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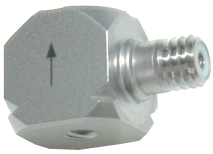
Miniature PiezoBeam Accelerometer

Type 8640A…

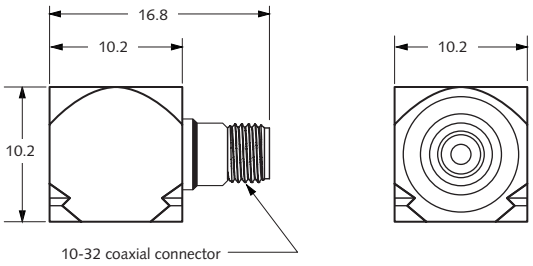
World Patent: W0/2007/062532
European Patent: 2006790940
U.S. Patent: 12088325

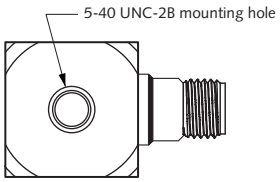
Light Weight IEPE TEDS Accelerometer

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





Dimensions are shown in mm, unless otherwise noted.

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.

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/s^2, 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)

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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.

 Type 800M156 Ground isolated mounting clip	 Type 800M158 Ground isolated adhesive mounting base	 Type 800M160 Magnetic mounting base
 Type 8640 mounted on Type 800M156	 Type 8640 mounted on Type 800M158	 Type 8640 mounted on Type 800M160

Fig. 1: Mounting accessories

Accessories included	Type
• Ground isolated mounting clip	800M156
• Ground isolated adhesive mounting base	800M158
• Mounting wax	8432
• ISO 17025 Calibration Certificate	

Optional accessories	Type
• Magnetic mounting base	800M160

Optional cables	Type
• Fluropolymer jacketed cable, 10-32 (pos.) to BNC (pos.)	1761B…
• Fluropolymer 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

Type 8640A □ □

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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