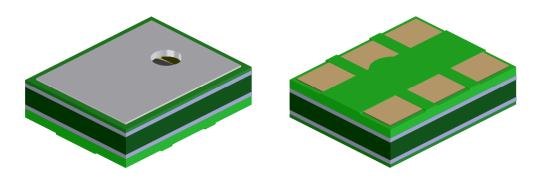


Switchable Gain "Mini" SiSonic<sup>™</sup> Microphone Specification with Enhanced RF Protection - *Halogen Free* 



Knowles Acoustics 1151 Maplewood Drive Itasca, IL 60143



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### 1. DESCRIPTION AND APPLICATION

- 1.1 DESCRIPTION
  Switchable Gain "Mini" Surface Mount Silicon Microphone with Enhanced RF Protection Halogen Free
- 1.2 APPLICATION

Consumer electronics devices

#### 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



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Downloaded from **Elcodis.com** electronic components distributor



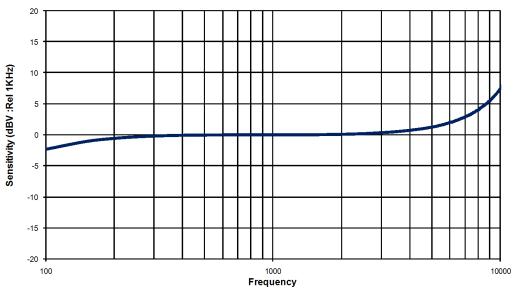
### 4. ACOUSTIC & ELECTRICAL SPECIFICATIONS

TEST CONDITIONS: +20°C, 60-70% R.H.

|                           | Symple of        | Condition                            | Limits                   |           |         | Unit |
|---------------------------|------------------|--------------------------------------|--------------------------|-----------|---------|------|
|                           | Symbol           | Condition                            | Min.                     | Nom.      | Max.    | Unii |
| Directivity               |                  | Omni-directional                     |                          |           |         |      |
| Nominal Sensitivity Range | S                |                                      | -42                      |           | -22     | dB   |
| Sensitivity (maximum)     | S <sub>max</sub> | @1kHz (0dB=1 V/Pa)<br>Vswitch = High | -25                      | -22       | -19     | dB   |
| Sensitivity (maximum)     | Smin             | @1kHz (0dB=1 V/Pa)<br>Vswitch = Low  | -45                      | -42       | -39     | dB   |
| Switching Voltage High    | Vswitch          | High Gain Switch                     | 1.5                      |           | 5.5     | V    |
| Switching Voltage Low     | Vswitch          | Low Gain Switch                      | 0.0                      |           | 0.4     | V    |
| Supply Voltage            | Vs               | Operating Voltage                    | 1.5                      |           | 5.5     | V    |
| Output Impedance          | Zout             | @1kHz (0dB=1 V/Pa)                   |                          |           | 100     | Ω    |
| Current Consumption       | IDDS             | Across 1.5V to 5.5V                  | 100                      |           | 370     | μΑ   |
| Signal to Noise Ratio     | S/N              | @ 1kHz (0dB=1V/Pa)                   |                          | 59        |         | dB   |
| Sensitivity Loss Across   |                  | Change in sensitivity                | No Char                  | ge Across | Voltage | dB   |
| Voltage                   |                  | over 5.5V to 1.5V                    |                          | Range     |         | Фb   |
| Maximum Input Sound       |                  | At 100dB                             | SPL, THD <               | < 1%      |         |      |
| Level                     |                  | At 115dB \$                          | SPL, THD <u>&lt;</u> 10% |           |         |      |
| Frequency Range           |                  |                                      | 100                      |           | 10,000  | Hz   |

### 5. FREQUENCY RESPONSE CURVE

# TYPICAL FREE FEIELD RESPONSE NORMALIZED TO 1kHz



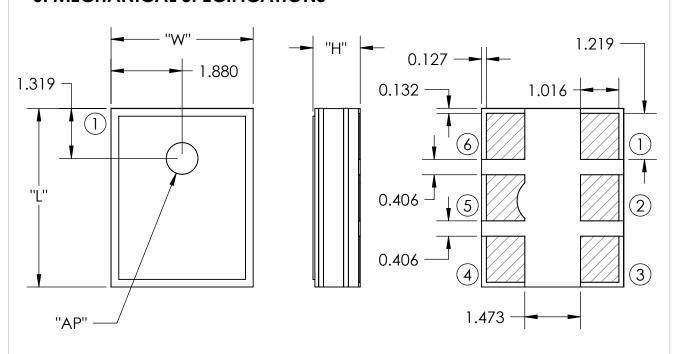


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### 6. MECHANICAL SPECIFICATIONS



| ITEM       | DIMENSION | TOLERANCE | UNITS |
|------------|-----------|-----------|-------|
| LENGTH (L) | 4.720     | ±0.100    | mm    |
| WIDTH (W)  | 3.760     | ±0.100    | mm    |
| HEIGHT (H) | 1.250     | ±0.100    | mm    |
| ACOUSTIC   | Ø0.838    | +0.100    | no no |
| PORT (AP)  | WU.838    | ±0.100    | mm    |

| PIN OUTPUT |                  |  |
|------------|------------------|--|
| PIN#       | FUNCTION         |  |
| 1          | OUTPUT           |  |
| 2          | HIGH GAIN SWITCH |  |
| 3          | GAIN             |  |
| 4          | GROUND           |  |
|            | NO CONNECT OR    |  |
| 5          | GROUND           |  |
| 6          | POWER (Vdd)      |  |

#### Note:

Dimensions are in milimeters unless otherwise specified.

Tolerance ±0.15mm unless otherwise specified.

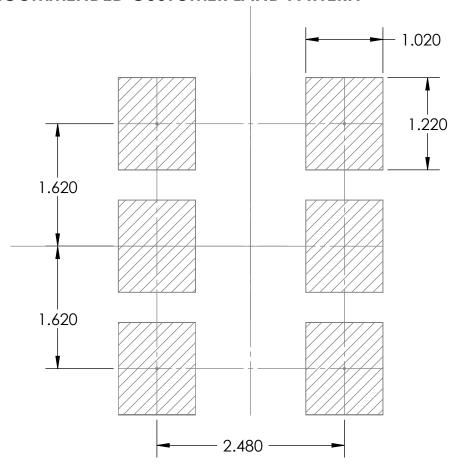


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### 7. RECOMMENDED CUSTOMER LAND PATTERN



### 8. RECOMMENDED SOLDER STENCIL PATTERN

N/A

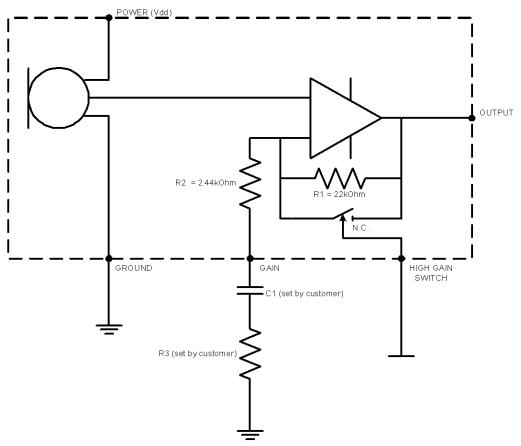




### 9. RECOMMENDED INTERFACE CIRCUIT

| Gain Setting Guidelines |   |  |
|-------------------------|---|--|
| Desired Gain (dB)       | <u>Method</u>   |  |
| OdB                     | $V_{switch} = Low$                                      |  |
| 20dB                    | $V_{\text{switch}} = \text{High}$ , C1 > 0.47 $\mu$ F * |  |
| Customer adjustable     | Add R3 and C1 to achieve specific gain and high-        |  |
| gain (between 0 to      | pass crossover frequency.                               |  |
| 20dB)                   |   |  |

<sup>\*</sup> Selection of actual value of C1 depends upon the highpass crossover frequency desi



#### Setting Gain Formulas:

High Gain setting is determined as:

 $-> G = 1 + \{R1 / (R2 + R3)\}$  Gain(dB) - 20 \* log(G)

High-pass-filter Corner Frequency:

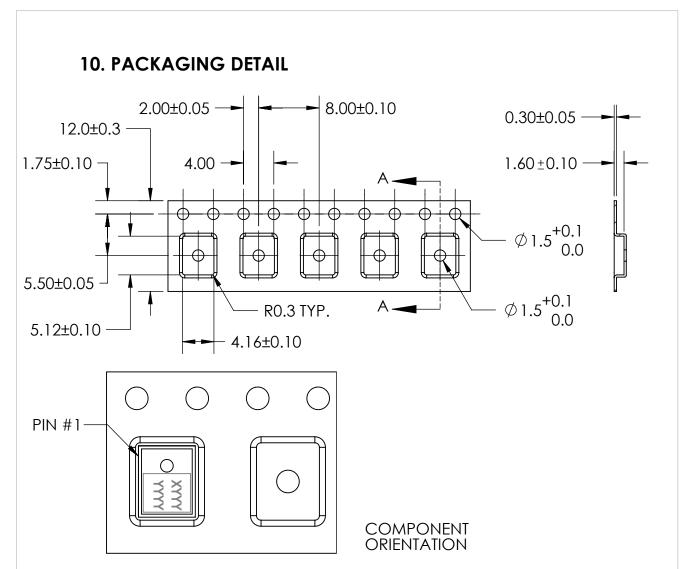
-> C.F. - 1 / { 2 \* p \* ( R2 + R3 ) \* C1 }



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| MODEL NUMBER       | SUFFIX | REEL<br>DIAMETER | QUANTITY<br>PER REFI |
|--------------------|--------|------------------|----------------------|
| SPM0407HE3H-SB     | -2     | 7"               | 1,200                |
| 31 74040711L311-3b | -6     | 13"              | 4,800                |

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

#### Note:

Dimensions are in milimeters unless otherwise specified.

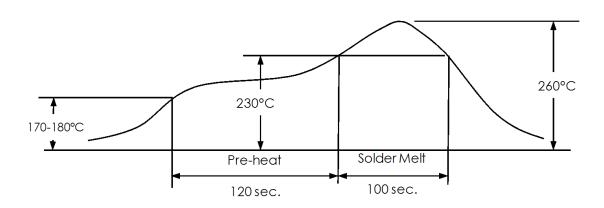


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### 11. SOLDER FLOW PROFILE



| 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

- 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.
- MSL (moisture sensitivity level) Class 2a.

  <u>Do not pull a vacuum</u> over port hole of the microphone. Pulling a vacum over the port hole can damage the device.
- Do not board wash after the reflow process. Board washing and cleaning agents (D) can damage the device. Do not expose to ultrasonic processing or cleaning.
- Do not brush board after the reflow process. Brushing the board with/without (E) solvents can damage the device.
- Do not insert any object in port hole of device at any time as this can damage (F) the device.
- (G) Number of reflow - Recommend no more than 3 cycles.



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## 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<br>Storage    | +105°C environment for 1,000 hours. (ICE 68-2-2 Test<br>Ba)   |
| Low Temperature<br>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<br>Bias | +85°C/85% R.H. environment while under bias for 336 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 +/-1kV 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    |
|----------|--------------------------------|---------|
| Α        | INITIAL RELEASE                | 8-28-09 |
|          |                                |         |
|          |                                |         |
|          |                                |         |
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