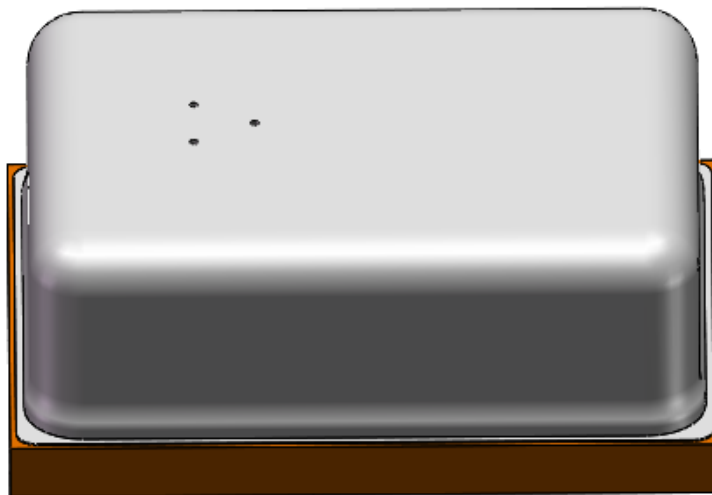


# SV01-003

## Bone Sensor

### Product Datasheet



# Restricted

## 1. Security warning

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## 2. Publication history

Version	Date	Description
1.0	2021.08.31	Preliminary datasheet
1.1	2021.09.23	Update tape depth in package specifications
2.0	2021.10.21	Update response curve and mark configuration
3.0	2021.12.16	Update response curve
3.1	2022.11.05	Update single ended application

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## 1. Introduction

The SV01-003 is a high performance Bone sensor optimized for picking-up people's voice through bone vibration, which achieves a better signal with high SNR and shields the normal ambient sound noise.

### Key features

- Package: 6-pin LGA package, 3.5mm x 2.65mm x 1.30mm
- Pb-free, halogen-free and RoHS compliant

### Performance

- Supply voltage: 1.52 ... 1.89V (low power mode)  
2.3...3.0V (Normal mode)
- Low Current: 50  $\mu$ A
- High sensitivity: -25 +3/-2 dBv/g
- Low Noise: Noise Density  $\leq 2\mu\text{g}/\sqrt{\text{Hz}}$
- Reflow Solderable

### Applications

- Wearable/hearable devices
- Communication in noisy/challenging types of environments
- Hearing aids
- Bone Joint Monitor in health prediction field
- Mechanical Joint Monitor and device conditioning
- Structure Health Monitor

## 2. Absolute Maximum Ratings

Table 1: Absolute Maximum Ratings

Parameters	Condition	Min	Max	Unit
Storage Temperature		-40	+85	$^{\circ}\text{C}$
Supply Voltage	All Pins	-0.3	+3.6	V
ESD rating	HBM,R=1.5kohm,C=100pF		$\pm 2$	kV
Maximum Acceleration	in Z Direction		10000	g

### 3. Testing Conditions

Table 2: Testing Condition (Vent Hole Sealed)

Test Conditions	Temperature	Humidity	Air Pressure
Standard Conditions	+15~+35	25%RH~75%RH	860hPa~1060hPa
Judgment Conditions	+20±2	40%RH~50%RH	860hPa~1060hPa

### 4. Characteristics

In application, the SV01-003 can be used in normal differential mode or single ended mode. In single ended mode, only one of the outputs of the VPU is used and the unused output can be left open or be grounded via a 1MΩ resistor.

Table 3: Parameter List

Parameters	Symbol	Condition	Min	Typical	Max	Unit
Power Supply						
Supply Voltage	Vdd	Low Power Mode	1.52	1.8	1.89	V
		Normal Mode	2.3		3.0	V
Current	IDD	1.52V≤VDD≤1.89V		50	100	uA
		2.3V≤VDD≤3.0V		150	200	uA
Output Impedance	Zout			150	400	Ω
Performance						
Sensitivity	S	f=100Hz, Z Axis, re. 1kHz value	-8	-5	-2	dBV/g
		f=1000Hz, Z Axis differential output	-27	-25	-22	dBV/g
		f=1000Hz, Z Axis single output only	-33	-31	-28	dBV/g
		f=2000Hz, Z Axis, re. 1kHz value	-1	2	5	dBV/g
Acoustic Sensitivity Loss	@100Hz	Sensitivity loss to ambient acoustic signals	40	50		dB
	@1kHz		30	40		dB
Acceleration Level		<10% THD@1kHz		±4		g
Low Power Mode						
Equivalent Noise		BW=100~4000Hz, A-weighted 1/3 octave		-101		dBv
Noise Density	@250Hz				6	ug/vHz
	@1kHz				3	ug/vHz
	@2kHz				2	ug/vHz
Normal Mode						
Equivalent Noise		BW=100~4000Hz, A-weighted 1/3 octave		-102		dBv
Noise Density	@250Hz				6	ug/vHz
	@1kHz				3	ug/vHz
	@2kHz				2	ug/vHz

Response Curve:

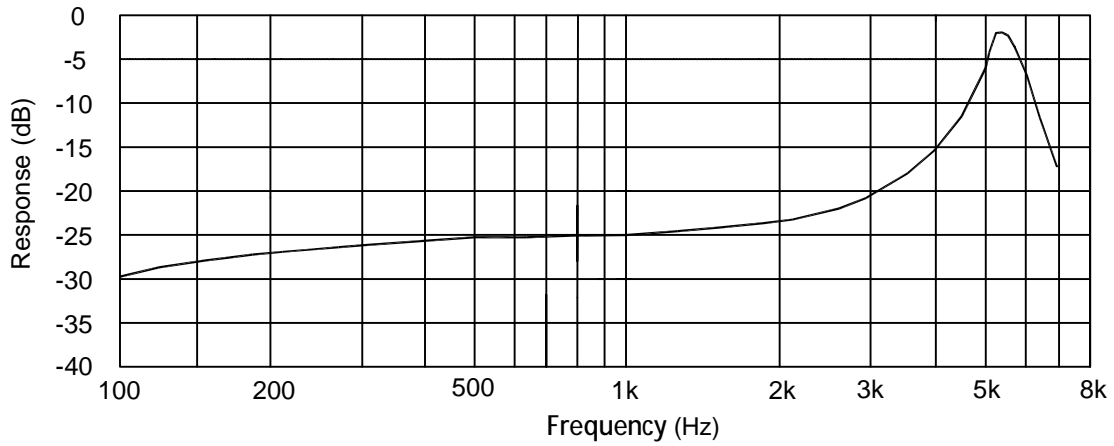


Figure 1: Frequency Response Curve

## 5. Mechanical Parameters

### 5.1 Pin Configuration

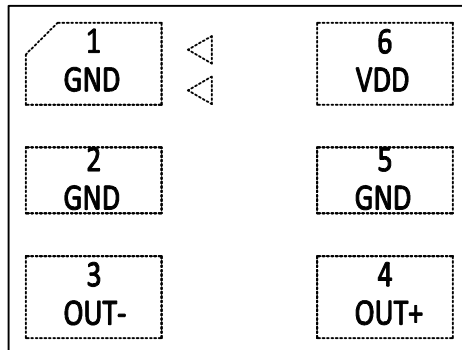


Figure 2: Layout pin configuration SV01-003  
(Top View, PAD not visible)

Table 4: SV01-003 Pin Configuration

Pin	Name	Function
1	GND	Ground
2	GND	Ground
3	OUT-	Signal Output
4	OUT+	Signal Output
5	GND	Ground
6	VDD	Power Supply

## 5.2 Outline Dimensions

The sensor housing is a 6 Pin LGA package with metal lid. Its dimensions are 3.5mm ( $\pm 0.1$  mm) x 2.65mm ( $\pm 0.1$  mm) x 1.3mm ( $\pm 0.1$ mm). Tolerance is  $\pm 0.1$ mm unless otherwise specified.

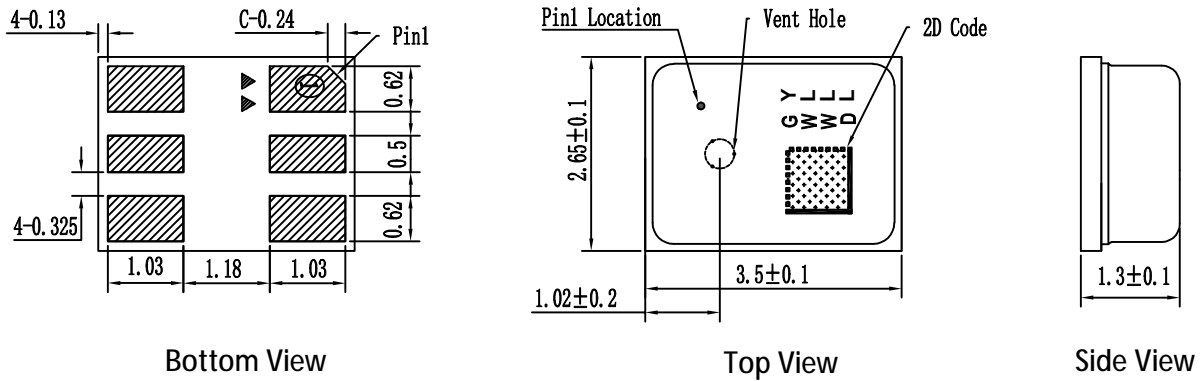


Figure 3: SV01-003 outline and size

## 6. Storage and Transportation

Keep in warehouse with less than 75% humidity and without sudden temperature change, acid air, any other harmful air or strong magnetic field.

The sensor with normal pack can be transported by ordinary conveyances. Please protect products against moist, shock, sunburn and pressure during transportation.

Storage Temperature Range:  $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$

Operating Temperature Range:  $-30^{\circ}\text{C} \sim +70^{\circ}\text{C}$

## 7. Cautions

### Vent Hole Protection

During reflow welding, it is forbidden to seal the vent holes of the sensor, to let air flow through vent holes in high temperature and avoid high air expansion damaging the package and the sensor.

After reflow process, it is recommended to seal the vent holes with Mylar membrane or UV glue, to prevent particle and enhance acoustic sensitivity loss.

After vent holes sealed, it is not recommended to handle the sensor in high temperature (more than 100), to avoid air expansion and damage to sensor and its performance.

### Nozzle Application

During SMT process, pay attention to avoid picking vent holes area, otherwise this may cause the device damage.

### Others

It is forbidden to wash the device with liquid before sealed hole, such as water, alcohol etc., otherwise this could damage the device.

## 8. PCB Design and Reflow Soldering

### Land Pattern Recommendation

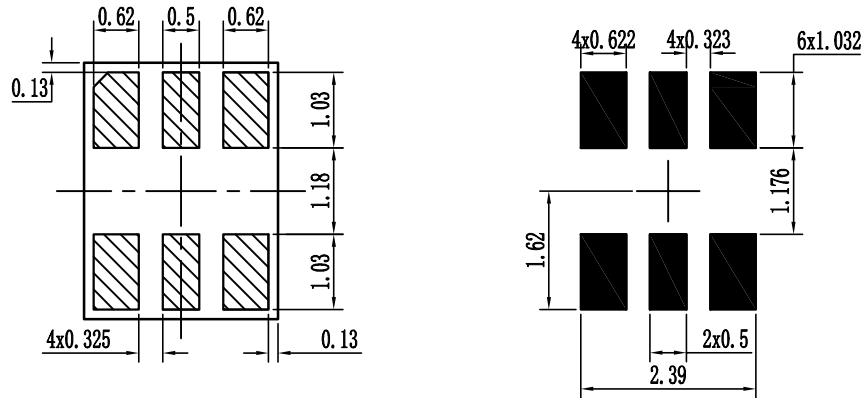


Figure 4: PCB Layout Pattern (Left), Solder Paste Stencil Pattern (Right)

### Nozzle and Picking Area

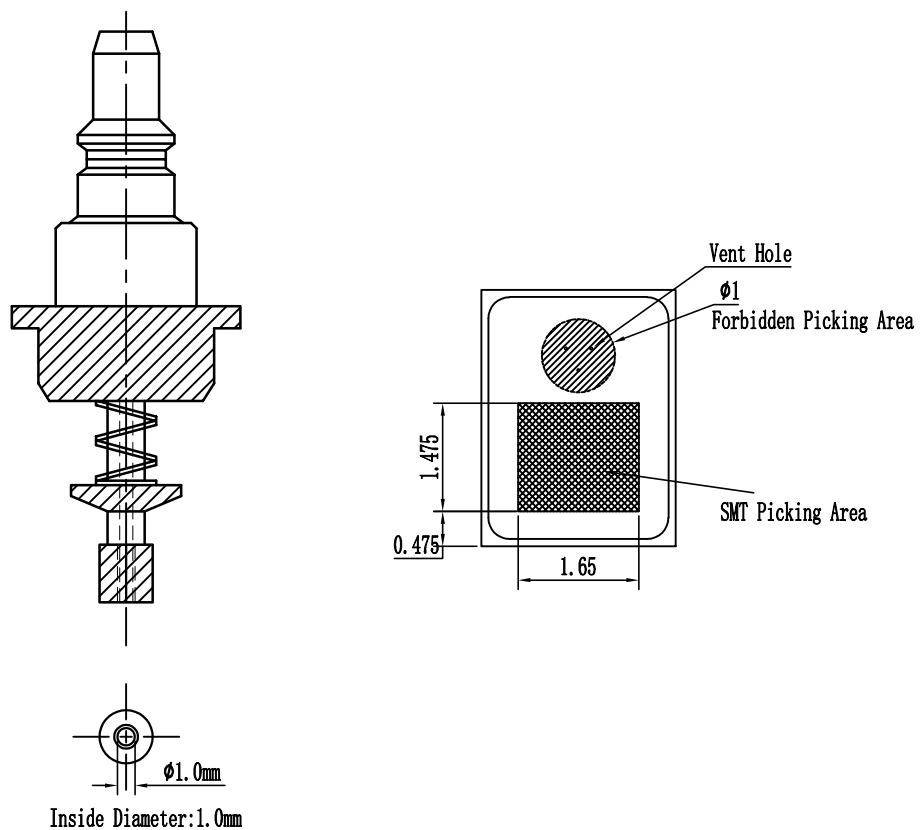


Figure 5: SMT Nozzle Dimension (Left), Picking Area Drawing (Right)

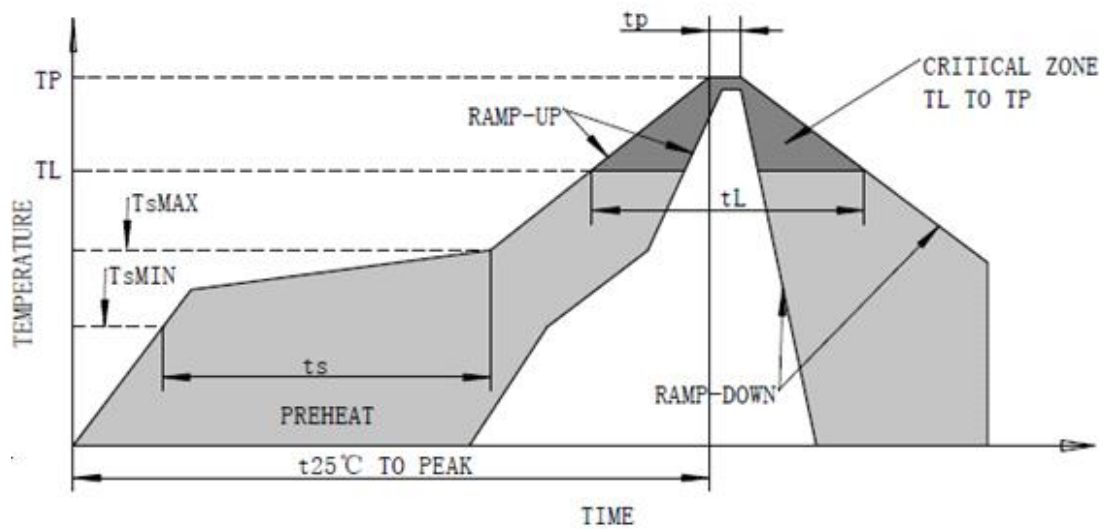


Soldering Recommendation

Soldering Machine Condition

Temperature Control	8 zones
Heater Type	Hot Air
Solder Type	Lead-free

Soldering Profile



Profile Feature	Pb-Free Assembly
Average ramp-up rate(TsMAX to TP)	2.5 /seconds max.
Preheat	
-Temperature Min.(TsMIN)	150
-Temperature Max.(TsMAX)	200
-Time(TsMIN to TsMAX)(Ts)	120~180 seconds
Time maintained above:	
-Temperature(TL)	217
-Time(tL)	Max 80 seconds
Peak temperature(TP)	260
Time within 5 of actual peak temperature(TP)2	Max 50 seconds
Ramp-down rate	-5 /seconds max.
Time 25 to peak temperature	8 minutes max.

## 9. Package Specifications

### 9.1 Tape Specifications

Quantity per reel: 4000pcs.

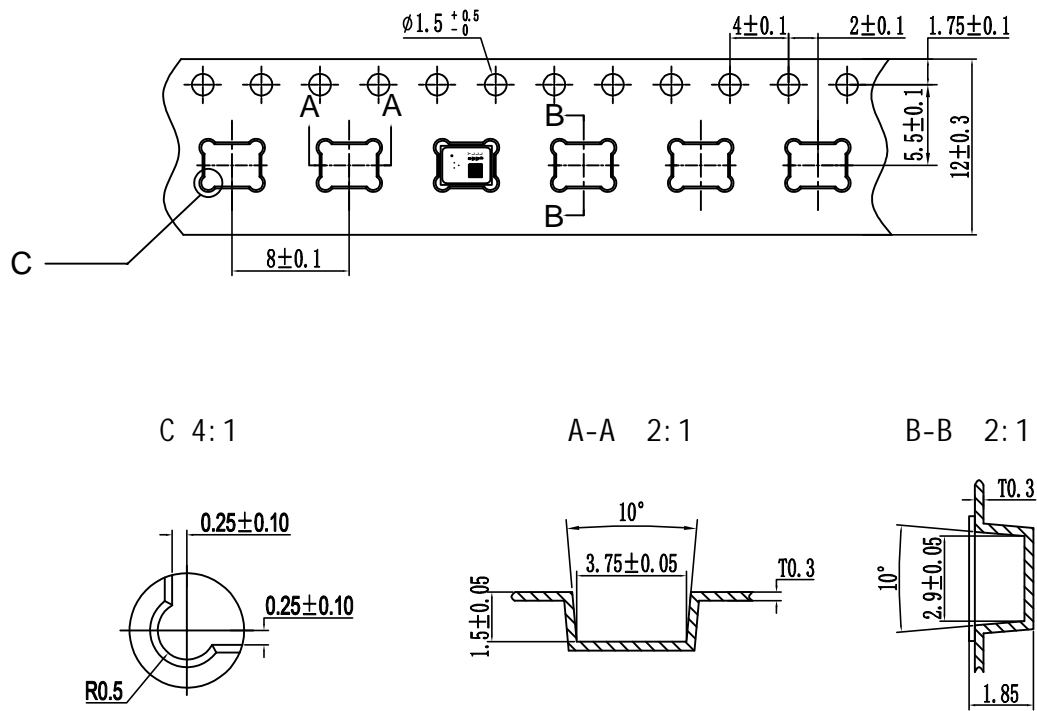


Figure 6: Tape Information (Unit: mm)

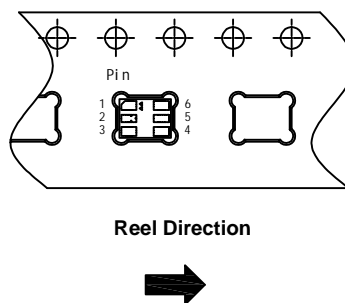
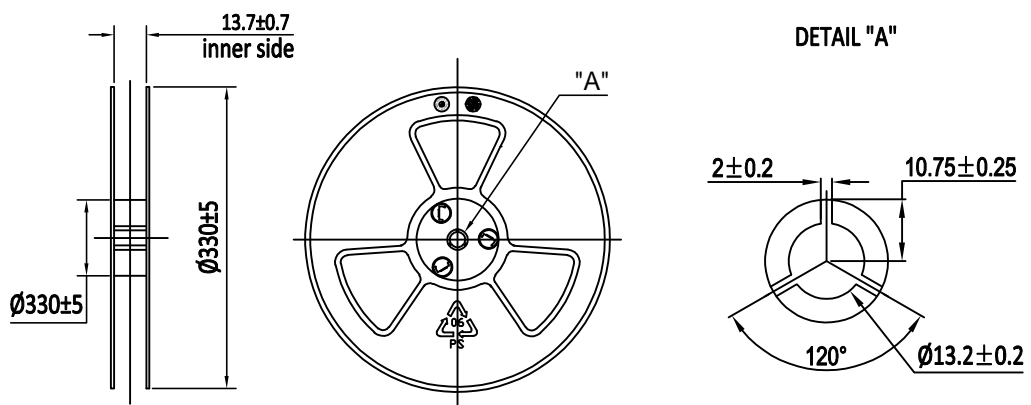


Figure 7: Pin Information

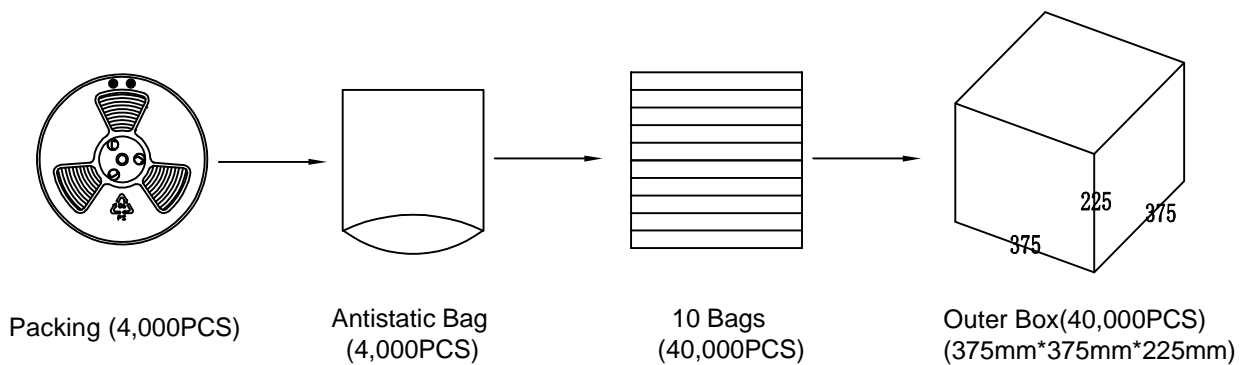
### 9.2 Reel Specification

13" reel will be provided for mass production stage and sample stage more than 1000pcs

13" Reel Specification (Unit: mm)



### 9.3 The content of Box



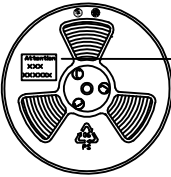
### 9.4 Packing Explain

The Label Content of the Reel



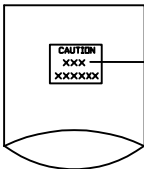
The Content Includes:  
RoHS+HF, MSL: ;  
Product type, Lot, Customer P/N;  
and other essential information such as  
Quantity, Date etc.

The Label Content of ESD Caution



ESD Caution Label

The Label Content of Moisture Caution



MSL 1 Caution Label