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SoniCrest Brand Acoustic Components

www.jlsonicrest.com

Document Type : Specification
 Product Type : Silicon Microphone Component
 Part Number : SMO04C-38/1316

A1 - New issue created by Hermes Shum on 16 Dec., 2019		
A2 - Updated sections 2 - 7, 10 by Hermes Shum on 9 Jan., 2020		

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1. Purpose and Scope

This document contains both general requirements, qualification requirements, and those specific electrical, mechanical requirements for this part.

2. Description

3.76 x 2.95 x 1.1 mm analog silicon microphone, reverse mounted, with RF filter and sensitivity tolerance $\pm 1\text{dB}$, RoHS compliant.

3. Application

Smartphones, Tablet, Headphones, Smart home devices, Automotive, etc.

4. Features

- High Performance Analog ultra low pressure sensor
- Temperature Coefficient of Sensitivity stability within $\pm 0.60\text{ dB/Deg C}$.
- Pressure Coefficient of Stability within $\pm 0.55\text{ dB/Kpa}$
- Ultra Low Profile Package Availability
- Surface Mountable: MLP Design
- Tape & Reel Packaging
- RoHS Compliance

5. Interface Circuit Design Considerations

5.1. Design Consideration

- 5.1.1.** Must avoid connecting 2.2K resistor between VDD and output terminal will result in non-functional failure or current consumption will be too high.

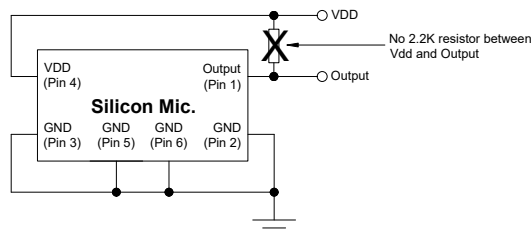


Figure 1. Design Consideration (1)

- 5.1.2.** Must avoid connecting RC to pin 2 because SoniCrest silicon microphones are all fixed gain series. Connecting RC to pin 2 leads to pin 2 floating resulted in malfunctioning or non-functional.

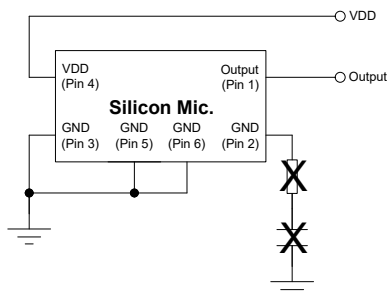


Figure 2. Design Consideration (2)

5.1.3. Interface Schematic

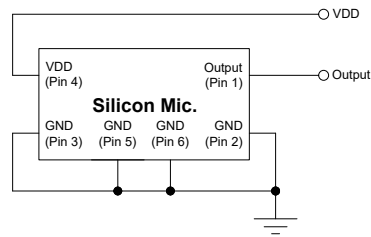
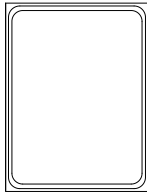


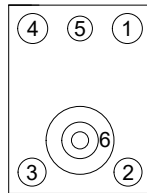
Figure 3. SMO04C-38/1316 Interface Schematic Diagram

5.2. Electrical Layout

Top View



Bottom View



Pin No.	Function
1	Output
2	GND
3	GND
4	VDD
5	GND
6	GND

Figure 4. Electrical Layout of SMO04C-38/1316

5.3. Terminology

- 5.3.1.** Pin 1: The Output Terminal, where the analog signal equivalent to applied pressure is available.
- 5.3.2.** Pin 2, 3, 5, 6: The Terminal where the supply negative is connected to sensor package.
- 5.3.3.** Pin 4: Input Voltage (maximum 3.6V).
- 5.3.4.** Sensitivity: Sensitivity is the open circuit output voltage amplitude for a given sound pressure at the pressure sensor diaphragm. This is frequency dependent so typically quoted at 1KHz. Units are defined in dB logarithmic scale. It is measured at the following conditions, $f = P_{IN} = 1\text{Pa}$, $V_{DD} = 2.0\text{V}$.

6. Component Requirement (All data taken at 23±2°C unless otherwise specified)

6.1. General Requirement

- 6.1.1. Operating Temperature Range : -40°C to +100°C
- 6.1.2. Storage Temperature Range : -40°C to +70°C
- 6.1.3. Solder reflow (for 30s max. of peak temperature) : ≤ 260°C

6.2. Electrical Requirement

- 6.2.1. Directivity : Omnidirectional
- 6.2.2. Maximum Input Sound Level
(for less than 10% distortion) : 124dB
- 6.2.3. Sensitivity
(0dB = 1V/Pa, 1kHz) : -38 ± 1dB
- 6.2.4. Operating Voltage Range : 1.6V to 3.6V
- 6.2.5. Current Consumption : ≤ 0.2mA
- 6.2.6. Frequency Range : 100Hz ~ 10KHz
- 6.2.7. Output Impedance : ≤ 300Ω
- 6.2.8. Total Harmonic Distortion : ≤ 0.5% (at 94dB)
- 6.2.9. S/N Ratio : 63dB (Typical)
- 6.2.10. Sensitivity Variation over Operation Range : 0.5dB
- 6.2.11. Power Supply Rejection
(100mVp-p square wave, 217Hz, A-weighted) : -90dB

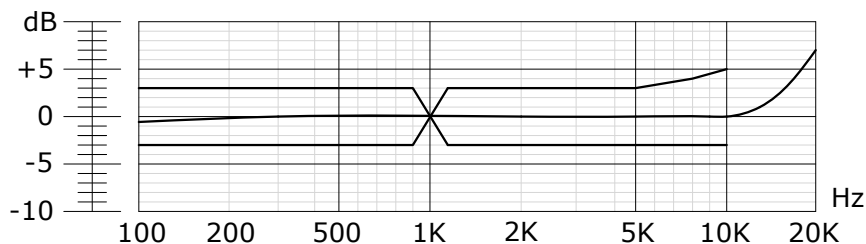


Figure 5. Frequency Response

6.3. Mechanical Requirement

- 6.3.1. Layout and Dimension : See Section 9, Figure 8

6.4. Test Setup

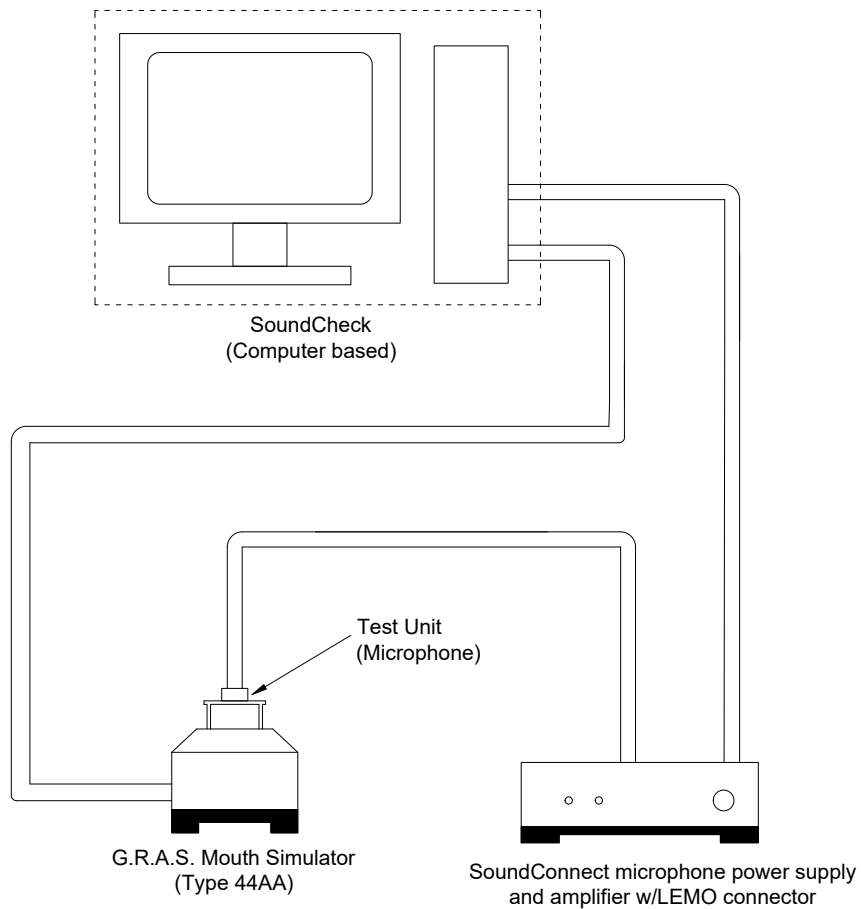


Figure 6. Test Setup

Notes : Apply sinusoidal wave from SoundCheck Audio Analyzer (Computer based) to speaker in G.R.A.S. Mouth Simulator Type 44AA. Measure sensitivity of test unit with specified driving circuit. The whole testing system should be calibrated based on calibration procedure recommended by the manufacturer before measurement. Measurement should be carried out in an excellent insulation from external noise environment.

7. Reliability Test

- 7.1. **Reflow Simulation (without solder)** : Subject samples to reflow soldering condition with maximum temperature $260\pm 5^{\circ}\text{C}$ for 3 times. Components must be fully stabilized between each reflow test, which may require up to a 2 hours soak.
- 7.2. **High Temperature Operating Test** : Subject samples to $+105\pm 3^{\circ}\text{C}$ for 1000 hours. Components must be fully stabilized at temperature extremes before data is taken, which may require up to a 2 hours soak.
- 7.3. **High Temperature Storage Test** : Subject samples to $+105\pm 3^{\circ}\text{C}$ for 1000 hours. Components must be fully stabilized at temperature extremes before data is taken, which may require up to a 2 hours soak.
- 7.4. **Low Temperature Operating Test** : Subject samples to $-40\pm 3^{\circ}\text{C}$ for 1000 hours. Components must be fully stabilized at temperature extremes before data is taken, which may require up to a 2 hours soak.
- 7.5. **Low Temperature Storage Test** : Subject samples to $-40\pm 3^{\circ}\text{C}$ for 1000 hours. Components must be fully stabilized at temperature extremes before data is taken, which may require up to a 2 hours soak.
- 7.6. **Static Humidity 1** : Precondition at room temperature for 1 hour. Then expose to $+85\pm 3^{\circ}\text{C}$ with 85% relative humidity for 1000 hours. Finally dry at room ambient for 2 hours before taking final measurement.
- 7.7. **Static Humidity 2** : Precondition at room temperature for 1 hour. Then expose to $+65\pm 3^{\circ}\text{C}$ with 95% relative humidity for 168 hours. Finally dry at room ambient for 2 hours before taking final measurement.
- 7.8. **Temperature Shock** : Each temperature cycle shall consist of 15 minutes at -40°C , 15 minutes at $+125^{\circ}\text{C}$ with 5 minutes transition time. Test duration is for 100 cycles. Components must be fully stabilized at temperature extremes before data is taken, which may require up to a 2 hours soak.
- 7.9. **Random Vibration** : Vibrate randomly along three perpendicular directions for 12 minutes in each direction, from 20 ~ 2000Hz with a peak acceleration 20g.
- 7.10. **Drop Test** : Drop samples naturally from the height of 1.5m onto a marble surface board for 4 times in 4 corners, 4 times in 6 faces, total of 40 drops.
- 7.11. **ESD Test** : Perform ESD test according to IEC61000-4-2 level 3.
- 7.12. **Mechanical Shock** : Subject samples to half sine shock pulses (10000g for 0.1ms) in each direction, total of 9 shocks.

8. Recommended reflow oven temperature profile

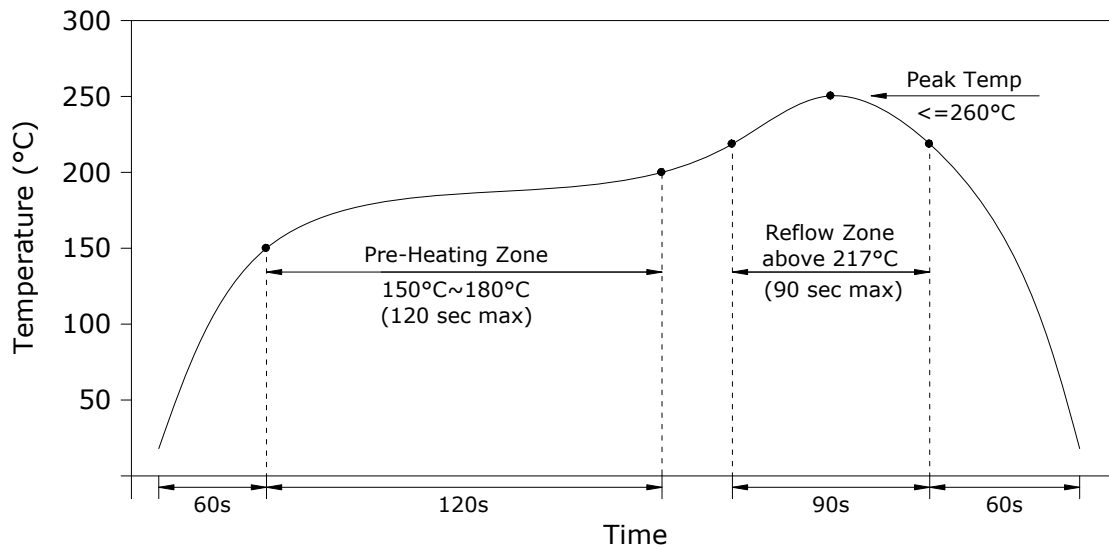


Figure 7. Recommended Reflow Oven Temperature Profile

Notes:

1. Do not board wash after the reflow process. Board washing and cleaning can damage the device.
2. The SMD process should use no clean solder paste, cleaning is not allowed because washing will damage the pressure sensor sensing elements.
3. Do not expose ultrasonic processing and cleaning.
4. Do not pull a vacuum over port hole of the microphone.

9. Mechanical Requirements

Unit : mm

Tolerance : Linear = ± 0.15

(unless otherwise specified)

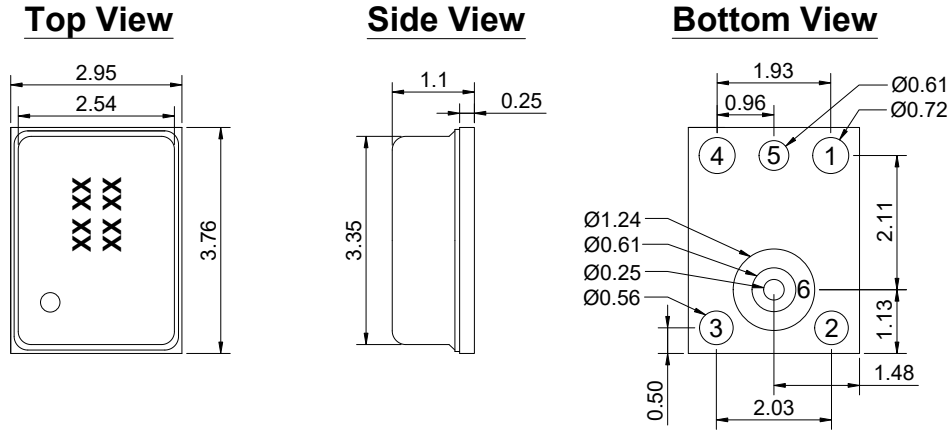


Figure 8. Mechanical Layout of SMO04C-38/1316

10. PCB Solder Pad Layout

The below figure provide general guidance about the recommended PCB land pattern. The land pattern dimensions are exactly the same size and shape as the pads on the pressure sensor module. Recommended solder paste height is 3-5 mils (75 μ m to 125 μ m).

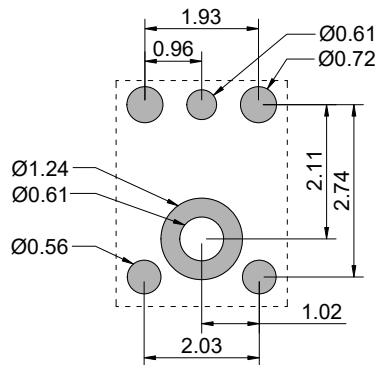


Figure 9. PCB solder pad layout for SMO04C-38/1316

11. Standard Packing Layout

11.1. Tape Layout

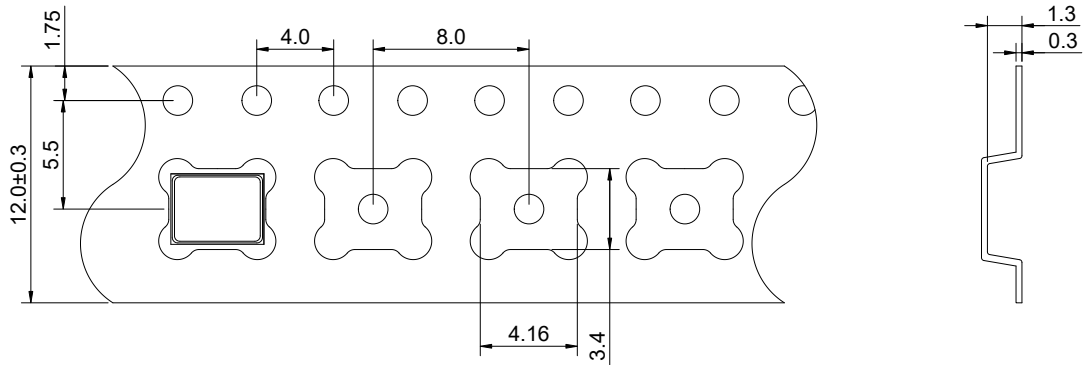


Figure 10. Tape Layout

11.2. Reel Layout

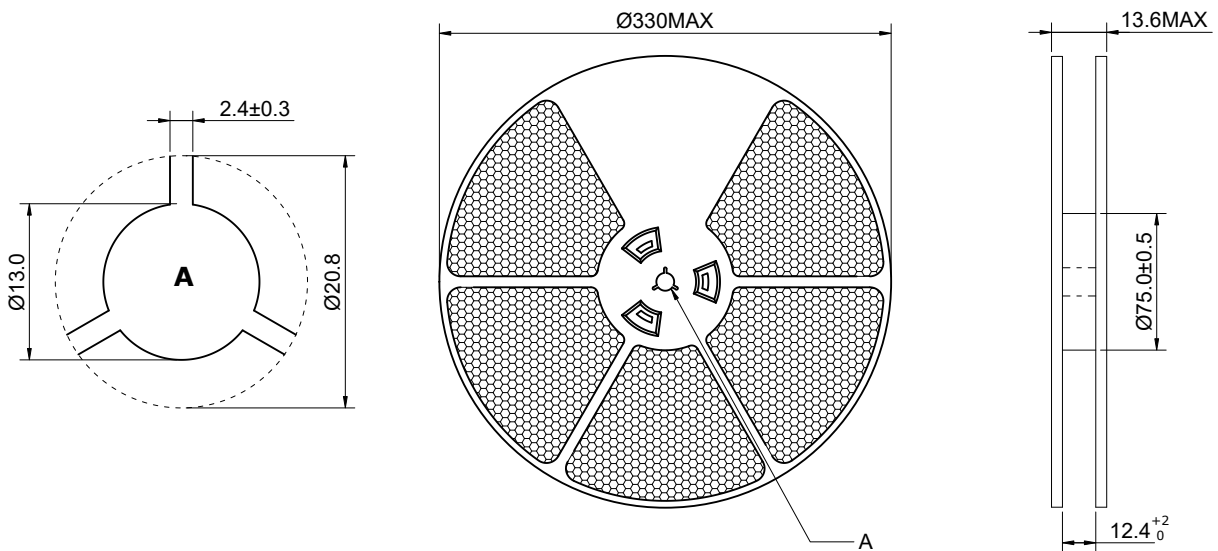


Figure 11. Reel Layout

11.3. Packing Quantity: 5000 pieces per reel, 5 reels per inner carton, 2 inner cartons per outer carton. (Total 50000 pieces)

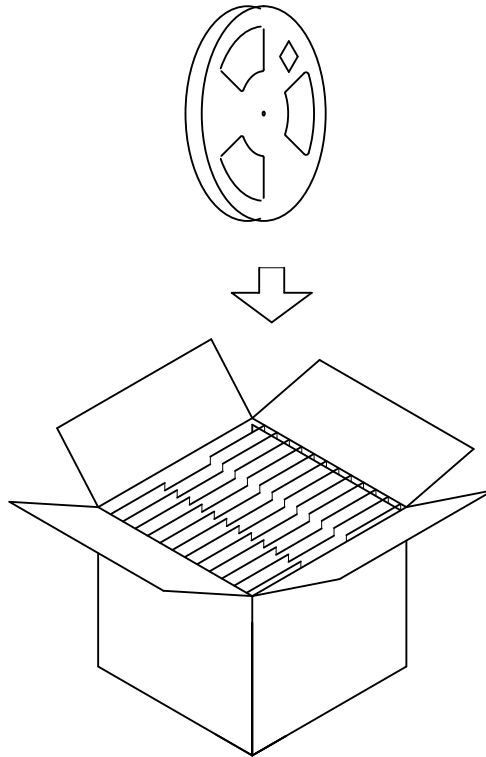
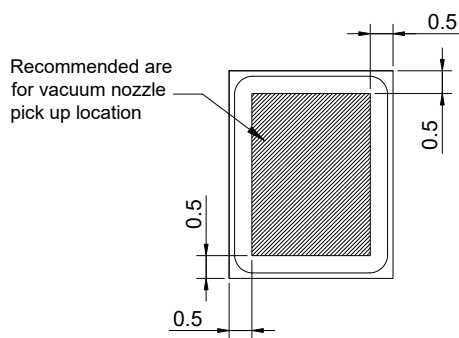


Figure 12. Reel Installation

11.4. Pickup Tool Pick Location



Pick Up Pressure Limits		
Condition	mmHg	PSI
Max. Air Purge	3000	58
Max. Vacuum	-500	9.6

Figure 13. Pickup Tool Pick Location