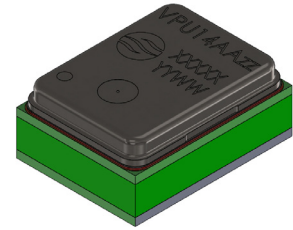


## Description

The Sonion Voice Pick Up (VPU) Sensor is a high-performance bone conduction sensor optimized for picking up a user's own voice.

The VPU Sensor enhances communication in noisy/challenging types of environments. Picking up your own voice via vibrating bones in your skull, results in an intelligible voice with high SNR and without the ambient sound/background noise. This highly intelligible signal from the VPU is perfect for accurately controlling a voice operated input system. This signal can also be used for anti-occlusion purposes.



## Applications

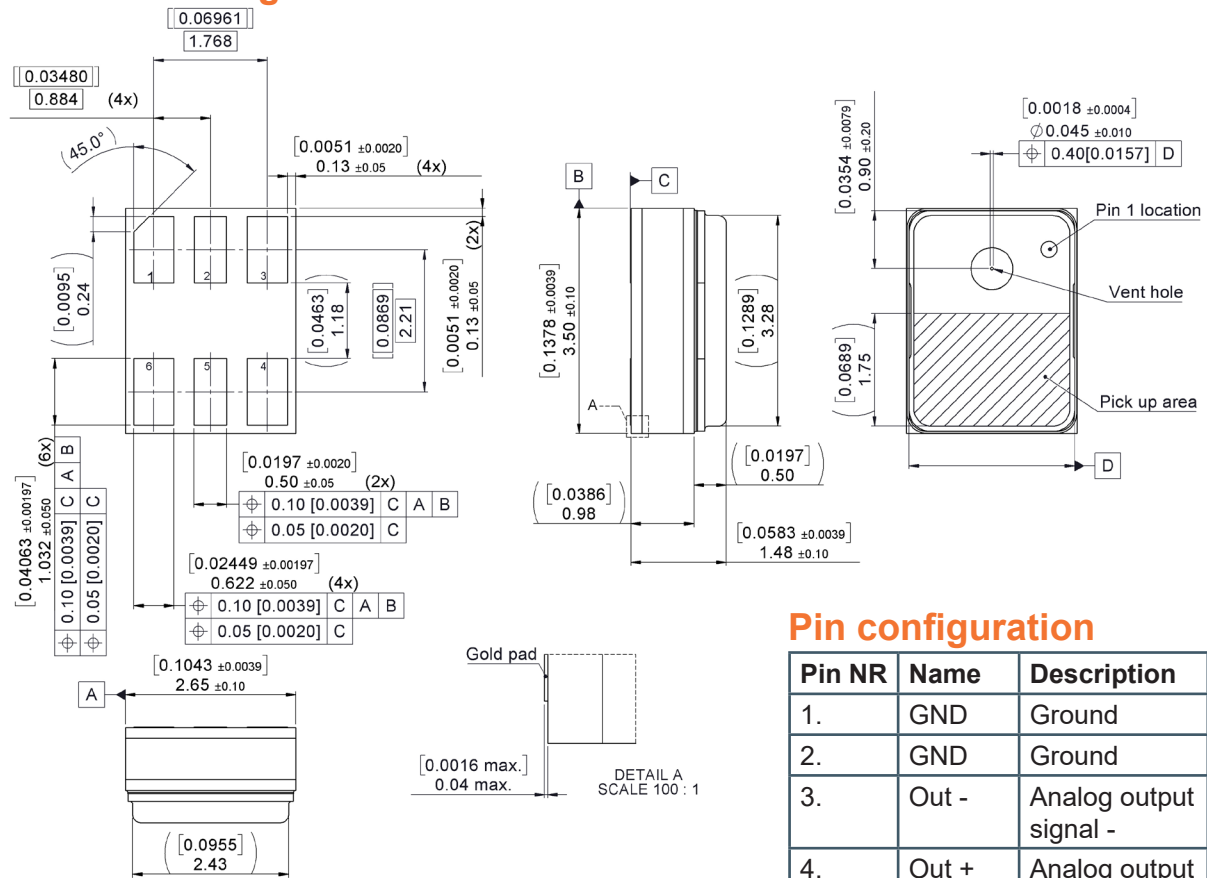
- Hearable / wearable devices, such as True Wireless Stereo earbuds, smart glasses, head worn devices, intelligent glasses, VR glasses
- On- / Over-ear headphones
- Professional headsets, such as call center headset, pilot headset, motorcycle headset
- Communication systems
- Smartphones

## Features

- Small size 3.5 x 2.65 x 1.5 mm<sup>3</sup>
- High bone conduction sensitivity with ultra-low noise
- Large bandwidth up to 8 kHz
- Optimized for picking up users' own voice on different position of human head
- Ultra-low power consumption, designed to help save battery life in continuous active mode
- Halogen Free
- REACH & RoHS Compliant
- Reflow solderable (SMD)
- Full hermetic package in application
- Storage specifications: MSL Class 1

Sonion reserves the right to make changes at any time to improve reliability, function or design, in order to provide the best product possible.

## Product drawing - Dimensions in mm



## Pin configuration

Pin NR	Name	Description
1.	GND	Ground
2.	GND	Ground
3.	Out -	Analog output signal -
4.	Out +	Analog output signal +
5.	GND	Ground
6.	VDD	Power supply

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## Specifications

All parameters below are specified in differential mode with closed vent at 1.8 V supply voltage and with 1MOhm // <200pF load impedance unless specified otherwise.

Environmental conditions: 23°C (73.4°F), 50% RH.

Performance		Min	Typ	Max	Unit	Comments
Sensitivity (Z-direction)	@ 150 Hz	-6	-3	0	dB	re. 1 kHz value
	@ 1 kHz	-26	-24	-21	dB	re. 1V per g differential output
	@ 1 kHz	-32	-30	-27	dB	re. 1V per g single output
Resonant peak	frequency	3.5	4	4.5	kHz	
	amplitude	7	10	13	dB	re. 1 kHz value
EIN (A-weighted)	100 Hz-10 kHz		-77	-74	dBg	
1/3 Octave EIN	@ 250 Hz		-89	-86	dBg	
	@ 1 kHz		-92	-89	dBg	
	@ 2 kHz		-93	-90	dBg	
Noise density	@ 250 Hz		4.7		µg/√Hz	
	@ 1 kHz		1.6		µg/√Hz	
	@ 2 kHz		1		µg/√Hz	
Max input level			6		g	for THD <10% @ 1kHz
			2.5		g	for THD <10% @ 4kHz

Power supply		Min	Typ	Max	Unit	Comments
Supply voltage (V <sub>DD</sub> )		1.52	1.8	2	V	for effective datasheet performance
Supply voltage (V <sub>DD</sub> )		-0.3		3.63	V	absolute maximum rating
Supply current			55	65	µA	V <sub>DD</sub> = 1.8 V
Power supply rejection ratio (PSRR)			52		dB	1 kHz, 100mV p-p sine wave
Power supply rejection (PSR)			-84		dBV	217 Hz, 100mV p-p square wave

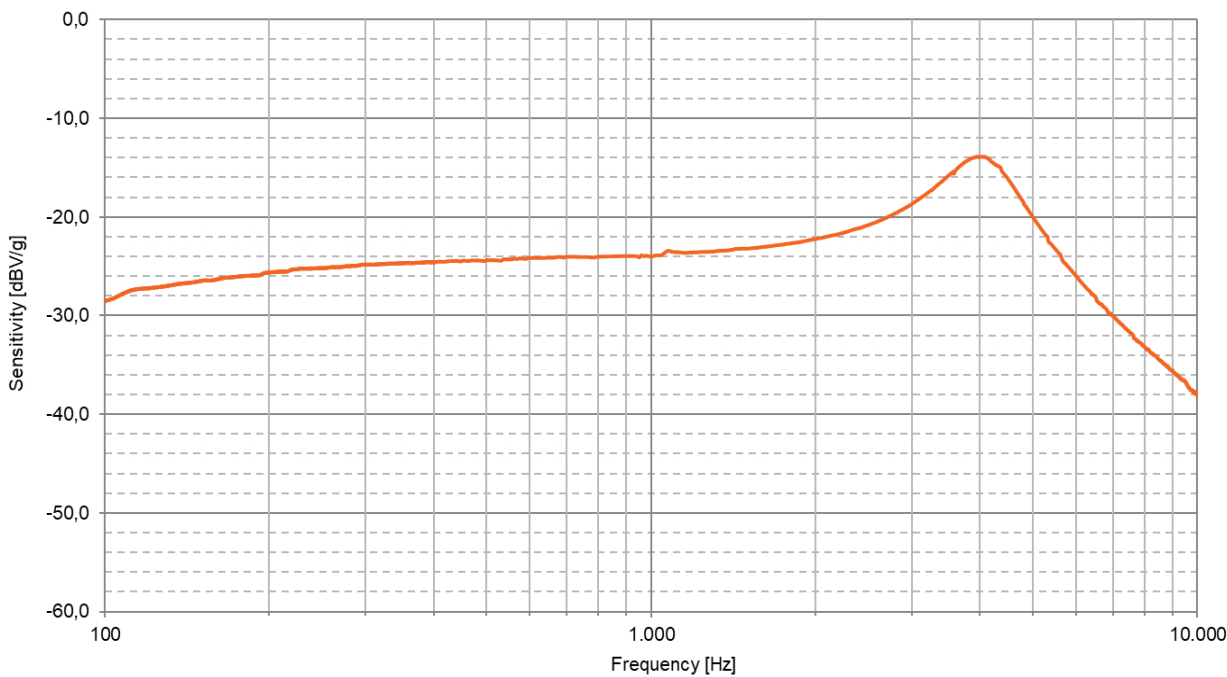
Output characteristics		Min	Typ	Max	Unit	Comments
Differential output impedance			5.5		kOhm	
Output common mode voltage			0.8		V	Between any output pad and GND
Output differential offset			10		mV	Between output+ and output-
Startup time			15	20	ms	Output to within ± 0.5 dB of stable sensitivity
Noise floor			-105		dBV	20 Hz to 20 kHz, A-weighted, rms

## Absolute Maximum Rating

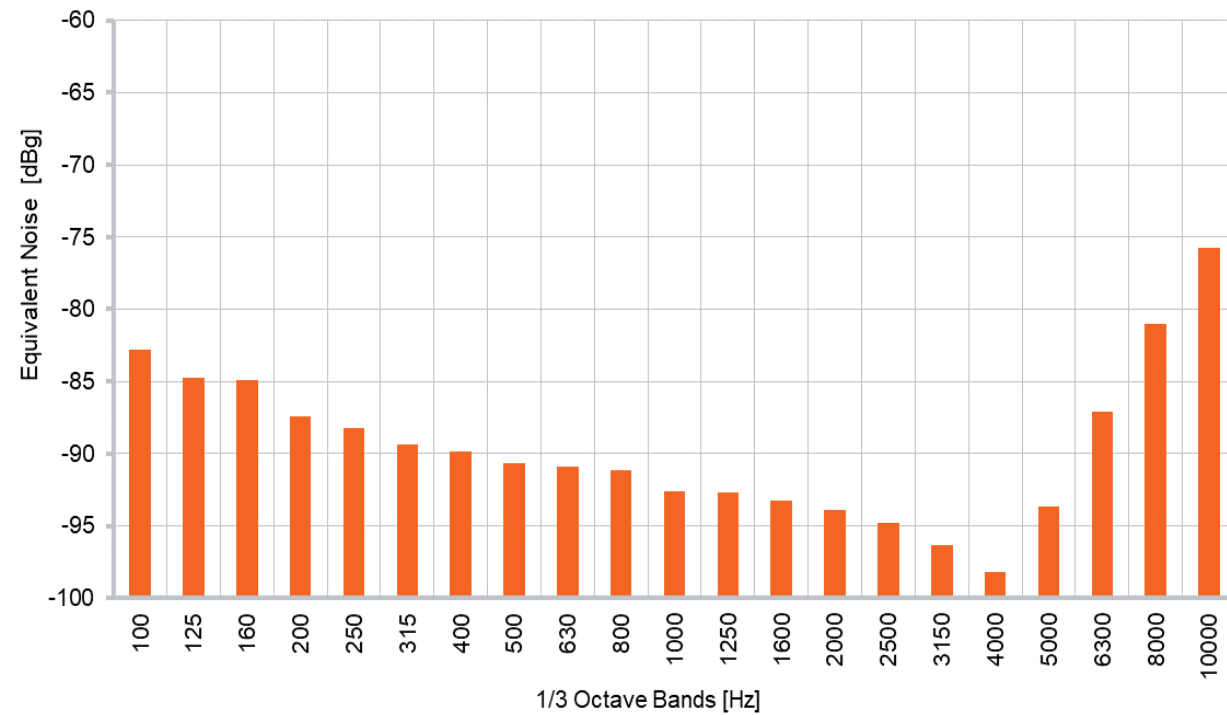
Parameters	Min	Typ	Max	Unit	Comments
Shock resistance			10k	g	tested with bare components without fixture in z direction
Temperature range biased	-40		85	°C	
Temperature range storage	-40		105	°C	
Storage ambient barometric range	500		1100	hPa	
ESD human-body model			2	kV	JEDEC JS-001-2017
ESD charge device model			250	V	JEDEC JS-002-2014

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Typical sensitivity characteristic (differential output)

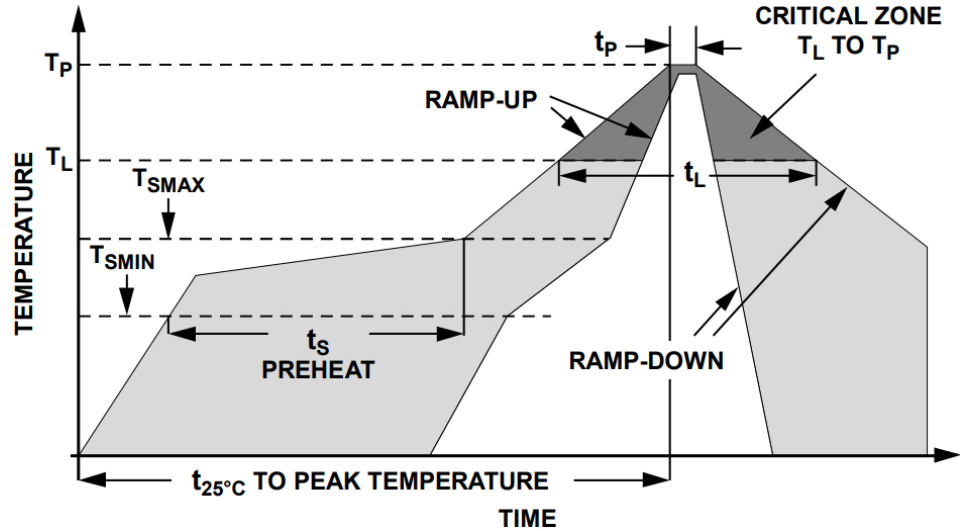


Typical 1/3 octave equivalent noise

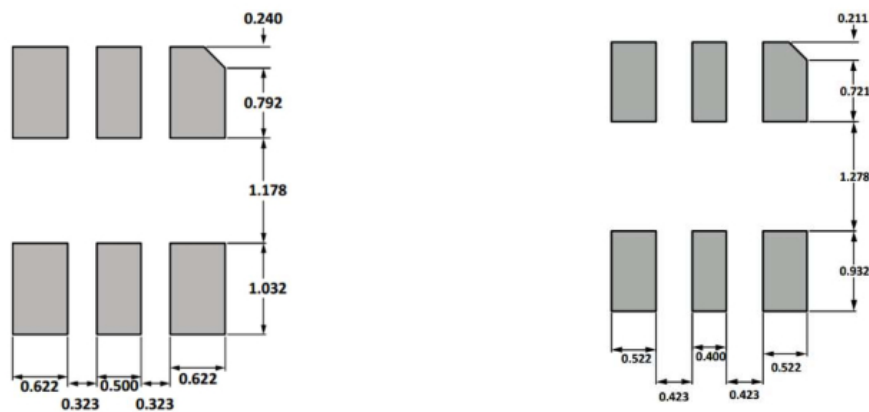


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Soldering profile



Recommended PCB land pattern layout (left), and recommended solder paste stencil pattern layout (right). Scales are in mm.



Tolerance of stencil mold and SMT process should be taken into consideration and make moderately adjustment on the stencil aperture dimensions

Profile feature		
Average ramp rate (Tl tp Tp)		1.25°C/sec max
Preheat	Minimum temperature (T <sub>sm</sub> )	100°C
	Minimum temperature (T <sub>sm</sub> )	200°C
	Time (T <sub>sm</sub> to T <sub>sm</sub> ), t <sub>s</sub>	60 sec to 75 sec
Ramp-up rate (T <sub>sm</sub> to Tl)		1.25°C/sec
Time maintained above liquidous (tl)		45 sec to 75 sec
Liquidous temperature (Tl)		217°C
Peak temperature (Tp)		260°C +0°C/-5°C
Time within +5°C of actual peak temperature (tp)		20 sec to 30 sec
Ramp-down rate		3°C/sec max
Time +25°C (t <sub>25°C</sub> ) to peak temperature		5 min max
No failure with 3x reflow		

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