IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

MEMS INNOVATIONS, LLC,	§	
	§	
***Plaintiff*,**	§	
	§	
v.	§	**Civil Action No. 2:22-cv-00434-JRG-RSP**
	§	
TDK CORPORATION AND TDK CORPORATION OF AMERICA,	§	**JURY TRIAL DEMANDED**
	§	
***Defendants*.**	§	
	§	

PLAINTIFF'S FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff MEMS Innovations, LLC ("MEMS Innovations" or "Plaintiff") hereby submits this First Amended Complaint for patent infringement against Defendants TDK Corporation and TDK Corporation of America (collectively "TDK" or "Defendants") and states as follows:

I. THE PARTIES

1. MEMS Innovations is a Limited Liability Company organized under the laws of the state of Texas with its principal place of business at 26522 La Alameda Ave., Suite 360, Mission Viejo, CA 92691, U.S.A.

2. On information and belief, Defendant TDK Corporation is a corporation organized under the laws of Japan, with its headquarters at 2-5-1 Nihonbashi, Chuo-ku, Tokyo, 103-6128, Japan. On information and belief, TDK Corporation provides sensor products including MEMS sensors in different parts of the world including the United States.[1] On information and belief, as of May of 2017, "InvenSense became part of the MEMS Sensors Business Group within the newly

[1] https://www.tdk.com/en/about_tdk/tdk_at_a_glance/index.html (last visited Oct. 6, 2022).

formed Sensor Systems Business Company of TDK Corporation."[2] On information and belief, TDK Corporation is involved with development and production of piezoelectric microspeakers, transducers and sensors that are incorporated into ultrasonic sensors that can be used in a variety of applications including, but not limited to, social distancing, robotics, appliances, AR/VR gaming, presence detection, smart locks, smart home & IoT, and drones.[3]

3. On information and belief, Defendant TDK Corporation of America is a corporation organized under the laws of California, with its headquarters at 475 Half Day Road, Lincolnshire, IL 60069 and with offices at 3320 Matrix Drive, Suite 100, Richardson, TX 75082.[4] TDK Corporation of America may be served via its registered agent, The Prentice-Hall Corporation System, Inc., 2710 Gateway Oaks Dr. STE 150N, Sacramento, CA 95833. On information and belief, TDK Corporation of America is involved in sale of electronic materials and components and power supplies.[5]

II. JURISDICTION AND VENUE

4. This Court has subject matter jurisdiction under 28 U.S.C. §§ 1331 and 1338(a) because this action arises under the patent laws of the United States, 35 U.S.C. § 1 *et seq.*, including 35 U.S.C. § 271.

5. On information and belief, Defendants have employees in the state of Texas and in this judicial district. Defendants have solicited business in the State of Texas, transacted business within the State of Texas and attempted to derive financial benefit from residents of the State of Texas, including benefits directly related to the instant patent infringement cause of action set forth

[2] https://invensense.tdk.com/company-profile/#:~:text=In%20May%20of%202017%2C%20InvenSense,Business%20Company%20of%20TDK%20Corporation. (last visited Oct. 6, 2022).
[3] https://invensense.tdk.com/smartsonic/ (last visited Oct. 6, 2022).
[4] https://www.us.tdk.com/contact/tdk-americas-contact.php (last visited Oct. 6, 2022); *see also* https://www.tdk.com/en/worldwide/index.html?country-area=input-USA (last visited Oct. 6, 2022).
[5] https://www.us.tdk.com/contact/tdk-americas-contact.php (last visited Oct. 6, 2022).

herein.

6. This Court has personal jurisdiction over Defendants at least because Defendants conduct business and have committed acts of patent infringement and/or have induced acts of patent infringement by others in this judicial district, the State of Texas, and elsewhere in the United States. As described in further detail below, on information and belief, Defendants make, use, offer for sale, sell, or import various piezoelectric microspeaker, transducers, and sensor chips or products containing piezoelectric microspeakers, transducers and sensors that infringe one or more of MEMS Innovations' patents and/or induce others to do so. On information and belief, these Infringing Products (the '505 Patent Infringing Products (defined below) and the '697 Patent Infringing Products (defined below), are collectively referred to herein as the "Infringing Products") have been offered for sale, sold, used, and imported in the United States, within the State of Texas and within this judicial district.

7. TDK is subject to personal jurisdiction under the provisions of the Texas Long Arm Statute, TX CIV. PRAC. & REM CODE § 17.041 et seq., by virtue of the fact that, upon information and belief, TDK has availed itself of the privilege of conducting and soliciting business within this State, including engaging in at least some of the infringing activities in this State, as well as by others acting as TDK's agents and/or representatives, such that it would be reasonable for this Court to exercise jurisdiction consistent with principles underlying the U.S. Constitution, and the exercise of jurisdiction by this Court would not offend traditional notions of fair play and substantial justice.

8. On information and belief, TDK has also established minimum contacts with this judicial district and regularly transacts and does business within this district. On further information and belief, TDK has purposefully directed activities at citizens of this State including

those located within this judicial district. On information and belief, TDK derives substantial revenue from the goods and services it provides to individuals in the state of Texas and in this judicial district.

9. This court also has personal jurisdiction over Defendants because, acting in consort, Defendants purposefully and voluntarily placed the Infringing Products into the stream of commerce, with the expectation that they will be purchased and used by customers in the United States, in the State of Texas and in this judicial district. On information and belief, customers in the State of Texas and in this judicial district have purchased and used and continue to purchase and use the Infringing Products. Accordingly, Defendants' conduct and connections with the State of Texas are such that they should reasonably have anticipated being brought into court here.

10. Venue is proper in this District as to TDK Corporation pursuant to 28 U.S.C. §§ 1391(b), 1391(c) and 1400(b) because, among other things, TDK Corporation is subject to this Court's personal jurisdiction and because, being an alien corporation, TDK Corporation may be sued in any district that has personal jurisdiction.

11. Venue is proper in this District as to TDK Corporation of America pursuant to 28 U.S.C. § 1400(b) at least because TDK Corporation of America has committed acts of infringement in this District and maintains a regular and established place of business in Collin County at 3320 Matrix Drive, Suite 100, Richardson TX 75082.[6]

12. Defendants are properly joined under 35 U.S.C. § 299(a)(1) because, as set forth in greater detail below, on information and belief, Defendants commonly and/or jointly make, use, sell, offer to sell, and/or import Infringing Products, such that at least one right to relief is asserted against Defendants jointly, severally, and in the alternative with respect to the same transactions,

[6] https://www.us.tdk.com/contact/sales.php?lnk_state=TX&lnk_country=A (last visited Oct. 6, 2022).

occurrences, or series of transactions or occurrences relating to the making, using, selling, offering to sell, and/or importing into the United States the same Infringing Products, as set forth in greater detail herein.

13. Defendants are properly joined under 35 U.S.C. § 299(a)(2) because, as set forth in greater detail below, on information and belief, Defendants make, use, sell, offer to sell in, and/or import into the United States the same or similar Infringing Products, such that questions of fact that are common to all Defendants will arise in this action.

III. BACKGROUND

14. Microelectromechanical systems ("MEMS") are small scale, electrically actuated, mechanical systems that are more recently manufactured by using similar methods to those used in the semiconductor industry, including patterning and photolithography. Acoustic MEMS may be used to produce and sense sound waves at various frequencies.

15. According to Defendants, ultrasonic sensors including the Infringing Products enable "flexible industrial design options for a broad range of use-case scenarios, including range-finding, presence and proximity sensing, object-detection and avoidance, and position-tracking."[7] Uses for ultrasonic sensors include, for example, home automation, personal electronics, obstacle avoidance, robotics and drones, remote presence sensing, augmented reality, virtual reality, gaming, gesture control, liquid level sensing, and shelf inventory monitoring.[8]

16. On October 12, 2010, the United States Patent and Trademark Office ("USPTO") duly and legally issued United States Patent No. 7,812,505 ("the '505 Patent"), titled "Piezoelectric Microspeaker Using Microelectromechanical Systems and Method of Manufacturing the Same." The '505 Patent is valid and enforceable.

[7] https://invensense.tdk.com/products/ch201/ (last visited Oct. 6, 2022).
[8] *Id.*

17. On February 14, 2012, the USPTO duly and legally issued United States Patent No. 8,114,697 ("the '697 Patent"), titled "Piezoelectric Microphone, Speaker, Microphone-Speaker Integrated Device and Manufacturing Method Thereof." The '697 Patent is valid and enforceable.

18. The '505 Patent and the '697 Patent (collectively, the "Asserted Patents") were originally assigned to and are owned by the Electronics and Telecommunications Research Institute ("ETRI"), which is Korea's national leader in the research and development of Information & Communication Technologies.[9] Since its inception in 1976, ETRI has developed countless new technologies, including inventions related to DRAM computer memory, CDMA and 4G LTE cellular phone communications, and LCD displays, as well as manufacturing microphones and speakers through a microelectromechanical system (MEMS) process, the technology at issue in this case.[10] ETRI employs over two thousand research and technical staff, of whom over 90% hold a post-graduate degree and 60% have earned a doctoral degree in their technological field.[11] Since its founding, ETRI has applied for and been granted over 28,000 patents and is an active participant in the development of international standards.[12]

19. MEMS Innovations is the exclusive licensee of the Asserted Patents with the sole and exclusive right to prosecute this action, to enforce the Asserted Patents against infringers, to collect damages for past, present and future infringement of the Asserted Patents, and to seek injunctive relief as appropriate under the law. TDK is not licensed to the Asserted Patents, either expressly or implicitly, nor does it enjoy the benefit from any other rights in or to the Asserted Patent whatsoever. Accordingly, Defendants' infringement, as described below, has injured, and

[9] https://www.etri.re.kr/engcon/sub1/sub1_02.etri (last visited Oct. 6, 2022).
[10] *Id.*
[11] http://www.koreaittimes.com/news/articleView.html?idxno=1654 (last visited Oct. 6, 2022).
[12] https://markets.businessinsider.com/news/stocks/electronics-and-telecommunications-research-institute-etri-joins-hevc-advance-1002307006 (last visited Oct. 6, 2022);
http://www.koreaittimes.com/news/articleView.html?idxno=1654. (last visited Oct. 6, 2022).

continues to injure MEMS Innovations.

IV. COUNT I: INFRINGEMENT OF '505 PATENT

20. MEMS Innovations incorporates each of the allegations of paragraphs 1-19 above.

21. Defendants have directly infringed and continue to directly infringe the '505 Patent by, for example, making, using, offering to sell, selling, and/or importing into the United States, without authority, products that practice one or more claims of the '505 Patent.

22. Defendants are not licensed or otherwise authorized to make, use, offer for sale, sell or import any products that embody the inventions of the '505 Patent in the United States.

23. Defendants have and continue to directly infringe one or more claims of the '505 Patent, including, for example, claim 1 of the '505 Patent, either literally or under the doctrine of equivalents, by making, using, offering to sell, selling, and/or importing into the United States infringing piezoelectric microspeakers and sensors without authority and in violation of 35 U.S.C. § 271.

24. With respect to the '505 Patent, Defendants' infringing products include, for example, the Chirp CH101 Ultrasonic Time-of-Flight (ToF) Sensor, the CH201 Ultrasonic ToF Sensor, the ICU-10201 High-Performance Ultrasonic Time-of-Flight Sensor, and the ICU-20201 High-Performance Ultra-Compact Ultrasonic Time-of-Flight Sensor ("Chirp Sensors"), as well as any other TDK ultrasonic sensors used in various applications that may or may not have TDK part numbers but are made by TDK with a similar structure and any TDK products that incorporate and/or include such TDK ultrasonic sensors (collectively, the "'505 Patent Infringing Products").

25. For example, the Chirp Sensors infringe representative claim 1 of the '505 Patent. On information and belief, the remaining '505 Patent Infringing Products infringe representative claim 1 of the '505 Patent in the same manner.

26. Claim 1 of the '505 Patent claims a piezoelectric microspeaker using

microelectromechanical systems (MEMS), comprising: a piezoelectric layer disposed on an elastic thin layer; and a resonance change unit patterned on one of a bottom surface of the elastic thin layer and a top surface of the piezoelectric layer.

27. The Chirp Sensors include a piezoelectric layer disposed on an elastic thin layer. A top view and exemplary scanning electron microscope (SCM) cross section of the CH101 sensor is shown below in Figure 1. Figure 2 (below) illustrates an exemplary cross-section of a portion of the CH101 sensor, with the piezoelectric layer (107) highlighted in orange and disposed on the polysilicon membrane elastic thin layer.

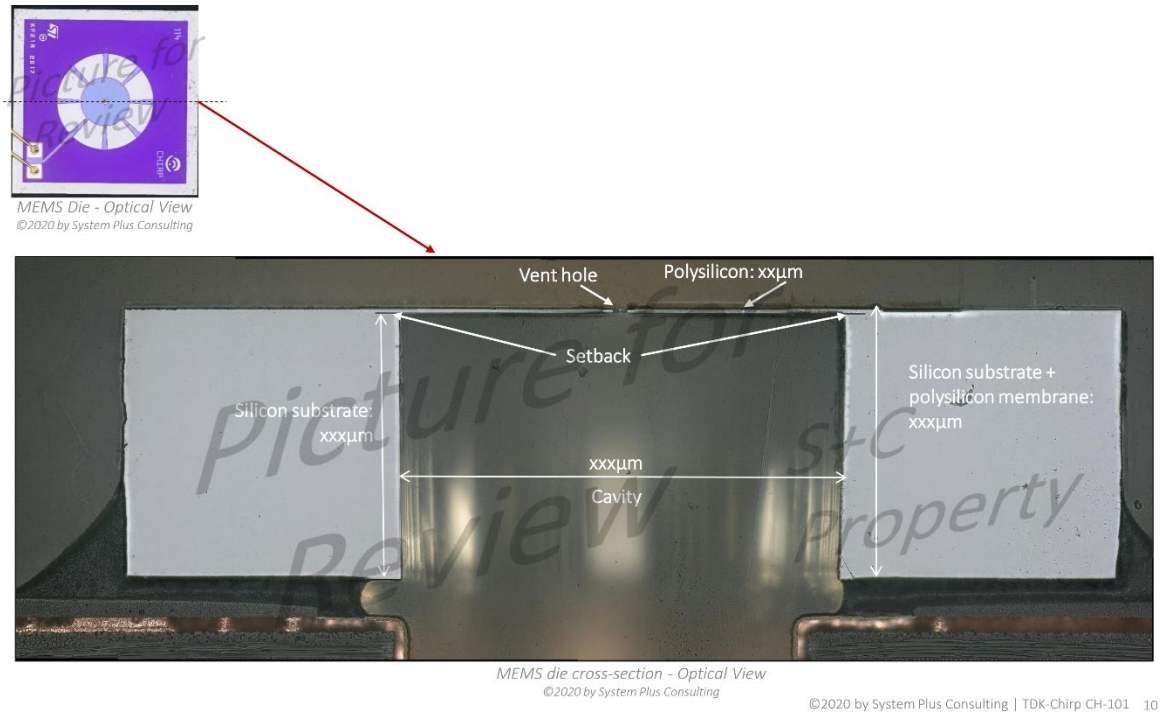


Figure 1

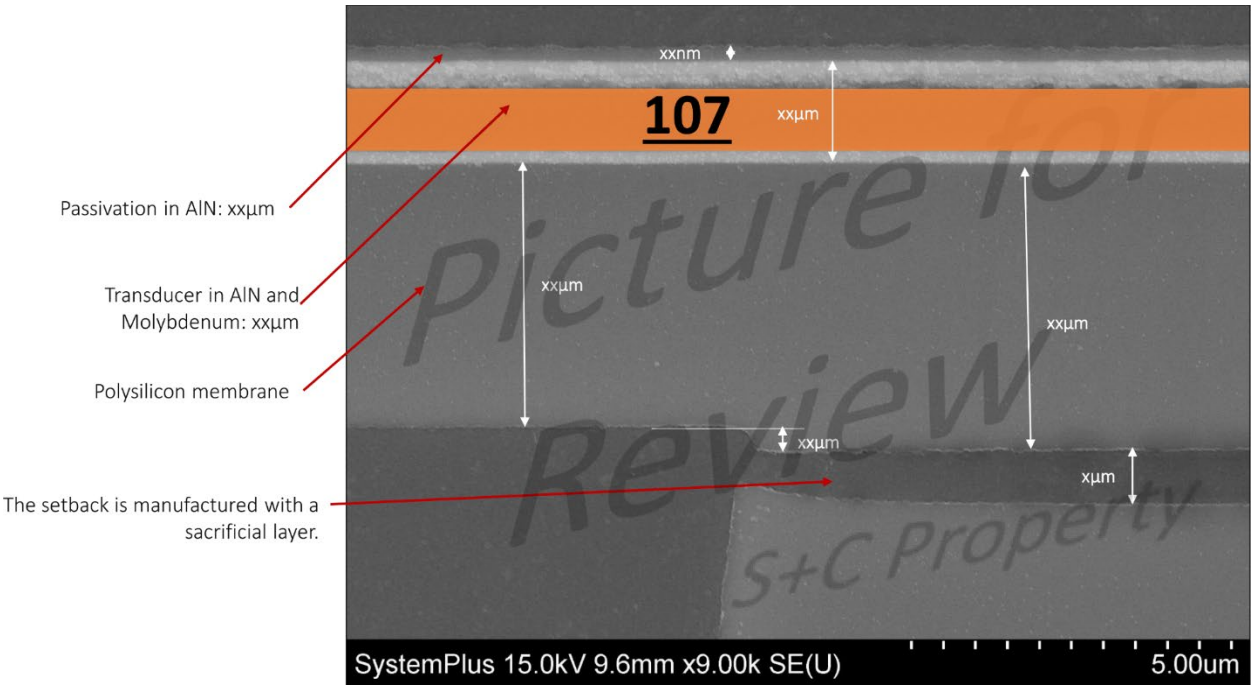


Figure 2

28. The Chirp Sensors also include a resonance change unit patterned on one of a bottom surface of the elastic thin layer (103) and a top surface of the piezoelectric layer. For example, as shown in the exemplary cross sections of a CH101 sensor in Figure 2 above and Figure 3 below, the "setback" (resonance change unit) is patterned on the bottom surface of the polysilicon membrane (elastic thin layer). The dimensions of the patterned setback define the resonance frequency of the piezoelectric microspeaker of the Chirp Sensors.

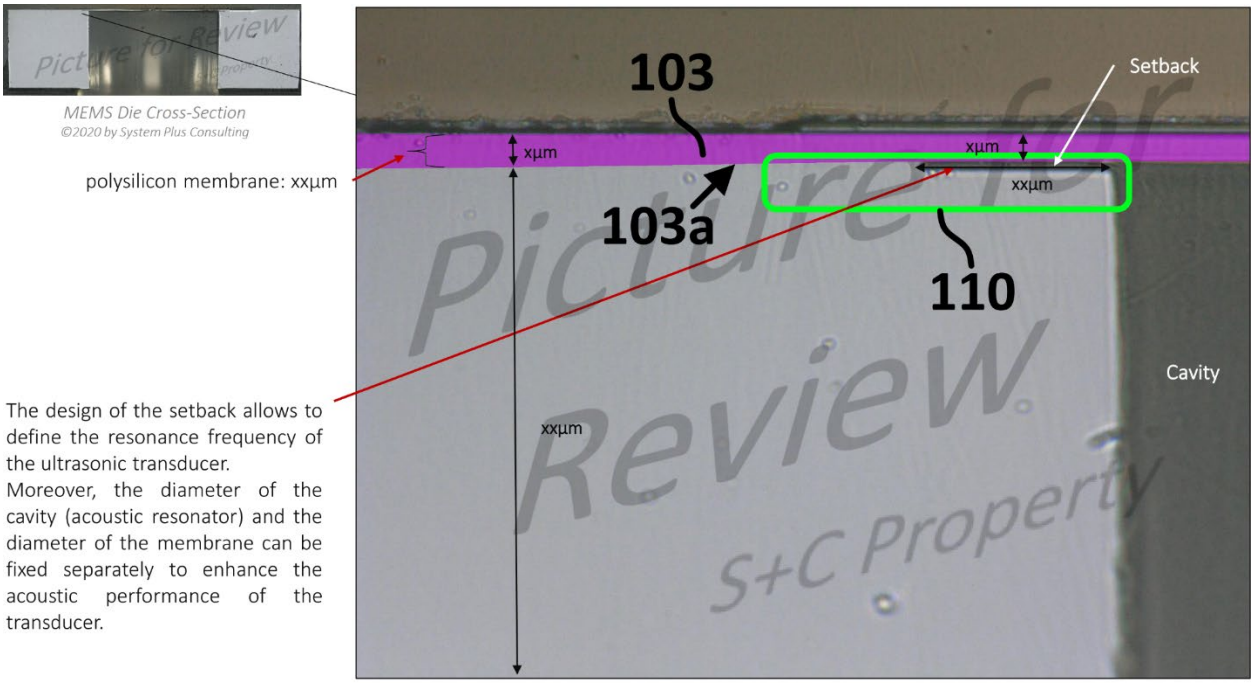


Figure 3

29. Defendants indirectly infringe the ’505 Patent. Defendants have and continue to indirectly infringe one or more claims of the ’505 Patent by knowingly and intentionally inducing others to directly infringe, either literally or under the doctrine of equivalents, by making, using, offering to sell, selling and/or importing into the United States infringing products that incorporate and/or use the ’505 Patent Infringing Products. Defendants induce direct infringement of the ’505 Patent by customers, importers, sellers, resellers, and/or end users of the ’505 Patent Infringing Products. On information and belief, the direct infringers include Defendants’ customers that incorporate the Infringing Products into a product that they make, use, offer for sale, sell, or import into the United States. On information and belief, the direct infringers incorporate the Infringing Products into one or more products in the fields of augmented reality/virtual reality hardware, smart home appliances, IoT devices, mobile devices (for example, fingerprint scanners, proximity detection, and ranging measurements) and wearables, automobiles (for example, detection of

presence of passengers, and collision detection), liquid level detection in industrial and consumer applications, medical and health applications, object detection (for example, hand detection for faucet control), robotics and drones, and in construction equipment.

30. TDK Corporation had actual knowledge of the ’505 Patent and that the ’505 Patent Infringing Products infringe that patent at least as of November 7, 2022. Accordingly, at least as of November 7, 2022, TDK Corporation was on notice, knew and/or should have known that its actions induced direct infringement by third parties. Accordingly, at least as of November 7, 2022, TDK Corporation induced infringement by third party direct infringers and should have known that its actions would induce actual infringement.

31. TDK Corporation of America had actual knowledge of the ’505 Patent and that the ’505 Patent Infringing Products infringe that patent at least as of November 7, 2022. Accordingly, at least as of November 7, 2022, TDK Corporation of America was on notice, knew and/or should have known that its actions induced direct infringement by third parties. Accordingly, at least as of November 7, 2022, TDK Corporation of America induced infringement by third party direct infringers and should have known that its actions would induce actual infringement.

32. Additionally, at the very least Defendants had actual knowledge of the ’505 Patent and their infringement of the same as of the date of this Complaint.

33. Defendants induced infringement by others with the intent to cause infringing acts by others or, in the alternative, with the belief that there was a high probability that others infringe the ’505 Patent, but while at best, remaining willfully blind to the infringement.

34. On information and belief, Defendants advertise the ’505 Patent Infringing Products, publish specifications and promotional literature encouraging customers to implement and incorporate the ’505 Patent Infringing Products into end user products, create and/or distribute

user manuals for the '505 Patent Infringing Products that provide instructions and/or encourage infringing use, and offer support and/or technical assistances to their customers that provide instructions on and/or encourage infringing use.

35. Defendants encourage and facilitate their customers to infringe the '505 Patent by promoting the '505 Patent Infringing Products, for example, stating on their website that "[t]he sensor handles a variety of ultrasonic signal-processing functions and algorithms, enabling customers flexible industrial design options for a broad range of use-case scenarios."[13]

36. Defendants' customers that incorporate the '505 Patent Infringing Products into other products (e.g., smartphones, vehicles, etc.) as well as the end users of those products, each directly infringe the Asserted Patents pursuant to Defendants' instructions and advertisements.

V. COUNT II: INFRINGEMENT OF '697 PATENT

37. MEMS Innovations incorporates each of the allegations of paragraphs 1-36 above.

38. Defendants have directly infringed and continue to directly infringe the '697 Patent by, for example, making, using, offering to sell, selling, and/or importing into the United States, without authority, products that practice one or more claims of the '697 Patent.

39. Defendants are not licensed or otherwise authorized to make, use, offer for sale, sell or import any products that embody the inventions of the '697 Patent in the United States.

40. Defendants have and continue to directly infringe one or more claims of the '697 Patent, including, for example, claim 10 of the '697 Patent, either literally or under the doctrine of equivalents, by making, using, offering to sell, selling, and/or importing into the United States infringing piezoelectric microspeakers and sensors without authority and in violation of 35 U.S.C. § 271.

[13] https://invensense.tdk.com/products/ch101/; https://invensense.tdk.com/products/ch201/ (last visited Oct. 6, 2022).

41. With respect to the '697 Patent, Defendants' infringing products include, for example, the Chirp CH101 Ultrasonic Time-of-Flight (ToF) Sensor, the CH201 Ultrasonic ToF Sensor, the ICU-10201 High-Performance Ultrasonic Time-of-Flight Sensor, and the ICU-20201 High-Performance Ultra-Compact Ultrasonic Time-of-Flight Sensor ("Chirp Sensors"), as well as any other TDK ultrasonic sensors used in various applications that may or may not have TDK part numbers but are made by TDK with a similar structure and any TDK products that incorporate and/or include such TDK ultrasonic sensors (collectively, the "'697 Patent Infringing Products").

42. For example, the Chirp CH101 infringes representative claim 10 of the '697 Patent. On information and belief, the remaining '697 Patent Infringing Products infringe representative claim 10 of the '697 Patent in the same manner.

43. Claim 10 of the '697 Patent claims: a piezoelectric speaker comprising: a silicon substrate; an insulating layer provided over the silicon substrate; a piezoelectric plate provided over the insulating layer, the piezoelectric plate including a piezoelectric strain region and a vibration region; and a mating electrode provided in the piezoelectric strain region of the piezoelectric plate, wherein the piezoelectric plate is thinner in the vibration region than in the piezoelectric strain region.

44. The CH101 includes a piezoelectric speaker. A top view and exemplary scanning electron microscope (SCM) cross section of the CH101 sensor is shown below in Figure 4. The piezoelectric speaker includes a silicon substrate which is also shown in Figure 4.

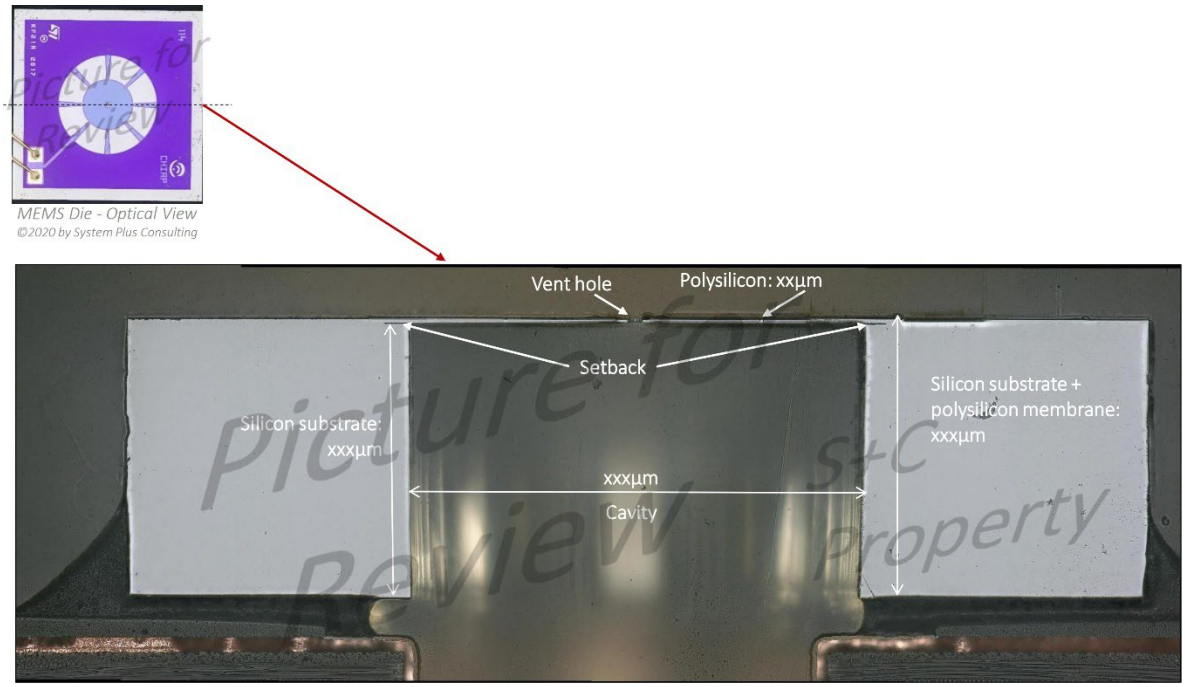
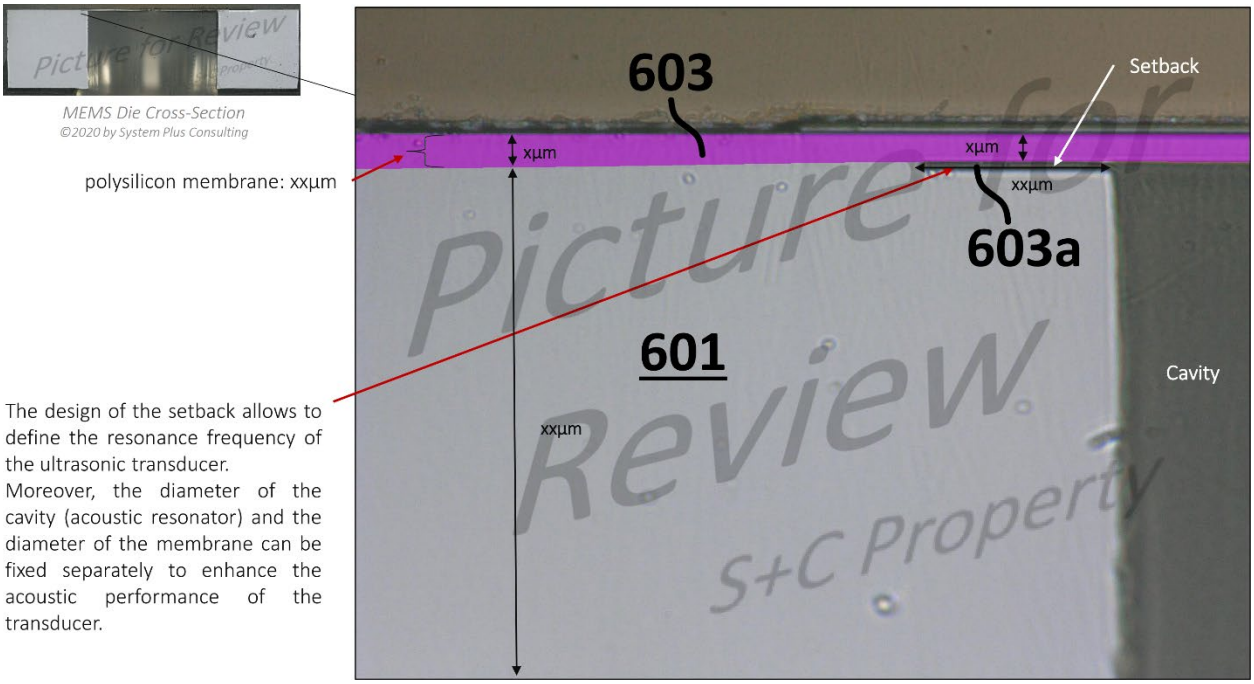
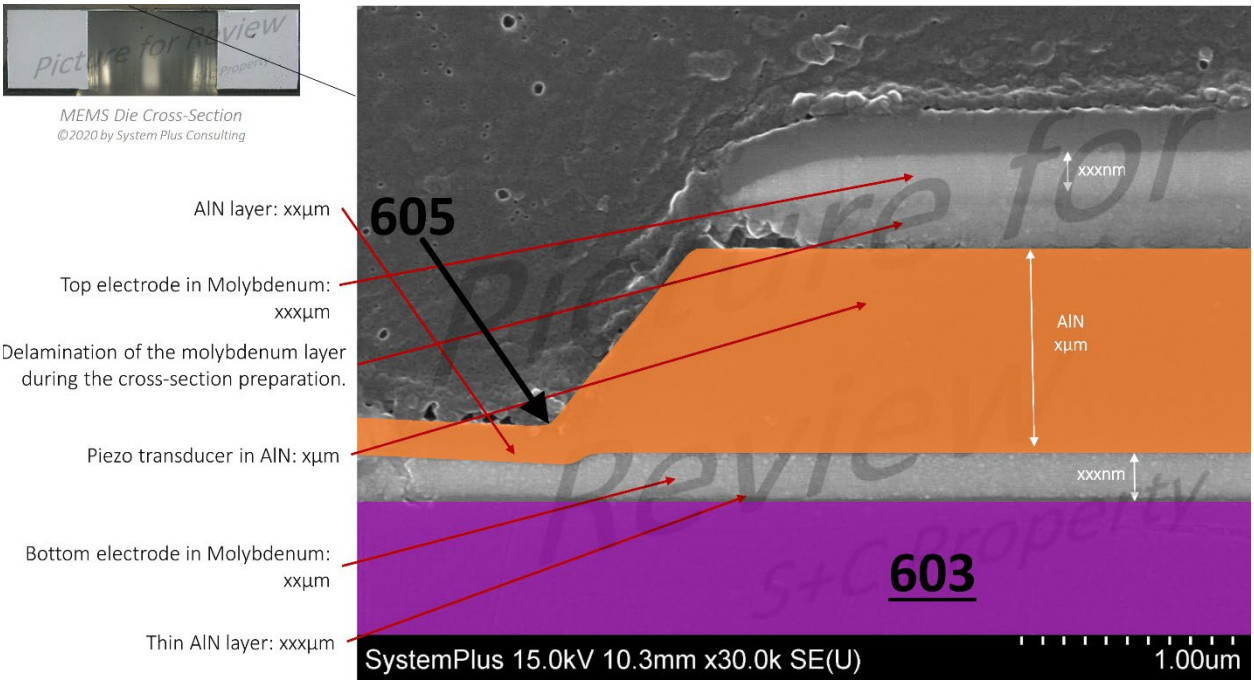


Figure 4

The CH101 also has an insulating layer, for example, a polysilicon membrane, provided over the silicon substrate. This illustrative insulating layer is highlighted in purple and labeled as "polysilicon membrane 603" in Figure 5 below.



Additionally, the CH101 has a piezoelectric plate provided over the insulating layer, highlighted in orange below in Figure 6. The piezoelectric AlN plate (605) is disposed over the insulating layer (for example, the polysilicon membrane 603). The piezoelectric plate (605) also includes a piezoelectric strain region and a vibration region having different relative thicknesses as also seen in Figure 6. There is also a mating electrode, labeled as top electrode in Molybdenum in Figure 6, that is provided in the thicker piezoelectric strain region of the piezoelectric plate (605). Finally, piezoelectric plate (605) is thinner in the vibration region than it is in the piezoelectric strain region.



45. Defendants indirectly infringe the ’697 Patent. Defendants have and continue to indirectly infringe one or more claims of the ’697 Patent by knowingly and intentionally inducing others to directly infringe, either literally or under the doctrine of equivalents, by making, using, offering to sell, selling and/or importing into the United States infringing products that incorporate and/or use the ’697 Patent Infringing Products. Defendants induce direct infringement of the ’697 Patent by customers, importers, sellers, resellers, and/or end users of the ’697 Patent Infringing

Products. On information and belief, the direct infringers include Defendants' customers that incorporate the Infringing Products into a product that they make, use, offer for sale, sell, or import into the United States. On information and belief, the direct infringers incorporate the Infringing Products into one or more products in the fields of augmented reality/virtual reality hardware, smart home appliances, IoT devices, mobile devices (for example, fingerprint scanners, proximity detection, and ranging measurements) and wearables, automobiles (for example, detection of presence of passengers, and collision detection), liquid level detection in industrial and consumer applications, medical and health applications, object detection (for example, hand detection for faucet control), robotics and drones, and in construction equipment.

46. TDK Corporation had actual knowledge of the '697 Patent and that the '697 Patent Infringing Products infringe that patent at least as of November 7, 2022. Accordingly, at least as of November 7, 2022, TDK Corporation was on notice, knew and/or should have known that its actions induced direct infringement by third parties. Accordingly, at least as of November 7, 2022, TDK Corporation induced infringement by third party direct infringers and should have known that its actions would induce actual infringement.

47. TDK Corporation of America had actual knowledge of the '697 Patent and that the '697 Patent Infringing Products infringe that patent at least as of November 7, 2022. Accordingly, at least as of November 7, 2022, TDK Corporation of America was on notice, knew and/or should have known that its actions induced direct infringement by third parties. Accordingly, at least as of November 7, 2022, TDK Corporation of America induced infringement by third party direct infringers and should have known that its actions would induce actual infringement.

48. Additionally, at the very least Defendants had actual knowledge of the '697 Patent and their infringement of the same as of the date of this Complaint.

49. Defendants induced infringement by others with the intent to cause infringing acts by others or, in the alternative, with the belief that there was a high probability that others infringe the '697 Patent, but while at best, remaining willfully blind to the infringement.

50. On information and belief, Defendants advertise the '697 Patent Infringing Products, publish specifications and promotional literature encouraging customers to implement and incorporate the '697 Patent Infringing Products into end user products, create and/or distribute user manuals for the '697 Patent Infringing Products that provide instructions and/or encourage infringing use, and offer support and/or technical assistances to their customers that provide instructions on and/or encourage infringing use.

51. Defendants encourage and facilitate their customers to infringe the '697 Patent by promoting the '697 Patent Infringing Products, for example, stating on their website that "The sensor handles a variety of ultrasonic signal-processing functions and algorithms, enabling customers flexible industrial design options for a broad range of use-case scenarios."[14]

52. Defendants' customers that incorporate the '697 Patent Infringing Products into other products (e.g., smartphones, vehicles, etc.) as well as the end users of those products, each directly infringe the Asserted Patents pursuant to Defendants' instructions and advertisements.

JURY DEMAND

53. MEMS Innovations hereby demands a trial by jury on all issues so triable.

PRAYER FOR RELIEF

WHEREFORE, MEMS Innovations requests entry of judgment in its favor and against Defendants as follows:

a) A declaration that Defendants have directly infringed one or more claims of the Asserted

[14] https://invensense.tdk.com/products/ch101/; https://invensense.tdk.com/products/ch201/ (last visited Oct. 6, 2022).

Patents, either literally or under the doctrine of equivalents;

b) A declaration that Defendants have induced infringement and/or are inducing infringement of one or more claims of the Asserted Patents, either literally or under the doctrine of equivalents;

c) An award of damages pursuant to 35 U.S.C. § 284 adequate to compensate MEMS Innovations for Defendants' infringement of the Asserted Patents in an amount according to proof at trial (together with prejudgment and post-judgment interest), but no less than a reasonable royalty;

d) An award of costs and expenses pursuant to 35 U.S.C. § 284 or as otherwise permitted by law; and

e) Such other and further relief, whether legal, equitable, or otherwise, to which MEMS Innovations may be entitled or which this Court may order.

Dated: November 11, 2022

Respectfully submitted,

/s/ Amir Alavi

Amir Alavi
Texas Bar No. 00793239
aalavi@aatriallaw.com
Masood Anjom
Texas Bar No. 24055107
manjom@aatriallaw.com
Michael McBride
Texas Bar No. 24065700
mmcbride@aatriallaw.com
Steven Jugle
Texas Bar No. 24083280
sjugle@aatriallaw.com
ALAVI & ANAIPAKOS PLLC
3417 Mercer Street, Suite C
Houston, Texas 77027
Telephone: (713) 751-2362
Facsimile: (713) 751-2341

Attorneys for MEMS Innovations, LLC