

Miniature PiezoBeam Accelerometer

Type 8640A...

Light Weight IEPE TEDS Accelerometer

World Patent: W0/2007/062532
 European Patent: 2006790940
 U.S. Patent: 12088325

The 8640A... is a high sensitivity single axis accelerometer. The sensor is designed primarily for modal analysis applications and has selective use as a general purpose vibration sensor.

- IEPE, ± 5 g, ± 10 g, and ± 50 g ranges
- Smallest PiezoBeam single axis accelerometer with lowest mass
- High sensitivity, low noise and high dynamic range
- Choice of ranges and sensitivities
- Ground Isolated Mounts
- TEDS Option
- Conforming to CE

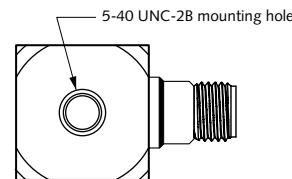
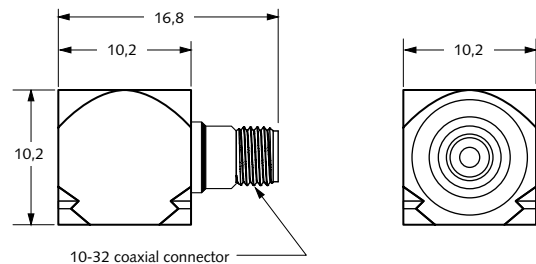
Description

Type 8640A... is a miniature and lightweight single axis accelerometer which reduces mass loading on thin-walled structures important to multichannel modal applications or general vibration measurements.

Internal of the PiezoBeam accelerometer is a unique sensing element consisting of a ceramic beam supported by a center post that when bending occurs as a result of being subjected to vibration, the cantilevered beam element yields an electrical charge. The charge signal is converted by the internal low noise charge amplifier to a proportional high level voltage signal at an output impedance of less than 500 ohms. Patented methods are used to thermally compensate the sensing element.

Type 8640A... single axis accelerometer, has an integral 10-32 connector and is designed for easy installation in confined areas. Type 8640A... has a welded titanium housing and is ground isolated when mounted with the mounting clip or adhesive mounting adapter. The sensing element design provides outstanding amplitude and phase response over a wide frequency range.

The accelerometer operates directly from the internal power source found in most FFT analyzers, from several Kistler Piezotron power supply couplers or any industry standard IEPE (Integrated Electronic Piezo Electric) compatible power source.



Dimensions are shown in mm, unless otherwise noted.

Application

This miniature and light weight, single axis accelerometer series is ideally suited for multiple channel modal analysis on small components or subsystems and well as full vehicle testing for aviation, space, automotive as well as a wide range of general test structures.

Note: Requires a thermally stable environment. Slight temperature fluctuations may cause high thermal transient output or error.

Accessing TEDS Data

Accelerometers with a "T" suffix are variants of the standard version incorporating the "Smart Sensor" design (PiezoSmart). Viewing an accelerometer's data sheet requires an Interface/Coupler such as Kistler's Type 5165A or Type 5000M04 with TEDS Editor software. The Interface provides negative current excitation (reverse polarity) altering the operating mode of the PiezoSmart sensor allowing the program editor software to read or add information contained in the memory chip.

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Technical data

| Specification | Unit | Type 8640A5 Type 8640A5T | Type 8640A10 Type 8640A10T | Type 8640A50 Type 8640A50T |
|--|----------|---|---|---|
| Acceleration range | g | ±5 | ±10 | ±50 |
| Acceleration limit | gpk | ±8 | ±16 | ±80 |
| Threshold (1 ... 10 kHz) | grms | 0,00014 | 0,00016 | 0,00036 |
| Sensitivity (±10 %) | mV/g | 1 000 | 500 | 100 |
| Resonant frequency mounted, nom. | kHz | 17 | 17 | 25 |
| Frequency response (±5 %) | Hz | 0,5 ... 3 000 | 0,5 ... 3 000 | 0,5 ... 5 000 |
| Phase shift <5° | Hz | 2 ... 3 000 | 2 ... 3 000 | 2 ... 5 000 |
| Amplitude non-linearity | %FSO | ±1 | ±1 | ±1 |
| Time constant nom. | s | 1,1 | 1,1 | 1,1 |
| Transverse sensitivity typ. (max. 3 %) | % | 1,5 | 1,5 | 1,5 |
| Environmental | | | | |
| Base strain sensitivity @ 250 µε | g/µε | 0,004 | 0,004 | 0,004 |
| Random vibration max. | grms | 50 | 50 | 100 |
| Shock limit (1 ms pulse) | gpk | 7 000 | 7 000 | 10 000 |
| Temperature coeff. of sensitivity | %/°C | 0,12 | 0,16 | 0,16 |
| Operating temperature range | °C | -40 ... 55 | -40 ... 65 | -40 ... 65 |
| Output | | | | |
| Bias nom. | VDC | 13 | 13 | 13 |
| Impedance | Ω | ≤100 | ≤100 | ≤100 |
| Voltage Full Scale ²⁾ | V | ±5 | ±5 | ±5 |
| Power supply ¹⁾ | | | | |
| Voltage ²⁾ | VDC | 22 ... 30 | 22 ... 30 | 22 ... 30 |
| Constant current | mA | 2 ... 20 | 2 ... 20 | 2 ... 20 |
| Construction | | | | |
| Sensing element | Type | PiezoBeam | PiezoBeam | PiezoBeam |
| Housing/base | material | Titanium | Titanium | Titanium |
| Sealing housing/ connector (EN 60529) | Type | IP68 | IP68 | IP68 |
| Connector | Type | 10-32 coaxial | 10-32 coaxial | 10-32 coaxial |
| Ground isolated | | with accessory | with accessory | with accessory |
| Mass | grams | 3,5 | 3,5 | 3,5 |
| Mounting | Type | wax, adhesive, Clip, magnet, stud (5-40 UNF-2B) | wax, adhesive, Clip, magnet, stud (5-40 UNF-2B) | wax, adhesive, Clip, magnet, stud (5-40 UNF-2B) |
| Mounting torque, stud | N·m | 0,7 | 0,7 | 0,7 |

1 g = 9,80665 m/s², 1 Inch = 25,4 mm, 1 Gramm = 0,03527 oz, 1 lbf-in = 0,113 N·m

¹⁾ If a Data Acquisition System (DAQ) is used, it must allow an input voltage greater than or equal to the minimum power supply voltage

²⁾ A power supply voltage of less than the minimum recommended voltage will decrease sensor range (i.e. clipping)

Mounting

The cube shape configuration of the single axis accelerometer allows for the sensor to be attached to the test surface using any available side with wax, adhesive and/or tape. The ground isolated mounting clip is used to mount and orient the 8640A... in one orientation. The primarily mounting surface also has a 5-40 UNF threaded hole which is compatible with ground isolated screw-on mounting accessories, namely, an adhesive mounting base and a magnetic mounting base. The specified frequency response is unaffected when the adhesive mounting base or magnetic mounting base is used. When the ground isolated mounting clip is used, the upper frequency limits are as follows:

- Without grease 1 kHz (±5 %) for all ranges
- With grease 3 kHz (±5 %) for 5 g and 10 g ranges
- With grease 4 kHz (±5 %) for the 50 g range.

Reliable and accurate measurements require that the mounting surface be clean and flat. The instruction manual for the Type 8640A... series provides detailed information regarding mounting surface preparation.



Fig. 1: Mounting accessories

Accessories included

- Ground isolated mounting clip **Type 800M156**
- Ground isolated adhesive mounting base **Type 800M158**
- Mounting wax **8432**

Optional accessories

- Magnetic mounting base **Type 800M160**

Optional cables

- Fluoropolymer jacketed cable, 10-32 (pos.) to BNC (pos.) **Type 1761B...**
- Fluoropolymer jacketed cable, 10-32 (pos.) to 10-32 (pos.) **1762B...**
- Flexible PVC jacketed cable, 10-32 pos to BNC (pos.) **1768A...K01**
- Flexible PVC jacketed cable 10-32 (pos.) to 10-32 (pos.) **1768A...K02**

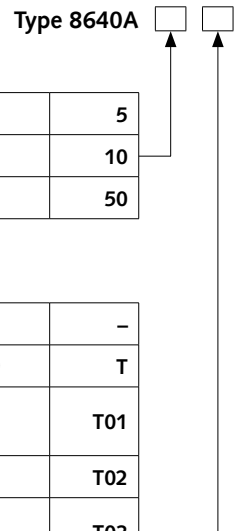
Ordering key

Measuring range

| | |
|-------|-----------|
| ±5 g | 5 |
| ±10 g | 10 |
| ±50 g | 50 |

TEDS templates / variants

| | |
|---|------------|
| Standard | - |
| Default, IEEE 1451.4 V0.9 Template 0 (UTID 1) | T |
| IEEE 1451.4 V0.9 Template 24 (UTID 116225) | T01 |
| LMS Template 117, Free format Point ID | T02 |
| LMS Template 118, Automotive Format (Field 14 Geometry = 0) | T03 |
| LMS Template 118, Aerospace Format (Field 14 Geometry = 1) | T04 |
| P1451.4 v1.0 template 25 – Transfer Function Disabled | T05 |
| P1451.4 v1.0 template 25 – Transfer Function Enabled | T06 |



| Measure | Connect | Amplify | Output | Analyze |
|-------------------------------------|-------------------------------------|---|--------------------------------|--------------|
| Type 8640A... Low impedance IEPE | Type 1761B... 10-32 pos BNC pos. | Type 51... Power supply / signal conditioner | Type 1511 BNC pos. BNC pos. | not supplied |

Fig. 2: Measuring chain

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