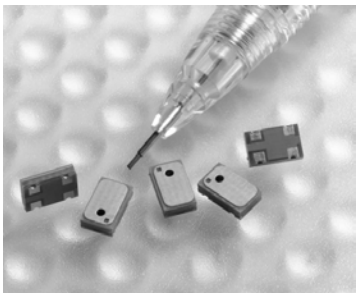
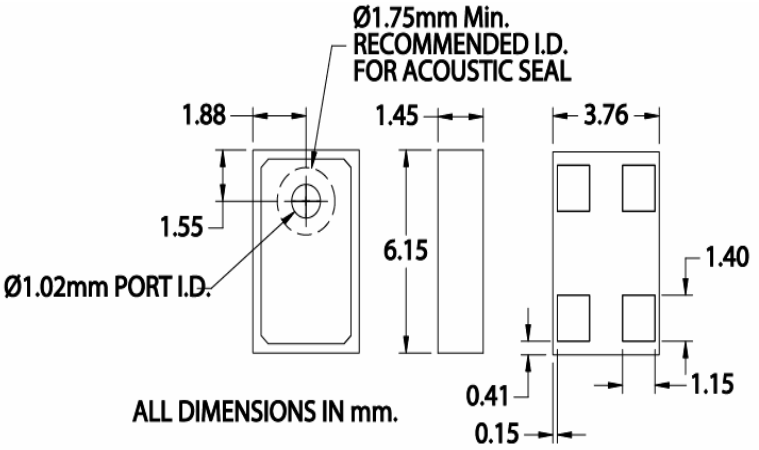
Product Specification: SP0103 Series with Integrated Amplifier

This document applies the following SiSonic Model Numbers:
SP0103NC3-2 SP0103NC3-3

SiSonic microphone with integrated amplifier offers designers numerous features: up to 20dB gain, surface-mountable, compatible with standard solder reflow, pick-and-place with standard high speed automated equipment, low output impedance, and excellent environmental characteristics. External amplifiers amplify both signal and external noise induced in the circuit, compared to SiSonic SP0103 that amplifies the signal prior to external noise.

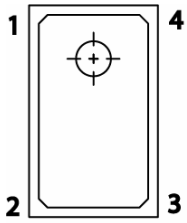


Microphone Dimensional Layout



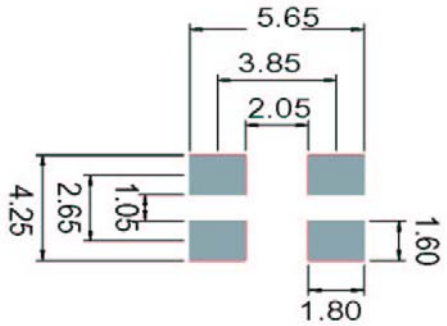
Item	Dim.	Tol. (+/-)	Units
Height	1.45	0.15	mm
Length	6.15	0.05	mm
Width	3.76	0.05	mm
Weight	< 0.5		grams
Coplanarity	< 0.1		mm

Microphone Pin Output



PIN#	FUNCTION
1	OUTPUT
2	GAIN CONTROL
3	GROUND
4	POWER

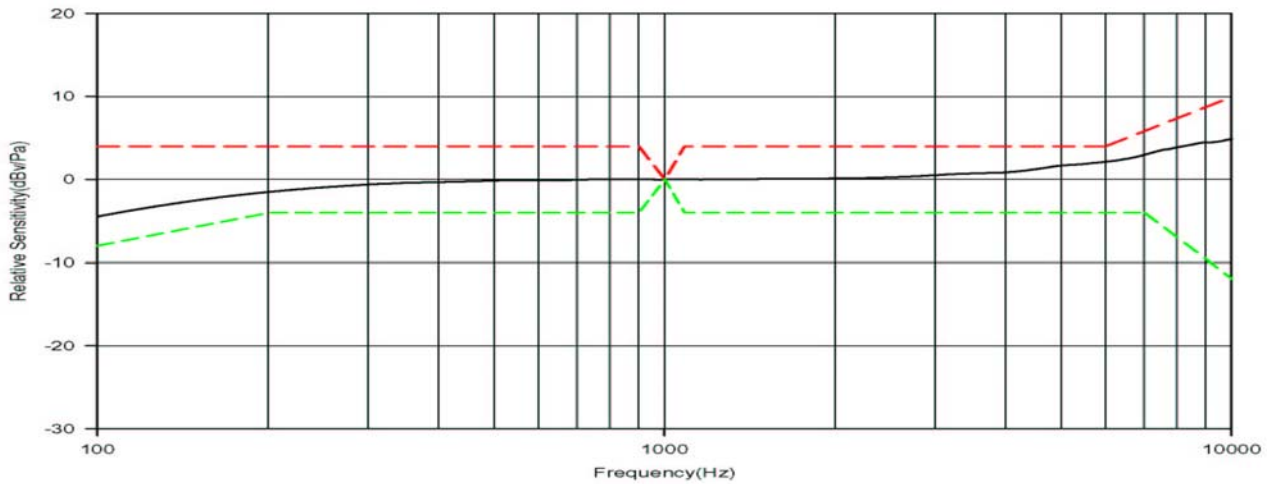
Recommended PCB Land Layout



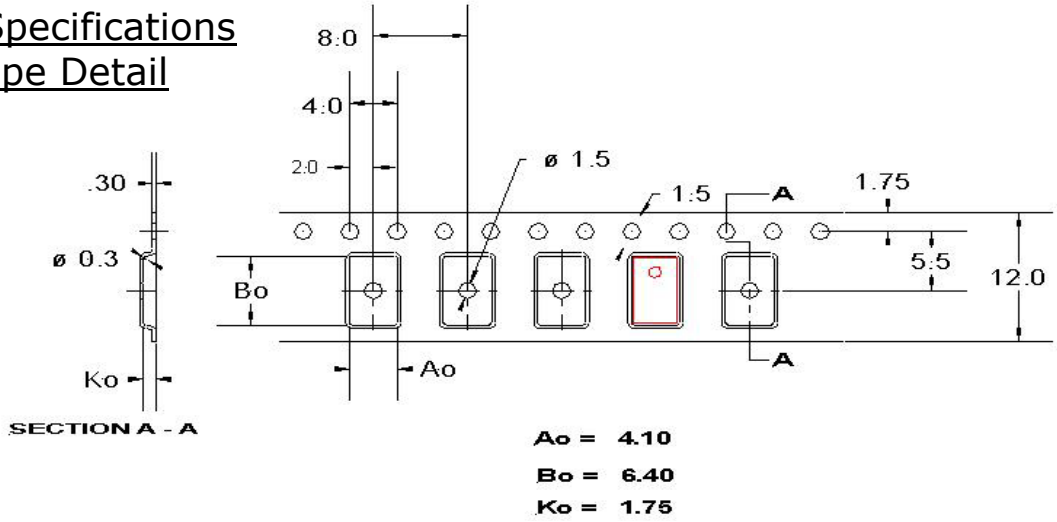
Product Specifications Test Conditions: +20ºC, 60-70% R.H.

	Symbol	Condition	Limits			Unit
			Min.	Nom.	Max.	
Directivity		Omni-directional				
Sensitivity	S	@ 1kHz (0dB=1V/Pa) where R3=0Ω, C1=0.47uF	-26	-22	-18	dB
Output impedance	Z_{OUT}	@ 1kHz (0dB=1V/Pa)			100	Ω
Current Consumption	I_{DSS}	across 1.5 to 5.5 volts	0.100		0.350	mA
Signal to Noise Ratio	S/N	@ 1kHz (0dB=1V/Pa)	55	59		dB
Typical Input Referred Noise	ENL	A-weighted		35		dBA SPL
Supply Voltage	Vs		1.5		5.5	V
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%				dB
Operating Temperature			-40		+100	ºC
Storage Temperature			-40		+100	ºC
Frequency Range		100 – 10,000				Hz

Frequency Response Curve



Packaging Specifications
Carrier – Tape Detail



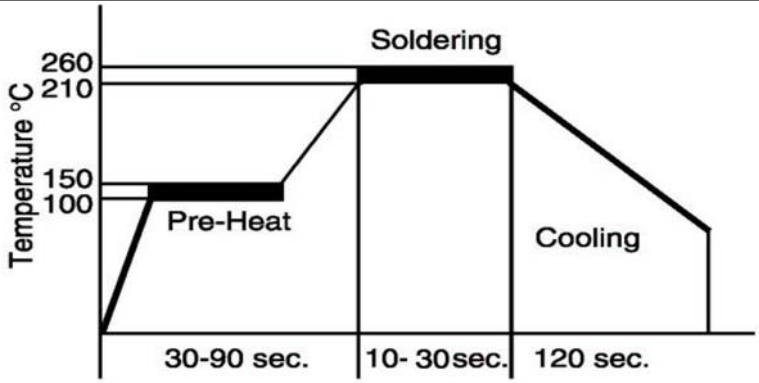
Model Number	Suffix	Reel Diameter	Qty per Reel	Capacitor Config.
SP0103NC3	-2	7”	1,200	10 & 33pF
SP0103NC3	-3	13”	4,500	10 & 33pF
NOTE: All devices are lead-free and compatible with lead-free reflow profile.				

Tape & Reel	Available in 7” or 13” diameter.
Leader Length	800mm or minimum of 100 empty pockets
Label	Label applied to external package and direct to reel. Per JEDEC.
Storage Life	1 year storage (original packaging, low humidity)
Polarity of part	“L” – direction

Solderability Characteristics (** No board washing after reflow **)

Solder Reflow	260ºC for maximum 30 seconds
Terminal Pads	Gold (27u”) over Nickel (150u”) Typical
# of Reflow Passes	reference Reliability section

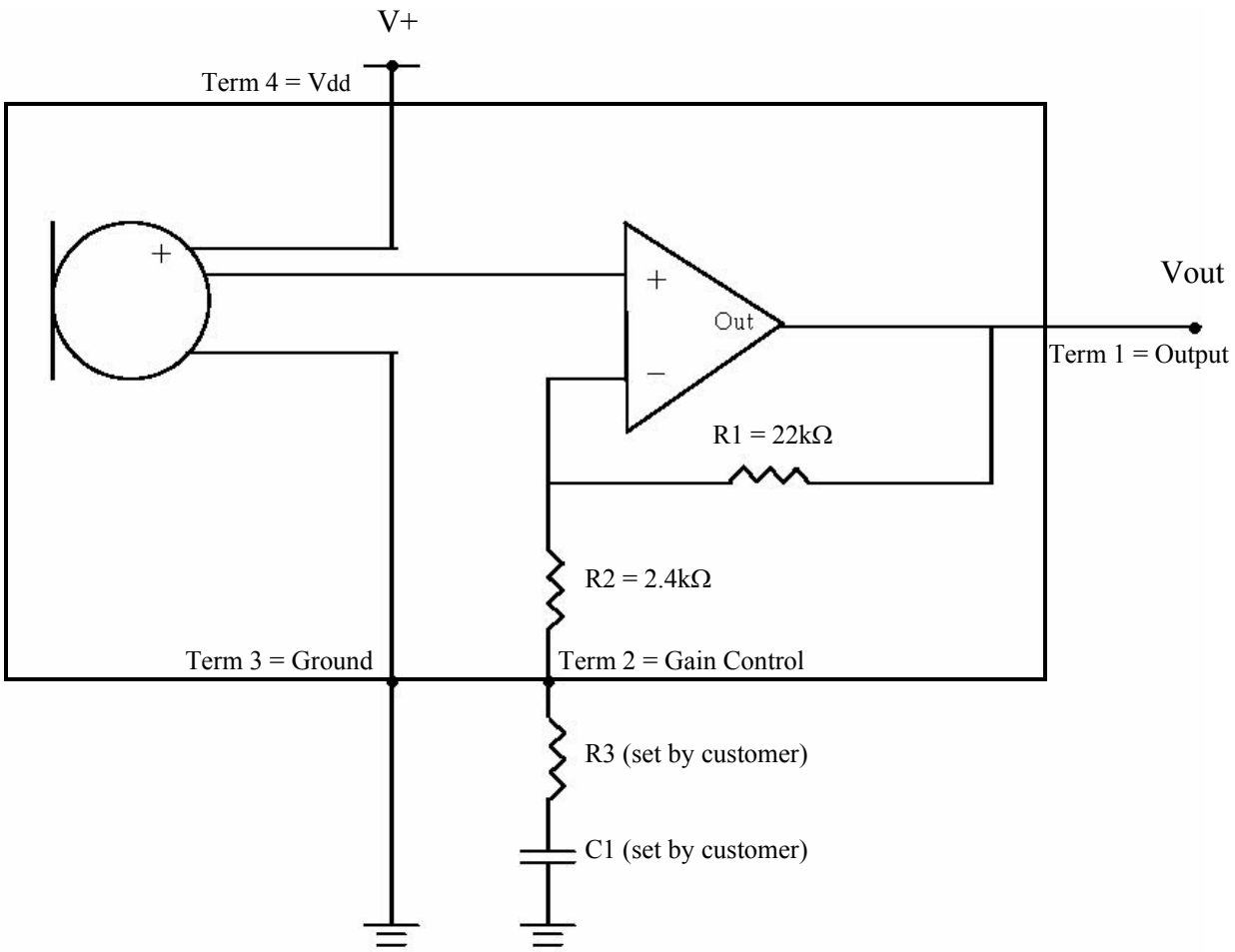
Solder Reflow Profile (Maximum Conditions)



Reliability

Thermal Shock	Microphone unit must operate when exposed to air-to-air thermal shock 100 cycles, from –40ºC to +125ºC. (IEC 68-2-4)
High Temperature Storage Test	Microphone unit must maintain sensitivity after storage at +105ºC for 1,000 hours. (IEC 68-2-2 Test Ba)
Low Temperature Storage Test	Microphone unit must maintain sensitivity after storage at –40ºC for 1,000 hours. (IEC 68-2-1 Test Aa)
High Temperature Operating Test	Microphone unit must operate within sensitivity specifications for 16 hours at 105ºC. (IEC 68-2-2 Test Ba)
Low Temperature Operating Test	Microphone unit must operate within sensitivity specifications for 16 hours at –40ºC. (IEC 68-2-1 Test Aa)
Humidity Test	Tested under Bias at 85ºC/85% R.H. for 270 hours. (JESD22-A101A-B)
Vibration Test	Microphone unit must operate under test condition: 4 cycles, from 20 to 2,000 Hz in each direction (x,y,z), 48 minutes, using peak acceleration of 20g (+20%, -0%). (MIL 883E, method 2007.2, A)
Electrostatic Discharge	Tested to 8kV direct contact discharge or 15kV air discharge as specified by IEC 1000-4-2, level 3 and level 4.
Reflow	Microphone is tested to 5 passes through reflow oven, with microphone mounted upside-down under conditions of 260ºC for 30 seconds maximum.
Mechanical Shock	Tested to greater than 5,000g (IEC 68-2-27, Ea).
Note:	After test conditions are performed, the sensitivity of the microphone shall not deviate more than 3dB from its initial value.

Recommended Interface Circuit for SP0103N Integrated Amplifier



Desired Gain	**Pin 2 Termination Method**
Unity Gain (0dB)	Tie Terminal 2 directly to Output (Terminal 1).
20dB Gain	Tie Terminal 2 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:
➡ G=1+ {R1 / (R2 + R3)} Gain(dB) = 20 * log(G)
High-pass-filter Corner Frequency:
➡ C.F. = 1 / {2*pi*(R2 + R3) * C1}