

## 1 Description

The Sonion Voice Pick Up Sensor is an accelerometer optimized for picking up wearers' voice using bone conduction and/or pressure generated in a sealed ear canal.

## 2 Features

- Small size 3.5 x 2.65 x 1.5 mm<sup>3</sup>
- High vibration sensitivity (-21dBV/g) with ultra-low noise (1.2 µg/√Hz)
- Optimized for picking up users' voice in ear canal
- Power consumption optimized for battery operated applications
- Halogen Free
- Compliant to REACH & RoHS

## 3 Application

The Voice Pick Up Sensor enables communication in a noisy environment without the need of a boom microphone. Picking up the voice by bone-vibration results in a signal with high own voice to ambient sound ratio. The high audibility signal is needed for accurately controlling a voice operated Operating System, anti-occlusion purposes and creating blind spots for own voice.

The small size makes them ideal for discrete and comfortable communication devices.

Examples of applications:

- Acoustic wearable devices, also known as hearables
- Peripherals for mobile phones
- Surveillance/security communication radios
- Military communication
- Hearing aids

Disclaimer: please note the following on these prototype samples

The main purpose of these samples to evaluate the Voice Pick Up Sensor in an application on the outside look and feel (dimensions, solder pads etc.) and the 3 main performance parameters: 'Vibration Sensitivity', the 'Resonance Peak Frequency' and the 'Resonance Peak Height'.

These sensors are prototypes, so performance and construction can change during the further development of the sensor. No specific reliability features were incorporated in the design yet, so we advise not to use them for reliability tests.

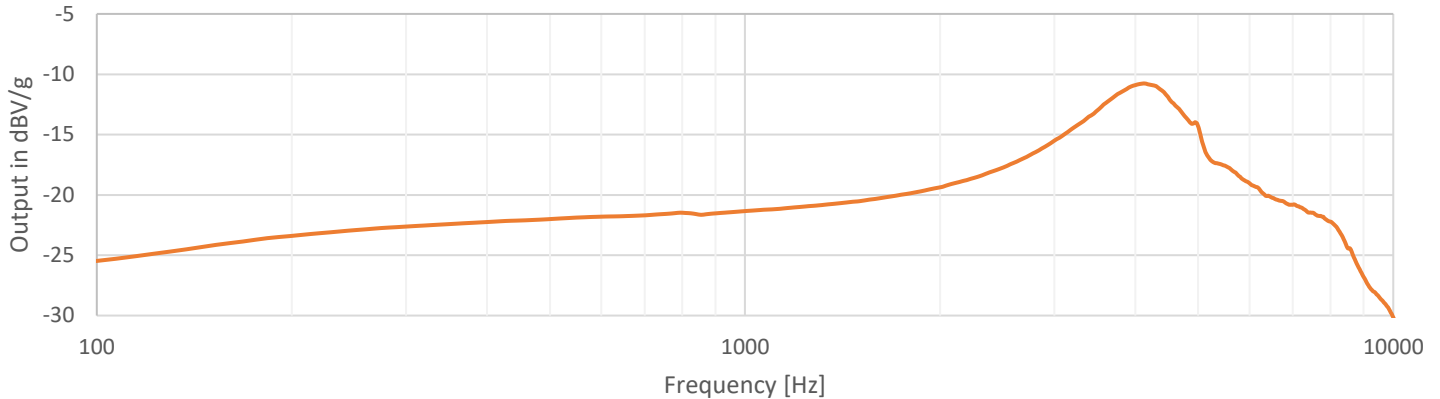
As the sensors are prototypes, the 3 main performance parameters can differ slightly from our target specification as given in our Tentative Datasheet Vibration Sensor. Please check the figures in the tables below for the targets for this specific sample batch.

For comments, feedback or questions, please contact your Sonion Representative.

Before handling and/or soldering to Sonion transducers, please study the Application Note "Handling Transducers", which can be found on the Sonion.com website.

## 4 Typical sensitivity characteristic

VPU - Typical sensitivity characteristic curve



## 5 Specification

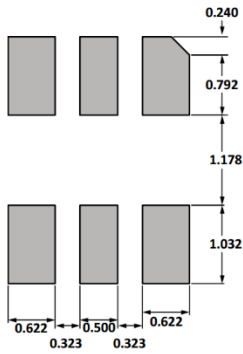
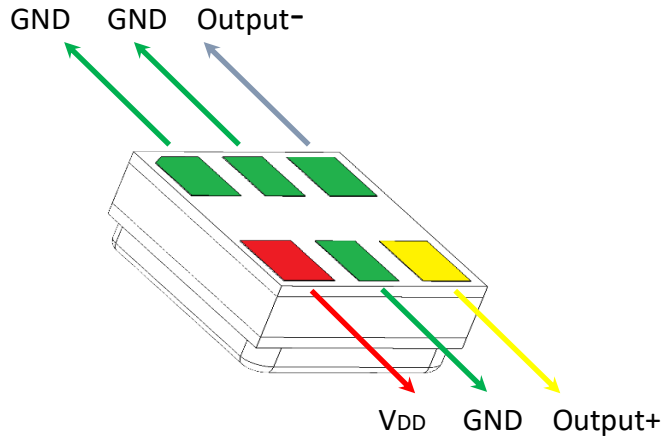
All parameters below are specified at 1.75V supply voltage and with  $1M\Omega // <200pF$  load impedance.  
 Environmental conditions: temperature  $23\pm 5^{\circ}C$ .

Parameters	Min	Typ	Max	Unit	Comments
Sensitivity @ 1kHz, Z-direction	-22.0	-21.0	-19.5	dBV/g	differential output
Sensitivity @ 1kHz, Z-direction	-28.0	-27.0	-25.5	dBV/g	single output only
Peak position (resonance frequency)	3.7	4	4.3	kHz	
Sensitivity @ peak, Z-direction	-12.0	-11.0	-10.0	dBV/g	differential output
Sensitivity @ peak, Z-direction	-18.0	-17.0	-16.0	dBV/g	single output only
1/3 Octave equivalent noise	@ 250 Hz-band		-92		dBg
	@ 1 kHz-band		-95		dBg
	@ 2 kHz-band		-96		dBg
noise density	@ 250 Hz		3.4		$\mu g/\sqrt{Hz}$
	@ 1 kHz		1.2		$\mu g/\sqrt{Hz}$
	@ 2 kHz		0.8		$\mu g/\sqrt{Hz}$
Maximum acceleration level		8		g	for THD < 10% @ 1kHz
<b>Power supply</b>					
Supply Voltage ( $V_{DD}$ )	1.52		2		Low Power mode
	2.2		3.63		High Performance mode
Supply Current ( $I_s$ )		55	65	$\mu A$	$V_{DD} = 1.8 V$
		165	190		$V_{DD} = 2.75 V$

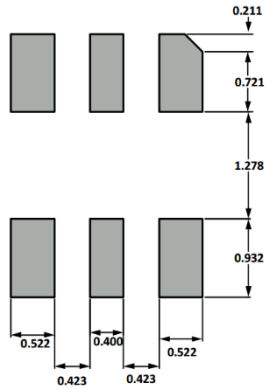
Output characteristics	Min	Typ	Max	Unit	Comments
Differential Output Impedance		5.5		k $\Omega$	Low power mode
		355		$\Omega$	High Performance mode
Output Common Mode Voltage		1.0		V	OUTPUT+ and OUTPUT-, high-performance mode
		0.8		V	OUTPUT+ and OUTPUT-, low-power mode
Output Differential Offset		10		mV	Between OUTPUT+ and OUTPUT-, high-performance mode
		10		mV	Between OUTPUT+ and OUTPUT-, low-power mode
Startup Time		15	20	ms	Output to within $\pm 0.5$ dB of stable sensitivity
Mode Switching Time		10		mV	High performance mode to low-power mode
		10		mV	Low-power mode to high performance mode
Noise Floor		-105		dBV	20 Hz to 20 kHz, A-weighted, rms, high performance mode

Absolute Maximum Ratings	Min	Typ	Max	Unit	Comments
Supply Voltage (V <sub>DD</sub> )	- 0.3		+ 3.63	V	
Acceleration			10k	g	in any direction
Temperature range biased	-40	23	85	$^{\circ}$ C	
Temperature range storage	-55		150	$^{\circ}$ C	
Storage ambient barometric range	500		1100	mHPa	

## 6 Connection

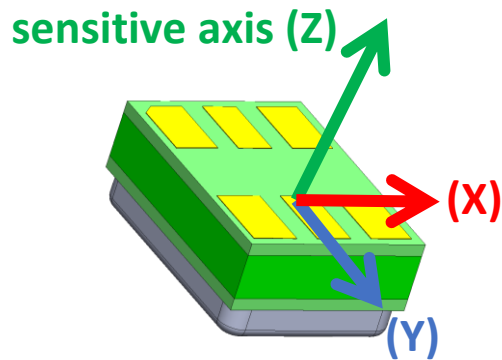


Recommended PCB Land Pattern Layout

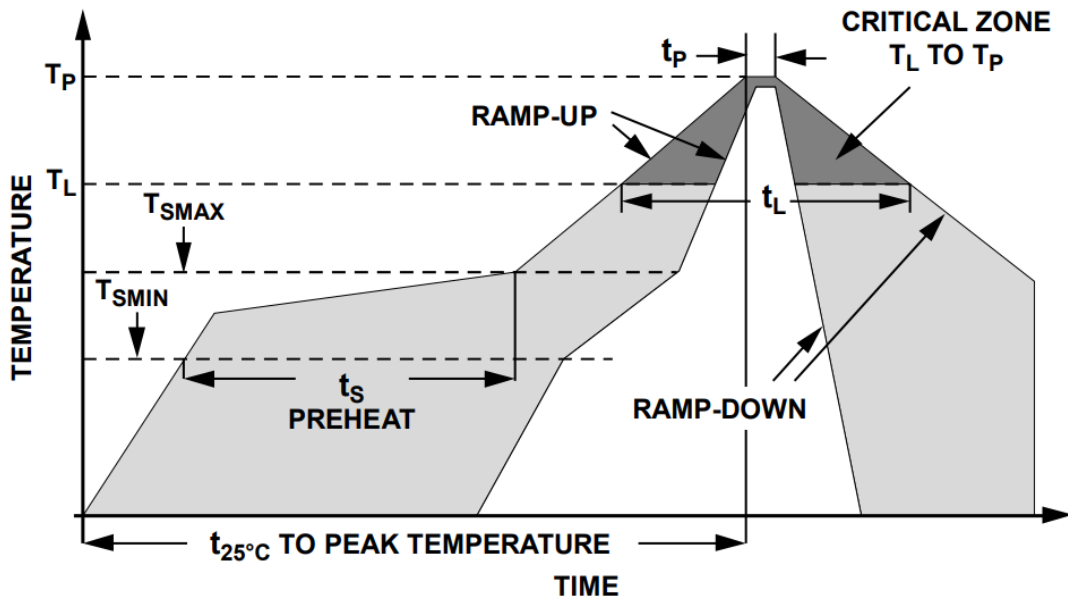


Recommended Solder Paste Stencil Pattern Layout

## 7 Axe definition



## 8 Soldering profile



PROFILE FEATURE		Sn63/Pb37	Pb-Free
Average Ramp Rate ( $T_L$ to $T_P$ )		1.25°C/sec max	1.25°C/sec max
Preheat	Minimum Temperature ( $T_{SMIN}$ )	100°C	100°C
	Minimum Temperature ( $T_{SMIN}$ )	150°C	200°C
	Time ( $T_{SMIN}$ to $T_{SMAX}$ ), $t_s$	60 sec to 75 sec	60 sec to 75 sec
Ramp-Up Rate ( $T_{SMAX}$ to $T_L$ )		1.25°C/sec	1.25°C/sec
Time Maintained Above Liquidous ( $t_L$ )		45 sec to 75 sec	~50 sec
Liquidous Temperature ( $T_L$ )		183°C	217°C
Peak Temperature ( $T_P$ )		215°C +3°C/-3°C	260°C +0°C/?5°C
Time Within +5°C of Actual Peak Temperature ( $t_p$ )		20 sec to 30 sec	20 sec to 30 sec
Ramp-Down Rate		3°C/sec max	3°C/sec max
Time +25°C ( $t_{25^\circ\text{C}}$ ) to Peak Temperature		5 min max	5 min max