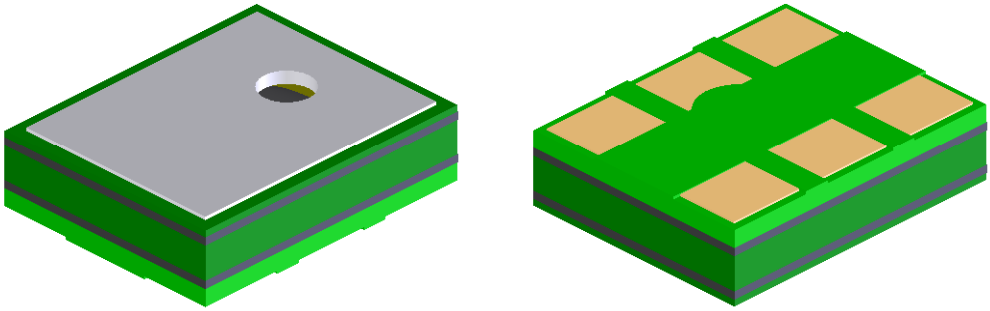
SPM0406HE3H-SB

Differential "Mini" Amplified SiSonic™ Microphone Specification with Enhanced RF Protection - *Halogen Free*



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1. DESCRIPTION AND APPLICATION

1.1 DESCRIPTION

Differential "Mini" Amplified 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

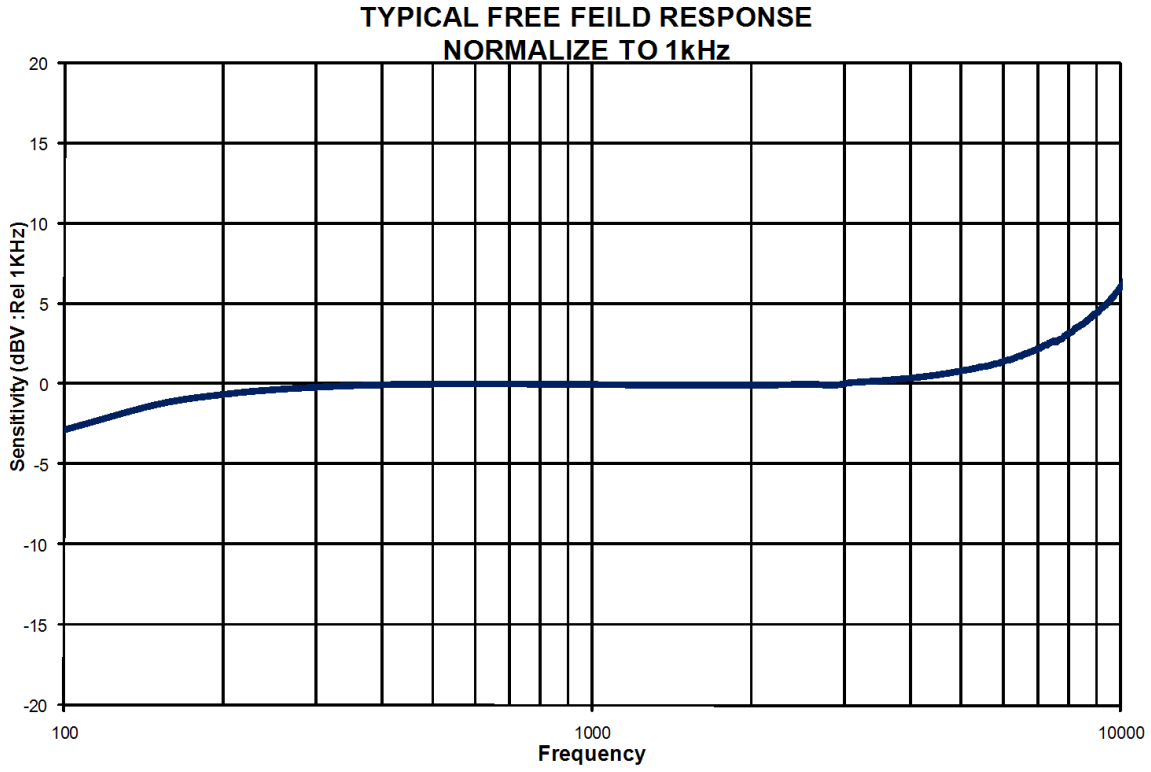
4. ACOUSTIC & ELECTRICAL SPECIFICATIONS

TEST CONDITIONS: +20°C, 60-70% R.H.

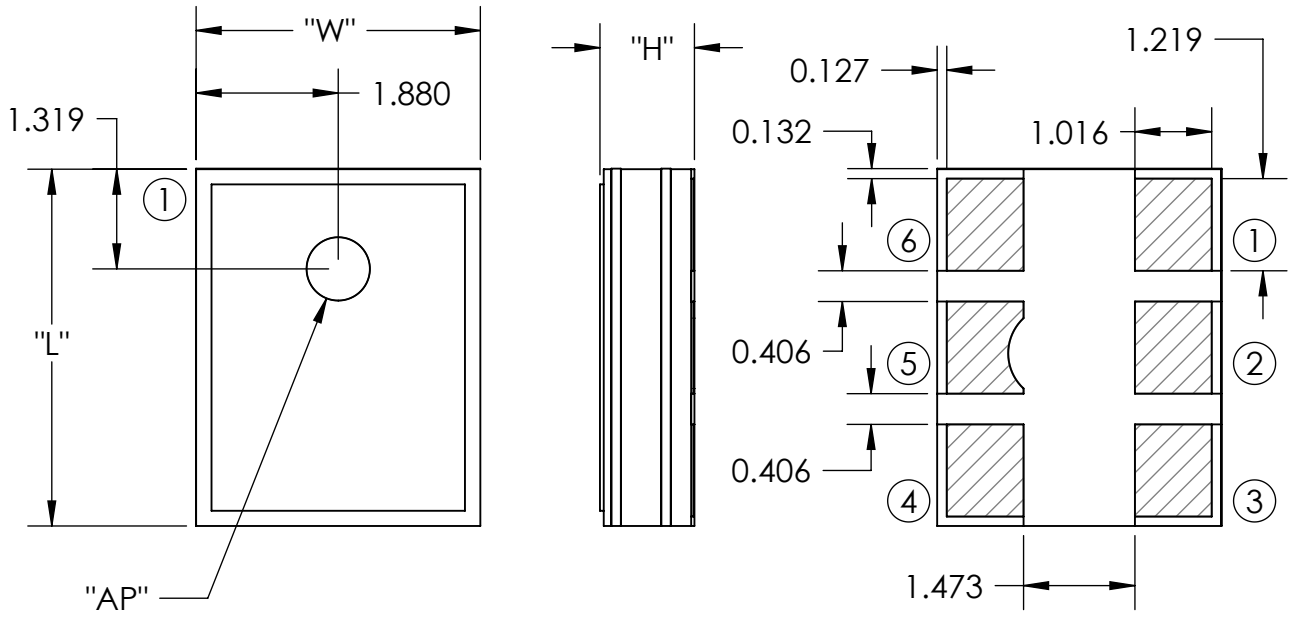
	Symbol	Condition	Limits			Unit
			Min.	Nom.	Max.	
Directivity		Omni-directional	---	---	---	
Sensitivity	S	@ 1kHz (0dB-1V/Pa)	-25	-22	-19	dB
Output Impedance	Z_{OUT}	@ 1kHz (0dB-1V/Pa)	---	---	100	Ω
Current Consumption	I_{DDS}	Across 1.5 to 5.5 volts	---	---	500	µA
Signal to Noise Ratio	S/N	@ 1kHz (0dB-1V/Pa)	---	59	---	dB
Supply Voltage	Vs		1.5	---	5.5	V
Typical Input Referred Noise	ENL	A-weighted	---	35	---	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% At 115dB SPL, THD ≤ 10%				

Note: Sensitivity is specified in differential mode at maximum gain. In differential mode with unity gain, sensitivity specification is -36 ±3dB. In single ended mode with unity gain, sensitivity specification is -42 ±3dB.

5. FREQUENCY RESPONSE CURVE



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 PORT (AP)	Ø0.838	±0.100	mm

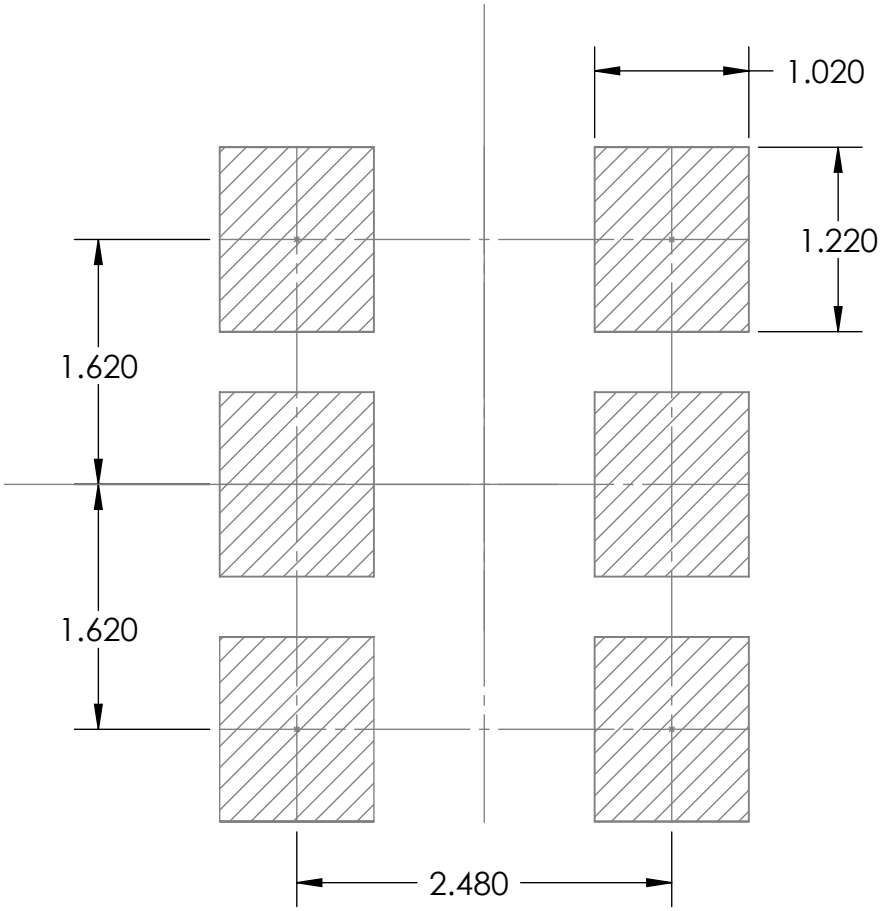
PIN OUTPUT	
PIN #	FUNCTION
1	OUTPUT +
2	OUTPUT -
3	GAIN
4	GROUND
5	NO CONNECT OR GROUND
6	POWER (Vdd)

Note:

Dimensions are in milimeters unless otherwise specified.

Tolerance ±0.15mm unless otherwise specified.

7. RECOMMENDED CUSTOMER LAND PATTERN

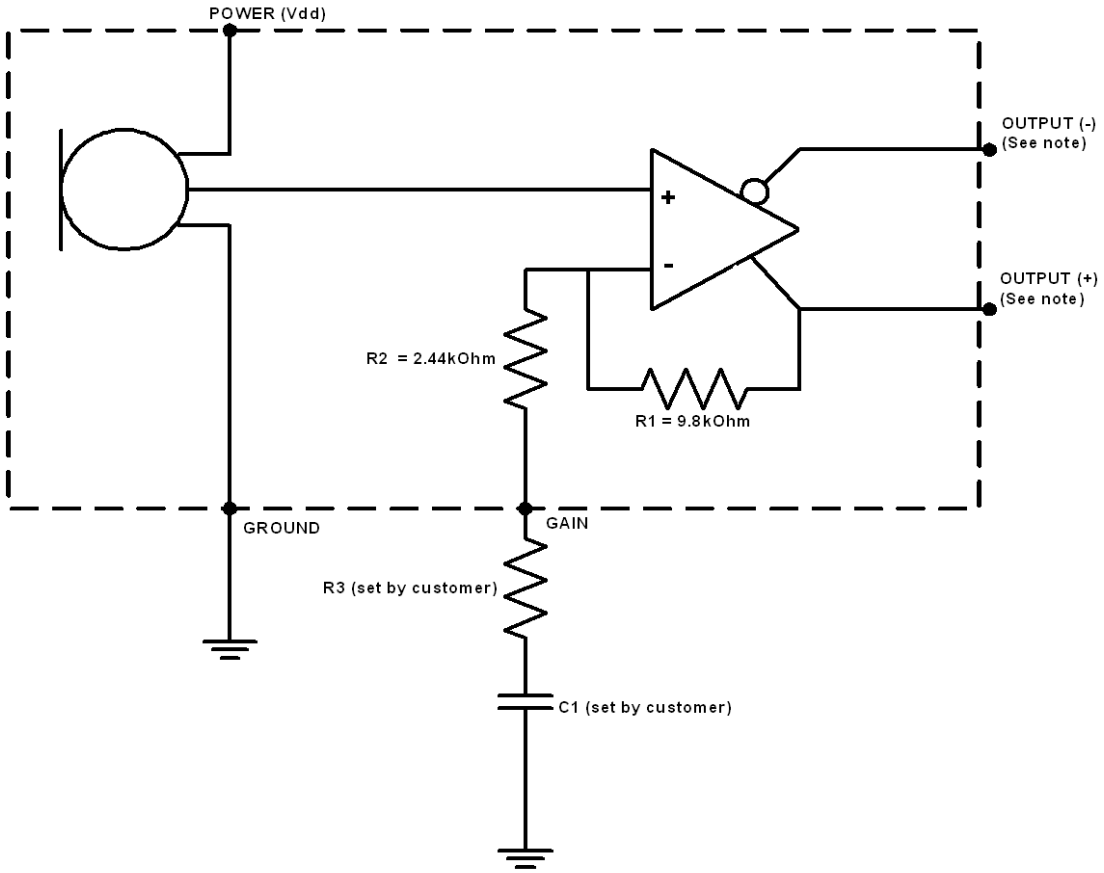


8. RECOMMENDED SOLDER STENCIL PATTERN

N/A

9. RECOMMENDED INTERFACE CIRCUIT

Desired Gain	Gain Pin Termination Method
Unity Gain (0dB)	Tie Gain Pin directly to Output+ Pin.
14dB Gain	Tie Gain Pin through C1 (0.47µF) to Ground Pin.
Adjustable Gain	Add R3 and C1. Use formulas provided to calculate gain and high-pass crossover frequency, or contact Knowles for support.



Note: Customer is recommended to use DC-blocking capacitor to each output line (Output + & Output -) to guard against DC mismatch during start-up.

Setting Gain Formulas:

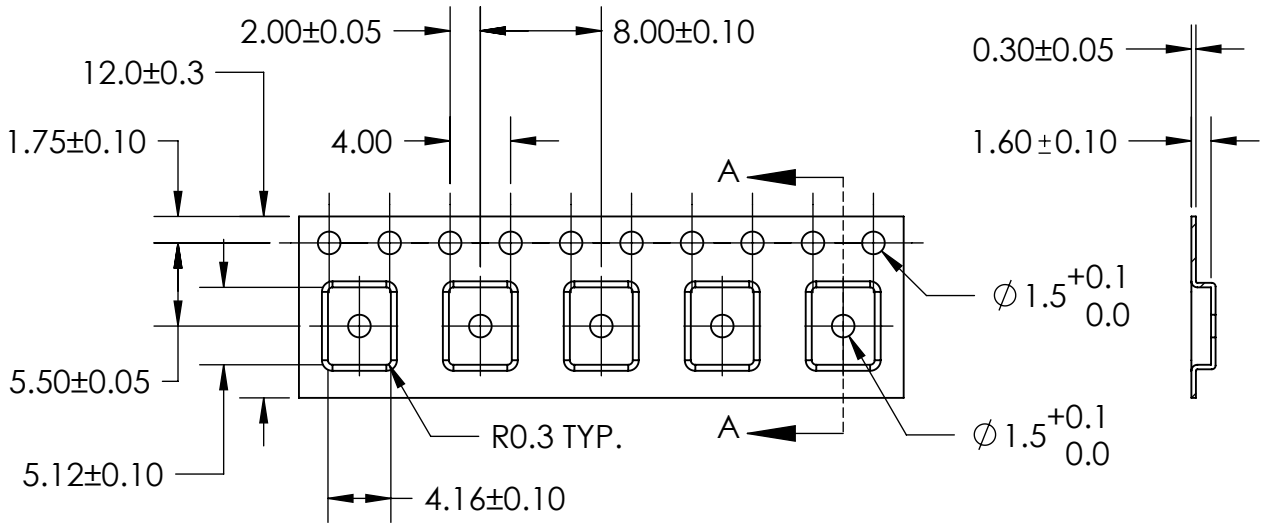
Gain on non-inverting Op-Amp is determined as:

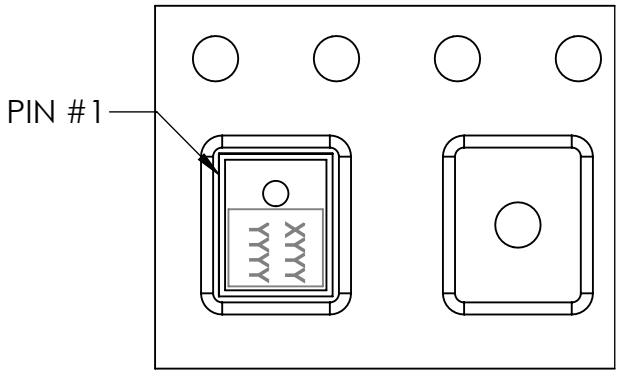
-> G = 1 + { R1 / (R2 + R3) } Gain(dB) - 20 * log(G)

High-pass-filter Corner Frequency:

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

10. PACKAGING DETAIL





COMPONENT ORIENTATION

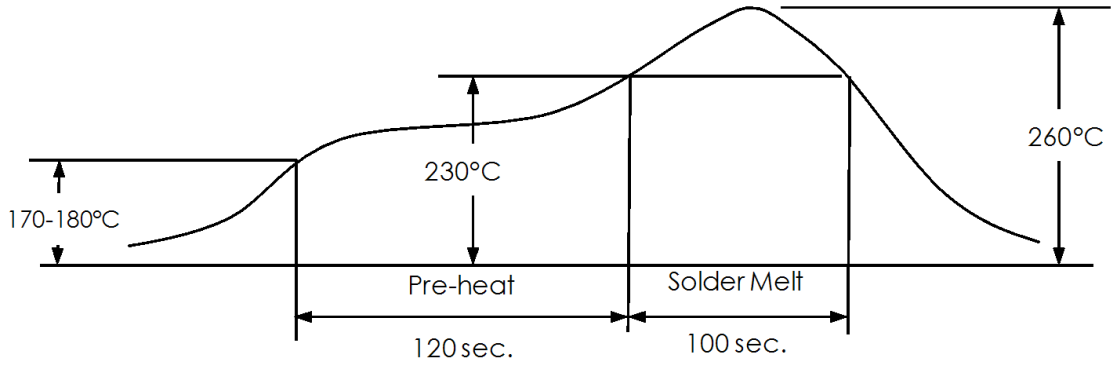
MODEL NUMBER	SUFFIX	REEL DIAMETER	QUANTITY PER REEL
SPM0406HE3H-SB	-2	7"	1,200
	-6	13"	4,800

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	30 sec.

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.
(C) Do not pull a vacuum over port hole of the microphone. Pulling a vacum over the port hole can damage the device.
(D) 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.
(E) Do not brush board after the reflow process. Brushing the board with/without solvents can damage the device.
(F) Do not insert any object in port hole of device at any time as this can damage the device.
(G) Number of reflow - Recommend no more than 3 cycles.

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 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
C	Preliminary Specification in new format	7-27-2009
D	Changed R1 from 22kOhms to 9.8kOhms (Sheet 6) (MDurso C10110553)	11-13-09