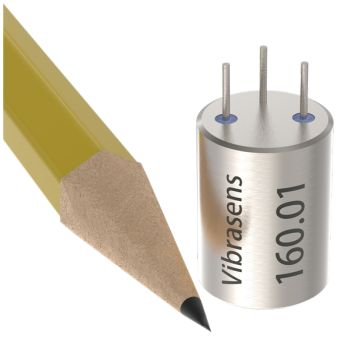
®OEM Piezoelectric Accelerometer, Model 160.01

Main Characteristics

- T0-5 eq. Transistor-Style Package
- Very low noise floor : 1 ug /√ Hz at 1000 Hz
- Small size (dia 9mm, height=12.2mm)
- Light weight (3 grams, 0.1 Oz)
- Variety of Sensitivities : 25, 50, 100 mV/g
- Variety of transmission : 2-Wire ®ICP/®IEPE transmission mode / 3-Wire Voltage output / 2-wire charge output
- Piezoelectric Annular shear mode



Model 160.01-V4V-1 Shown

Competitive advantage

- Very low noise floor : 1 ug /√ Hz at 1000 Hz
- Extended frequency range up to 20 kHz
- Low Cost
- Electronic is protected from Overload (Magnet mounting, shock protected)
- Life time hermetic sealing warranty (glass seal and laser weld)
- Base strain isolation (easier epoxy mounting)
- Exceptional bias stability (improved dynamic range)

Approvals

Description

The piezoelectric accelerometer model 160 uses a solid-state piezoelectric element in the annular shear mode. It is available with 2-wire ICP - IEPE - LIVM Voltage output for easy compatibility with existing piezoelectric accelerometer. 3-wire Voltage output is also available for simplified operation and connectivity to low power data acquisition unit.

Typical applications

The piezoelectric accelerometer model 160 is designed for vibration and shock measurements in high-volume and OEM applications. It is well suited for vibration monitoring and machinery protection. The amazing low noise floor (1 ug /√ Hz at 1000 Hz) is still 30 times lower than the best MEMs vibration sensor known in 2018. It has also twice the frequency spectrum of those high frequency MEMs.

With such low noise along with a frequency response that extends to 20 kHz this sensor is integrated in many state of the art OEM vibration monitoring systems.

Bearing vibration monitoring (Enveloping technique or true peak peak acceleration), gearbox wear, pinion and wheel faults, cracked shaft, misalignment, unbalance, rubbing, motor faults and bent shaft defects are all possible with this 20 kHz, reliable and low noise acceleration sensor.

Model 160 is easy to integrate compared to MEMs. As a matter of fact you just have to epoxy bond it where vibrations are the best transmitted. MEMs Vibration sensor located on the PCB are subject to flexure resonance which often lead to faulty vibrations signal in the axial and predominantly in the transverse direction.

Vibration Transmission through the PCB is also very difficult to handle especially when accurate vibrations above 8 kHz is required.

Revision History

Feb. 2011 : released

Ordering information

To order, specify model number, options, accessories and suffix :

160.01- AAA - B

AAA : Sensitivity

I6	……100 mV/g ±5% / 2-wire ICP-IEPE transmission
I6D	……...100 mV/g ±10% / 2-wire ICP-IEPE transmission
I6V	……...100 mV/g ±20% / 2-wire ICP-IEPE transmission
I5	……...50 mV/g ±5% / 2-wire ICP-IEPE transmission
I5D	……50 mV/g ±10% / 2-wire ICP-IEPE transmission
I5V	……50 mV/g ±20% / 2-wire ICP-IEPE transmission
I3	……...10 mV/g ±5% / 2-wire ICP-IEPE transmission
I3D	……10 mV/g ±10% / 2-wire ICP-IEPE transmission
I3V	……10 mV/g ±20% / 2-wire ICP-IEPE transmission
V6D	……100 mV/g ±10% / 3-wire voltage output
V6V	……....100 mV/g ±20% / 3-wire voltage output
V5D	……...50 mV/g ±10% / 3-wire voltage output
V5V	……..50 mV/g ±20% / 3-wire voltage output
V4D	……...25 mV/g ±10% / 3-wire voltage output
V4V	……...25 mV/g ±20% / 3-wire voltage output
P3V:	……11 pC/g ± 20% / 2 wire charge output

B : Connector

1 : Glass seal header, 3-pin

Specifications (24°C)

Dynamic

Frequency response

……..…….…….……	±1 dB : 1 to 10 000 Hz
……..…….…….……	±3 dB : 0.4 to 20 000 Hz

Mounted resonant frequency

……..…….…….……	> 42 kHz Nom

Dynamic range

AAA=I6 ……..…….…….……	80 g pk
AAA=I5 ……..…….…….……	160 g pk
AAA=I3 ……..…….…….……	800 g pk
AAA=V6 ……..…….…….……	25 g pk
AAA=V5 ……..…….…….……	50 g pk
AAA=V4 ……..…….…….……	100 g pk
AAA=P3 ……..…….…….……	Not applicable

Transverse response sensitivity (20Hz, 5g)……..…….…….……..	> 42 kHz Nom
Temperature response ……..…….…….……	+ 12% at 120°C
Polarity ……..…….…….……	Vertical
Linearity ……..…….…….……	<1%

Warm up time (Typical)

AAA=I__ (5% of final) ……..…….…….……	2 secs
AAA=V__(5% of final) ……..…….…….……	10 secs
AAA=P3_ ……..…….…….……	N/A

Electrical

Output impedance ……..…….…….……	(fig.1) Suffix dependant

DC output bias

AAA=I__ ……..…….…….……	12 VDC±2%
AAA=V_ ……..…….…….……	0.5 x Vsupply ±2%

Residual noise (24°C) : AAA=I3_

1 Hz ……..…….…….……	2000 ug /√ Hz
10 Hz ……..…….…….……	200 ug /√ Hz
100 Hz ……..…….…….……	10 ug /√ Hz
1000 Hz ……..…….…….……	2 ug /√ Hz
RMS (2.5 Hz to 25 kHz) ……..…….…….……	300 ug

Residual noise (24°C) : AAA=I5_

1 Hz ……..…….…….……	1500 ug /√ Hz
10 Hz ……..…….…….……	60 ug /√ Hz
100 Hz ……..…….…….……	5 ug /√ Hz
1000 Hz ……..…….…….……	2 ug /√ Hz
RMS (2.5 Hz to 25 kHz) ……..…….…….……	300 ug

Residual noise (24°C) : AAA=I6_

0.2 Hz ……..…….…….……	2000 ug /√ Hz
1 Hz ……..…….…….……	1500 ug /√ Hz
10 Hz ……..…….…….……	30 ug /√ Hz
100 Hz ……..…….…….……	3 ug /√ Hz
1000 Hz ……..…….…….……	1 ug /√ Hz
RMS (0.5 Hz to 1 kHz) ……..…….…….……	150 ug

Residual noise (24°C) : AAA=V4_, V5_, V6_

1 Hz ……..…….…….……	200 ug /√ Hz
10 Hz ……..…….…….……	20 ug /√ Hz
100 Hz ……..…….…….……	5 ug /√ Hz
1000 Hz ……..…….…….……	1 ug /√ Hz
RMS (2.5 Hz to 25 kHz) ……..…….…….……	160 ug

Power requirement

AAA=IXX (Fig 2a) ……..……	Constant current : +2 to +10mA DC

……Voltage : +22 to +28 VDC
Protection, overvoltage …… Yes
Protection, reverse polarity …… Yes
ESD Protection …… > 20V
AAA=VXX (Fig 2b) …… Voltage : +3 to +5 VDC
Current draw …… 1 mA max
Protection, overvoltage …… Yes
Protection, reverse polarity …… No
ESD Protection …… none
AAA=P3V (Fig 2c) …… not applicable

Environmental

Temperature, operating continuous
AAA=I__ ……-55 to 120 °C (-65 to 250°F)
AAA=V__ ……-55 to 120 °C (-65 to 250°F)
AAA=P__ ……-55 to 120 °C (-65 to 250°F)
Humidity / Enclosure
B=1 …… Not affected, hermetically sealed, 1E-8torr.l/s
Acceleration limit :
Shock …… 5 000g peak
Continuous vibration …… 500g peak
Temp. transient sens. (3Hz, LLF, 20dB/dec)…… 0.8 mg/°C

Physical

Dimensions
B=1 …… Fig. 1a
Mounting…… Fig. 1b
Design …… Ceramic, piezo annular shear mode
Weight
All ……3 gr Nom (0.1 Oz)
Material …… Stainless steel

Accessories, supplied

Calibration supplied
……Sensitivity check (5g, 160 Hz)
…… No frequency response

Mounting

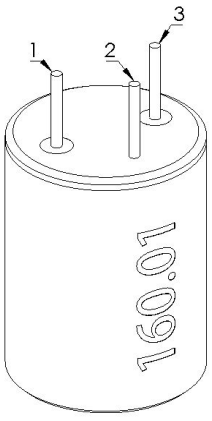


Fig 1a : Outline drawing

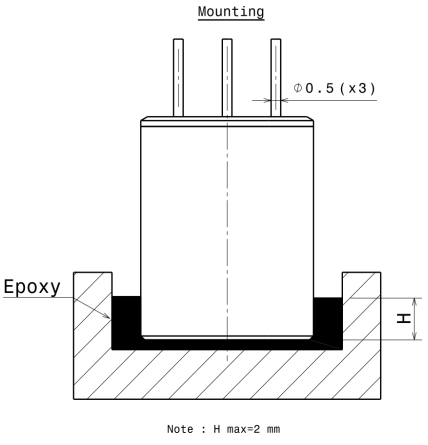


Fig 1b : Mounting drawing

Wiring

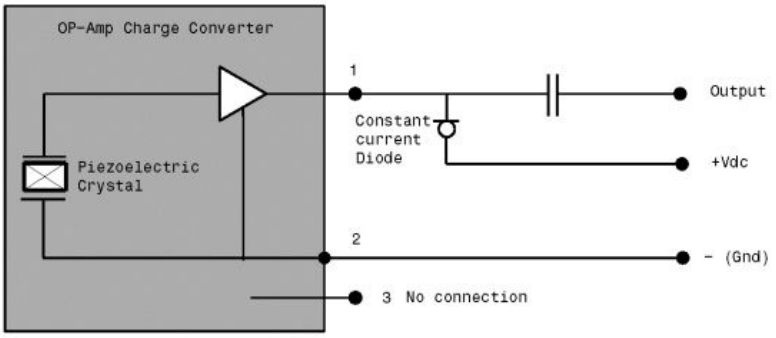


Fig 2a : Electrical layout - 2 - Wire ICP / IEPE

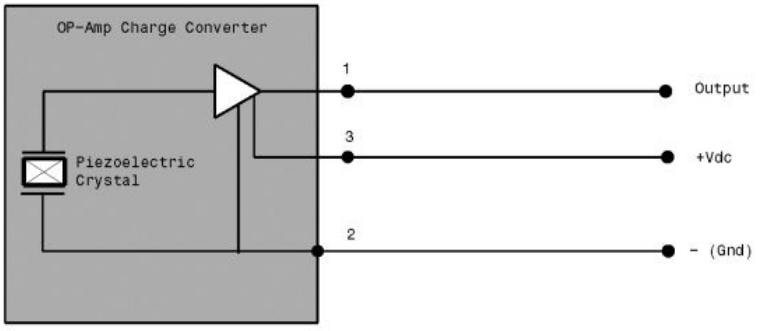


Fig 2b : Electrical layout -3 Wire Voltage Output

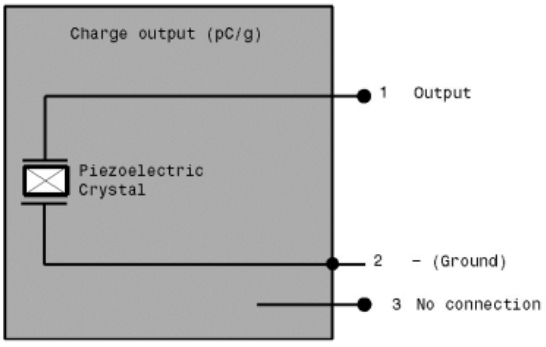


Fig 2c : Electrical layout - 2-Wire Charge Output

Drawings

Outline 160.01-IAA	IEPE - 2- wires	Download link 160.01-I_Out.pdf
Outline 160.01-VAA	5VDC - 3-wire	Download link 160.01-V_Out.pdf
Outline 160.01-PAA	Charge Output	Download link 160.01-P_Out.pdf