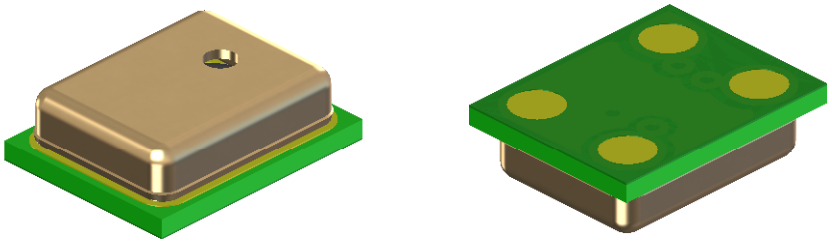
SPU0414HR5H-SB

Amplified "Ultra-Mini" SiSonic™ Microphone Specification With MaxRF Protection - *Halogen Free*



Knowles Acoustics
1151 Maplewood Drive
Itasca, IL 60143

1. DESCRIPTION AND APPLICATION

1.1 DESCRIPTION

"Ultra-mini" Surface Mount Silicon Microphone with Maximum RF Protection - *Halogen Free*

1.2 APPLICATION

Consumer electronic 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

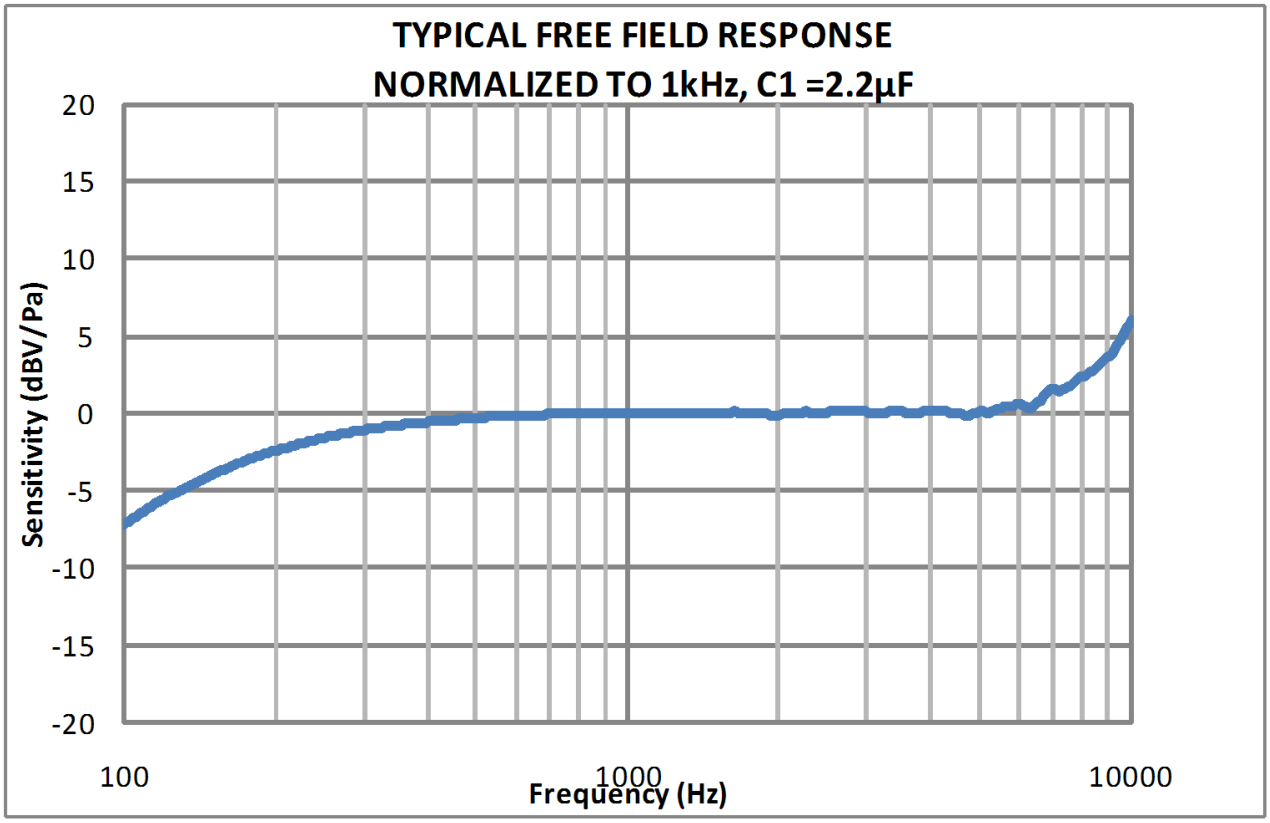
3.2 Storage Temperature Range: -40˚C to +100˚C

4. ACOUSTIC & ELECTRICAL SPECIFICATIONS

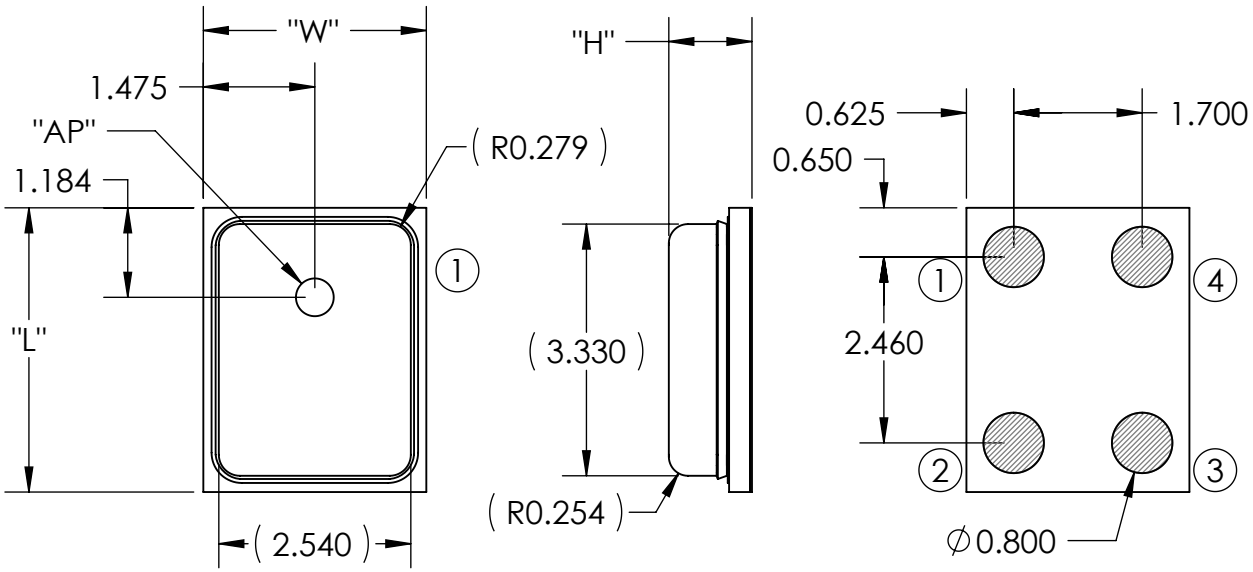
TEST CONDITIONS: +20˚C, 60-70% R.H.

	Symbol	Condition	Limits			Unit
			Min.	Nom.	Max.	
Directivity		Omni-directional	---	---	---	
Sensitivity	S	@ 1kHz (0dB-1V/Pa)	-25	-22	-19	dBV
Output Impedance	Z_{OUT}	@ 1kHz (0dB-1V/Pa)	---	---	500	Ω
Current Consumption	I_{DDS}	Across 1.5 to 3.6 volts	---	---	350	µA
Signal to Noise Ratio	S/N	@ 1kHz (0dB-1V/Pa)	---	59	---	dB
Supply Voltage	Vs		1.5	---	3.6	V
Sensitivity Loss Across Voltage		Change in sensitivity over 3.6V to 1.5V	No Change Across Voltage Range			dB
Total Harmonic Distortion	THD	At 100dB SPL, THD < 1% At 150dB SPL, THD ≤ 10%				

5. FREQUENCY RESPONSE CURVE



6. MECHANICAL SPECIFICATIONS



ITEM	DIMENSION	TOLERANCE	UNITS
LENGTH (L)	3.760	±0.100	mm
WIDTH (W)	2.950	±0.100	mm
HEIGHT (H)	1.100	±0.100	mm
ACOUSTIC PORT (AP)	Ø0.500	±0.100	mm

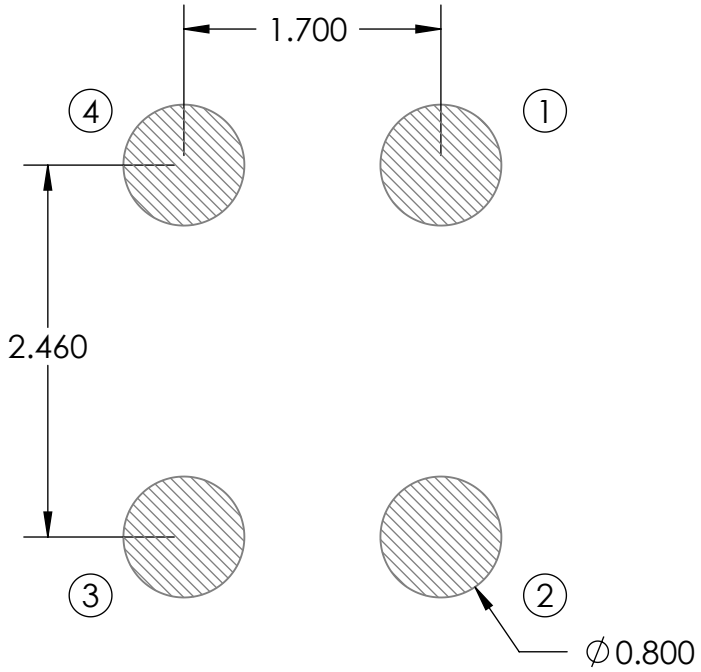
PIN OUTPUT	
PIN #	FUNCTION
1	POWER (Vdd)
2	GROUND
3	GAIN
4	OUTPUT

Note:

Dimensions are in milimeters unless otherwise specified.

Tolerance ±0.15mm unless otherwise specified.

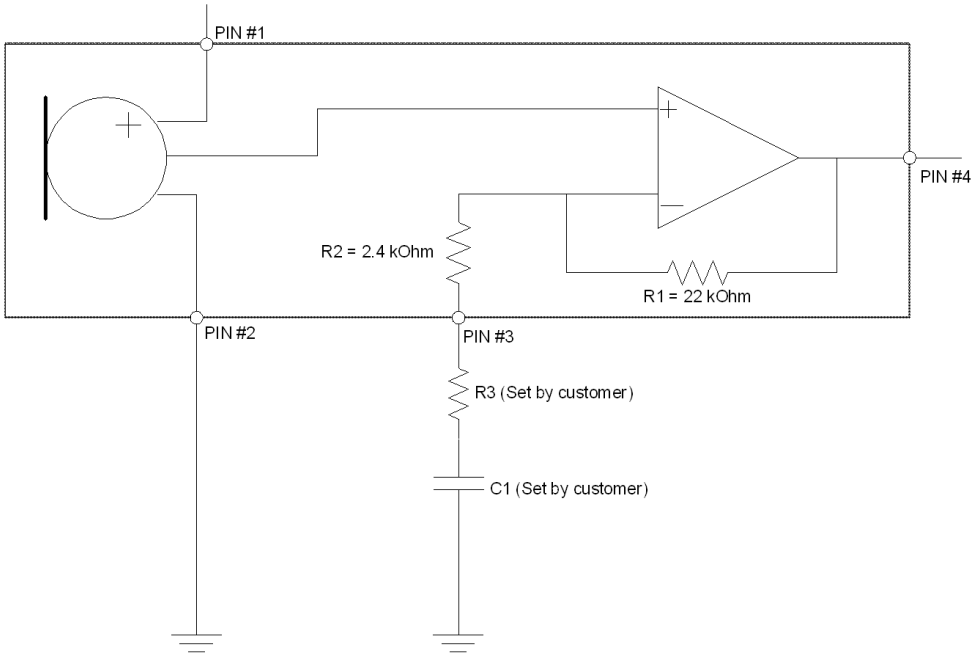
7. RECOMMENDED CUSTOMER LAND PATTERN



8. RECOMMENDED SOLDER STENCIL PATTERN

N/A

9. RECOMMENDED INTERFACE CIRCUIT



DESIRED GAIN	GAIN TERMINATION METHOD
Unity Gain (0dB)	Tie Gain directly to Output
20dB Gain	Tie Gain through C1 (0.47µF) to Ground
Adjustable Gain	Add R3 and C1. Use formulas provided to calculate settings or contact Knowles for support.

Setting Gain Formulas:

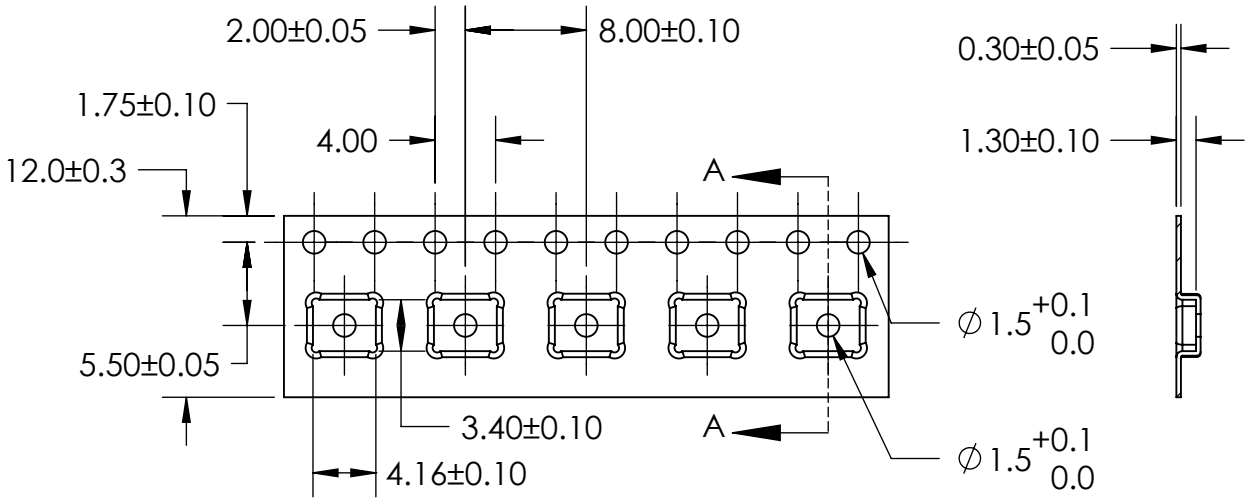
Gain of non-inverting Op-Amp is determined by:

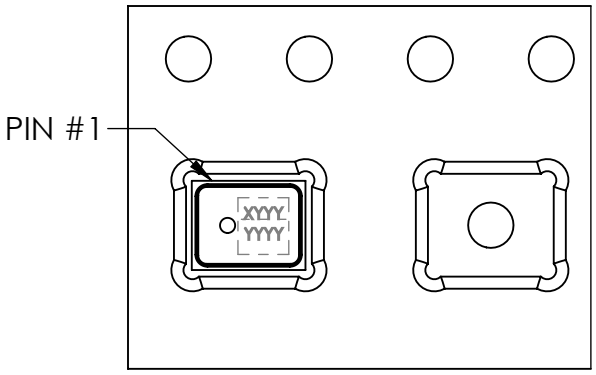
-> G = 1 + { R1 / (R2 + R3) } Gain(dB) = 20 * log(G)

High-pass-filter Corner Frequency:

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

10. PACKAGING DETAIL





COMPONENT ORIENTATION

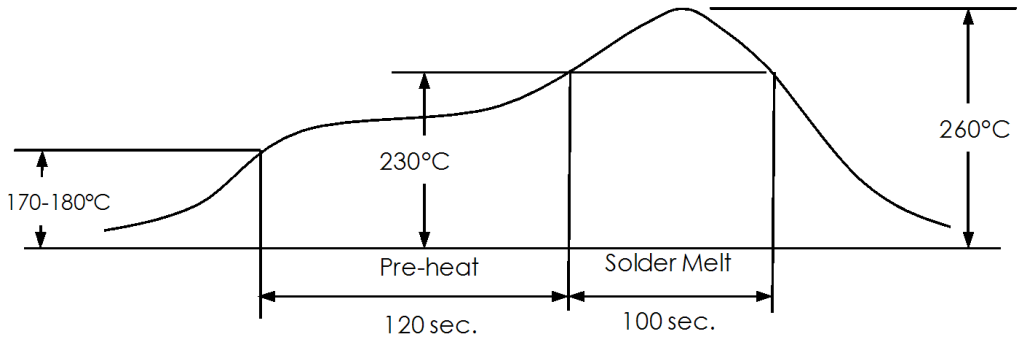
MODEL NUMBER	SUFFIX	REEL DIAMETER	QUANTITY PER REEL
SPU0414HR5H-SB	-7	13"	5,700

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

Note:

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	n/a

Notes:	
1.	Do not pull a vacuum over port hole of the microphone. Pulling a vacum 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.	Do not brush board after the reflow process. Brushing the board with/without solvents can damage the device.
4.	Do not insert any object in port hole of device at any time as this can damage the device.
5.	Number of reflow - Recommend no more than 3 cycles.

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.

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 Storage	+105°C environment for 1,000 hours. (ICE 68-2-2 Test Ba)
Low Temperature 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 Bias	+85°C/85% R.H. environment while under bias for 1,000 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 Release	
A	Initial Release, C10109400, DMS	4-23-2009