm) and ultra-high resolutions (larger than eight megapixels).
  (2008 Annual Report at 50.)

- CMOS Image Sensor Technology
  In 2009, TSMC was the first semiconductor company to have 1.4μm pixel with Back Side Illumination (BSI) technology in production that propelled our key customer to their performance leadership position. On top of that, we also successfully demonstrated world-

[6] TSMC's Rule 20-F SEC Report at 13.

first 12" bulk Si BSI technology with 1.1μm pixel size using 65nm design rules, with optical performance surpassing 1.75μm pixel. This technology would allow high performance sensors at density up to 16M pixels to achieve the performance not attainable by the conventional front side illumination at the same pixel size.
(2009 Annual Report at 51.)

- "We use 65-nanometer and back-side illumination (BSI) technology to achieve the best quantum efficiency for CMOS image sensors."
(2010 Annual Report at 6.)

- "TSMC further strengthened its comprehensive development of specialty technologies in 2010, including Back-side Illumination CMOS image sensor (BSI CIS), 90/65nm embedded flash and 0.13μm analog technologies."
(2010 Annual Report at 10.)

- "CMOS Image Sensor Technology
In 2010, TSMC extended our leadership in back-side illumination (BSI) to enable our key customer to win more visible business with popular handheld products. At the same time, BSI wafer processing in 12" bulk-silicon also started risk production with the 65nm 8-megapixel product to be ramped up in early 2011, followed by many others. TSMC also won the business for another leading CIS provider for 12" technology development, with wafer loading scheduled for 2012."
(2010 Annual Report at 51.)

- "TSMC further strengthened its comprehensive development of specialty technologies in 2011, including Backside Illumination CMOS image sensor (BSI CIS)"
(2011 Annual Report at 10.)
- "In addition, TSMC further strengthened its comprehensive development of specialty technologies in 2012, including . . . 40nm automotive and Backside Illumination CMOS Image Sensor (BSI CIS), which successfully migrated to 65nm from 0.11μm and to volume production in 12-inch fabs."
(2012 Annual Report at 6.)

- "65nm TSI CIS (TSMC Stacked Illumination CMOS Image Sensor) technology was fully qualified, and is ready for customer tape-outs in the first quarter of 2015."
(2014 Annual Report at 009.)

- "45nm 1.0 pixel TSMC Stacked Illumination CMOS Image Sensor technology was fully qualified and started production in the fourth quarter of 2015 for mid- to high-end mobile cameras."
(2015 Annual Report at 009.)

49. Further, in TSMC's 2016-2020 Annual Reports (all of which are publicly available at https://investor.tsmc.com/english/annual-reports), TSMC discusses its design and manufacturing capabilities for BSI sensors and CMOS image sensors, for example, as follows:

- "Complementary Metal-Oxide-Semiconductor (CMOS) Image Sensor Technology
  In 2016, CMOS image sensor technology made the following breakthroughs: (1) high-density wafer hybrid bond technology; (2) second-generation wafer backside trench isolation for pixels; and (3) composite metal grid structure for SNR (signal-to-noise ratio) per pixel improvement. The first breakthrough achieved the world's most advanced pitch density. The second and third breakthroughs reduced per-pixel electrical and optical cross-talk for better image quality compared to previous generations of optical structures. All three technologies passed product and process qualification and are progressing toward mass production."
  (2016 Annual Report at 079.)

- "Complementary Metal-Oxide-Semiconductor (CMOS) Image Sensor Technology
  In 2017, TSMC had several achievements in CMOS image sensor technology including: (1) high-performance sub-micron pixel development, which was completed and made ready for mass production; (2) quantum efficiency (QE), which gained significant boost on near-infrared sensors by innovated structure and usage of new material; and (3) pitch Density of wafer bond technology, which was pushed higher to maintain the Company's world-wide leading position."
  (2017 Annual Report at 077.)

- "Complementary Metal-Oxide-Semiconductor (CMOS) Image Sensor Technology
  In 2018, TSMC had several achievements in CMOS image sensor technology including: (1) mass-production of new generation sensors of sub-micron pixel for mobile application; (2) successful development of Ge-on-Si sensor for 3D range sensing applications with performance superior to Si sensor; (3) successful application of wafer stack technology to prototype Single Photon Avalanche Diode (SPAD) sensor array technology for 3D time-of-flight applications."
  (2018 Annual Report at 75.)

- "CMOS Image Sensor (CIS) technology was further refined to support the strong demand in advanced smartphone cameras. In early 2020, TSMC helped customers lead the market in rolling out 0.8μm pixel products. Pixel size was further reduced to 0.7μm within nine months with timely volume production. The smaller pixel size enables 30% higher resolution for CIS with the same chip size."
  (2020 Annual Report at 013.)

- "Complementary Metal-Oxide-Semiconductor (CMOS) Image Sensors
  In 2020, TSMC made several technical innovations in CMOS image sensor technology. The top four accomplishments were: (1) pixel size scaling demonstrating 15% shrinkage from the previous year with mass production for mobile, high-resolution imaging applications now underway; (2) technology transfer and start of mass production of

> automotive grade, ultra-wide dynamic-range image sensors with high reliability standard; (3) start of risk production phase of Germanium time-of-flight (TOF) sensors, which provide higher 3D object accuracy and use longer wavelength optical sources, resulting in lower system power consumption compared to silicon-type sensors – suitable for mobile devices and machine vision applications; (4) successful development of phase-II 3D metal-insulator-metal (MiM) high-density pixel-embedded capacitors with three times higher capacitance density than the previous generation for global shutter and high dynamic-range image sensor applications."
> (2020 Annual Report at 084.)

50. Through the above-noted 2016-2020 Annual Reports, which were publicly available to investors, customers, and potential customers in the United States, TSMC disclosed and promoted its manufacturing and design capabilities for BSI sensors that infringe the Asserted Patents and/or are prepared by processes that infringe the Asserted Patents.

51. TSMC has also authored, co-authored, and/or published numerous scientific papers concerning the design and its manufacture of BSI sensors that infringe one or more claims of the '965 and '319 patents and/or are prepared by processes that infringe one or more claims of the '965 and '319 patents. For example, a 2010 publication by TSMC (Exhibit E, S.G. Wuu *et al*., "A Leading-Edge 0.9μm Pixel CMOS Sensor Technology with Backside Illumination: Future Challenges for Pixel Scaling," *Int'l Electron Devices Meeting* 14.1.1-14.1.4 (2010)), discloses TSMC's manufacturing process for BSI sensors that infringes one or more claims of the Asserted Patents. *See* Exhibit E at 14.4.1, 14.1.3, Figure 1. Specifically, this publication states that:

> A schematic of BSI process flow is shown in Fig.1. P/P+ epi wafers provide a cost-effective solution compared with SOI wafers. After Back-End-of-Line (BEOL) process is completed, a device wafer runs through a planarization process and is bonded with a carrier wafer. The bonded wafer is then mechanically and chemically thinned down from the bottom side of the device wafer to the target thickness. The new backside Si surface is implanted with a shallow P+ layer followed by laser anneal for dopant activation. Backside antireflection (BARC) layers are coated to further enhance optical sensitivity. Pad opening, color filter array, and packaging process are performed to complete the BSI sensor manufacturing.

Exhibit E at 14.1.1, cols. 1-2. Further, Figure 1 of Exhibit E discloses the following process

schematic:

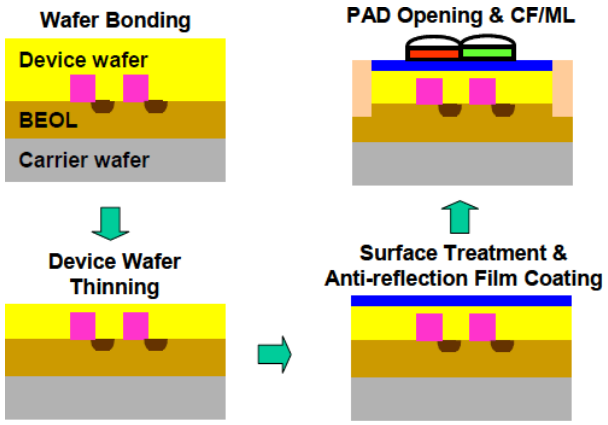

Figure1. Schematic of BSI process flow

Exhibit E at 14.1.3. Thus, in a 2010 publication TSMC informed customers and potential customers in the U.S. of its process for preparing BSI sensors that infringe one or more claims of the Asserted Patents, stating that "[t]he major steps are wafer bonding, thin-down process, and laser anneal." Exhibit E at 14.1.1, col. 2.

52. Further, one of TSMC's primary customers, OmniVision Technologies, Inc. ("OmniVision"), which is based in Sunnyvale, CA, has announced on numerous occasions that its BSI sensor products are developed and designed in collaboration with TSMC and manufactured by TSMC for the U.S. market. For example, in 2008 OmniVision announced that it had developed a BSI sensor product (OminBSI) "with the support of its long-time foundry and process technology partner," TSMC. *See, e.g.*, Exhibit F at 2.

53. In another example, a 2009 publication by OmniVision and TSMC (Exhibit G, S.G. Wuu *et al*., "A Manufacturable Back-Side Illumination Technology using Bulk-Si Substrate for Advanced CMOS Image Sensor," *Proc. Int'l Image Sensor Workshop*, Bergen, NO (June 2009)), discloses TSMC's manufacturing process for BSI sensors that infringes one or more claims of the '965 and '319 patents. *See* Exhibit G at 3, 5, Figure 1.

54. TSMC's Annual Report lists the "Major Corporate Function" of TSMC NA as "[s]ales, market development, field technical solutions and business operations for customers in North America."[7] Defendant TSMC and TSMC NA are related entities that work in concert to design, manufacture, import, distribute, market, and/or sell products that are manufactured according to the patents-in-suit. As of the end of 2021, TSMC owns 100% of TSMC NA's shares.[8] TSMC exercises actual control over TSMC NA and is liable for TSMC NA's direct and/or indirect infringing actions.

55. On information and belief, VisEra is a company that specializes in bonding optical elements to BSI wafers that partner with and/or providing service to, TSMC, and/or TSMC's Agents, and/or Xintec, and/or TSMC's customers. On information and belief, Defendant TSMC is a majority shareholder in VisEra, holding 72.83% of VisEra's shares, according to page 56 of VisEra's 2021 Annual Report. https://www.viseratech.com/download/0/120/.[9] Several members of VisEra's Board of Directors are affiliated with TSMC. *Id.* at 12. Nine out of ten board members of VisEra are currently working for worked for TSMC, including the Chairman, Mr. Robert Kuan. *Id*. at 12-13. According to a press release, TSMC, in partnership with Santa Clara, California-based OmniVision Technologies Inc., set up VisEra in 2003.[10] TSMC bought out OmniVision Technologies Inc. in 2014, becoming the single majority shareholder of VisEra.[11] At least since 2014, TSMC exercises actual control over VisEra and is liable for VisEra's direct and/or indirect infringing actions.

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[7] TSMC 2018 annual report is publicly available for download at: https://www.tsmc.com/download/ir/annualReports/2018/english/index.html.

[8] TSMC 2021 annual report is publicly available for download at: https://investor.tsmc.com/static/annualReports/2021/english/pdf/e_all.pdf. On page 71 of the 2021 TSMC annual report, it shows TSMC owns 100% of TSMC North America.

[9] Page 71 of TSMC 2021 annual report, showing TSMC owns 72.83% of VisEra, available at https://investor.tsmc.com/static/annualReports/2021/english/pdf/e_all.pdf.

[10] TSMC press release at https://pr.tsmc.com/english/news/1266.

[11] Public news at https://news.cnyes.com/news/id/642878. See also on page 18 and 78 of TSMC 2016Q2 report available at https://investor.tsmc.com/sites/ir/2019-11/2016Q2-C-consolidated.pdf.

56. On information and belief, Xintec. is a chip packaging company that partners with, and/or providing services to, TSMC and/or TSMC's Agents, and/or VisEra, and/or TSMC's customers. *See* https://www.xintec.com.tw/eng/index.aspx. On information and belief, Xintec is controlled, directly or indirectly by TSMC and/or OmniVision. On information and belief, TSMC owns at least 41.01% of Xintec's shares.[12] Six out of eight members of Xintec's management team are currently working or worked for TSMC, for example, including but not limited to, C.H. Chen (Chairman & President), C.A. Lin (Vice President, Sales and Marketing), M.Y. Chu (Vice President, Operations), T.Y. Liu (Sr. Director, R&D), J.W. Ma (Sr. Director, QR), and C.M. Fan (Sr. Director, Supporting).[13] Three out of five board members are currently working or worked for TSMC and/or TSMC's subsidiary companies.[14] According to Xintec's fourth quarter, 2022 report, TSMC contributes more than 70% of Xintec's overall revenue.[15] Further, VisEra leases real estates and factories from Xintec.[16] TSMC exercises actual control over VisEra and is liable for VisEra's direct and/or indirect infringing actions.

57. On information and belief, OmniVision is a long-time partner of TSMC in the design, manufacturing, and marketing of BSI sensors. Omnivision characterizes itself as "[a] leading developer of advanced digital imaging, analog and touch & display solutions. https://www.ovt.com. "OMNIVISION works in partnership with customers to customize end-to-end image-system

[12] https://fubon-ebrokerdj.fbs.com.tw/z/zc/zck/zck_3374.djhtm.

[13] https://www.xintec.com.tw/eng/AX_Management-Team.aspx.

[14] https://www.xintec.com.tw/eng/CSR_CG_Board_of_Directors.aspx, showing C.H. Chen, Y.J. Wan, and Robert Hsieh are either currently working or worked for TSMC and/or TSMC's subsidiary companies.

[15] Fourth quarter, 2021 Xintec financial report ("Xintec 4Q2021"): https://www.xintec.com.tw/images/financial-reports/chi/110FinancialReports(4Q110).pdf. On page 43 of Xintec 4Q2021 report, Xintec's total revenue is $7,667,343,000 NTD. On page 56 of Xintec 4Q2021, TSMC contributed to Xintec's revenue is $5,597,455,000 NTD.

[16] Page 56 of Xintec 4Q2021 report.

solutions from image sensing to output displays [including] [i]ndustry leading CMOS image sensor technology. . . .” https://www.ovt.com/company/about-us/. OmniVision advertises that its “supply chain partners” include TSMC, Visera and Xintec: “OMNIVISION is proud to have achieved compliance for ISO 9001:2015 certifications at both its headquarters in Santa Clara and its manufacturing/test facility in Shanghai, China. In addition, along with its supply-chain partners (TSMC, VisEra, Xintec, KYEC and ASE), the company has achieved the prestigious ISO TS16949 for its manufacturing and test facility in Shanghai, which is the highest level of certification one can receive for automotive manufacturing sites.” *Id.*

58. Together, TSMC, TSMC NA, Omnivision, and VisEra and/or Xintec form an Enterprise (“Enterprise 1”) for manufacturing BIS sensors, among other semiconductor imaging products, that infringe the patents-in-suit. To wit, Defendant, alone or through Defendant’s Agents, has entered into one or more agreements, including but not limited to contracts, corporate control over subsidiaries, and/or verbal agreements, which in fact have formed Enterprise 1 among TSMC, TSMC NA, OmniVision, VisEra and/or Xintec. The members of Enterprise 1 have a pecuniary interest in the common purpose of manufacturing and marketing of such sensors to entities in the United States, and/or to entities, including consumer product manufacturers who market products incorporating such BSI sensors which products are imported into the United States and which are offered for sale and/or sold in the United States. Collectively, each of the members of Enterprise 1 has an equal right to a voice in the direction of the enterprise, which gives such member an equal right of control. For example, OmniVision negotiates with one or more TSMC entities, including Defendant TSMC or its wholly owned subsidiary TSMC NA, to manufacture BSI sensors. The enterprise controls the foundry and manufacturing processes, including foundries owned by TSMC and/or VisEra and/or Xintec, which coordinate to manufacture the sensors. As an example, TSMC, a Taiwan company, manufactures the accused wafers for OmniVision, a California corporation. The

manufacture of the wafers originates when TSMC supplies TSMC NA with price quotations that are forwarded by TSMC NA to TSMC's customers, such as OmniVision. If OmniVision agrees to the terms of the price quotations, one of its foreign subsidiaries sends a purchase order to TSMC NA. TSMC NA then enters the purchase order into its computer system, which transmits the relevant product number, quantity, and price to TSMC. After receiving a purchase order from TSMC NA, TSMC manufactures the wafers in Taiwan. When the wafers are ready for pick-up, TSMC NA sends an invoice to OmniVision's foreign subsidiary "C/O OmniVision," giving it a certain number of days to pay. OmniVision's foreign subsidiary pays TSMC NA electronically in the United States, and then TSMC NA transfers of that amount to TSMC in Taiwan. TSMC NA retains the remaining amount if any. If further processing is necessary, the wafers are further processed by VisEra and/or Xintec. Enterprise 1 has a well-established supply chain that includes customers in the United States who import and purchase Defendant's BSI sensors and products containing Defendant's BSI sensors.

59. Another one of TSMC's primary customers is ON Semiconductor Corporation ("ONsemi"), which is based in Phoenix, Arizona. On information and belief, ONsemi's BSI sensor products are developed and designed in collaboration with TSMC and manufactured by TSMC for the U.S. market. On information and belief TSMC, TSMC NA, ONsemi, and other corporations, such as VisEra and/or Xintec constitute another enterprise ("Enterprise 2") for the manufacture of BSI sensors, and the sale of such sensors through a well-established supply chain to consumer product manufacturers for sale to customers in the United States. The members of Enterprise 2 have a pecuniary interest in the common purpose of manufacturing and marketing of such sensors to entities in the United States, and/or to entities, including consumer product manufacturers who market products incorporating such BSI sensors which products are imported into the United States and which are offered for sale and/or sold in the United States. Collectively, each of the members of Enterprise 2 has an equal right to a voice in the direction of the enterprise, which gives such member

an equal right of control. For example, ONsemi negotiates with one or more TSMC entities, including Defendant TSMC in this case, to manufacture BSI sensors. Enterprise 2 controls the foundry and manufacturing processes, including foundries owned by TSMC and/or VisEra and/or Xintec, which coordinate to manufacture the sensors. Enterprise 2 has a well-established supply chain that includes customers in the United States who import and purchase Defendant's BSI sensors and products containing Defendant's BSI sensors.

60. Together, TSMC, TSMC NA, VisEra and/or Xintec form an Enterprise ("Enterprise 3") for manufacturing BIS sensors, among other semiconductor imaging products, that infringe the patents-in-suit. To wit, Defendant has entered into one or more agreements, including but not limited to contracts, corporate control over subsidiaries, and/or verbal agreements, which in fact have formed Enterprise 3 among TSMC, TSMC NA, VisEra and/or Xintec. The members of Enterprise 3 have a pecuniary interest in the common purpose of manufacturing and marketing of BSI sensors to entities in the United States, and/or to entities, including consumer product manufacturers who market products incorporating such BSI sensors which products are imported into the United States and which are offered for sale and/or sold in the United States.

61. Defendant's BSI sensors, including but not limited to Omnivision BSI sensors such as OV64B, OS02C10, OV10650, OV2775, OX01B40, OV4688, OV48B, and OV4689; ONsemi BSI sensors such as AR0233, AR0521, AR00820, and AR430; Sony BSI sensors such as IMX324, IMX415, IMX586, IMX315, and IMX803 (collectively "Accused Products"), infringe one or more claims of the Asserted Patents.

62. Defendant TSMC has been working with Sony on producing infringing BSI sensors for a long time. *See* Ex. R ("Sony has long been outsourcing to TSMC the production of logic semiconductors, which are indispensable for stacked image sensors.") Before 2022, TSMC has been providing the logic layer for Sony's infringing BSI sensors, *i.e.*, image signal processing (ISP). *See*

id. Since 2022, TSMC has been producing both the ISP and the sensor layer for Sony's infringing BSI sensors. *See id.*

63. Sony Corporation and/or Sony Semiconductor Solutions Corporation is TSMC's customer since at least 2014 as disclosed in TSMC's annual reports.

64. In 2014, TSMC provided ISP chip to Sony which is incorporated into infringing BSI sensors. Apple iPhone 6/6 Plus incorporated the infringing BSI sensor jointly made by TSMC and Sony. *See* Ex. N at p.3 ("[i]n 2014 Sony demonstrated flexibility in choice of wafer vendors afforded by chip stacking by using TSMC as a foundry for the ISP on the Apple iPhone 6/6 Plus iSight cameras. These chips incorporate Sony 90 nm CIS wafers and TSMC 40 nm ISP wafers.") In TSMC's 2014 annual report, Sony Electronics Inc. is listed in "statement of notes and accounts receivable, net December 31, 2014" having a balance of 1,345,228,000 New Taiwan Dollars, which is about 45 million USD.[17]

65. In 2022, Apple iPhone 14/14 Pro used Sony's infringing BSI sensors made by TSMC. TSMC made both the ISP layer and sensor layer for Sony's infringing BSI sensors. *See* Exhibits O, P, Q.

66. In 2021, TSMC established a joint venture with Sony Semiconductor Solutions Corporation, a subsidiary of Sony, to start a new company, Japan Advanced Semiconductor Manufacturing (JASM), to make, produce, and sell infringing BSI sensors. *See* Ex. S ("In December 2021, TSMC established a subsidiary, Japan Advanced Semiconductor Manufacturing, Inc. (JASM), in Kumamoto, Japan, with Sony Semiconductor Solutions Corporation and DENSO Corporation participating as minority shareholders. JASM will construct and operate a fab that utilizes 12/16- and 22/28-nanometer technology to address strong global market demand for specialty technologies.

[17] https://investor.tsmc.com/sites/ir/annual-report/2014/e_11_1.pdf.

Production is targeted to begin by the end of 2024."); Ex. T ("In February 2022, TSMC, Sony Semiconductor Solutions Corporation (SSS) and Denso Corporation jointly announced a joint venture of Japan Advanced Semiconductor Manufacturing (JASM). In addition to the previously announced 22/28 nanometer process, TSMC will also enhance JASM's capabilities with 12/16 nanometer FinFET process technology, and increase monthly production capacity to 55,000 12-inch wafers. With the additional capacity, the total capital expenditure for JASM's Kumamoto fab is estimated to be approximately US$8.6 billion with strong support from the Japanese government."); Ex. O; Ex. R ("Sony plans to invest 500 million dollars (c. 57 billion JPY) in the semiconductor foundry that TSMC plans to build in Kumamoto Prefecture, aiming to strengthen its cooperation with the Taiwanese manufacture").

67. TSMC and/or its subsidiary and Sony and/or its subsidiaries constitute an enterprise ("Enterprise 4") for the manufacture of BSI sensors, and the sale of such sensors through a well-established supply chain to consumer product manufacturers, e.g., Apple, for sale to customers in the United States, e.g., the consumers. The members of Enterprise 4 have a pecuniary interest in the common purpose of manufacturing and marketing of such sensors to entities in the United States, and/or to entities, including consumer product manufacturers who market products incorporating such BSI sensors which products are imported into the United States and which are offered for sale and/or sold to consumer in the United States. Collectively, each of the members of Enterprise 4 has an equal right to a voice in the direction of the enterprise, which gives such member an equal right of control. For example, Sony and/or its subsidiary negotiates with one or more TSMC entities, including Defendant TSMC in this case, to manufacture at least a portion of or the entire BSI sensors. Enterprise 4 controls the foundry and manufacturing processes, including foundries owned or associated with TSMC, which coordinate to manufacture the sensors. Enterprise 4 has a well-

established supply chain that includes customers in the United States who import and purchase Defendant's BSI sensors and products containing Defendant's BSI sensors.

COUNT I – Infringement of U.S. Patent No. 6,168,965

68. Plaintiff incorporates paragraphs 1-67, above, by reference.

69. The '965 patent expired on or about August 12, 2019.

70. The BSI sensors manufactured by Defendant TSMC have been placed in the stream of commerce into the United States by TSMC and TSMC's Agents, and/or Enterprise 1, and/or Enterprise 2, and/or Enterprise 3, and/or Enterprise 4 and have been imported and sold in the United States. Such BSI sensors infringe at least claims 1, 7, 8, 10 of the '965 patent under section 271(g) for the reasons set forth in Exhibit H, attached hereto and incorporated herein by reference.

71. On information and belief, the BSI sensors imported into and sold in the United States were manufactured by TSMC, which filled orders from OmniVision and/or ONsemi and/or Sony, which Omnivision and/or ONsemi and/or Sony negotiated with TSMC and/or TSMC NA, and/or TSMC's Agents, and/or Enterprise 1, and/or Enterprise 2, and/or Enterprise 3, and/or Enterprise 4.

72. TSMC has known of the '965 patent since at least 2006, as evidenced by TSMC's citation of the '965 patent during prosecution of U.S. Patent Appl. No. 11/424,286, titled "Light Reflection for Backside Illuminated Sensor," filed June 15, 2006. *See* Exhibit I (excerpts from the publicly available prosecution file of U.S. Patent Appl. No. 11/424,286) at 20 showing that the application was assigned to TSMC); at 28-30 (Information Disclosure Statement dated June 15, 2006, citing the '965 patent).

73. TSMC similarly cited the '965 patent during prosecution of U.S. Patent Appl. No. 11/532,674, titled "Method for Providing Metal Extension in Backside Illuminated Sensor for Wafer Level Testing," filed Sept. 18, 2006. *See* Exhibit J (excerpts from the publicly available prosecution file of U.S. Patent Appl. No. 11/532,674) 2-6 (Information Disclosure Statement dated December 19,

2007, citing the ’965 patent); at 13 (showing that the application was assigned to TSMC).

74. Defendant and/or TSMC’s Agents and/or Enterprise 1 and/or Enterprise 2, and/or Enterprise 3, and/or Enterprise 4 have actively induced infringement by U.S. customers to import into the United States and sell and/or offer to sell Defendant’s infringing BSI sensors and/or products containing consumer products containing Defendant’s infringing BSI sensors, knowing that those sensors were made by a process that is covered by the claims of the ’965 patent, with specific intent to encourage infringement by such customers.

75. Defendant is aware that a significant amount of the Accused Products were eventually sold in the United States.

76. Plaintiff is entitled to a judgment that TSMC’s BSI sensors were manufactured by a process that infringes claims 1, 7, 8, 10 of the ’965 patent by the importation of the BSI sensors and/or consumer products that included TSMC’s BSI sensors.

77. Plaintiff is entitled to damages not less than a reasonable royalty for TSMC’s past infringement of one or more claims of the ’965 patent.

78. TSMC’s past knowledge of the ’965 patent demonstrates that its infringement of the ’965 patent was deliberate, willful, and unlicensed, permitting Plaintiff to seek enhanced damages under 35 U.S.C. § 284.

COUNT II – Infringement of U.S. Patent No. 6,169,319

79. Plaintiff incorporates paragraphs 1-78, above, by reference.

80. The ’319 patent expired on or about August 12, 2019.

81. The BSI sensors manufactured by Defendant have been placed in the stream of commerce into the United States by TSMC and TSMC’s Agents and/or Enterprise 1 and/or Enterprise 2 and/or Enterprise 3 and/or Enterprise 4 have been imported and sold in the United States. Such BSI

sensors infringe at least claims 1, 2, 6 of the ’319 patent under section 271(a) for the reasons set forth in Exhibit K, attached hereto and incorporated herein by reference.

82. On information and belief, the BSI sensors imported into and sold in the United States were manufactured by TSMC, which filled orders from OmniVision and/or ONsemi and/or Sony, which Omnivision and/or ONsemi and/or Sony negotiated with TSMC, and/or TSMC NA, and/or TSMC’s Agents and/or Enterprise 1, and/or Enterprise 2, and/or Enterprise 3, and/or Enterprise 4.

83. TSMC has known of the ’319 patent since at least 2006, as evidenced by TSMC’s citation of the ’319 patent during prosecution of U.S. Patent Appl. No. 11/424,286, titled “Light Reflection for Backside Illuminated Sensor,” filed June 15, 2006. *See* Exhibit I (excerpts from the publicly available prosecution file of U.S. Patent Appl. No. 11/424,286) at 20 showing that the application was assigned to TSMC); at 28-30 (Information Disclosure Statement dated June 15, 2006, citing the ’319 patent).

84. TSMC similarly cited the ’319 patent during prosecution of U.S. Patent Appl. No. 11/532,674, titled “Method for Providing Metal Extension in Backside Illuminated Sensor for Wafer Level Testing,” filed Sept. 18, 2006. *See* Exhibit J (excerpts from the publicly available prosecution file of U.S. Patent Appl. No. 11/532,674) 2-6 (Information Disclosure Statement dated December 19, 2007, citing the ’319 patent); at 13 (showing that the application was assigned to TSMC).

85. Defendant and/or TSMC’s Agents and/or Enterprise 1 and/or Enterprise 2 and/or Enterprise 3 and/or Enterprise 4 have actively induced infringement of the ’319 patent by inducing US consumers to use the BSI sensors and US customers to import into the United States and sell and/or offer to sell Defendant’s BSI sensors and/or products containing Defendant’s BSI sensors, knowing that those sensors are covered by the claims of the ’965 patent, with specific intent to encourage infringement by such customers.

86. Defendant is aware that a significant amount of the Accused Products were eventually sold in the United States.

87. Plaintiff is entitled to a judgment that Defendant induced US consumers to use and/or its customers to offer for sale, sell, import, and/or use utilize BSI sensors and consumer products that incorporated BSI sensors that infringed at least claims 1 2, 6 of the ’319 patent.

88. Plaintiff is entitled to damages not less than a reasonable royalty for Defendant’s past infringement of one or more claims of the ’319 patent.

89. Defendant’s past knowledge of the ’319 patent demonstrates that its infringement of the ’319 patent was deliberate, willful, and unlicensed, permitting Plaintiff to seek enhanced damages under 35 U.S.C. § 284.

COUNT III – Infringement of U.S. Patent No. 9,356,169

90. Plaintiff incorporates paragraphs 1-89, above, by reference.

91. The BSI sensors manufactured by Defendant have been placed in the stream of commerce into the United States by Defendant and/or Defendant’s Agents and/or Enterprise 1 and/or Enterprise 2 and/or Enterprise 3 and/or Enterprise 4 and have been imported and sold in the United States. Such BSI sensors infringe at least claims 1, 3-6, 10-15 of the ’169 patent under section 271(a) for the reasons set forth in Exhibit I, attached hereto and incorporated herein by reference.

92. On information and belief, the BSI sensors imported into and sold in the United States were manufactured by TSMC, which filled orders from OmniVision and/or ONsemi and/or Sony, which Omnivision and/or ONsemi and/or Sony negotiated with TSMC and/or TSMC NA, and/or Enterprise 1, and/or Enterprise 2, and/or Enterprise 3, and/or Enterprise 4.

93. On information and belief, at the time such orders were negotiated, Defendant was aware of Plaintiff’s ’169 patent. Defendant has been aware that their actions alleged in this

Complaint have induced infringement of the '169 patent since at least as early as December 14, 2021, when Plaintiff filed its first lawsuit against TSMC.

94. Defendant and/or TSMC's Agents and/or Enterprise 1 and/or Enterprise 2 and/or Enterprise 3 and/or Enterprise 4 has actively induced infringement of the '169 patent by inducing US consumers to use and/or customers to import into the United States and sell and/or offer to sell Defendant's infringing BSI sensors and/or products containing Defendant's infringing BSI sensors, knowing that those sensors are covered by the claims of the '169 patent, with specific intent to encourage infringement by such customers.

95. Defendant, together and/or with TSMC's Agents and/or with Enterprise 1 and/or Enterprise 2 and/or Enterprise 3 and/or Enterprise 4 has actively induced infringement of the '169 Patent under 35 U.S.C. § 271(b). Defendant, together and/or with TSMC's Agents and/or with Enterprise 1, and/or Enterprise 2, and/or Enterprise 3 and/or Enterprise 4 actively encouraged US consumers to use and/or customers to directly infringe the '169 patent by using, selling, offering for sale, and/or importing BSI sensors as well as devices and products containing the BSI sensors, Defendant, together with TSMC's Agents and/or with Enterprise 1 and/or Enterprise 2 and/or Enterprise 3 and/or Enterprise 4 actively encouraged US consumers to use and/or its customers to utilize infringing BSI sensors (and for their customers' customers to utilize the same) by and through Defendant's sales engineering and technical marketing efforts and staff. Defendant's sales engineers and technical marketing staff interfaced with customers and potential customers to develop and manufacture BSI sensors that infringed one or more claims of the '169 patent. *See, e.g.*, Exhibits E, F, and G. In doing so, Defendant's sales engineers and technical marketing staff touted the technological and economic benefits of the infringing BSI sensors and actively encouraged use of the infringing BSI sensors. Defendant has known that its customers' products (including the Accused Products) constituted direct infringement of at least one claim of the '169 patent since at least

December 14, 2021, when Plaintiff sued TSMC for infringement. As a result of Defendant's active encouragement and intentional inducement, Defendant's customers have offered for sale, sold, imported, and used products that directly infringed the '169 Patent (including but not limited to the Accused Products).

96. Plaintiff is entitled to a judgment that Defendant induced its customers to offer for sale, sell, import, and/or use utilize BSI sensors and consumer products that incorporated BSI sensors that infringed at least claims 1, 3-6, 10-15 of the '169 patent and/or US consumers to use thereof.

97. Plaintiff is entitled to damages not less than a reasonable royalty for Defendant's past infringement of one or more claims of the '169 patent.

98. Defendant's past knowledge of the '169 patent demonstrates that its infringement of the '169 patent was deliberate, willful, and unlicensed, permitting Plaintiff to seek enhanced damages under 35 U.S.C. § 284.

COUNT IV – Infringement of U.S. Patent No. 9,431,455

99. Plaintiff incorporates paragraphs 1-98 above, by reference.

100. The BSI sensors manufactured Defendant have been placed in the stream of commerce into the United States by TSMC and/or TSMC's Agents and/or Enterprise 1 and/or Enterprise 2 and/or Enterprise 3 and/or Enterprise 4 and have been imported and sold in the United States. Such BSI sensors infringe at least claim 1 of the '455 patent under section 271(g) for the reasons set forth in Exhibit M, attached hereto and incorporated herein by reference.

101. On information and belief, the BSI sensors imported into and sold in the United States were manufactured by TSMC, which filled orders from OmniVision and/or ONsemi and/or Sony, which Omnivision and/or ONsemi and/or Sony negotiated with TSMC and/or TSMC's Agents, and/or Enterprise 1, and/or Enterprise 2, and/or Enterprise 3, and/or Enterprise 4.

102. On information and belief, at the time such orders were negotiated, Defendant was

aware of Plaintiff's '455 patent. Defendant has been aware that their actions alleged in this Complaint have induced infringement of the '455 patent since at least as early as December 14, 2021, when Plaintiff filed its first lawsuit against TSMC.

103. Defendant and/or Defendant's Agents and/or Enterprise 1 and/or Enterprise 2 and/or Enterprise 3 and/or Enterprise 4 have actively induced infringement by U.S. customers to import Defendant's infringing BSI sensors and/or products containing consumer products containing Defendant's infringing BSI sensors, knowing that those sensors were covered by at least claim 1 of the '455 patent, with specific intent to encourage infringement by such customers.

104. Defendant is aware that a significant amount of the Accused Products were eventually sold in the United States.

105. Plaintiff is entitled to a judgment that Defendant will induce its customers to offer for sale, sell, import, and/or use utilize BSI sensors and consumer products that incorporated BSI sensors that infringe at least claim 1 of the '455 patent.

106. Plaintiff is entitled to a judgment that Defendant's BSI sensors that infringe claim 19 and/or are manufactured by a process that infringes at least claim 1 of the '455 patent by the importation of the BSI sensors and/or consumer products that included Defendant's BSI sensors.

107. Plaintiff is entitled to damages not less than a reasonable royalty for TSMC's infringement of one or more claims of the '455 patent.

108. Defendant's past knowledge of the '455 patent demonstrates that its infringement of the '455 patent was deliberate, willful, and unlicensed, permitting Plaintiff to seek enhanced damages under 35 U.S.C. § 284.

REQUEST FOR RELIEF

FOR ALL THESE REASONS, Plaintiff respectfully requests that the Court find in its favor and against Defendant, and that the Court grant Plaintiff the following relief:

a. Judgment that one or more claims of the Asserted Patents have been infringed by Defendant;

b. Judgment that Defendant account for and pay to Plaintiff all damages to and costs incurred by Plaintiff because of Defendant's infringing activities and other conduct complained of herein;

c. That Plaintiff be granted pre-judgment and post-judgment interest on the damages caused by Defendant's infringing activities and other conduct complained of herein;

d. That the Court declare this an exceptional case and award Plaintiff its reasonable attorney's fees and costs in accordance with 35 U.S.C. § 285; and

e. That Plaintiff be granted such other and further relief as the Court may deem just and proper under the circumstances.

Respectfully submitted,

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CERTIFICATE OF SERVICE

The undersigned certifies that the foregoing document was filed electronically in compliance with Local Rule CV-5(a). As such, this document was served on all counsel who have consented to electronic service on July 26, 2023.

/s/ Joshua R. Thane
Joshua R. Thane