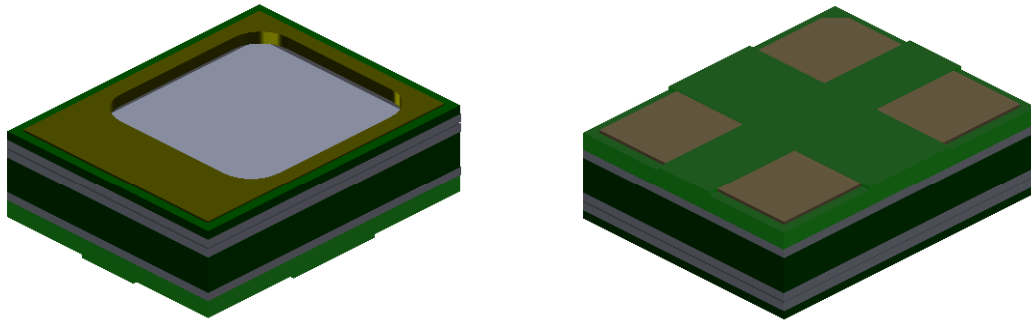


"Mini" SiSonic™ Ultrasonic Acoustic Sensor Specification



Knowles Acoustics
1151 Maplewood Drive
Itasca, IL 60143

1. DESCRIPTION AND APPLICATION

1.1 DESCRIPTION

Surface Mount Wide-band Ultrasonic Acoustic Sensor

1.2 APPLICATION

Hand held telecommunication devices, Positioning Sensing,
Pneumatic Flow Sensing.

2. PART MARKING

Identification Number Convention

S 1 2 3

4 5 6 7

S: Manufacturing Location

"S" - Knowles Electronics Suzhou
Suzhou, China

"No Alpha Character" - Knowles Electronics
Itasca, IL USA

"E" - Engineering Samples

Digits 1-7: Job Identification Number

3. TEMPERATURE RANGE

3.1 Operating Temperature Range: -40°C to +100°C

3.2 Storage Temperature Range: -40°C to +100°C

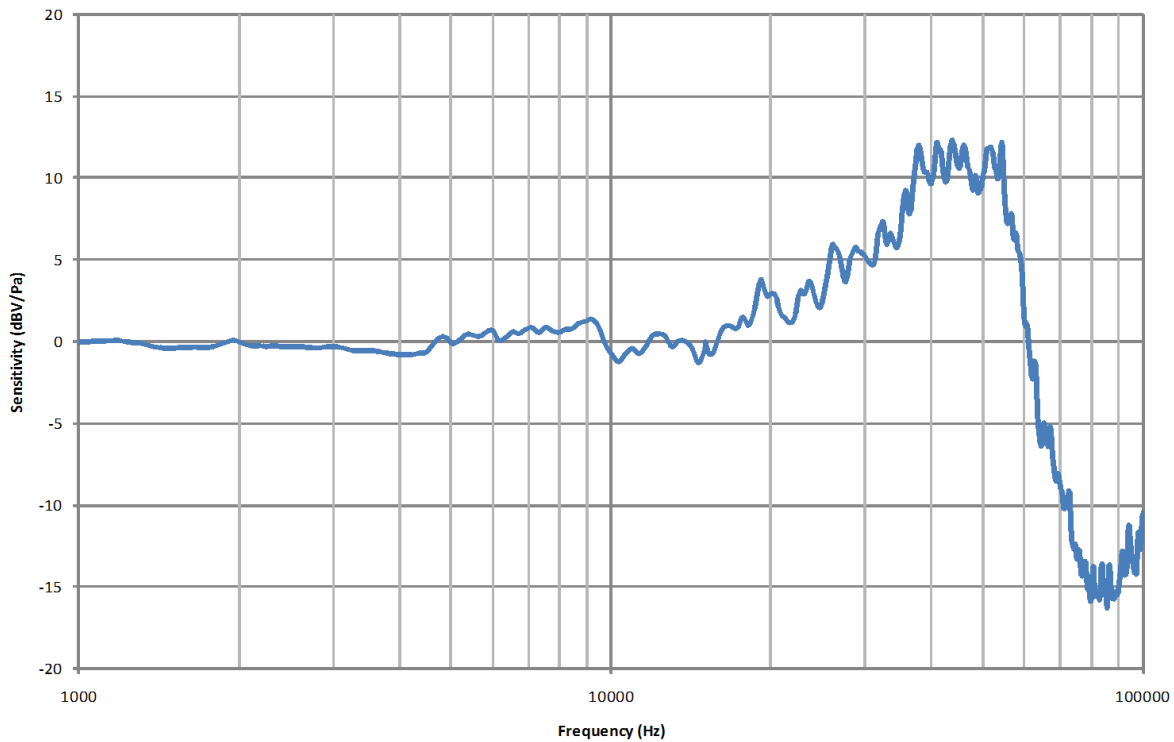
4. ACOUSTIC & ELECTRICAL SPECIFICATIONS

TEST CONDITIONS: +20 °C, 60-70% R.H.

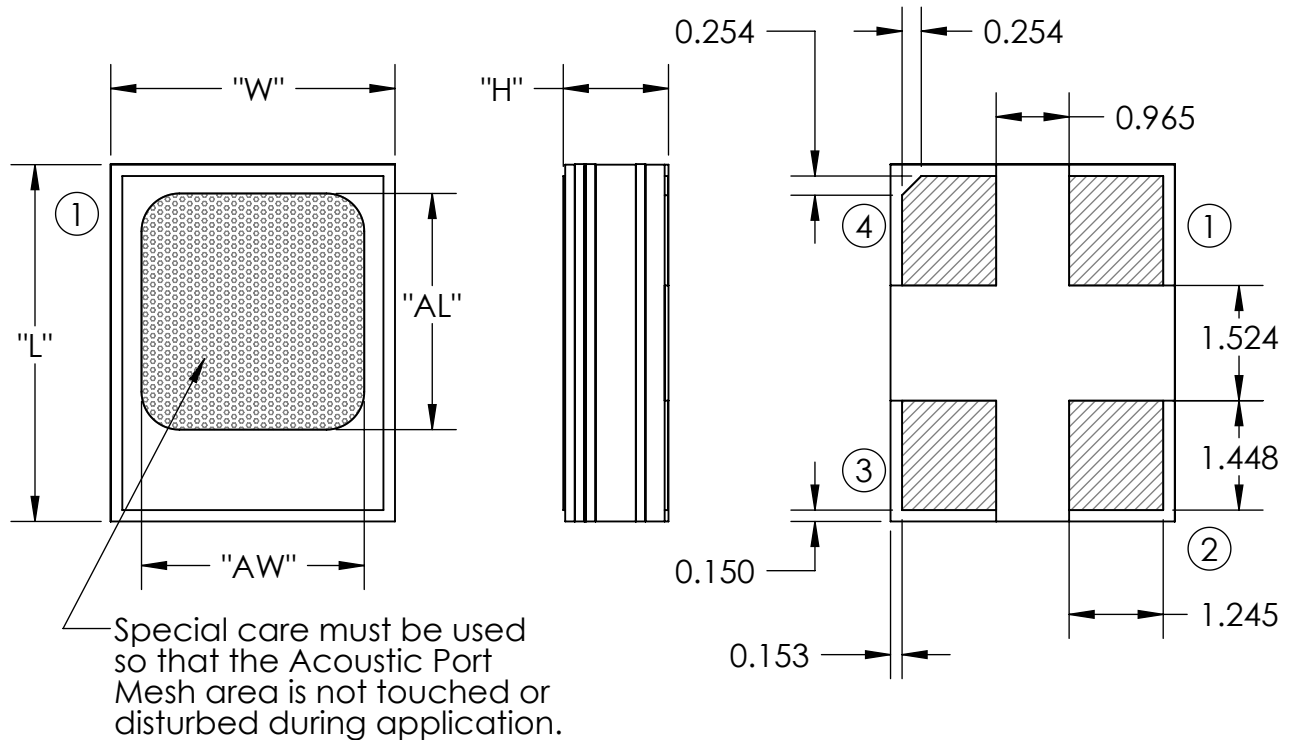
| | Symbol | Condition | Limits | | | Unit |
|---------------------------------|------------------|---|---|------|------|------|
| | | | Min. | Nom. | Max. | |
| Directivity | | Omni-directional | -- | -- | -- | |
| Sensitivity | S | @ 1kHz (0dB-1V/Pa) | -46 | -42 | -38 | dB |
| Output Impedance | Z _{OUT} | @ 1kHz (0dB-1V/Pa) | -- | -- | 300 | Ω |
| Current Consumption | I _{DDs} | Across 1.5 to 3.6 volts | -- | -- | 250 | μA |
| Signal to Noise Ratio | S/N | @ 1kHz (0dB-1V/Pa) | -- | 59 | -- | dB |
| Supply Voltage | V _s | | 1.5 | -- | 3.6 | V |
| 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% At 115dB SPL, THD ≤ 10% | | | |

5. FREQUENCY RESPONSE CURVE

Typical Free Field Response
Normalized to 1kHz, C1 = 2.2μF



6. MECHANICAL SPECIFICATIONS



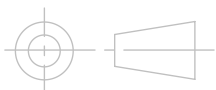
| ITEM | DIMENSION | TOLERANCE | UNITS |
|----------------------|-----------|-----------|-------|
| LENGTH (L) | 4.720 | ±0.100 | mm |
| WIDTH (W) | 3.760 | ±0.100 | mm |
| HEIGHT (H) | 1.400 | ±0.100 | mm |
| ACOUSTIC LENGTH (AL) | 3.120 | ±0.100 | mm |
| ACOUSTIC WIDTH (AW) | 2.950 | ±0.100 | mm |

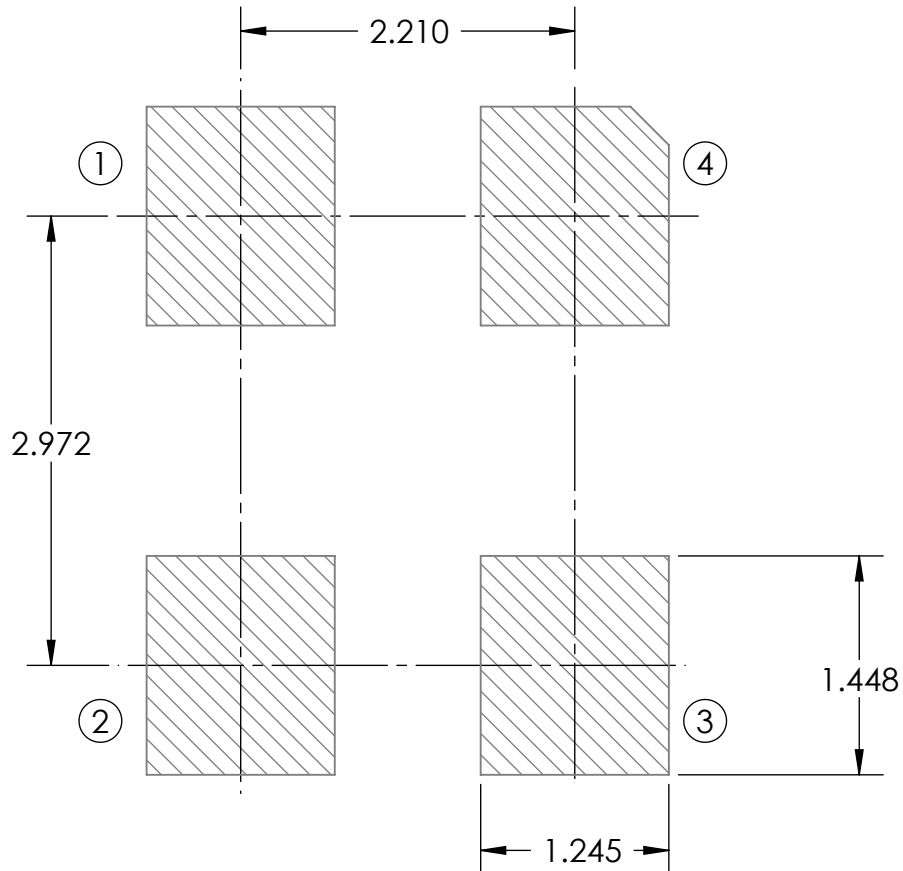
| PIN OUTPUT | |
|------------|-------------|
| PIN # | FUNCTION |
| 1 | OUTPUT |
| 2 | GROUND |
| 3 | GROUND |
| 4 | POWER (Vdd) |

Note:

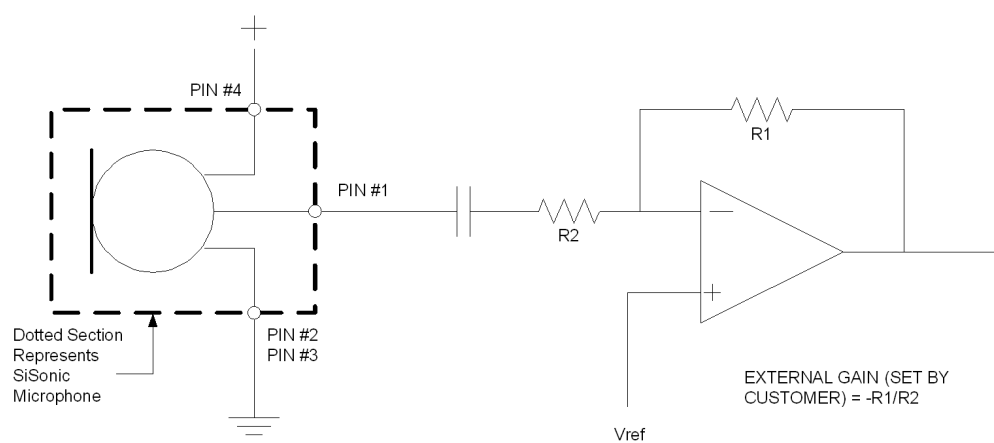
Dimensions are in millimeters unless otherwise specified.

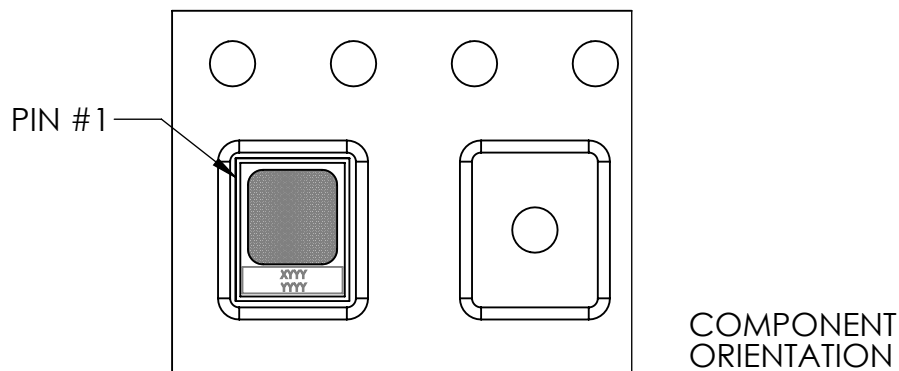
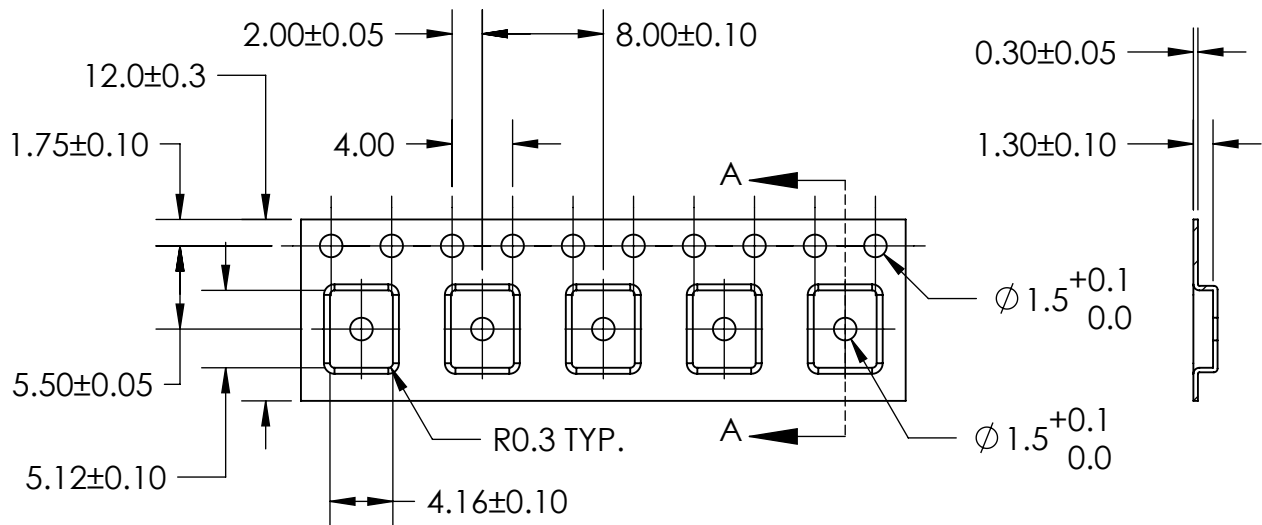
Tolerance ±0.15mm unless otherwise specified.



7. RECOMMENDED CUSTOMER LAND PATTERN**8. RECOMMENDED SOLDER STENCIL PATTERN****N/A**

9. RECOMMENDED INTERFACE CIRCUIT



10. PACKAGING DETAIL


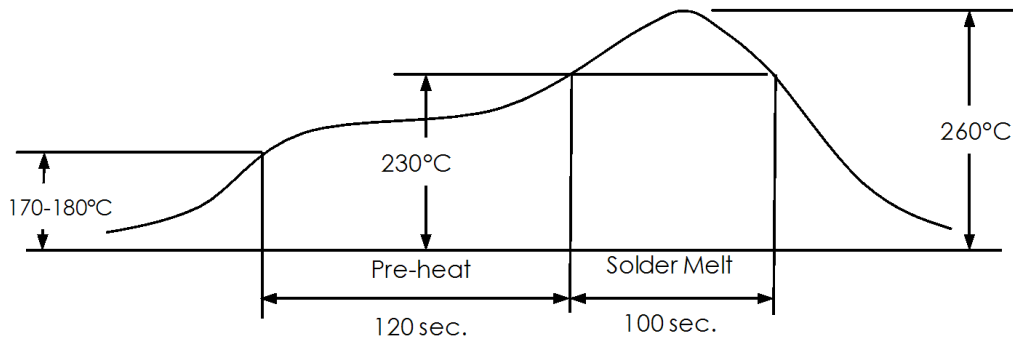
| MODEL NUMBER | SUFFIX | REEL DIAMETER | QUANTITY PER REEL |
|--------------|--------|---------------|-------------------|
| SPM0404UD5 | -2 | 7" | 1,200 |
| | -6 | 13" | 4,800 |

| | |
|-------------|---|
| TAPE & REEL | PER EIA-481 |
| LABEL | LABEL APPLIED TO EXTERNAL PACKAGE & DIRECT TO REEL. |

Note:

Dimensions are in millimeters unless otherwise specified.

11. SOLDER FLOW PROFILE



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

12. ADDITIONAL NOTES

- (A) 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.
- (B) MSL (moisture sensitivity level) Class 2a.
- (C) Do not pull a vacuum over port hole of the microphone. Pulling a vacuum over the port hole can damage the device.
- (D) 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.
- (E) Do not brush board after the reflow process. Brushing the board with/without solvents can damage the device.
- (F) Do not insert any object in port hole of device at any time as this can damage the device.
- (G) Number of reflow - Recommend no more than 3 cycles.

13. 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 | 100 cycles of air-air thermal shock from -40°C to +125°C with 15 minute soaks. (ICE 68-2-4) |
| High Temperature Storage | +105°C environment for 1,000 hours. (ICE 68-2-2 Test Ba) |
| Low Temperature Storage | -40°C environment for 1,000 hours. (ICE 68-2-2 Test Aa) |
| High Temperature Bias | +105°C environment while under bias for 1,000 hours. (ICE 68-2-2 Test Ba) |
| Low Temperature Bias | -40°C environment while under bias for 1,000 hours. (ICE 68-2-2 Test Aa) |
| Temperature / Humidity Bias | +85°C/85% R.H. environment while under bias for 1,000 hours. (JESD22-A101A-B) |
| Vibration | 4 cycles lasting 12 minutes from 20 TO 2,000 Hz in X, Y and Z direction with peak acceleration of 20g. (MIL 883E, Method 2007.2, A) |
| Electrostatic Discharge | 3 discharges at +/-8kV direct contact to lid when unit is grounded (IEC 61000-4-2) and 3 discharges at +/-2kV direct contact to I/O pins. (MIL 883E, Method 3015.7) |
| Reflow | 5 reflow cycles with peak temperature of +260°C. |
| Mechanical Shock | 3 pulses of 10,000g in the X, Y and Z direction. (IEC 68-2-27, Test Ea) |

14. SPECIFICATION REVISIONS

| Revision | Detailed Specification Changes | Date |
|-----------------|--|------------------|
| 1 | Preliminary Specification, DMS | 6-11-2009 |
| A | Initial Release. (DMS, C10109833) | 7/20/2009 |
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