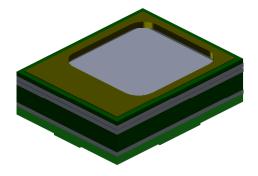
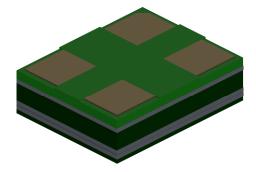


"Mini" SiSonic<sup>™</sup> Ultrasonic Acoustic Sensor Specification





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





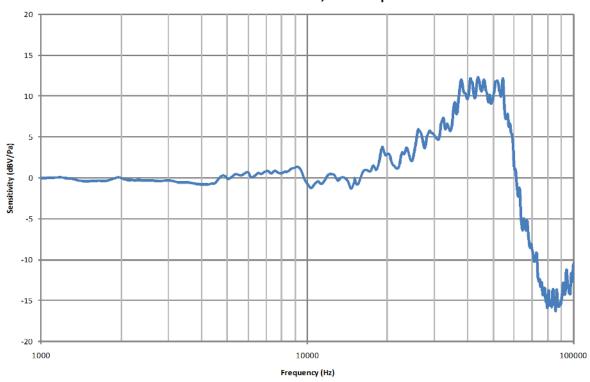
## 4. ACOUSTIC & ELECTRICAL SPECIFICATIONS

TEST CONDITIONS: +20°C, 60-70% R.H.

|                         | Symbol | Condition               | Limits                   |      | Unit |        |
|-------------------------|--------|-------------------------|--------------------------|------|------|--------|
|                         | Symbol | Condition               | Min.                     | Nom. | Max. | Offili |
| Directivity             |        | Omni-directional        |                          | I    |      |        |
| Sensitivity             | S      | @ 1kHz (0dB-1V/Pa)      | -46                      | -42  | -38  | dB     |
| Output Impedance        | Zout   | @ 1kHz (0dB-1V/Pa)      |                          | -    | 300  | Ω      |
| Current Consumption     | ldds . | Across 1.5 to 3.6 volts |                          |      | 250  | μA     |
| Signal to Noise Ratio   | S/N    | @ 1kHz (0dB-1V/Pa)      |                          | 59   |      | dB     |
| Supply Voltage          | Vs     |                         | 1.5                      | -    | 3.6  | V      |
| Sensitivity Loss Across |        | Change in sensitivity   | No Change Across Voltage |      | dB   |        |
| Voltage                 |        | over 3.6V to 1.5V       | Range                    |      | аь   |        |
| Maximum Input Sound     |        | At 100dB                | SPL, THD < 1%            |      |      |        |
| Level                   |        | At 115dB S              | SPL, THD <u>&lt;</u> 10% |      |      |        |

## 5. FREQUENCY RESPONSE CURVE





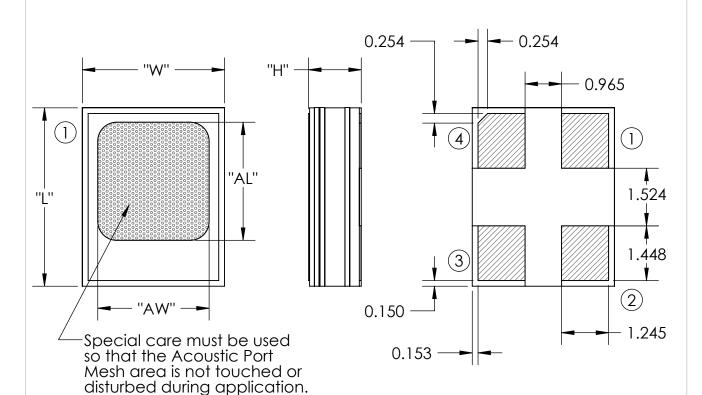


Knowles Acoustics, a division of Knowles Electronics, LLC.

Revision: A Release Level: ACTIVE Sheet 3 of 10



## 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    | 3.120     | ±0.100    | po po |
| LENGTH (AL) | 3.120     | ±0.100    | mm    |
| ACOUSTIC    | 2.950     | ±0.100    | mm    |
| WIDTH (AW)  | 2.730     | ±0.100    | mm    |

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

#### Note:

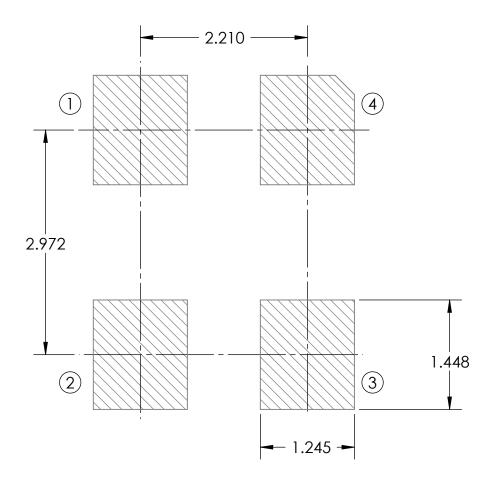
Dimensions are in milimeters unless otherwise specified.

Tolerance  $\pm 0.15$ mm unless otherwise specified.





## 7. RECOMMENDED CUSTOMER LAND PATTERN



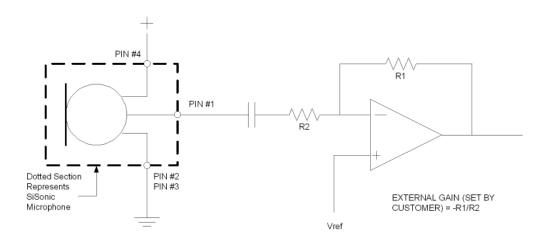
## 8. RECOMMENDED SOLDER STENCIL PATTERN

N/A





## 9. RECOMMENDED INTERFACE CIRCUIT







# 10. PACKAGING DETAIL 2.00±0.05 1.75±0.10 4.00 RO.3 TYP. 5.12±0.10 PIN #1

| MODEL NUMBER   | SUFFIX | REEL<br>DIAMETER | QUANTITY<br>PER REEL |
|----------------|--------|------------------|----------------------|
| SPM0404UD5     | -2     | 7"               | 1,200                |
| 31 1/104040103 | -6     | 13"              | 4,800                |

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

#### Note:

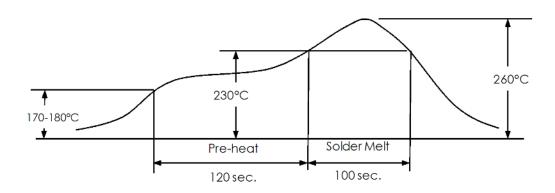
COMPONENT ORIENTATION

Dimensions are in milimeters 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) <u>Do not pull a vacuum</u> over port hole of the microphone. Pulling a vacum 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) <u>Do not brush board</u> 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.



Knowles Acoustics, a division of Knowles Electronics, LLC.

Revision: A Release Level: ACTIVE Sheet 8 of 10



## 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        | +105°C environment for 1,000 hours. (ICE 68-2-2 Test  |
| Storage                 | Ba)   |
| Low Temperature         | 40°C environment for 1,000 hours (ICE (9,00 Tost Ag)  |
| 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)  |
|                         | -40°C environment while under bias for 1,000 hours.   |
| Low Temperature Bias    | (ICE 68-2-2 Test Aa)  |
| Temperature / Humidity  | +85°C/85% R.H. environment while under bias for 1,000   |
| Bias                    | 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 |
| Α        | Initial Release. (DMS, C10109833) | 7/20/2009 |
|          |                                   |           |
|          |                                   |           |
|          |                                   |           |
|          |                                   |           |
|          |                                   |           |
|          |                                   |           |
|          |                                   |           |
|          |                                   |           |
|          |                                   |           |
|          |                                   |           |
|          |                                   |           |
|          |                                   |           |
|          |                                   |           |

The information contained in this literature is based on our experience to date and is believed to be reliable and it is subject to change without notice. It is intended as a guide for use by persons having technical skill at their own discretion and risk. We do not guarantee favorable results or assume any liability in connection with its use. Dimensions contained herein are for reference purposes only. For specific dimensional requirements consult factory. This publication is not to be taken as a license to operate under, or recommendation to infringe any existing patents. This supersedes and voids all previous literature.

