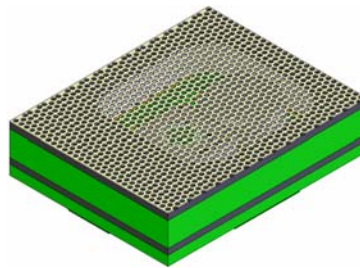


## ULTRASONIC ACOUSTIC SENSOR



## 1. DESCRIPTION AND APPLICATION

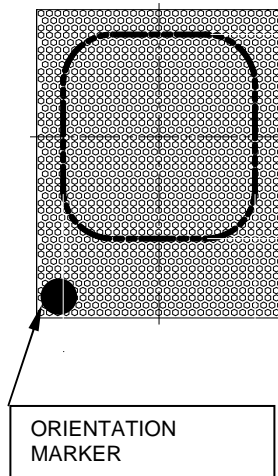
### 1.1. Description

Surface Mount Wide-Band Ultrasonic Acoustic Sensor

### 1.2. Applications

Hand held telecommunication devices, Positioning Sensing, Pneumatic Flow Sensing

## 2. PART MARKING



Orientation Identifier corresponds with Pin Position #2  
Refer to Section 6 of this specification for Mechanical Detail

## 3. TEMPERATURE RANGE

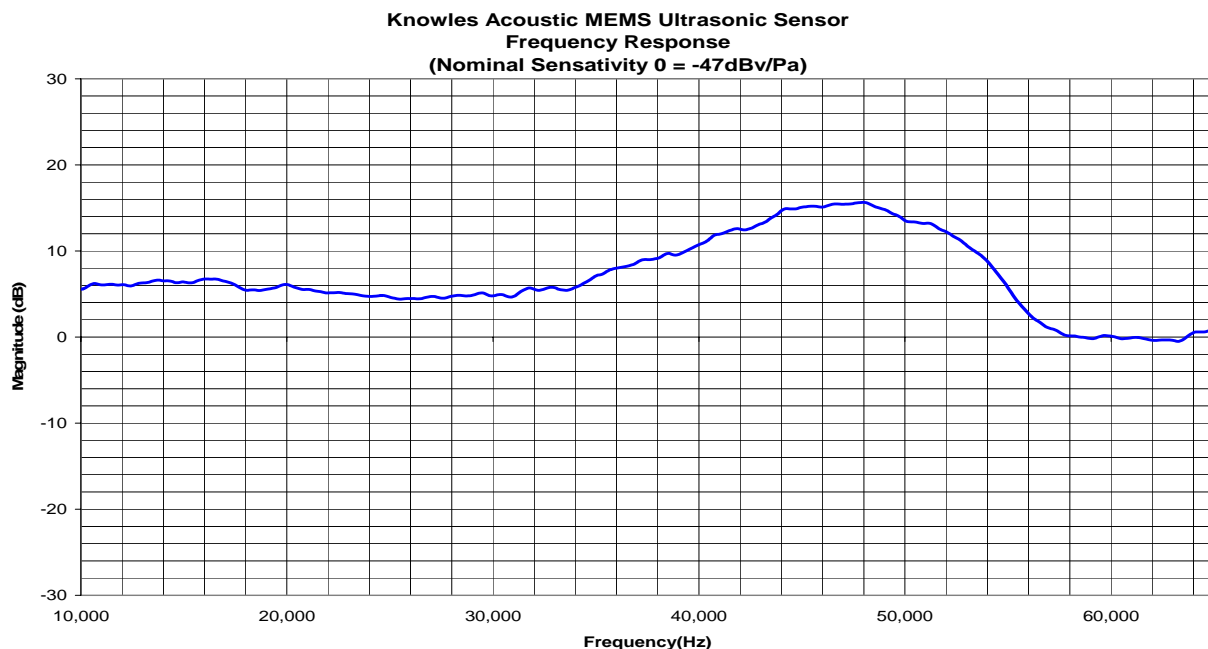
3.1. Operating Temperature Range:  $-40^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$

3.2. Storage Temperature Range:  $-40^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$

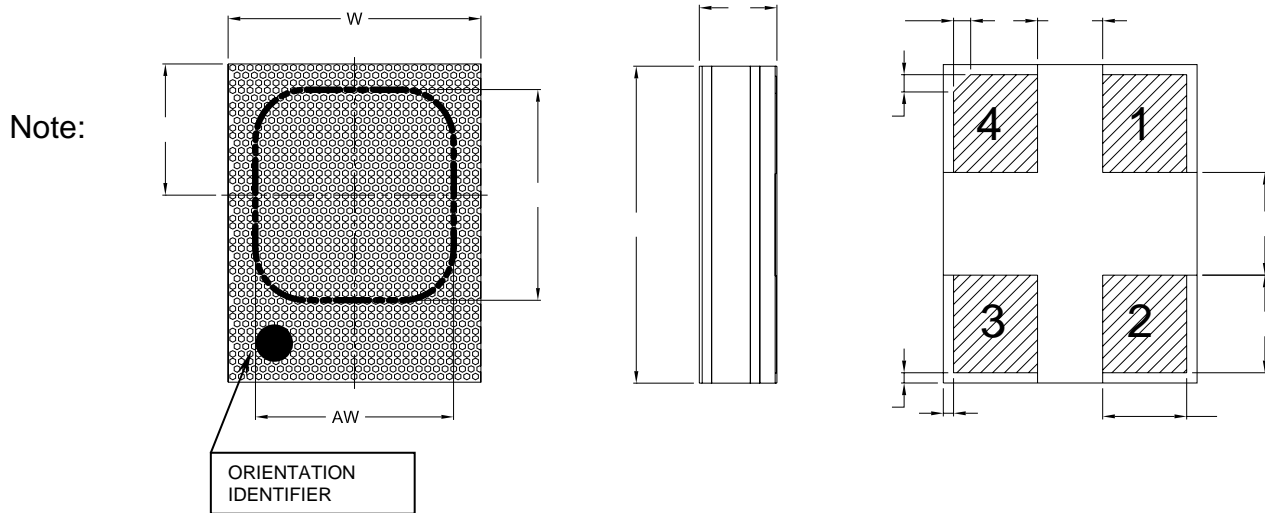
#### 4. ACOUSTIC AND ELECTRICAL SPECIFICATIONS

|                                 | Symbol | Condition   | Limits                         |      |       | Unit     |
|---------------------------------|--------|---|--------------------------------|------|-------|----------|
|                                 |        |   | Min.                           | Nom. | Max.  |          |
| Directivity                     |        | Omni-directional                                    |                                |      |       |          |
| Frequency Range                 | f      |   | 10k                            |      | 65k   | Hz       |
| Sensitivity                     | S      | @ 1kHz (0dB=1V/Pa)                                  | -51                            | -47  | -43   | dB       |
| Output impedance                | ZOUT   | @ 1kHz (0dB=1V/Pa)                                  | n/a                            | n/a  | 300   | $\Omega$ |
| Current Consumption             | IDSS   | across 1.5 to 3.6 volts                             | 0.100                          | n/a  | 0.250 | mA       |
| Signal to Noise Ratio           | S/N    | @ 1kHz (0dB=1V/Pa)                                  | 55                             | 59   | n/a   | dB       |
| Supply Voltage                  | Vs     |   | 1.5                            | n/a  | 3.6   | V        |
| Typical Input Referred Noise    | ENL    | A-weighted  | n/a                            | 35   | n/a   | dB SPL   |
| Sensitivity Loss across Voltage |        | Change in sensitivity over 3.6v to 1.5v             | No Change Across Voltage Range |      |       | dB       |
| Maximum Input Sound Level       |        | At 100dB SPL, THD < 1%<br>At 115dB SPL, THD = < 10% |                                |      |       | dB       |

#### 5. FREQUENCY RESPONSE CURVE



## 6. MECHANICAL SPECIFICATIONS

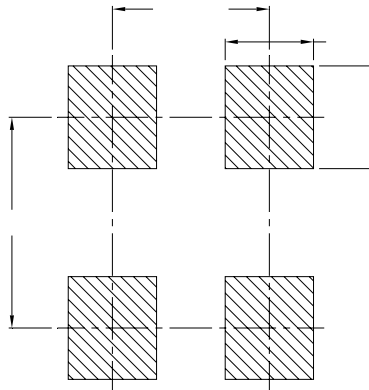


| Item          | Dim. | Tol. (+/-) | Units |
|---------------|------|------------|-------|
| (H) Height    | 1.15 | 0.10       | mm    |
| (L) Length    | 4.72 | 0.10       | mm    |
| (W) Width     | 3.76 | 0.10       | mm    |
| Acoustic Area |      |            |       |
| (AW) Width    | 2.95 | -          | mm    |
| (AL) Length   | 3.12 | -          | mm    |
| Weight        | 0.07 | g          |       |
| Coplanarity   | <0.1 | mm         |       |

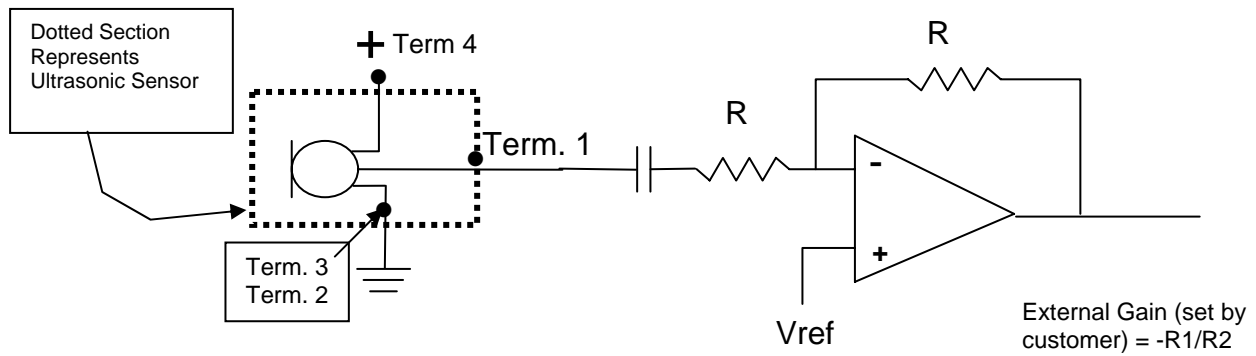
| PIN Designation |          |
|-----------------|----------|
| Pin #           | Function |
| 1               | Output   |
| 2               | Ground   |
| 3               | Ground   |
| 4               | Power    |

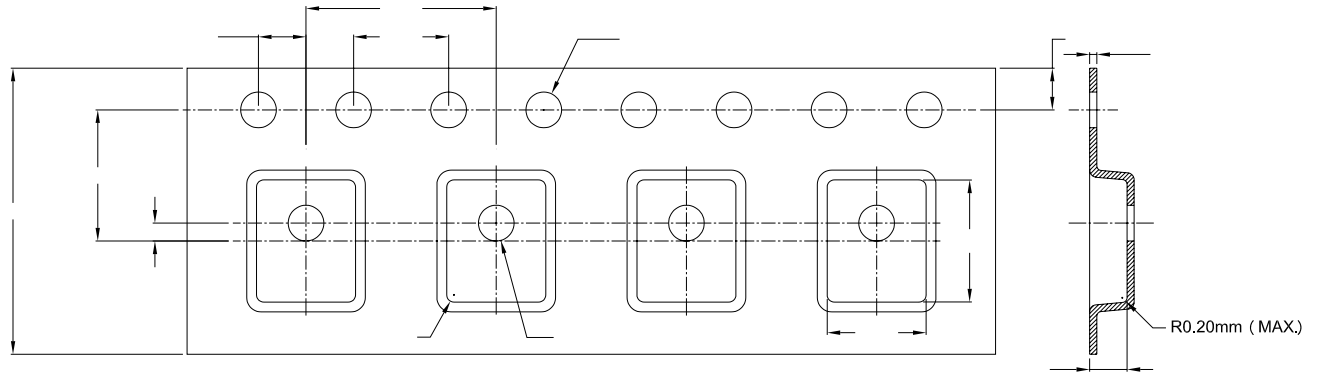
(Tolerance +/-0.15mm unless otherwise specified)

## 7. RECOMMENDED LAND PATTERN



## 8. RECOMMENDED INTERFACE CIRCUIT

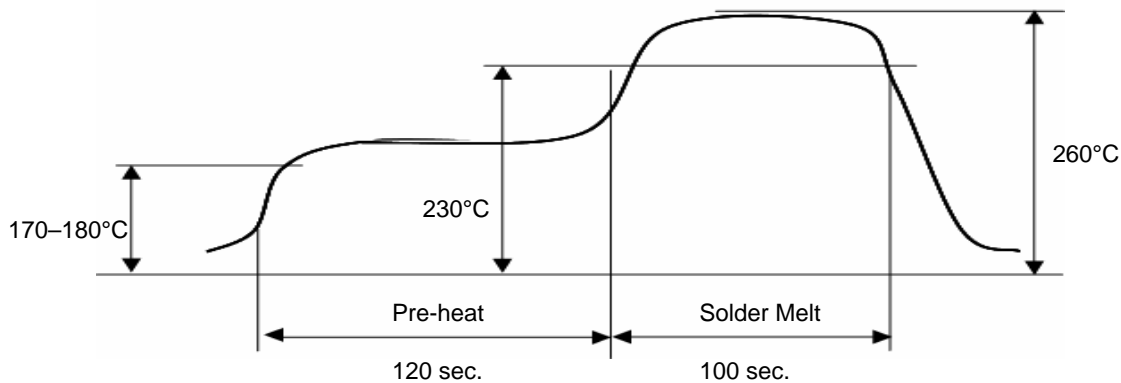


**9. PACKAGE DETAIL**


| <u>Model Number</u> | <u>Suffix</u> | <u>Reel Diameter</u> | <u>Quantity per Reel</u> |
|---------------------|---------------|----------------------|--------------------------|
| SPM0204UD5          | -2            | 7"                   | 1,200                    |
| SPM0204UD5          | -6            | 13"                  | 4,800                    |

|               |   |
|---------------|---|
| Leader Length | 800mm or minimum of 100 empty pockets   |
| Label         | Label applied to external package and direct to reel. Per JEDEC.  |
| Empty Units   | No consecutive empty pockets; No more than 3 empty pockets per reel. (Does not include empty pockets for leader/follower) |

## 10. SOLDER REFLOW PROFILE



| <u>Stage</u> | <u>Temperature Profile</u> | <u>Time (maximum)</u> |
|--------------|----------------------------|-----------------------|
| Pre-heat     | 170 ~ 180 C                | 120 sec.              |
| Solder Melt  | Above 230 C                | 100 sec.              |
| Peak         | 260 C maximum              | 30 sec.               |

### Notes:

- Do not pull a vacuum over the port hole of the microphone. Pulling a vacuum over the port hole can damage the device.
- Do not board wash after the reflow process. Board washing and cleaning agents can damage the device. Do not expose to ultrasonic processing or cleaning.
- Number of Reflow = recommend no more than 3 cycles.

## 11. ADDITIONAL NOTES

- (A) Packaging (reference SiSonic\_Packaging\_Spec.pdf)
- (B) Shelf life: Twelve (12) months when devices are to be stored in factory supplied, unopened ESD moisture sensitive bag under maximum environmental conditions of 30°C, 70% R.H.
- (C) Exposure: Devices should not be exposed to high humidity, high temperature environment. MSL (moisture sensitivity level) Class 2.
- (D) Out of bag: Maximum of 90 days out of ESD moisture sensitive bag, assuming maximum conditions of 30°C/70% R.H.

## 12. RELIABILITY SPECIFICATIONS

Note: After test conditions are performed, the sensitivity of the microphone shall not deviate more than 3dB from its initial value.

| Test                            | Description   |
|---------------------------------|---|
| Thermal Shock                   | Microphone unit must operate when exposed to air-to-air thermal shock 100 cycles, from $-40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ . (IEC 68-2-4),  |
| High Temperature Storage Test   | Microphone unit must maintain sensitivity after storage at $+105^{\circ}\text{C}$ for 1,000 hours. (IEC 68-2-2 Test Ba)   |
| Low Temperature Storage Test    | Microphone unit must maintain sensitivity after storage at $-40^{\circ}\text{C}$ for 1,000 hours. (IEC 68-2-1 Test Aa)  |
| High Temperature Operating Test | Microphone unit must operate within sensitivity specifications for 1,000 hours at $105^{\circ}\text{C}$ . (IEC 68-2-2 Test Ba)  |
| Low Temperature Operating Test  | Microphone unit must operate within sensitivity specifications for 1,000 hours at $-40^{\circ}\text{C}$ . (IEC 68-2-1 Test Aa)  |
| Humidity Test                   | Tested under Bias at $85^{\circ}\text{C}/85\%$ R.H. for 1,000 hours. (JESD22-A101A-B)   |
| Vibration Test                  | Microphone unit must operate under test condition: 4 cycles, from 20 to 2,000 Hz in each direction (x,y,z), 48 minutes, using peak acceleration of 20 G (+20%, -0%). (MIL 883E, method 2007.2, A) |
| Electrostatic Discharge         | Tested to 8kV direct contact discharge to the case and tested to 2kV direct contact to I/O terminals.   |
| Reflow                          | Microphone is tested to 5 passes through reflow oven, with microphone mounted upside-down under conditions of $260^{\circ}\text{C}$ for 30 seconds maximum.                                       |
| Mechanical Shock                | Microphone must operate after exposure to shock test of 10,000 G per IEC 68-2-27, Ea.   |



### 13. SPECIFICATION REVISIONS

| Revision | Detailed Specification Changes | Date |
|----------|--------------------------------|------|
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