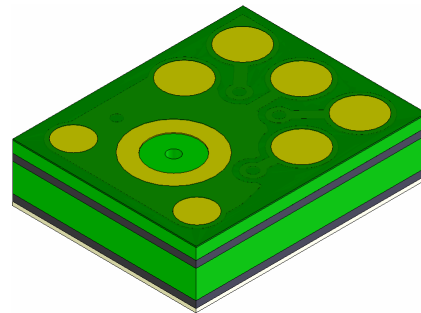
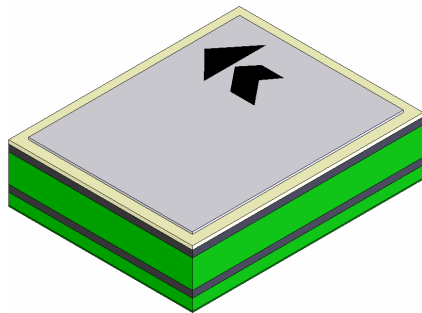


Halogen Free Enhanced RF Protected Zero Height Amplified “Mini” SiSonic™ Microphone Specification



Knowles Acoustics
1151 Maplewood Drive
Itasca, IL 60143

1. DESCRIPTION AND APPLICATION

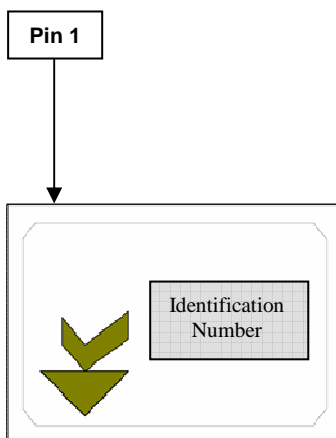
1.1 Description

Halogen Free “Mini” Amplified Surface Mount Zero Height Silicon Microphone with RF Protection

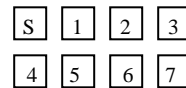
1.2 Application

Hand held telecommunication devices

2. PART MARKING



Identification Number Convention



S: Manufacturing Location

“S” – Knowles Electronics Suzhou
Suzhou, China

“No Alpha Character” – Knowles Electronics Itasca
Itasca, IL USA

“E” – Engineering Samples

Digits 1 – 7: Job Identification Number

3. TEMPERATURE RANGE

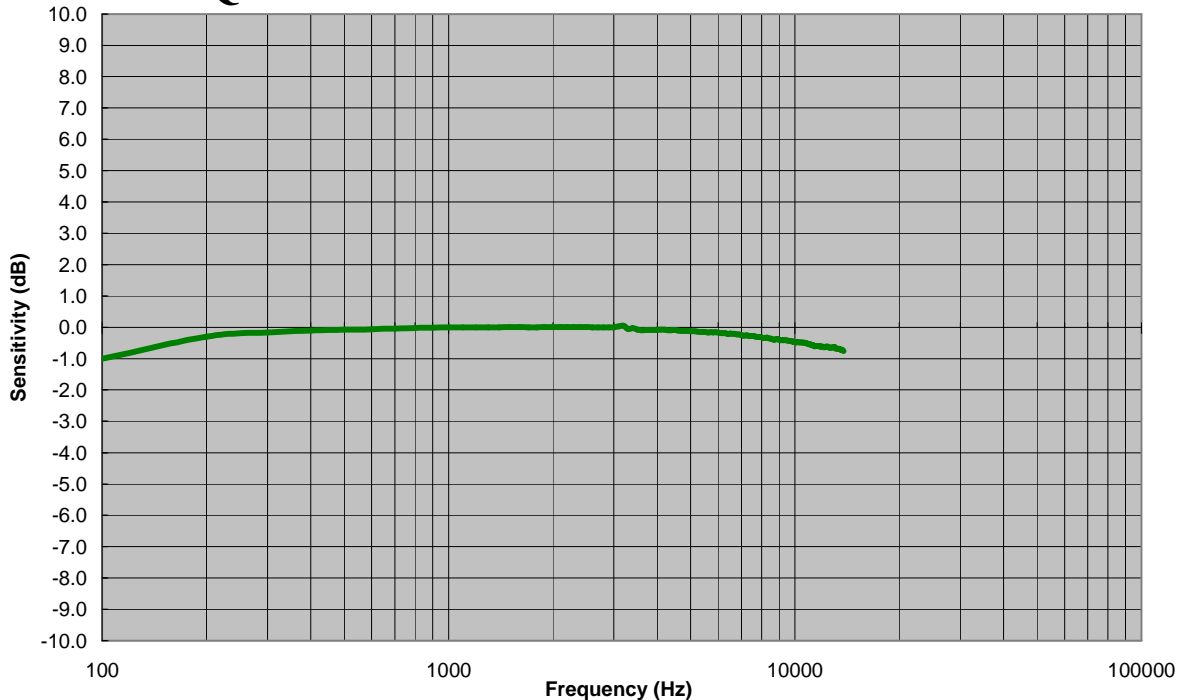
3.1 Operating Temperature Range: -40°C to +100°C

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

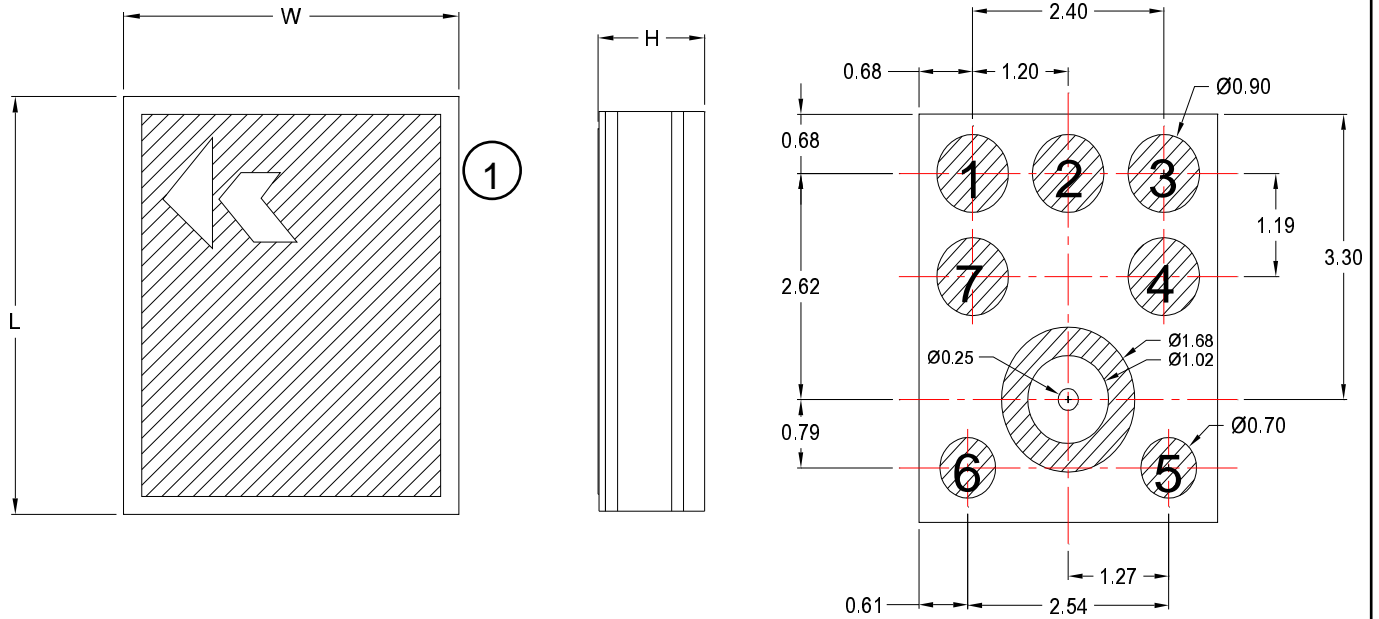
4. ACOUSTIC & ELECTRICAL SPECIFICATIONS

| | Symbol | Condition | Limits | | | Unit |
|---------------------------------|------------------|---|--------------------------------|------|-------|---------|
| | | | Min. | Nom. | Max. | |
| Directivity | | Omni-directional | | | | |
| Sensitivity | S | @ 1kHz (0dB=1V/Pa) | -21 | -18 | -15 | dB |
| Output impedance | Z _{OUT} | @ 1kHz (0dB=1V/Pa) | n/a | n/a | 300 | Ω |
| Current Consumption | I _{DSS} | across 1.5 to 3.6 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 | V _s | | 1.5 | n/a | 3.6 | V |
| Typical Input Referred Noise | ENL | A-weighted | n/a | 35 | n/a | dBa 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% At 115dB SPL, THD = < 10% | | | | dB |

5. FREQUENCY RESPONSE CURVE



6. MECHANICAL SPECIFICATIONS

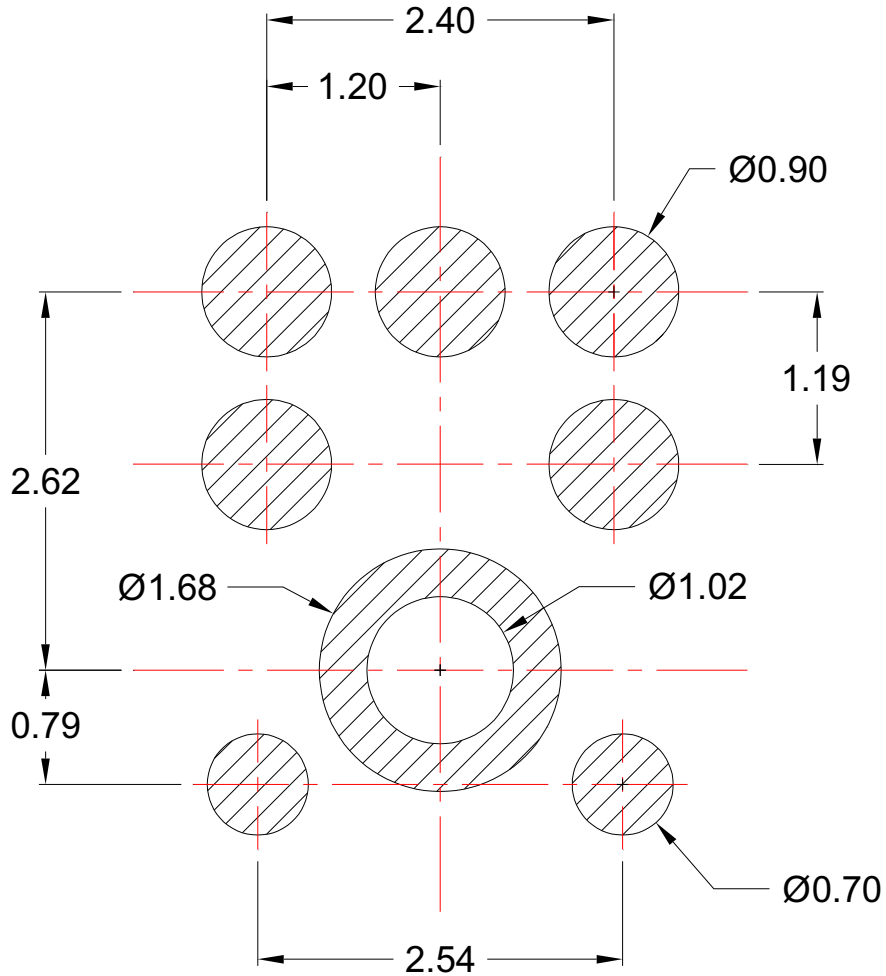


| PIN Designation | |
|-----------------|----------|
| Pin # | Function |
| 1 | Power |
| 2 | Ground |
| 3 | Output |
| 4 | Gain |
| 5-7 | Ground |

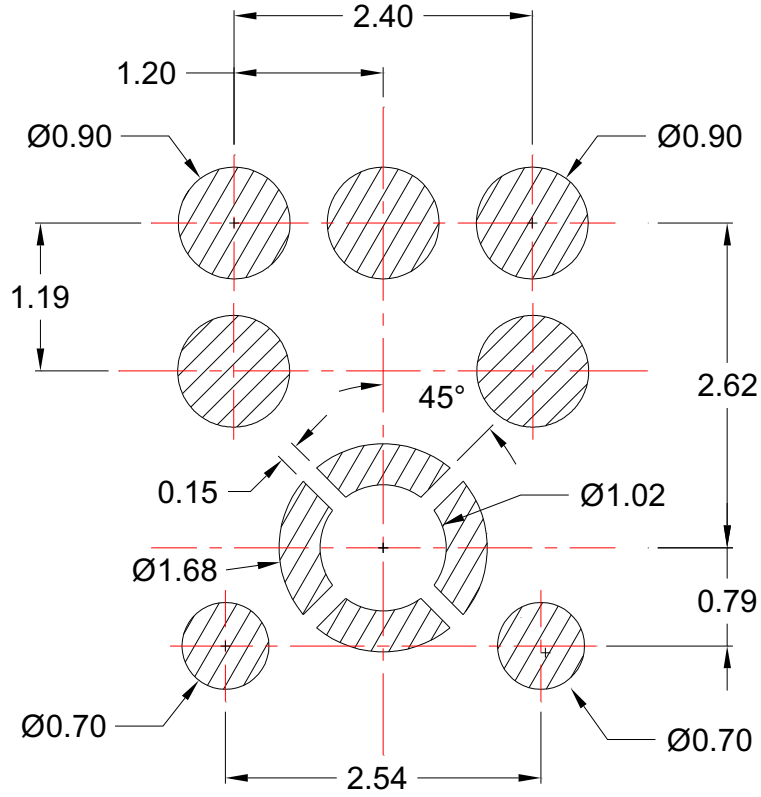
| Item | Dim. | Tol. (+/-) | Units |
|-------------|------|------------|-------|
| Height | 1.25 | 0.10 | mm |
| Length | 4.72 | 0.10 | mm |
| Width | 3.76 | 0.10 | mm |
| Port Hole | 0.25 | TBD | mm |
| Weight | 0.06 | | grams |
| Coplanarity | <0.1 | | mm |

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

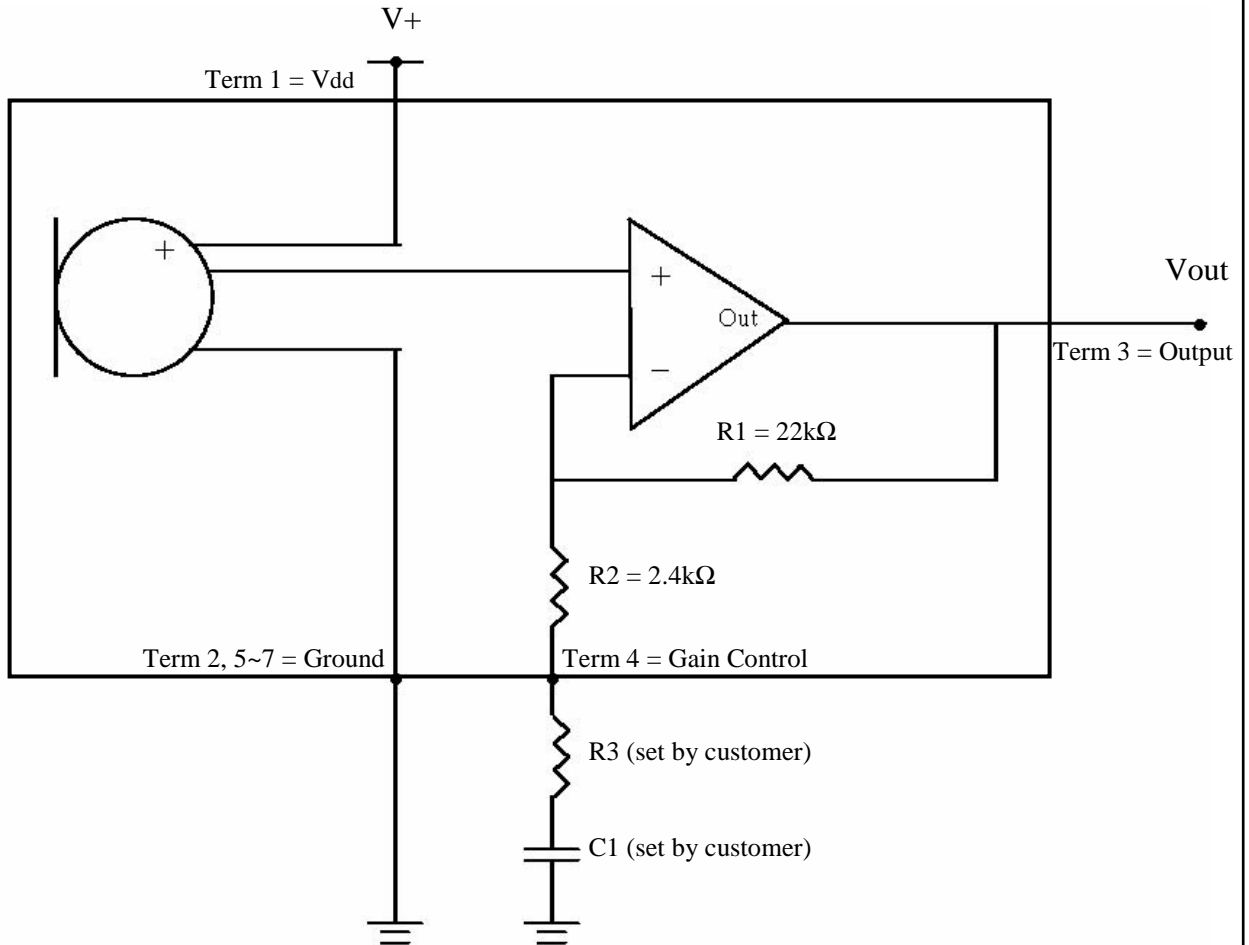
7. RECOMMENDED CUSTOMER LAND PATTERN



8. RECOMMENDED SOLDER STENCIL PATTERN



9. RECOMMENDED INTERFACE CIRCUIT



| Desired Gain | Pin 2 Termination Method |
|---------------------|---|
| Unity Gain (0dB) | Tie Terminal 4 directly to Output (Terminal 3). |
| 20dB Gain | Tie Terminal 4 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:

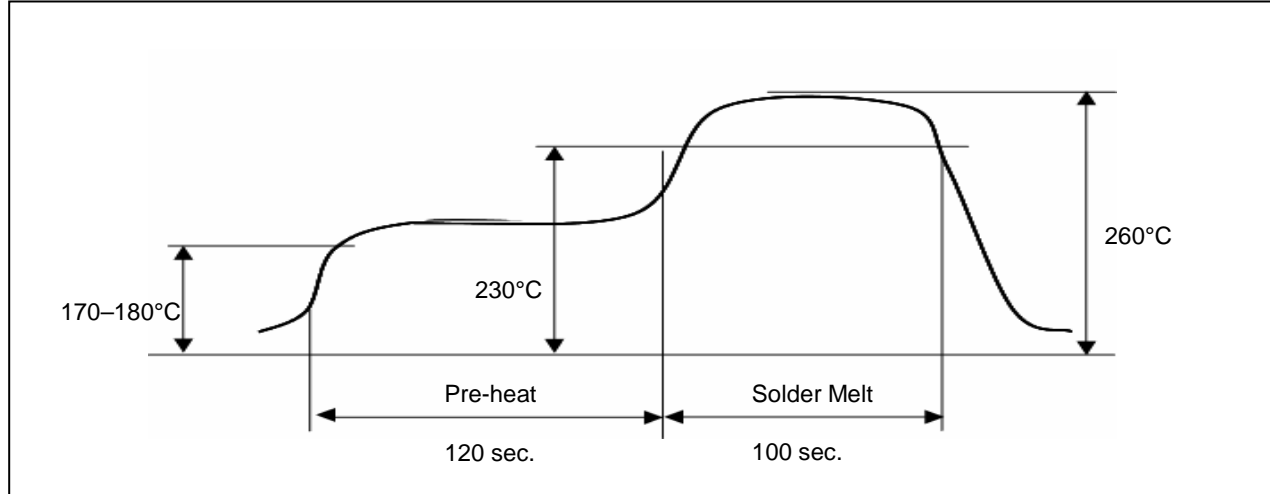
Gain of non-inverting Op-Amp is determined as:

$$\rightarrow G = 1 + \left\{ \frac{R1}{R2 + R3} \right\} \quad \text{Gain(dB)} = 20 * \log(G)$$

High-pass-filter Corner Frequency:

$$\rightarrow \text{C.F.} = 1 / \{ 2 * \pi * (R2 + R3) * C1 \}$$

11. SOLDER REFLOW PROFILE



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

Notes:

1. Do not pull a vacuum over the port hole of the microphone. Pulling a vacuum over the port hole can damage the device.
2. 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.
3. Number of Reflow = recommend no more than 3 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 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.

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 -40C to +125C with 15min soaks. (ICE 68-2-4) |
| High Temperature Storage | +105C environment for 1,000 hours. (IEC 68-2-2 Test Ba) |
| Low Temperature Storage | -40C environment for 1,000 hours. (IEC 68-2-2 Test Aa) |
| High Temperature Bias | +105C environment while under bias for 1,000 hours. (IEC 68-2-2 Test Ba) |
| Low Temperature Bias | -40C environment while under bias for 1,000 hours. (IEC 68-2-2 Test Aa) |
| Temperature / Humidity Bias | +85C/85% RH environment while under bias for 500 hours. (JESD22-A101A-B) |
| Vibration | 4 cycles lasting 12 minutes from 20 to 2,000Hz in X, Y, and Z direction with a peak acceleration of 20g. (MIL 883E, Method 2007.2, A) |
| Electrostatic Discharge | 3 discharges at +/- 8kV direct contact to the lid when unit is grounded (IEC 1000-4-2) and 3 discharges at +/- 2kV direct contact to the I/O pins (MIL 883E, Method 3015.7) |
| Reflow | 5 reflow cycles with peak temperature of 260C. |
| Mechanical Shock | 3 pulses of 10,000g in the X, Y, and Z direction. (IEC 68-2-27, Test Ea) |

