



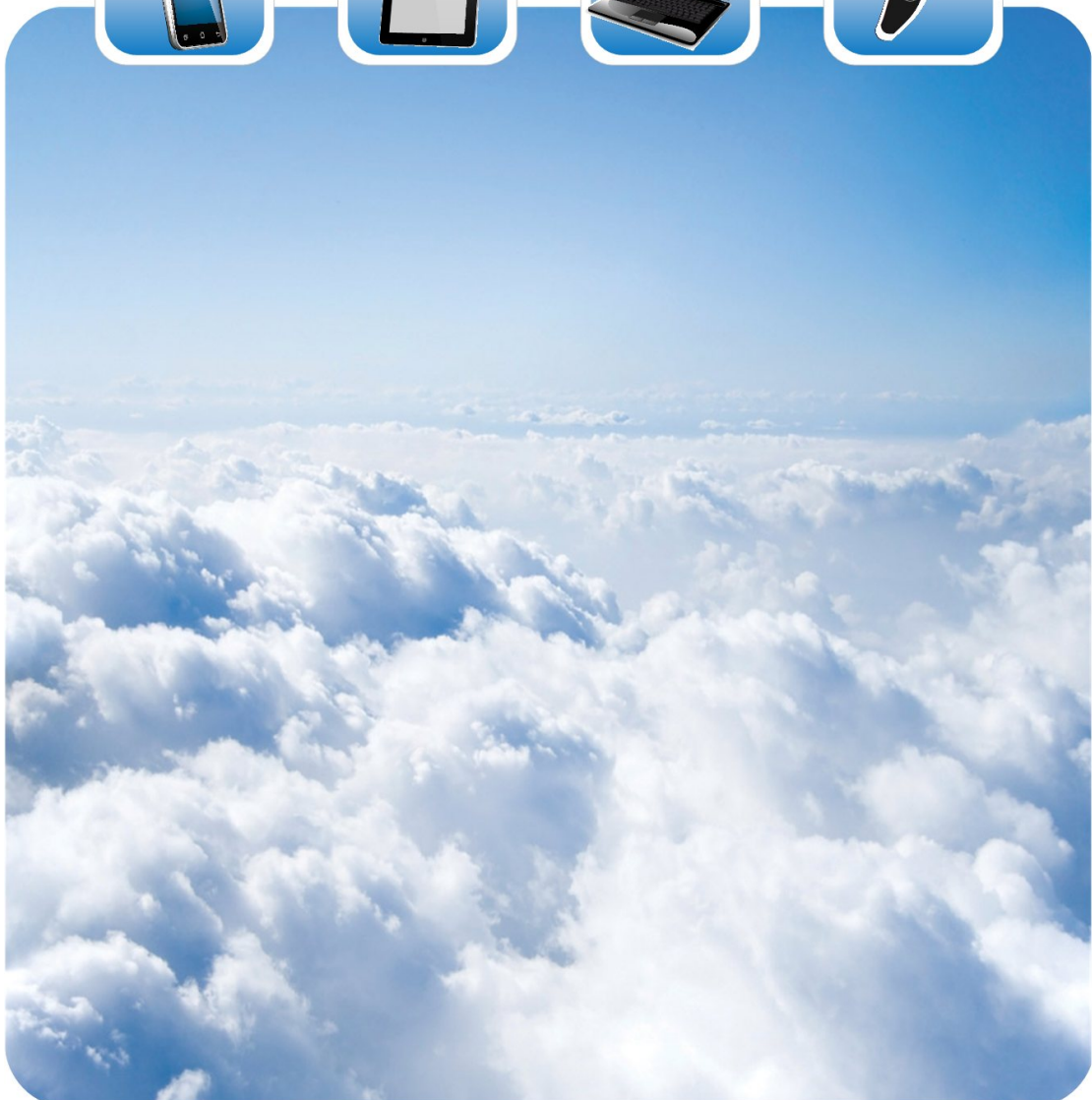
苏州敏芯微电子技术股份有限公司  
MEMSensing Microsystems (Suzhou, China) Co., Ltd.

# Data Sheet

V 1.0 / May. 2019

## MSM421A3729H9KRMC

Analog output MEMS microphone



# MSM421A3729H9KRC

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## GENERAL DESCRIPTION

MSM421A3729H9KRC is an omnidirectional, Top-ported, analog output MEMS microphone. It has high performance and reliability. It is with enhanced RF immunity performance .

MSM421A3729H9KRC is available in a thin 3.76 mm × 2.95 mm × 1.1 mm metal can LGA package. It is SMT compatible with no sensitivity degradation.

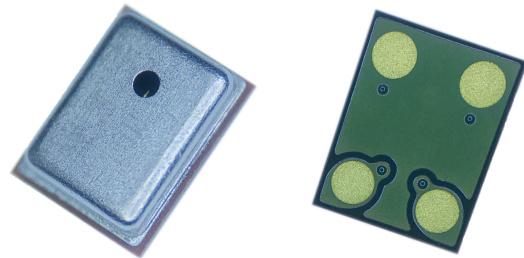
## APPLICATIONS

- ✧ Mobile Phone
- ✧ Laptop
- ✧ Tablet computer
- ✧ Bluetooth headset
- ✧ Earphone
- ✧ Wearable intelligent equipment

## FEATURES

- ✧ Low Noise
- ✧ Omnidirectional
- ✧ Excellent RF immunity
- ✧ Standard SMD Reflow
- ✧ Compatible with Sn/Pb and Pb-free solder processes
- ✧ RoHS/Halogen free compliant
- ✧ Sensitivity Matching within +/-1dB

## PRODUCT VIEW



# MSM421A3729H9KRC

Analog output MEMS microphone



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## ABSOLUTE MAXIMUM RATINGS

| Parameter            | Maximum value | Unit   |
|----------------------|---------------|--------|
| Supply Voltage       | -0.3 to 4.0   | V      |
| Sound Pressure Level | 140           | dB SPL |
| Mechanical Shock     | 10,000        | g      |
| Storage temperature  | -40 to 100    | °C     |

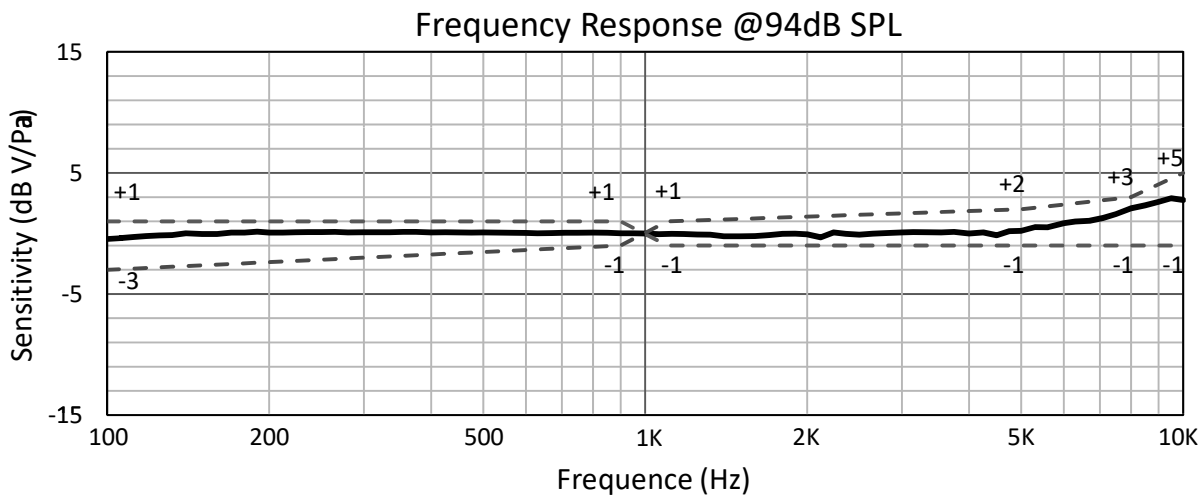
Stresses exceeding these “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only. Functional operation at these or any other conditions beyond those indicated under “Acoustic & Electrical Specifications” is not implied. Exposure beyond those indicated under “Acoustic & Electrical Specifications” for extended periods may affect device reliability.

## ACOUSTIC & ELECTRICAL SPECIFICATIONS

| All data taken at 25°C, Relative Humidity 45±5% unless otherwise specified |   |      |      |        |  |
|--|---|------|------|--------|--|
|  | Limits                                  |      |      | unit   | condition  |
|  | Min.                                    | Nom. | Max. |        |  |
| Directivity  | Omni directional                        |      |      |        |  |
| Sensitivity  | -43                                     | -42  | -41  | dB     | @1kHz ref 1V/Pa                                      |
| Operation voltage  | 1.5                                     | -    | 3.6  | V      |  |
| Freq. range  | Refer to the frequency response graphic |      |      | Hz     | Ref to sensitivity@1kHz                              |
| Sensitivity loss across supply voltage                                     | No change across the voltage range      |      |      | dB     |  |
| Signal to noise ratio  | -                                       | 58   | -    | dB     | 20 kHz bandwidth, A-weighted                         |
| THD  | -                                       | 0.1  | -    | %      | 94dB SPL @1kHz S =Nom, Rload > 2 k                   |
| AOP  | -                                       | 130  | -    | dB SPL | 10% THD @1kHz S =Nom, Rload > 2 k                    |
| Polarity   | Increasing output voltage               |      |      |        | Increasing sound pressure                            |
| Output impedance   | -                                       | 200  | -    | Ω      | @1kHz  |
| DC Output  |   | 0.7  |      | V      |  |
| PSRR   | -                                       | 70   | -    | dB     | 200mVpp sine wave @ 1 kHz, VDD = 1.8V                |
| PSR  | -                                       | -100 | -    | dBV(A) | 100 mVpp square wave@ 217 Hz, VDD = 1.8V, A-weighted |
| Current consumption  | -                                       | 150  | 170  | μA     |  |

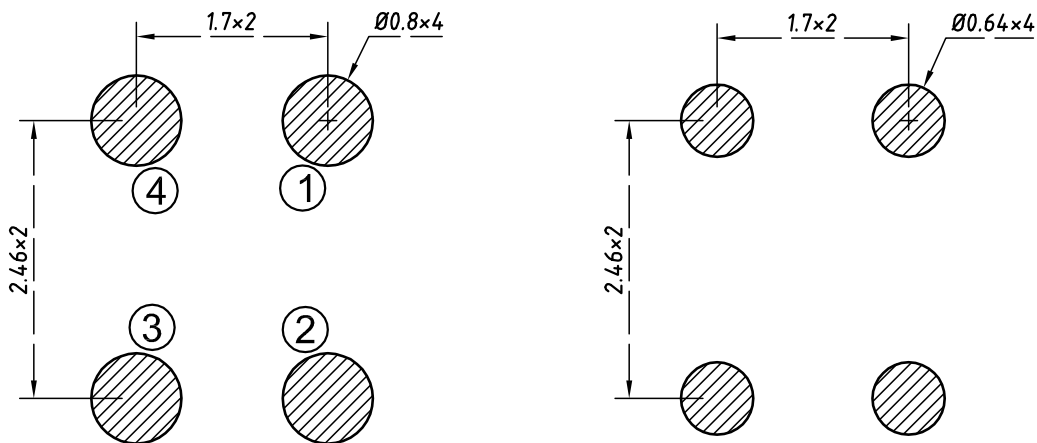


## TYPICAL FREQUENCY RESPONSE



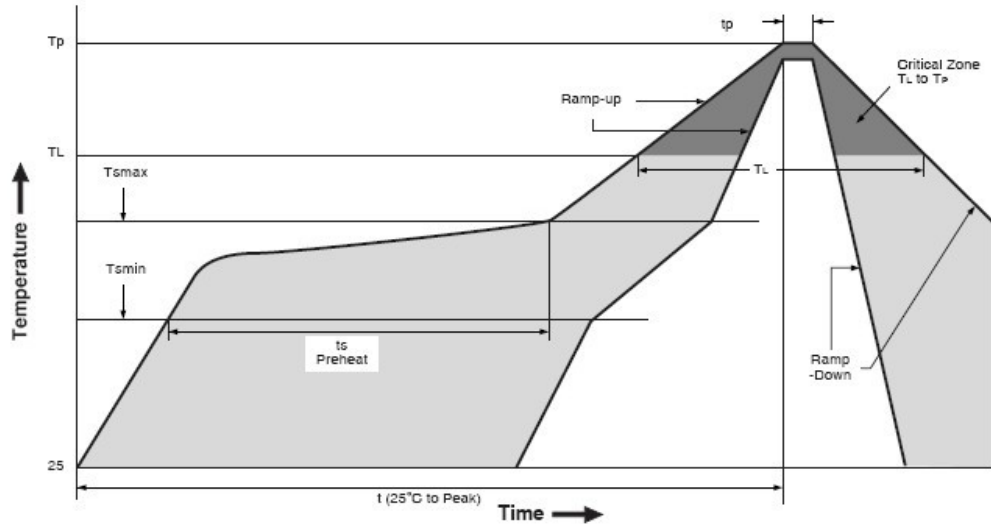
## SMT Parameters:

### 1. Recommend PCB land pattern layout & Example solder stencil pattern: (unit: mm)





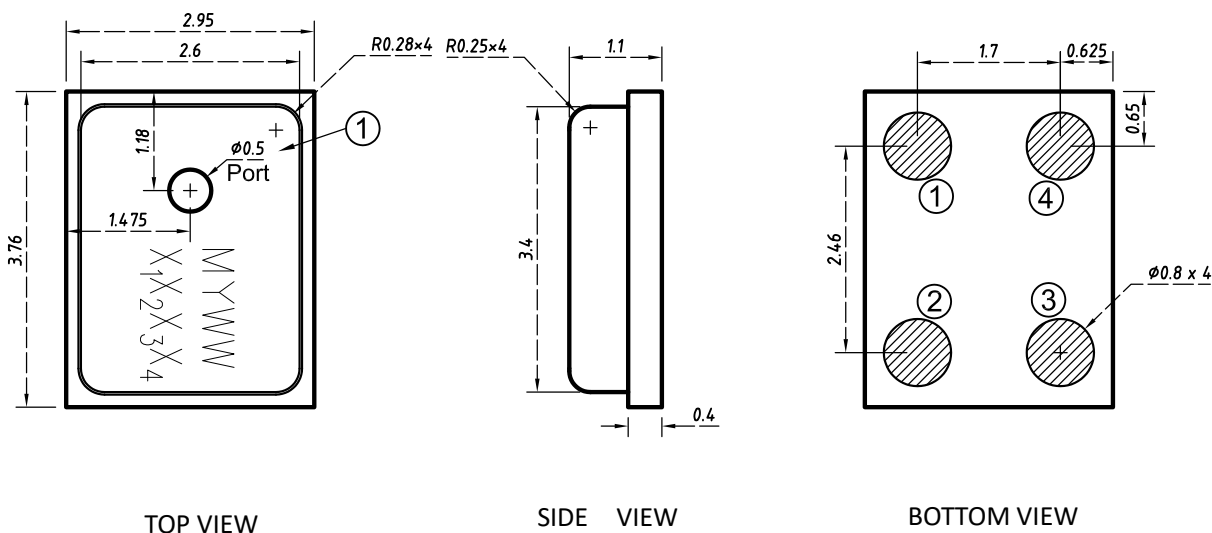
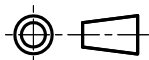
## 2. Recommend reflow profile:



| Description                                    | Parameter           | Pb-free           |
|--|---------------------|-------------------|
| Average ramp-up rate                           | $T_{smax}$ to $T_P$ | 3°C/sec max       |
| Preheat  |                     |                   |
| Minimum temperature                            | $T_{SMIN}$          | 150 °C            |
| Maximum temperature                            | $T_{SMAX}$          | 200 °C            |
| Time( $T_{SMIN}$ to $T_{SMAX}$ )               | $t_s$               | 60 sec to 180 sec |
| Ramp-up rate                                   | $T_{SMAX}$ to $T_L$ | 1.25 °C/sec       |
| Time maintained above liquidus temperature     | $t_L$               | 60 sec to 150 sec |
| Liquidus temperature                           | $T_L$               | 217 °C            |
| Peak temperature                               | $T_P$               | 260 °C            |
| Time within 5°C of actual peak temperature     | $t_p$               | 20 sec to 40 sec  |
| Ramp-down rate                                 | $T_P$ to $T_{smax}$ | 6 °C/sec max      |
| Time 25 °C ( $t_{25 °C}$ ) to peak temperature | $t$                 | 8 minutes max     |



**OUTLINE DIMENSIONS AND PIN DEFINITION:**



**PIN function description**

| PIN# | Function |
|------|----------|
| 1    | VDD      |
| 2    | GND      |
| 3    | GND      |
| 4    | OUT      |

| Item               | Dimension | Tolerance |
|--------------------|-----------|-----------|
| Length (L)         | 3.76      | ±0.10     |
| Width (W)          | 2.95      | ±0.10     |
| Height (H)         | 1.10      | ±0.10     |
| Acoustic Port (AP) | ∅0.5      | ±0.05     |

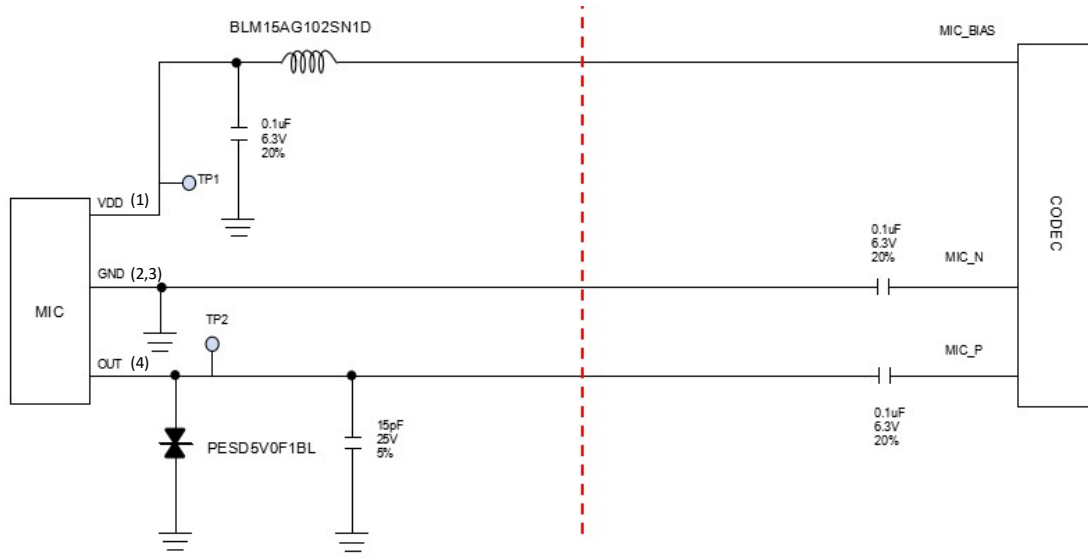
Dimensions are in millimeters, tolerance is ±0.15mm unless otherwise specified.

|   |   |               |
|---|---|---------------|
| MYWW<br>X <sub>1</sub> X <sub>2</sub> X <sub>3</sub> X <sub>4</sub> | M   | Memsensing    |
|   | Y   | Year(A~Z)     |
|   | WW  | Week          |
|   | X <sub>1</sub> X <sub>2</sub> X <sub>3</sub> X <sub>4</sub> | Serial Number |



**RECOMMENDED INTERFACE CIRCUIT:**

- **Recommended Application Example (differential amplification circuit)**



NOTE: It is recommended that the components on the left side of red line be placed close to MIC, and components on the right side of red line be placed close to codec.



## **ADDITIONAL NOTES**

(A) MSL (moisture sensitivity level) Class 1.

(B) Maximum of 3 reflow cycles is recommended.

I In order to minimize device damage:

Do not board wash or clean after the reflow process.

Do not brush board with or without solvents after the reflow process.

Do not directly expose to ultrasonic processing, welding, or cleaning.

Do not insert any object in port hole of device at any time.

Do not apply air pressure into the port hole.

Do not pull a vacuum over port hole of the microphone.

## **STORAGE AND TRANSPORTATION**

(A) Keep MEMS MIC in warehouse with less than 75% humidity and without sudden temperature change, acid air, any other harmful air or strong magnetic field.

Recommend floor life (out of bag) at factory no more than 4 weeks.

(B) The MEMS MIC with normal pack can be transported by ordinary conveyances. Please protect products against moist, shock, sunburn and pressure during transportation.

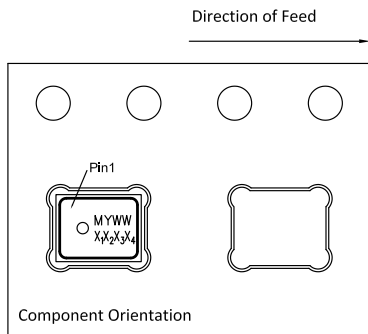
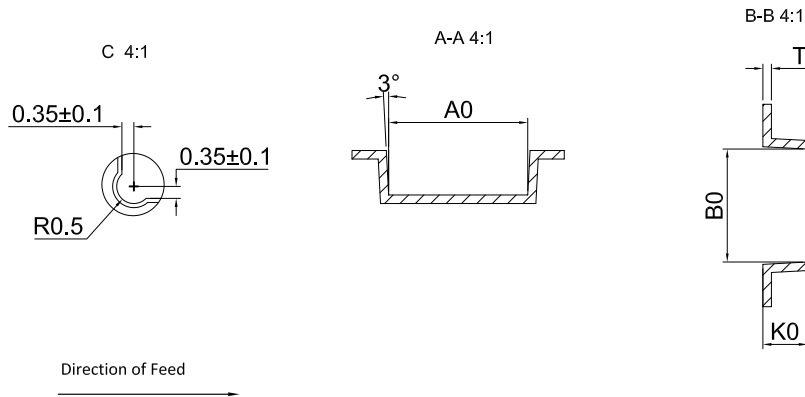
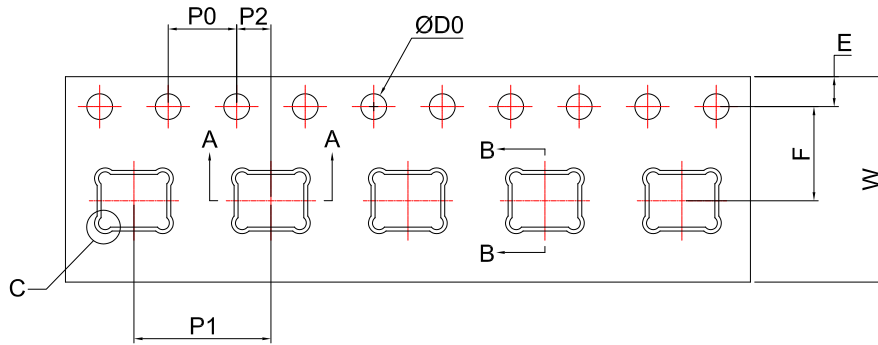
## **MATERIALS STATEMENT**

Meet the requirements of MEMSensing standard on hazard substances control (including RoHS2.0+REACH+Halogen-Free, etc.), with “HSF” identification on label.





**PACKAGING & MARKING DETAIL:**



|         |            |            |           |                                    |           |
|---------|------------|------------|-----------|------------------------------------|-----------|
| ITEM    | W          | E          | F         | ØD0                                | K0        |
| DIM(mm) | 12.00±0.30 | 1.75±0.10  | 5.50±0.10 | 1.50 <sup>+0.10</sup> <sub>0</sub> | 1.30±0.10 |
| ITEM    | P0         | 10P0       | P1        | A0                                 | B0        |
| DIM(mm) | 4.00±0.10  | 40.00±0.20 | 8.00±0.10 | 4.06±0.05                          | 3.30±0.10 |
| ITEM    | P2         | T          |           |                                    |           |
| DIM(mm) | 2.00±0.10  | 0.25±0.05  |           |                                    |           |

**Note:**

- 1) Dimensions are in mm;
- 2) Don't put the vacuum suction nozzle alignment the port hole;
- 3) Tape & Reel Per EIA-481 standard;
- 4) Label applied to external package and direct to reel;
- 5) Static voltage <100V;

| Model Number     | Reel Diameter | Quantity Per Reel |
|------------------|---------------|-------------------|
| MSM421A3729H9KRC | 13 inch       | 5700              |



## RELIABILITY SPECIFICATIONS

| Test                      | Description   |
|---------------------------|---|
| Thermal Shock             | 100 cycles air-to-air thermal shock from -40°C to +125°C with 15 minute soaks.  |
| High Temperature Storage  | 1,000 hours at +105°C environment   |
| Low Temperature Storage   | 1,000 hours at -40°C environment  |
| Reflow                    | 5 reflow cycles with peak temperature of +260°C   |
| ESD-HBM                   | 3 discharges of ±2 kV direct contact to I/O pins.   |
| ESD- LID-GND              | 3 discharges of ±8 kV direct contact to lid while unit is grounded.   |
| ESD-MM                    | 3 discharges of ±200V direct contact to I/O pins.   |
| Vibration                 | 4 cycles of 20 to 2,000 Hz sinusoidal sweep with 20 G peak acceleration lasting 12 minutes in X, Y, and Z directions. |
| Mechanical Shock          | 3 pulses of 10,000 G in the X, Y and Z direction  |
| High Temperature Bias     | 1,000 hours at +105°C under bias  |
| Low Temperature Bias      | 1,000 hours at -40°C under bias   |
| Temperature/Humidity Bias | 1,000 hours at +85°C/85% R.H. under bias.   |
| Drop Test                 | To be no interference in operation after dropped to 1.0cm steel plate 18 times from 1.5 meter height                  |

**NOTE:** Sensitivity should vary within ±3dB from initial sensitivity. (The measurement to be done after 2 hours of conditioning at 20±2 °C, R.H 60%~70%)

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## REVISION HISTORY:

| Revision | Subjects (major changes since last revision) | Date       |
|----------|--|------------|
| 0.8      | Preliminary Edition                          | 2018-12-29 |
| 1.0      | Initial Release                              | 2019-05-28 |

### 公司销售、技术支持联系方式

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