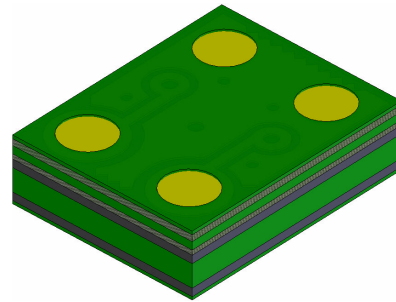
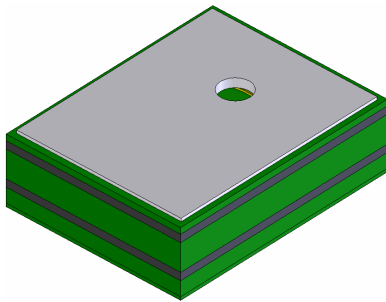


## “Ultra-Mini” SiSonic™ Microphone Specification With RF Protection



**Knowles Acoustics**  
1151 Maplewood Drive  
Itasca, IL 60143

## 1. DESCRIPTION AND APPLICATION

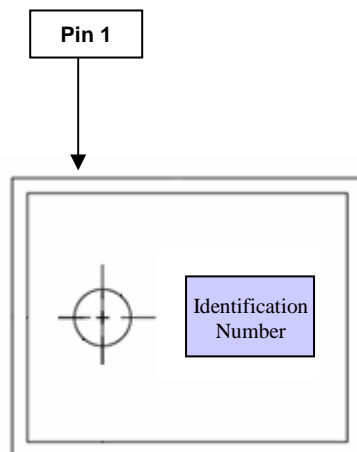
### 1.1 Description

“Mini” Surface Mount Silicon Microphone with RF  
Filter Protection

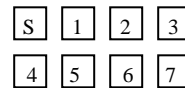
### 1.2 Application

Hand held consumer electronics

## 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

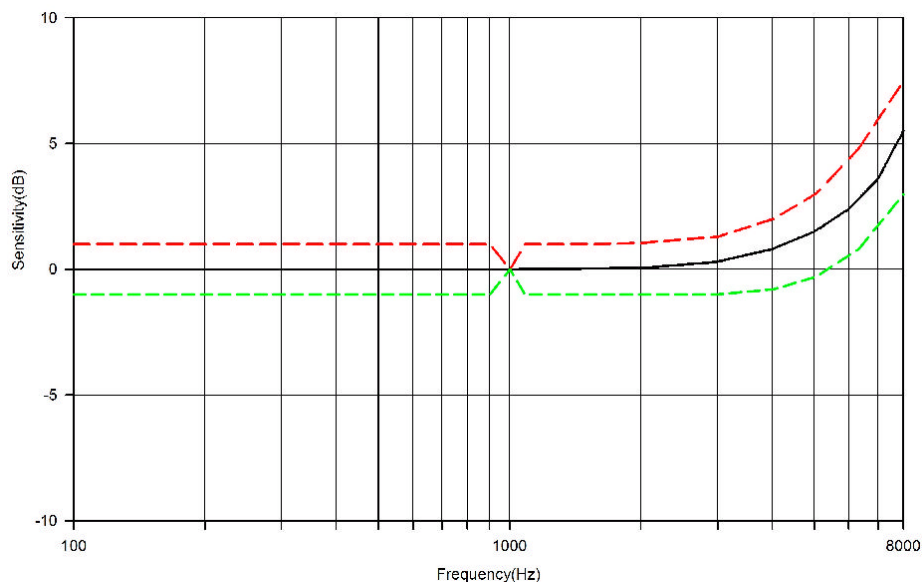
3.1 Operating Temperature Range:  $-40^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$

3.2 Storage Temperature Range:  $-40^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$

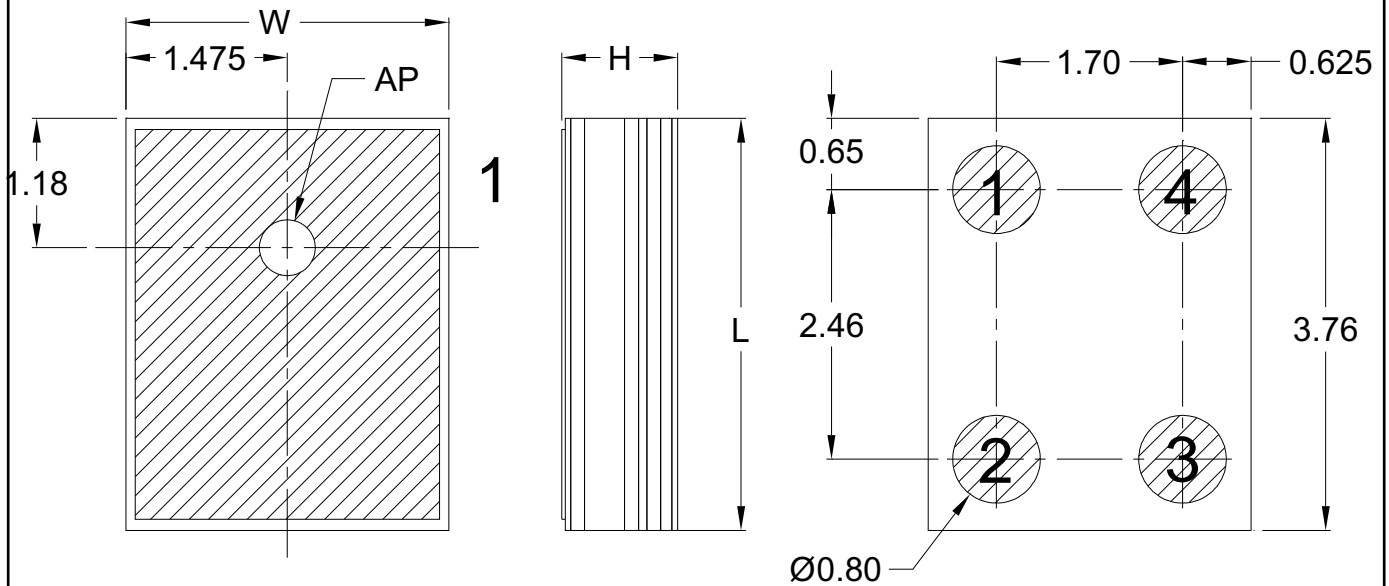
## 4. ACOUSTIC & ELECTRICAL SPECIFICATIONS

	Symbol	Condition	Limits			Unit
			Min.	Nom.	Max.	
Directivity		Omni-directional				
Sensitivity	S	@ 1kHz (0dB=1V/Pa)	-45	-42	-39	dB
Output impedance	Z <sub>OUT</sub>	@ 1kHz (0dB=1V/Pa)	n/a	n/a	300	Ω
Current Consumption	I <sub>DSS</sub>	across 1.5 to 3.6 volts	0.100	n/a	0.250	mA
Signal to Noise Ratio	S/N	@ 1kHz (0dB=1V/Pa)	55	59	n/a	dB
Supply Voltage	V <sub>s</sub>		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

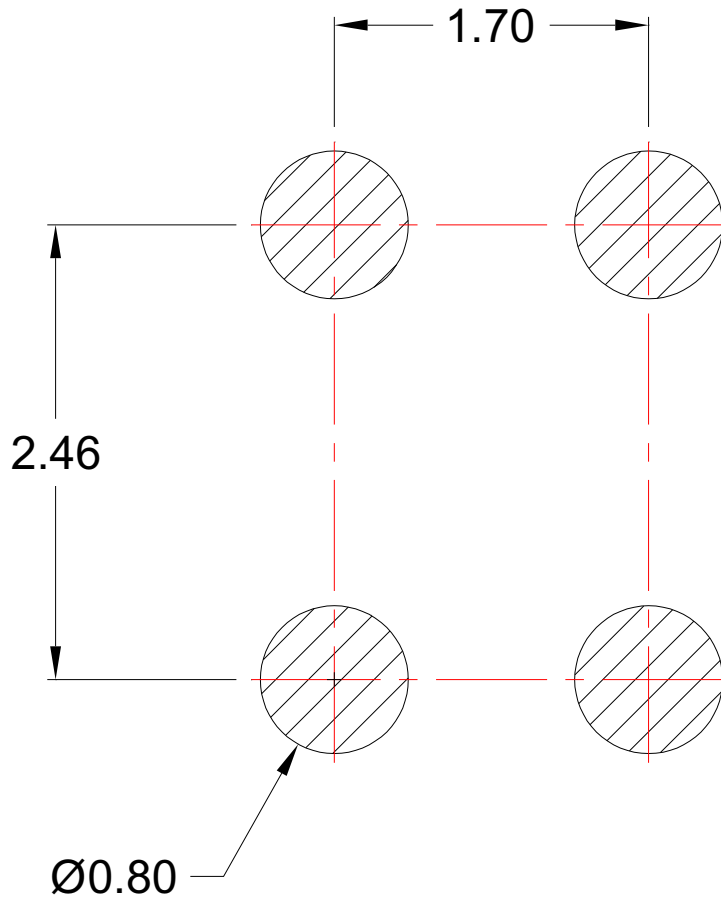


PIN Designation	
Pin #	Function
1	Power
2	Ground
3	Ground
4	Output

Item	Dimension	Tolerance (+/-)	Units
Length (L)	3.76	0.10	mm
Width (W)	2.95	0.10	mm
Height (H)	1.10	0.10	mm
Acoustic Port (Diameter) (AP)	0.50	0.10	mm

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

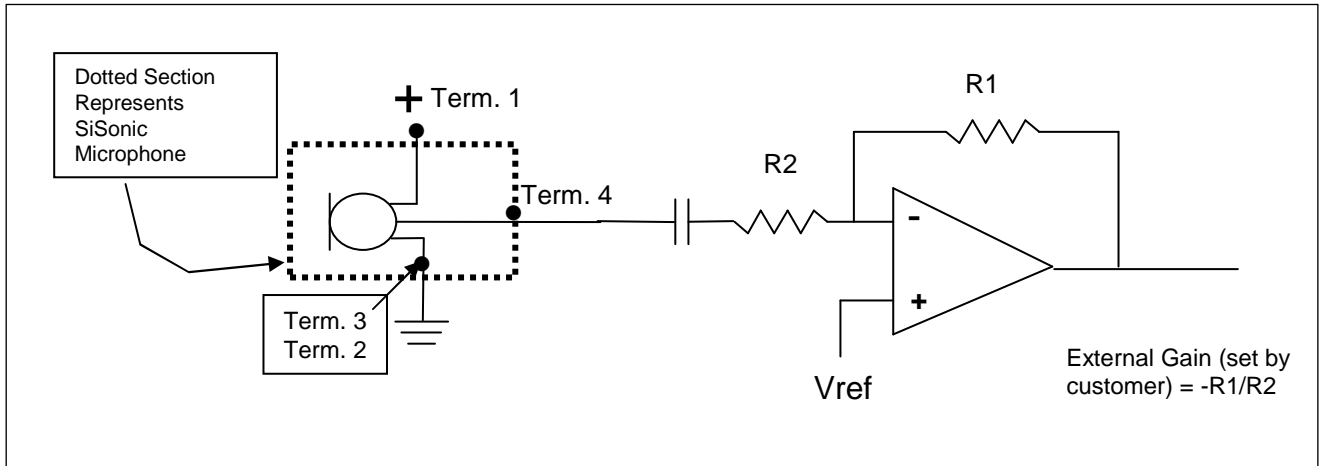
## 7. RECOMMENDED CUSTOMER LAND PATTERN



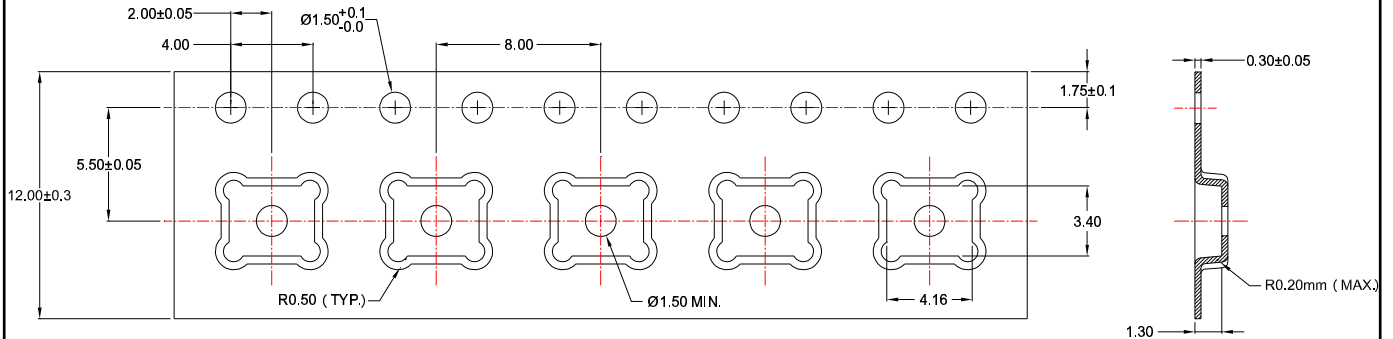
## 8. RECOMMENDED SOLDER STENCIL PATTERN

N/A

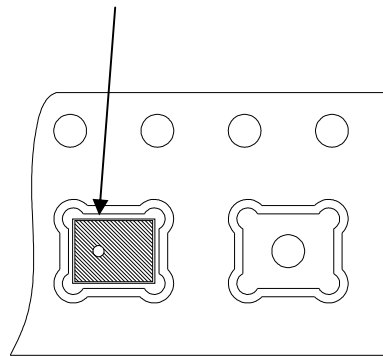
## 9. RECOMMENDED INTERFACE CIRCUIT



## 10. PACKAGING DETAIL



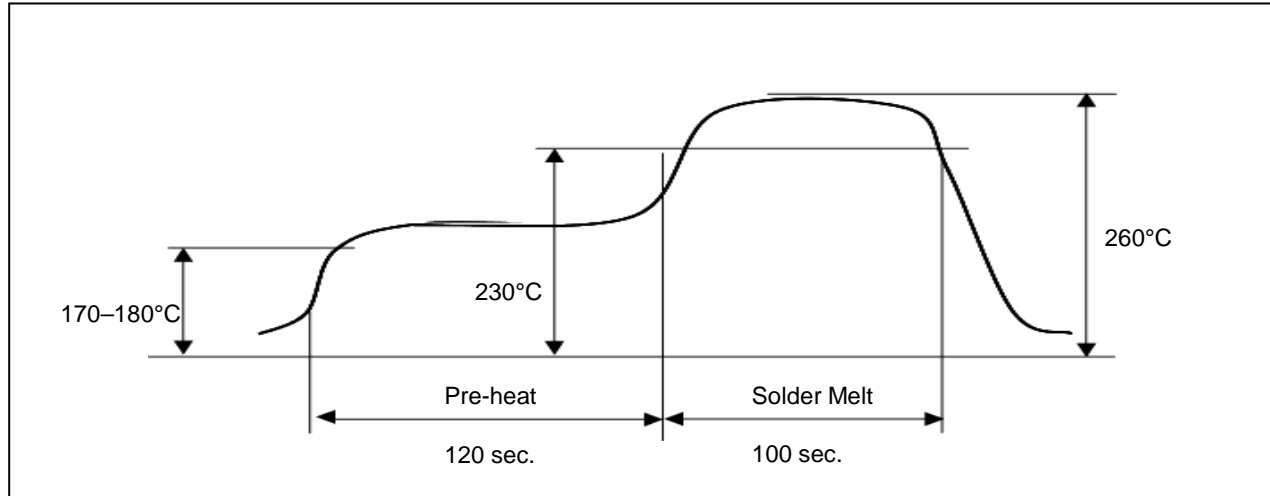
Pin 1 Location



Model Number	Suffix	Reel Diameter	Quantity per Reel
SPUL409HE5H-PB	-2	7"	1,200
SPUL409HE5H-PB	-7	13"	5,700

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



<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)

