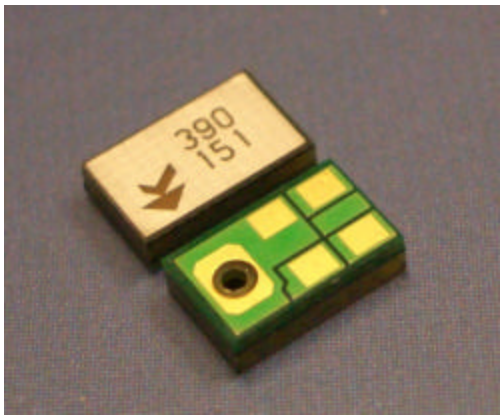
# "Zero Height" Amplified SiSonic™ Microphone Specification




Knowles Acoustics
1151 Maplewood Drive
Itasca, IL 60143

# 1. DESCRIPTION AND APPLICATION

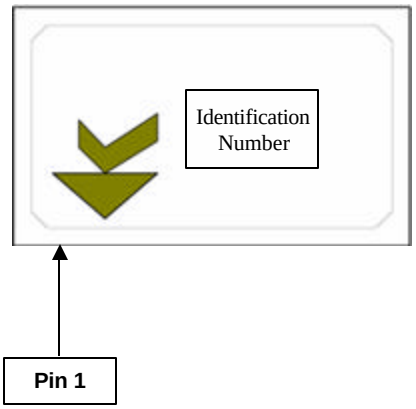
## 1.1 Description

Zero Height Amplified Surface Mount Silicon Microphone

## 1.2 Application

Hand held telecommunication devices

# 2. PART MARKING




Identification Number Convention

| S | 1 | 2 | 3 |
|---|---|---|---|
| 4 | 5 | 6 | |

S: Manufacturing Location

"S" – Knowles Electronics Suzhou
Suzhou, China

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

"E" – Engineering Samples

Digits 1 – 6: Job Identification Number

# 3. TEMPERATURE RANGE

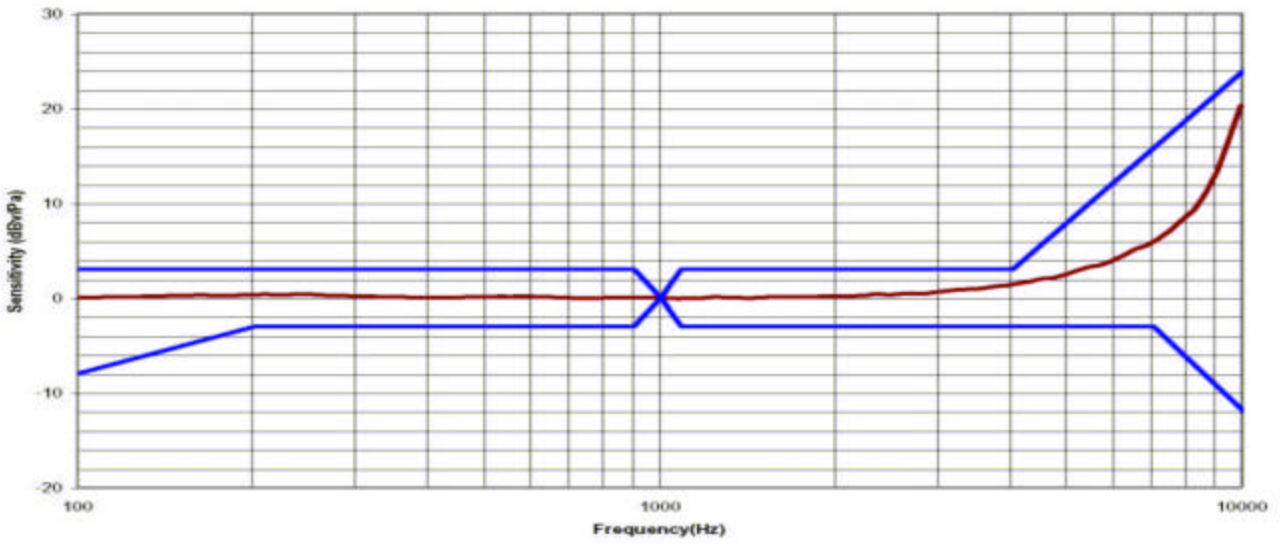
## 3.1 Operating Temperature Range: -40°C to +100°C

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

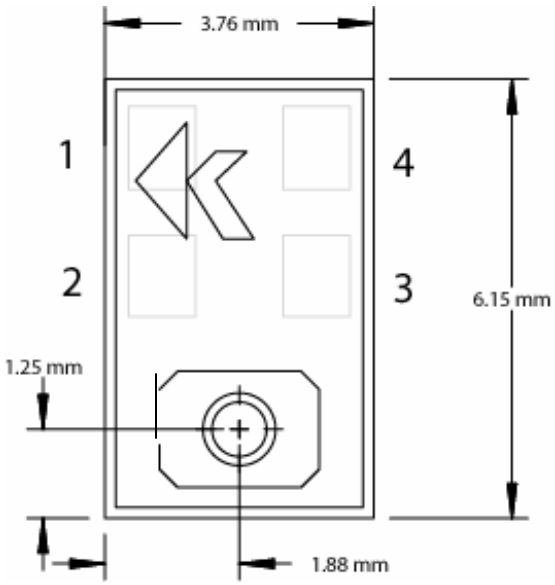
# 4. ACOUSTIC & ELECTRICAL SPECIFICATIONS

| | Symbol | Condition | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Nom. | Max. | |
| Directivity | | Omni-directional | | | | |
| Sensitivity | S | @ 1kHz (0dB=1V/Pa) | -26 | -22 | -18 | dB |
| Output impedance | $Z_{OUT}$ | @ 1kHz (0dB=1V/Pa) | n/a | n/a | 100 | Ω |
| Current Consumption | $I_{DSS}$ | across 1.5 to 5.5 volts | 0.100 | n/a | 0.350 | mA |
| Signal to Noise Ratio | S/N | @ 1kHz (0dB=1V/Pa) | 55 | 59 | n/a | dB |
| Supply Voltage | Vs | | 1.5 | n/a | 5.5 | V |
| Typical Input Referred Noise | ENL | A-weighted | n/a | 35 | n/a | dBA SPL |
| Sensitivity Loss across Voltage | | Change in sensitivity over 5.5v 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 |
| Contact Resistance | | | | | 100 | Ohms |

# 5. FREQUENCY RESPONSE CURVE



# 6. MECHANICAL SPECIFICATIONS

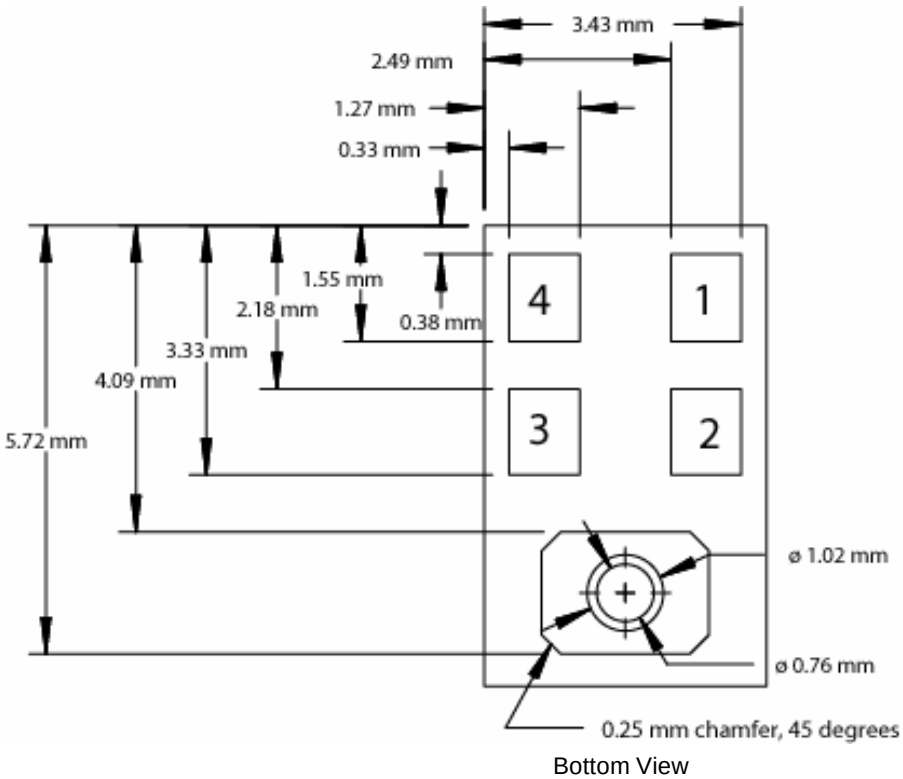



Top View


Side View

| Item | Dim. | Tol. (+/-) | Units |
|---|---|---|---|
| Height | 1.65 | +0.20 -0.10 | mm |
| Length | 6.15 | 0.10 | mm |
| Width | 3.76 | 0.10 | mm |
| Weight | 0.09 | grams | |
| Coplanarity | < 0.1 | | mm |

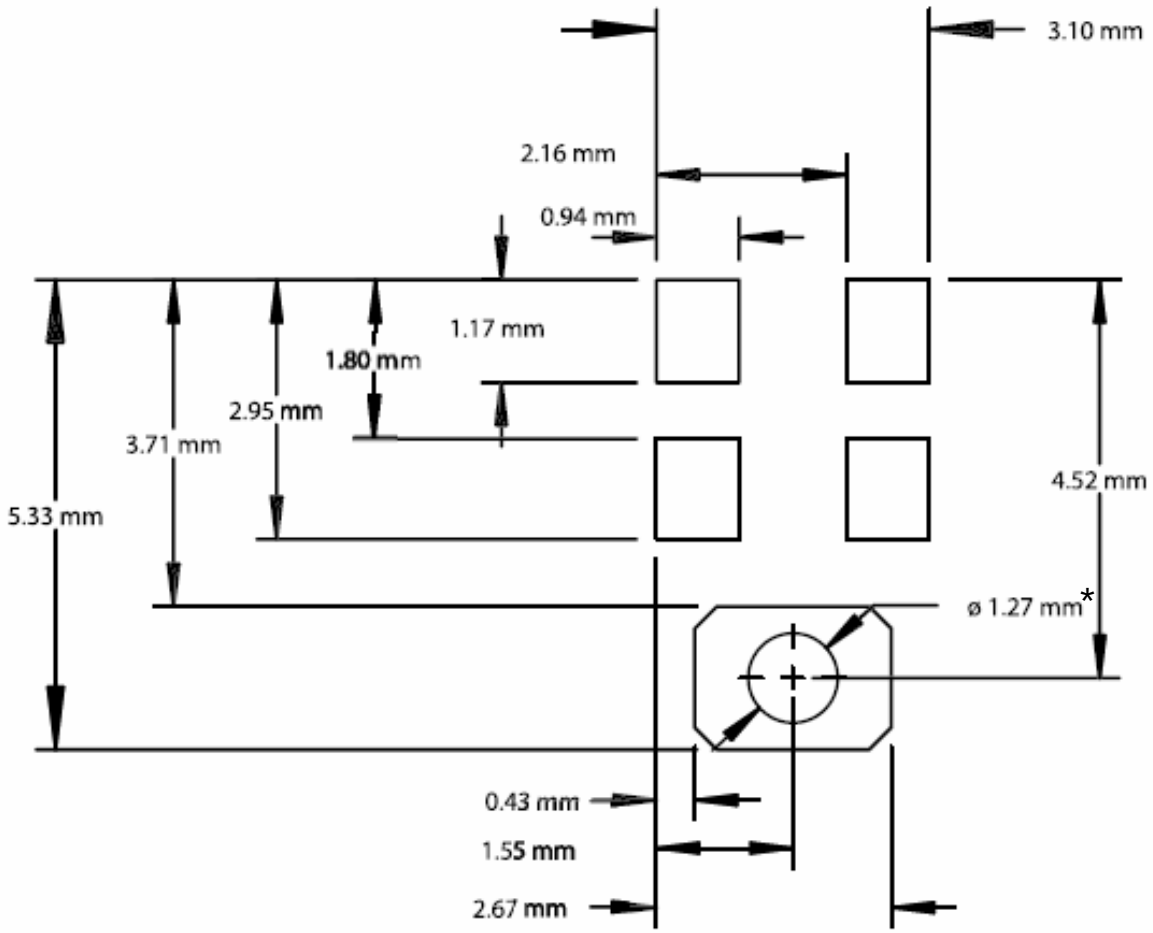
| Pin Output | |
|---|---|
| **Pin #** | **Function** |
| 1 | Output |
| 2 | Gain Control |
| 3 | Ground |
| 4 | Power |




Bottom View

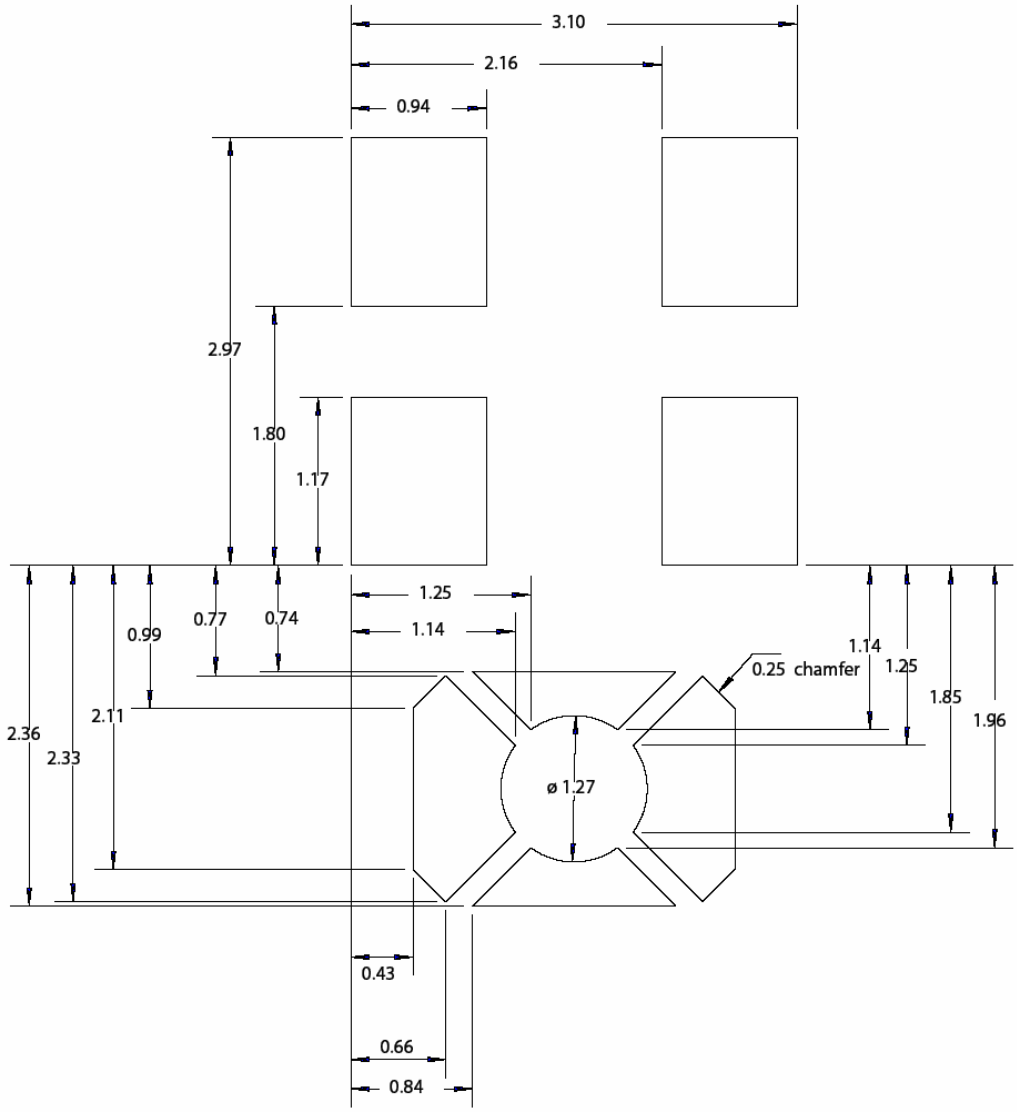
(Note: Tolerance +/-0.15mm unless otherwise specified)

# 7. RECOMMENDED CUSTOMER LAND PATTERN




* Note: Minimum PCB Hole Diameter: 1.02 mm

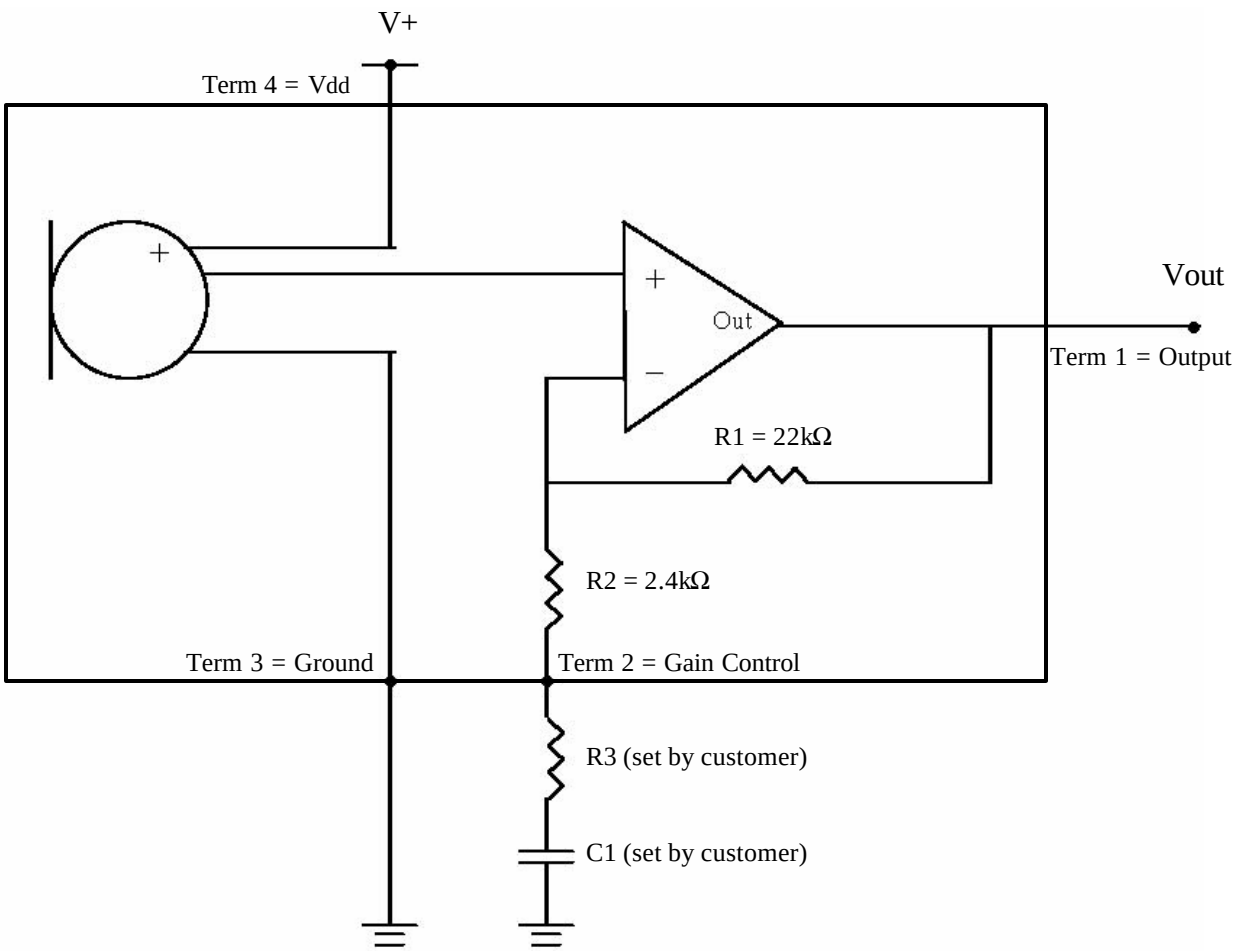
# 8. RECOMMENDED SOLDER STENCIL PATTERN




Notes:

- The design requires that an acoustic seal be established between the SiSonic and customer PCB. This is accomplished via a solder seal.
- Solder Stencil Thickness = 0.127 min to 0.178 max
- Stencil Material = Stainless Steel

# 9. RECOMMENDED INTERFACE CIRCUIT




| **Desired Gain** | **Pin 2 Termination Method** |
|---|---|
| Unity Gain (0dB) | Tie Terminal 2 directly to Output (Terminal 1). |
| 20dB Gain | Tie Terminal 2 through C1 (0.47uF) to Ground. |
| Adjustable Gain | Add R3 and C1. Use formulas provided to calculate settings, or contact Knowles for support. |

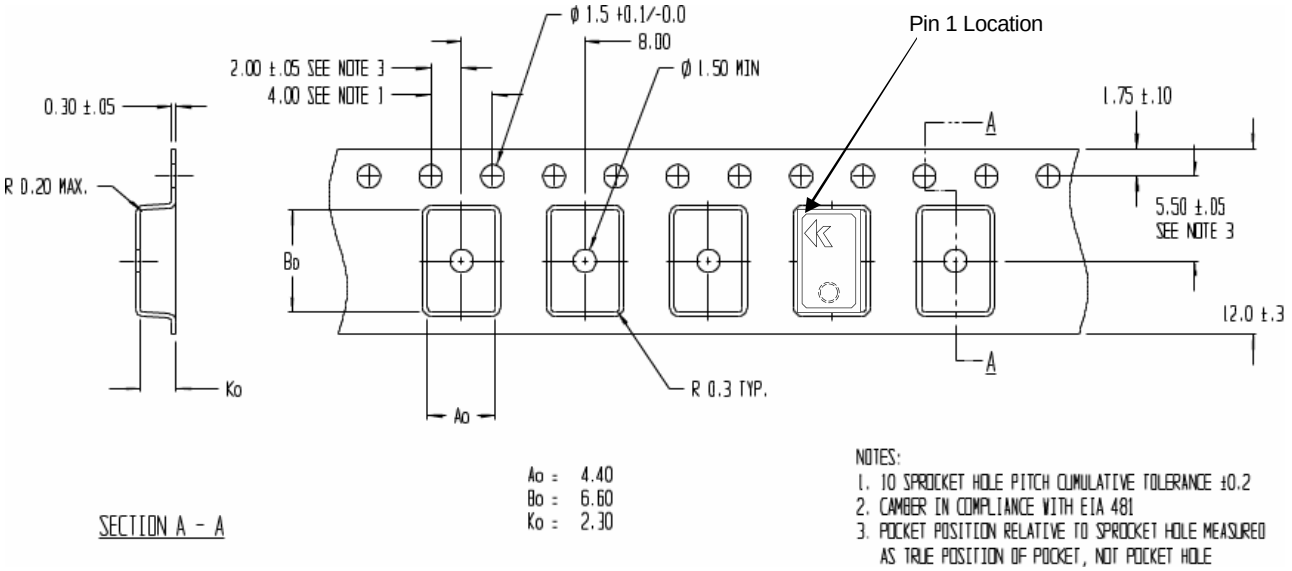
**Setting Gain Formulas**:
Gain of non-inverting Op-Amp is determined as:

➡ G=1+ {R1 / (R2 + R3)}  Gain(dB) = 20 * log(G)

High-pass-filter Corner Frequency:

➡ C.F. = 1 / {2*p*(R2 + R3) * C1}

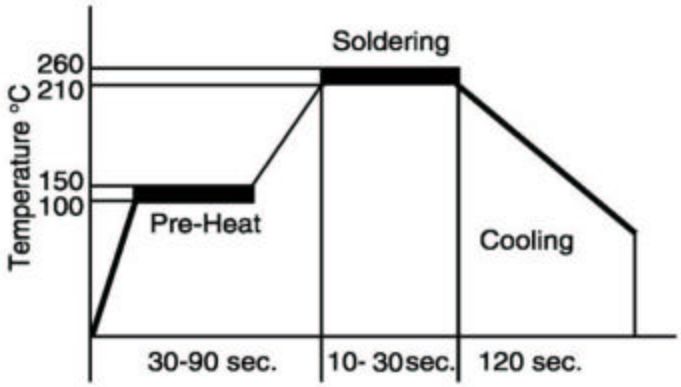
# 10. PACKAGING DETAIL




| Model Number | Suffix | Reel Diameter | Qty per Reel |
|---|---|---|---|
| SP0103BE3 | -5 | 7” | 900 |
| SP0103BE3 | -4 | 13” | 3,600 |

| | |
|---|---|
| Tape & Reel | Available in 13” and 7” diameter. |
| 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) |

# 11. SOLDER REFLOW PROFILE




Notes:

1. Maximum condition = 260 C for 30 seconds.
2. Do not pull a vacuum over the port hole of the microphone. Pulling a vacuum over the port hole can damage the device.
3. 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.
4. Number of Reflow = recommend no more than 2 cycles.

# 12. 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 moisture sensitivity bag under environmental conditions of 30ºC, 60% R.H.

(C) Exposure: Devices should not be exposed to high humidity, high temperature environment. Customer should follow standard baking times as stated in JEDEC J-STD-033A, reference Class 2A.
Out of bag: 90 days out of ESD moisture sensitive bag, assuming 30C/60% RH as maximum.
Baking Condition: After 90 days, refer to JEDEC J-STD-033A for recommend baking times and temperatures.

# 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 | Microphone unit must operate when exposed to air-to-air thermal shock 100 cycles, from –40ºC to +125ºC. (IEC 68-2-4), |
| High Temperature Storage Test | Microphone unit must maintain sensitivity after storage at +105ºC for 1,000 hours. (IEC 68-2-2 Test Ba) |
| Low Temperature Storage Test | Microphone unit must maintain sensitivity after storage at –40ºC 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 105ºC. (IEC 68-2-2 Test Ba) |
| Low Temperature Operating Test | Microphone unit must operate within sensitivity specifications for 1,000 hours at –40ºC. (IEC 68-2-1 Test Aa) |
| Humidity Test | Tested under Bias at 85ºC/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 or 15kV air discharge as specified by IEC 1000-4-2, level 3 and level 4. |
| Reflow | Microphone is tested to 5 passes through reflow oven, with microphone mounted upside-down under conditions of 260ºC for 30 seconds maximum. |
| Mechanical Shock | Microphone must operate after exposure to shock test of 10,000 G per IEC 68-2-27, Ea. |

# 14. SPECIFICATION REVISIONS

| Revision | Detailed Specification Changes | Date |
|---|---|---|
| A | Initial Release | 12-01-04 |
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