

## A. SPECIFICATION;

Specifications applies to part number TRS-MT0006-002 Multilayer Piezo Ceramic Speaker

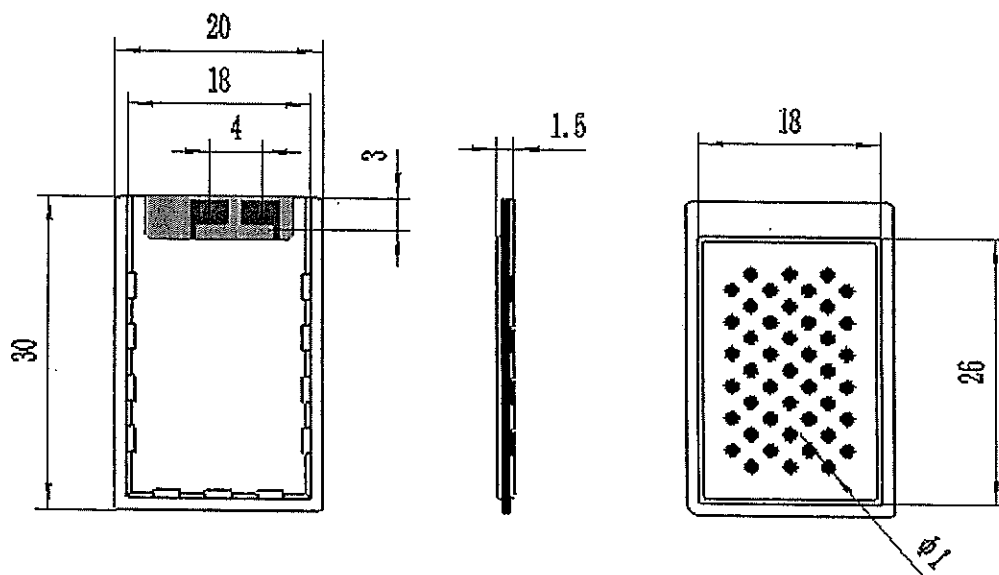
## B. Characteristics and applications:

As one of our MLCT ( MULTILAYER CERAMIC TRANSMITTER) series, this product is in Multi layer ceramic structure. Thanks to it's high power density, it can achieve high output with a low driving voltage.

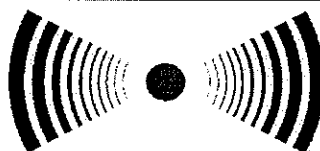
Main characteristics includes:

1. simple acoustic design which can be installed in a narrow and flat space.
2. milliwatts of power consumption and high conversion efficiency which make it widely used.
3. water-proof design.
4. it won't cause any electromagnetic interference to surrounding electronic devices and is good at anti-electromagnetic interference.

## C: APPEARANCE AND DIMENSIONS:



Transducers USA  
Confidential and Proprietary



Transducers USA  
1400 Howard Street  
Elk Grove, IL 60007  
Toll Free: 800-956-1920 FAX: 847-956-1950  
[www.tusainc.com](http://www.tusainc.com) info@tusainc.com

All dimensions are in MM unless otherwise specified

Drawing Number:  
**TRS-MT0006-002**

Title:  
**Multilayer Piezo Ceramic Speaker  
1 of 8**

Date:  
**4/27/2012**

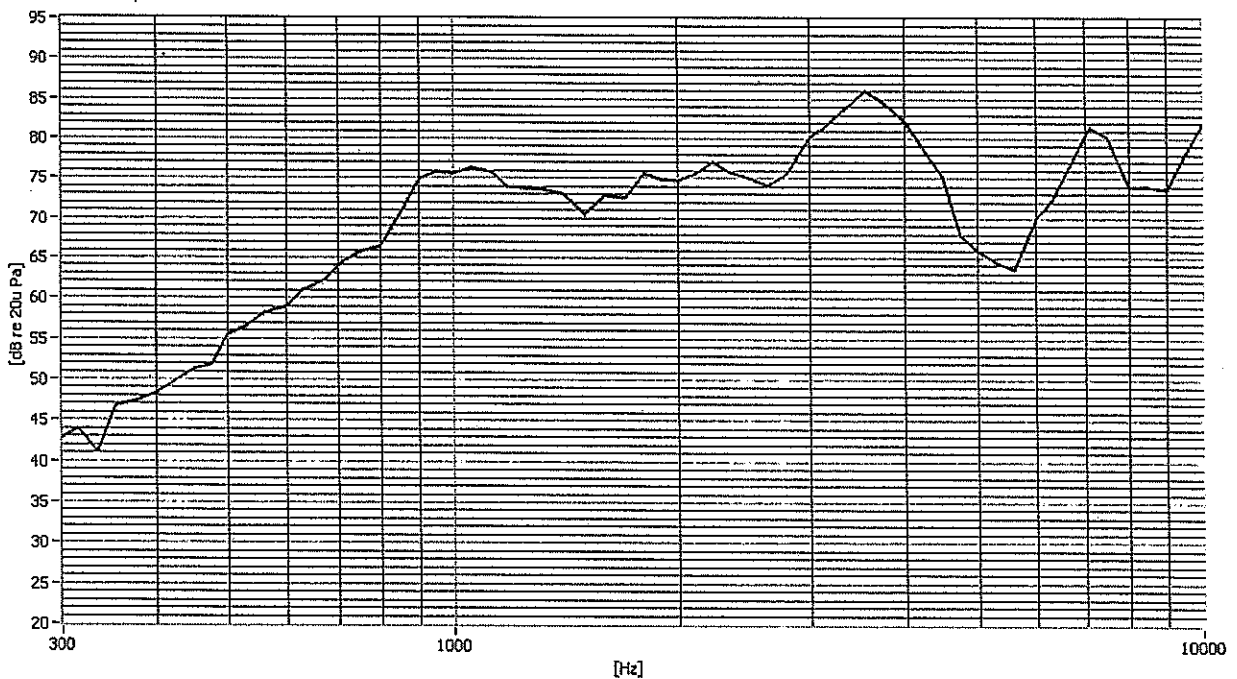
THE INFORMATION DISCLOSED HEREIN WAS ORIGINATED BY AND IS THE PROPERTY OF TRANSDUCERS USA, INC. AND EXCEPT FOR USE EXPRESSLY GRANTED TO THE UNITED STATES GOVERNMENT, TRANSDUCERS USA, INC. RESERVES ALL PATENT PROPRIETARY DESIGN, USE, SALE, MANUFACTURING AND PRODUCTION RIGHTS THERETO. THIS DOES NOT APPLY TO VENDOR

## D: Electrical Specifications.

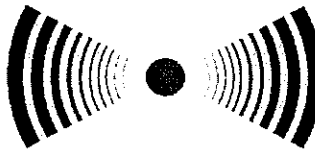
No.	Item	Unit	Specification	Condition
1	Dimension	mm	20 x 30	
2	S.P.L.	dB	80 Min	B & K ( 10cm / 5Vrms/at muffle room) ( average at 4-point: 1.0K, 1.5K, 2.0K, 2.5K)
3	Electrostatic Capacity	nF	1200 +/- 30%	Digital electric bridge (120Hz/1V25C)
4	FO	Hz	800 +/- 100	B&K (5Vrms)
5	Frequency Range	Hz	300 ~ 20000	
6	Max Input Voltage	Vp-p	16	
7	Operating Temperature	C	-20 ~ +70	
8	Storage Temperature	C	-30 ~ +85	

## E: Typical Frequency Curve:

THD + Rub&Buzz



Transducers USA  
Confidential and Proprietary



Transducers USA  
1400 Howard Street  
Elk Grove, IL 60007  
Toll Free: 800-956-1920 FAX: 847-956-1950  
[www.tusainc.com](http://www.tusainc.com) [info@tusainc.com](mailto:info@tusainc.com)

All dimensions are in MM unless otherwise specified

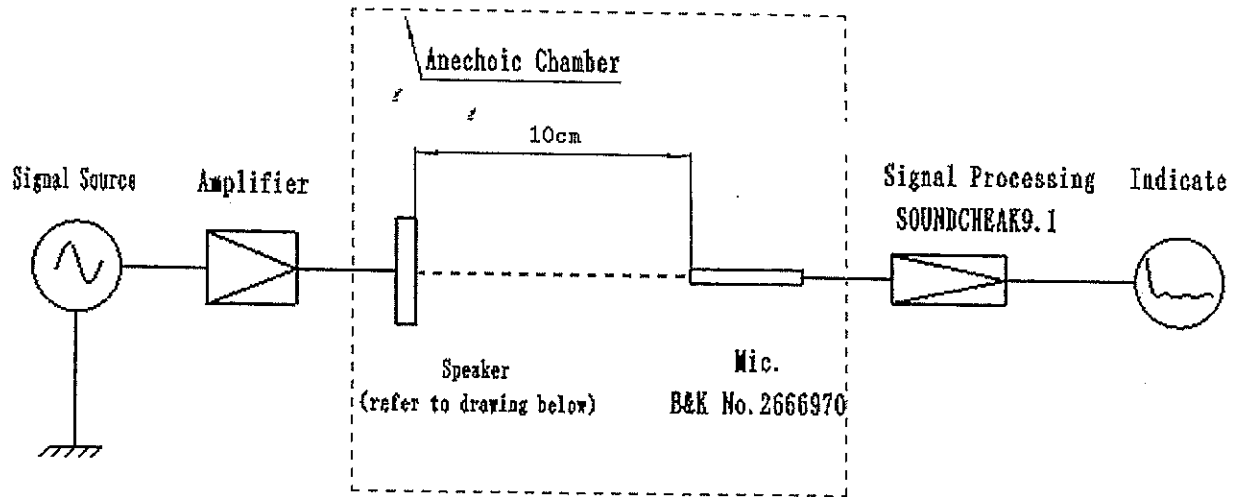
Drawing Number:  
**TRS-MT0006-002**

Title:  
**Multilayer Piezo Ceramic Speaker  
2 of 8**

Date:  
**4/27/2012**

THE INFORMATION DISCLOSED HEREIN WAS ORIGINATED BY AND IS THE PROPERTY OF TRANSDUCERS USA, INC. AND EXCEPT FOR USE EXPRESSLY GRANTED TO THE UNITED STATES GOVERNMENT, TRANSDUCERS USA, INC. RESERVES ALL PATENT PROPRIETARY DESIGN, USE, SALE, MANUFACTURING AND PRODUCTION RIGHTS THERETO. THIS DOES NOT APPLY TO VENDOR

F: Test Method:

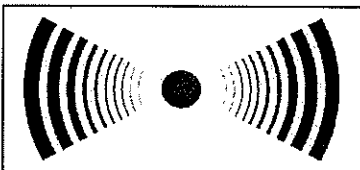


This speaker is being tested in an anechoic chamber. It is installed in a baffle of 135cm x 135 cm.

Conditions of testing:

- 10cm between microphone and the center of speaker
- Voltage of 5Vrms
- Sweep frequency range of 300Hz – 10KHz

Transducers USA  
Confidential and Proprietary



Transducers USA  
1400 Howard Street  
Elk Grove, IL 60007  
Toll Free: 800-956-1920 FAX: 847-956-1950  
[www.tusainc.com](http://www.tusainc.com) info@tusainc.com

All dimensions are in MM unless otherwise specified

Drawing Number:  
**TRS-MT0006-002**

Title:  
**Multilayer Piezo Ceramic Speaker  
3 of 8**

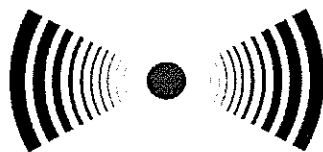
Date:  
**4/27/2012**

THE INFORMATION DISCLOSED HEREIN WAS ORIGINATED BY AND IS THE PROPERTY OF TRANSDUCERS USA, INC. AND EXCEPT FOR USE EXPRESSLY GRANTED TO THE UNITED STATES GOVERNMENT, TRANSDUCERS USA, INC. RESERVES ALL PATENT PROPRIETARY DESIGN, USE, SALE, MANUFACTURING AND PRODUCTION RIGHTS THERETO. THIS DOES NOT APPLY TO VENDOR

G: Mechanical, Environmental and Life Characteristics.

No.	Experiment Item	Condition	Test Standard
1	Shock Test	Room temp Sweep Fre, 10-55 Hz Amplitude 1.5mm/ XYZ axis / 2 Hrs	SPL should be met Initial average +/- 3dB ( 1KHz / 1.5KHz / 2KHz / 2.5KHz)
2	Drop test	Put in a jig with it's weight 150g, dropping in 6 directions of surface 3 times per surface under the height of 150cm	
3	Salt test	Put PCB in salt mist for 24Hrs (+35C, mass percent of NaCl: 5%)	4 hours in +25+/-3 C after testing, slight oxidization is allowed on condition being qualified with soldering test and SPL should be meet the initial average +/- 3dB
4	Storage under high temp	85 +/- 2C/240 hours, then 4 hours in room temp	SPL should be met Initial average +/- 3dB ( 1KHz / 1.5KHz / 2KHz / 2.5KHz)
5	Storage under low temp	-30 +/- 2C/240 hours, then 4 hours in room temp	
6	Storage under high temp humidity	+60 +/-2C/ RH95%/240 hours/ 5Vrms ( 300-20000Hz/ Spep10Hz/LT10s) then 4 hours in room temp	
7	Power on under high temp humidity	+60 +/-2C/ RH95%/240 hours/ 5Vrms ( 300-20000Hz/ Spep10Hz/LT10s) then 4 hours in room temp	
8	Thermal shock	-30C for 30 min then put in +85C within 2-3 min for 30 min. repeat 20 times then 4 hours at room temp	
9	Max voltage	Loading Voltage 16Vp-p / 0.5 hour in room temperature ( Fre 300~20000Hz, Step 10Hz, LT 10s) The voltage is setted to be the Max Value of Voltage as per required in the specm then 4 hours at room temp.	
10	Life test	Under room temp., make it work for 240 hours at 5Vrms/ 1KHz, then 4 hours in room temp	

Transducers USA  
Confidential and Proprietary



Transducers USA  
1400 Howard Street  
Elk Grove, IL 60007  
Toll Free: 800-956-1920 FAX: 847-956-1950  
[www.tusainc.com](http://www.tusainc.com) info@tusainc.com

All dimensions are in MM unless otherwise specified

Drawing Number:  
**TRS-MT0006-002**

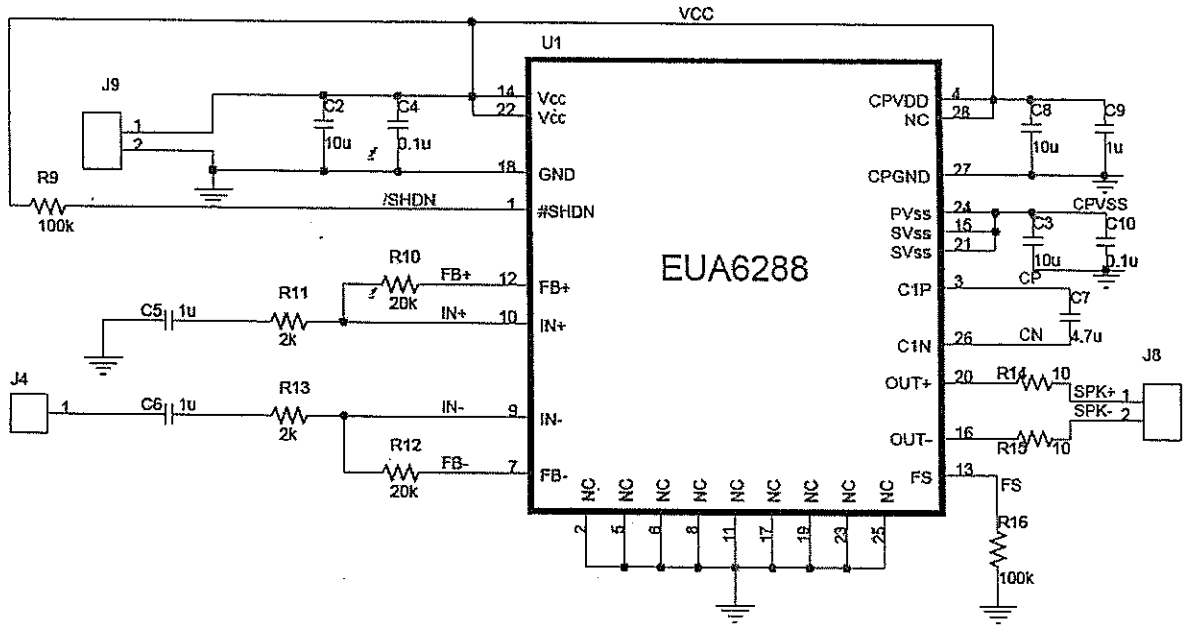
Title:  
**Multilayer Piezo Ceramic Speaker  
4 of 8**

Date:  
**4/27/2012**

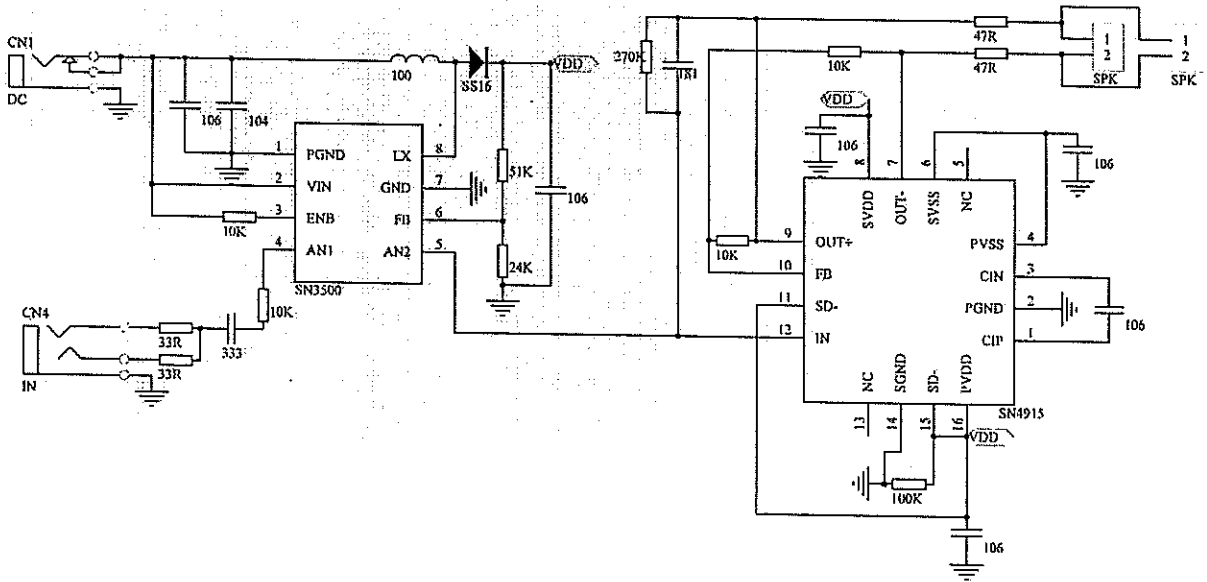
THE INFORMATION DISCLOSED HEREIN WAS ORIGINATED BY AND IS THE PROPERTY OF TRANSDUCERS USA, INC. AND EXCEPT FOR USE EXPRESSLY GRANTED TO THE UNITED STATES GOVERNMENT, TRANSDUCERS USA, INC. RESERVES ALL PATENT PROPRIETARY DESIGN, USE, SALE, MANUFACTURING AND PRODUCTION RIGHTS THERETO. THIS DOES NOT APPLY TO VENDOR

H: Circuit

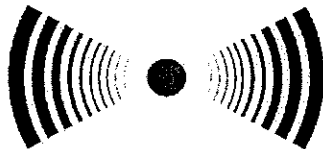
Circuit: EUA6288 (Vout:14V)



Circuit: SN3500+SN4915 (Vout: 20V)



Transducers USA  
Confidential and Proprietary



Transducers USA  
1400 Howard Street  
Elk Grove, IL 60007  
Toll Free: 800-956-1920 FAX: 847-956-1950  
[www.tusainc.com](http://www.tusainc.com) [info@tusainc.com](mailto:info@tusainc.com)

All dimensions are in MM unless otherwise specified

Drawing Number:  
**TRS-MT0006-002**

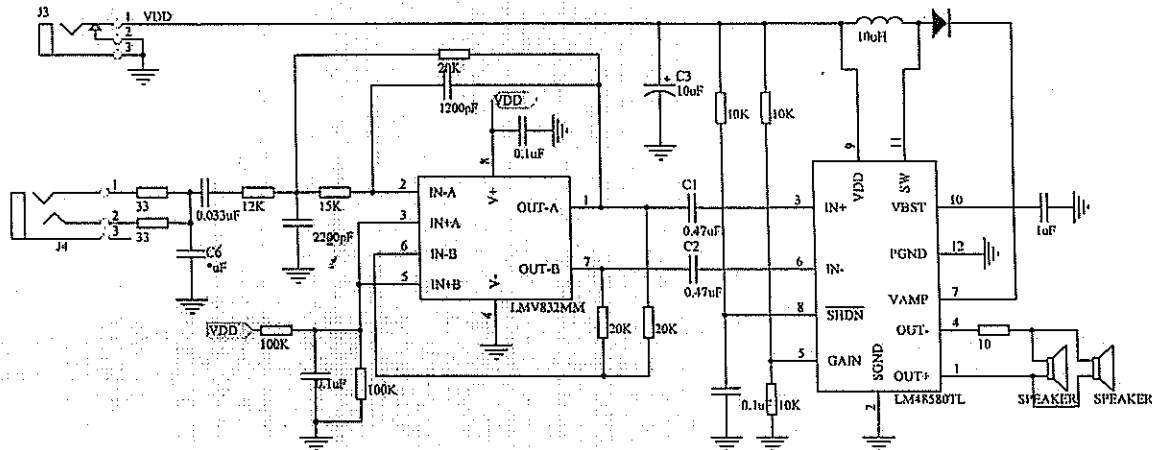
Title:  
**Multilayer Piezo Ceramic Speaker  
5 of 8**

Date:  
**4/27/2012**

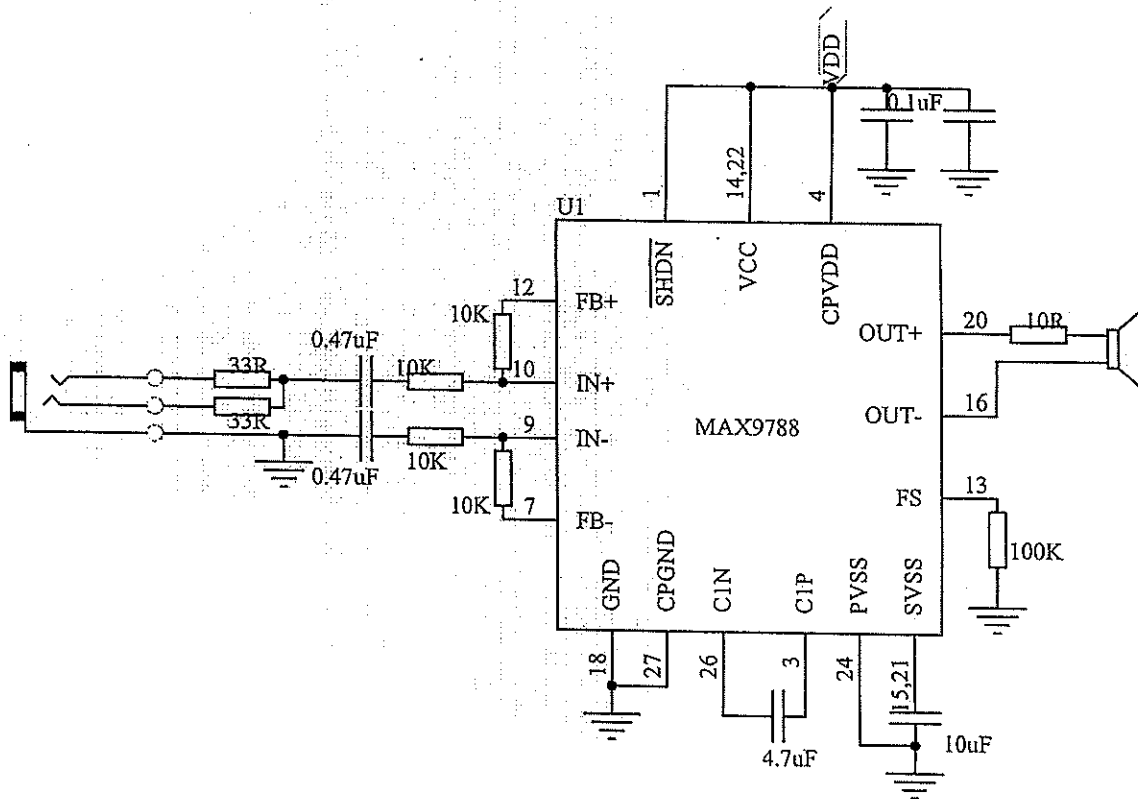
THE INFORMATION DISCLOSED HEREIN WAS ORIGINATED BY AND IS THE PROPERTY OF TRANSDUCERS USA, INC. AND EXCEPT FOR USE EXPRESSLY GRANTED TO THE UNITED STATES GOVERNMENT, TRANSDUCERS USA, INC. RESERVES ALL PATENT PROPRIETARY DESIGN, USE, SALE, MANUFACTURING AND PRODUCTION RIGHTS THERETO. THIS DOES NOT APPLY TO VENDOR

LMV832MM+LM48580TL (Vout: 24V)

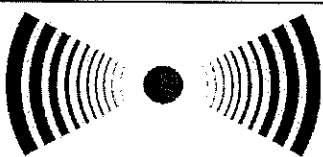
H: Circuit



Circuit: MAX9788(Vout: 14V)



Transducers USA  
Confidential and Proprietary



Transducers USA  
1400 Howard Street  
Elk Grove, IL 60007  
Toll Free: 800-956-1920 FAX: 847-956-1950  
[www.tusainc.com](http://www.tusainc.com) info@tusainc.com

All dimensions are in MM unless otherwise specified

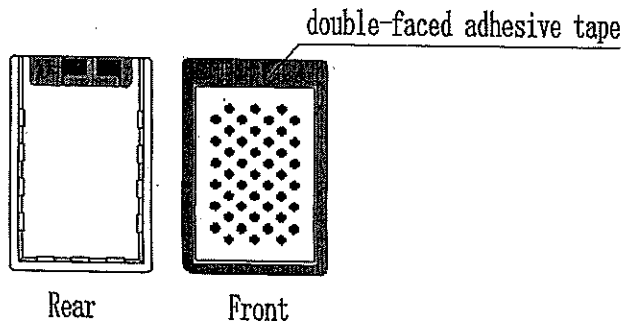
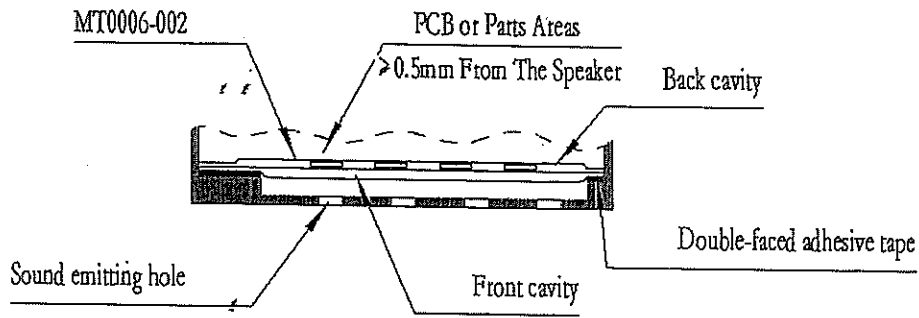
Drawing Number:  
**TRS-MT0006-002**

Title:  
**Multilayer Piezo Ceramic Speaker  
6 of 8**

Date:  
**4/27/2012**

THE INFORMATION DISCLOSED HEREIN WAS ORIGINATED BY AND IS THE PROPERTY OF TRANSDUCERS USA, INC. AND EXCEPT FOR USE EXPRESSLY GRANTED TO THE UNITED STATES GOVERNMENT, TRANSDUCERS USA, INC. RESERVES ALL PATENT PROPRIETARY DESIGN, USE, SALE, MANUFACTURING AND PRODUCTION RIGHTS THERETO. THIS DOES NOT APPLY TO VENDOR

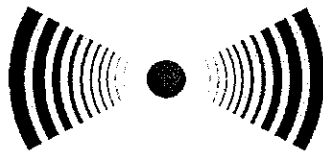
# I: Design and Installation



## Suggestions and notices

- The front and back chamber cover can use the covers of the machine. For example, if it's installed in a cell phone there is no need for extra design of chamber
- The following 3 situations which cause murmurs, vibration and resonance should be avoided: The structure of facility is not firmly fixed; Audio cable of speaker contacts the vibrating area or it, the speaker itself is not fixed well
- The chamber which is shaped by the sealed adhesives and surrounding structure should be kept sealed. If you want a sound hole please refer to the design 9. The distance between front cover and speaker is more than 0.5mm.
- The distance from the front cover to the structural parts and other electrical components should be more than 0.5mm, so as to avoid any contact or friction with the speaker.
- Suggestion: Back chamber should be separated and sealed ( $> 0.7cc$ ). The bigger chamber is the better for sound quality. The back chamber should be sealed during assembly to avoid sound leak which affects sound quality and volume.
- During installation do not apply too much pressure in the vertical direction on the speaker.

Transducers USA  
Confidential and Proprietary



Transducers USA  
1400 Howard Street  
Elk Grove, IL 60007  
Toll Free: 800-956-1920 FAX: 847-956-1950  
[www.tusainc.com](http://www.tusainc.com) info@tusainc.com

All dimensions are in MM unless otherwise specified

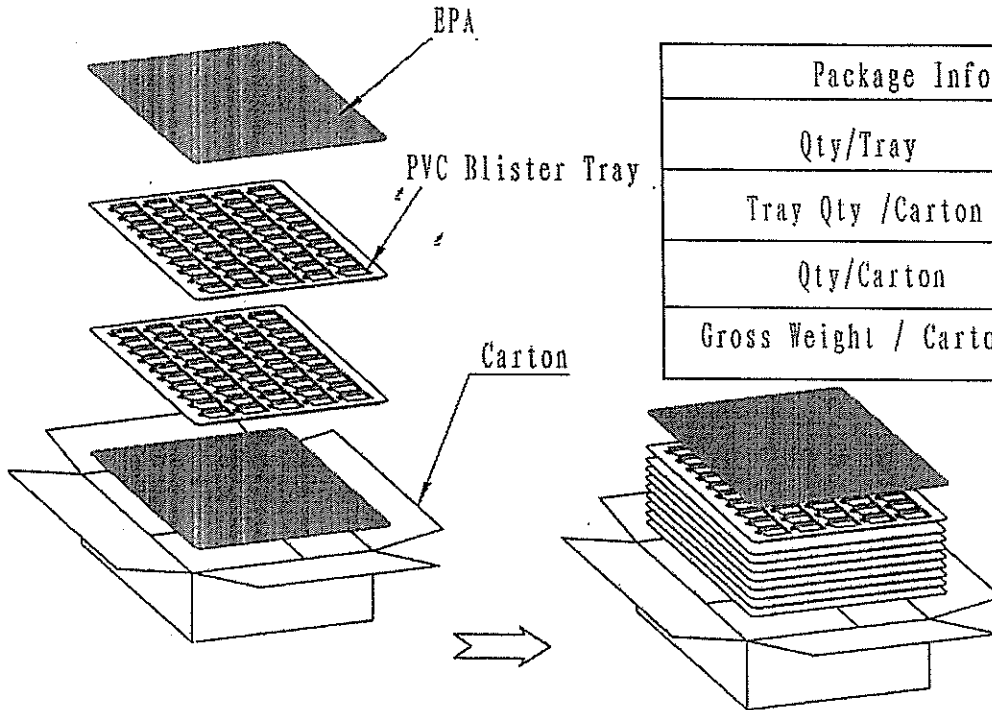
Drawing Number:  
**TRS-MT0006-002**

Title:  
**Multilayer Piezo Ceramic Speaker  
7 of 8**

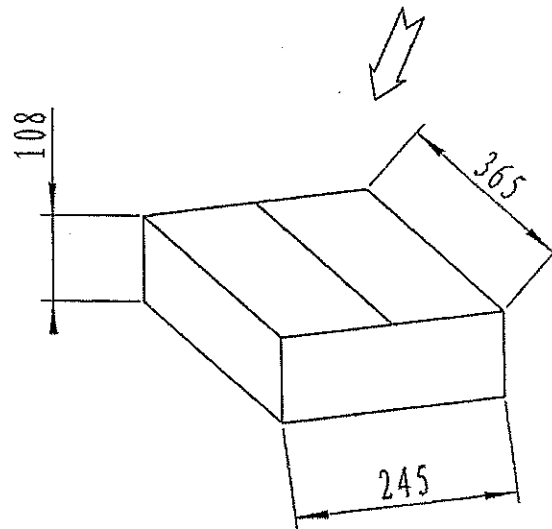
Date:  
**4/27/2012**

THE INFORMATION DISCLOSED HEREIN WAS ORIGINATED BY AND IS THE PROPERTY OF TRANSDUCERS USA, INC. AND EXCEPT FOR USE EXPRESSLY GRANTED TO THE UNITED STATES GOVERNMENT, TRANSDUCERS USA, INC. RESERVES ALL PATENT PROPRIETARY DESIGN, USE, SALE, MANUFACTURING AND PRODUCTION RIGHTS THERETO. THIS DOES NOT APPLY TO VENDOR

# J: Packaging

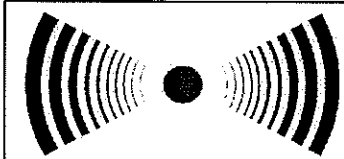


Package Information	
Qty/Tray	50pcs
Tray Qty /Carton	20pcs
Qty/Carton	1000pcs
Gross Weight / Carton	2.5Kg



Unit: mm

Transducers USA  
Confidential and Proprietary



Transducers USA  
1400 Howard Street  
Elk Grove, IL 60007  
Toll Free: 800-956-1920 FAX: 847-956-1950  
[www.tusainc.com](http://www.tusainc.com) info@tusainc.com

All dimensions are in MM unless otherwise specified

Drawing Number:  
**TRS-MT0006-002**

Title:  
**Multilayer Piezo Ceramic Speaker  
8 of 8**

Date:  
**4/27/2012**

THE INFORMATION DISCLOSED HEREIN WAS ORIGINATED BY AND IS THE PROPERTY OF TRANSDUCERS USA, INC. AND EXCEPT FOR USE EXPRESSLY GRANTED TO THE UNITED STATES GOVERNMENT, TRANSDUCERS USA, INC. RESERVES ALL PATENT PROPRIETARY DESIGN, USE, SALE, MANUFACTURING AND PRODUCTION RIGHTS THERETO. THIS DOES NOT APPLY TO VENDOR