

Miniature PiezoBeam accelerometer

Lightweight, IEPE triaxial TEDS accelerometer

Type 8688A...

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

Type 8688A... is a high sensitivity triaxial accelerometer that simultaneously measures vibration in three orthogonal axes. The sensor is designed primarily for modal analysis applications and offers selective use as a general purpose vibration sensor.

- IEPE, ± 5 g, ± 10 g, and ± 50 g ranges
- Smallest PiezoBeam triaxial accelerometer with lowest mass
- Low cost, miniature and lightweight triaxial
- High sensitivity, low noise and high dynamic range
- Choice of ranges and sensitivities
- Ground isolated mounts
- TEDS option
- Conforming to CEC

Description

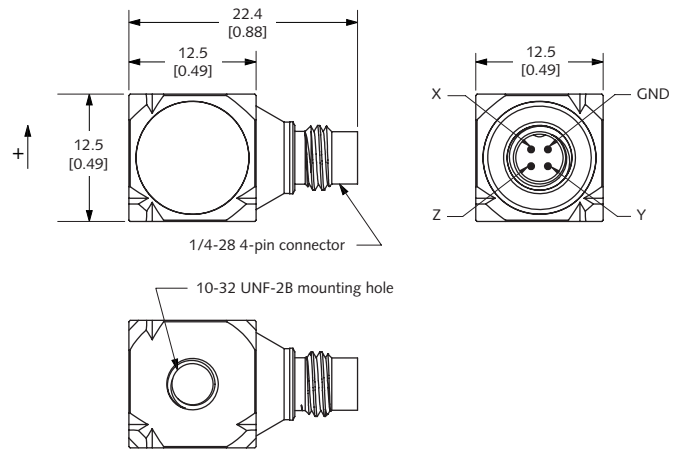
Internal to the PiezoBeam accelerometer is a unique sensing element consisting of a ceramic beam supported by a center post that, when bending occurs as a result of being subjected to vibration, the cantilevered beam element yields an electrical charge. The charge signal is converted by the internal 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 8688A... is a miniature and lightweight triaxial accelerometer that reduces mass loading on thin-walled structures important to multi-channel modal applications or general vibration measurements.

Type 8688A... triaxial accelerometers, have an integral 4 pin connector and is designed for easy installation in confined areas where sensor may be mounted on any of three faces. Type 8688A... has 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



Dimensions are shown in [in], unless otherwise noted.

Application

This miniature and lightweight triaxial accelerometer series is ideally suited for multiple channel modal analysis on small components or subsystems, as well as full vehicle testing for aviation, space, automotive and 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 LabAmp Type 5165A... The interface operates per the Class 1 MMI defined in IEEE 1541.4, altering the operating mode of the PiezoSmart sensor while allowing the program editor software to read or add information contained in the memory chip.

Technical Data

Specification	Unit	Type 8688A5 Type 8688A5T	Type 8688A10 Type 8688A10T	Type 8688A50 Type 8688A50T
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	15	15	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 [%/°F]	0.17 [0.09]	0.23 [0.13]	0.23 [0.13]
Operating temperature range	°C [°F]	-40 ... 55 [-40 ... 130]	-40 ... 65 [-40 ... 150]	-40 ... 65 [-40 ... 150]

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 ... 6	2 ... 6	2 ... 6

Construction

Sensing element	Type	PiezoBeam	PiezoBeam	PiezoBeam
Housing/base	material	Titanium	Titanium	Titanium
Sealing-housing/connector (EN 60529)	Type	IP68	IP68	IP68
Connector	Type	1/4-28, 4 pin (pos.)	1/4-28, 4 pin (pos.)	1/4-28, 4 pin (pos.)
Ground isolated		with accessory	with accessory	with accessory
Mass	grams	6.7	6.7	6.5
Mounting	Type	wax, adhesive, clip, magnet, stud (10-32 UNF-2B)	wax, adhesive, clip, magnet, stud (10-32 UNF-2B)	wax, adhesive, clip, magnet, stud (10-32 UNF-2B)
Mounting torque	N·m [in·lbf]	0.7 [6.2]	0.7 [6.2]	0.7 [6.2]

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).

1 g = 9.80665 m/s², 1 in = 25.4 mm, 1 Gram = 0.03527 oz, 1 lbf-in = 0.113 N·m

Mounting

The cube-shaped configuration of the triaxial accelerometer allows for the sensor to be attached to the test surface using any available side with wax, adhesive and/or tape. The off-ground mounting clip can be used in three sensor orientations for mounting flexibility. The primary mounting surface also has a 10-32 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 5g and 10g ranges
- With grease: 4 kHz (±5%) for the 50g range

Reliable and accurate measurements require that the mounting surface be clean and flat. The instruction manual for the Type 8688A... series provides detailed information regarding mounting surface preparation.



Fig. 1: Mounting accessories

Accessories Included

- Ground isolated mounting clip
- Ground isolated adhesive mounting clip
- Mounting wax
- ISO 17025 Calibration Certificate

Type

800M155
800M157
8432

Optional Accessories

- Magnetic mounting base

Type

800M159

Optional Cables

- Fluoropolymer jacketed breakout cable,
¼-28 4 pin (neg.) to 3x BNC (pos.)
(xx = length: 3, 5, or 10 meters – For other
special length requests use 1756CK04sp)
- Flexible silicone jacketed breakout cable
– ¼-28 4 pin (neg.) to 3x BNC (pos.);
(xx = length: 1, 3, 5, or 10 meters)

Type

1756C...
1734A...

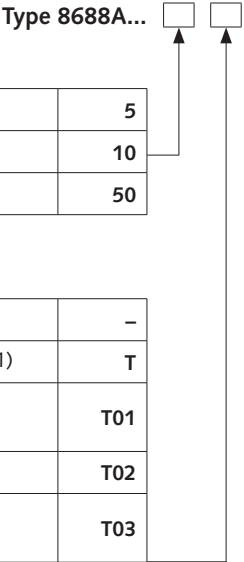
Ordering Key

Measuring range

±5 g	5
±10 g	10
±50 g	50

TEDS Templates / Variants

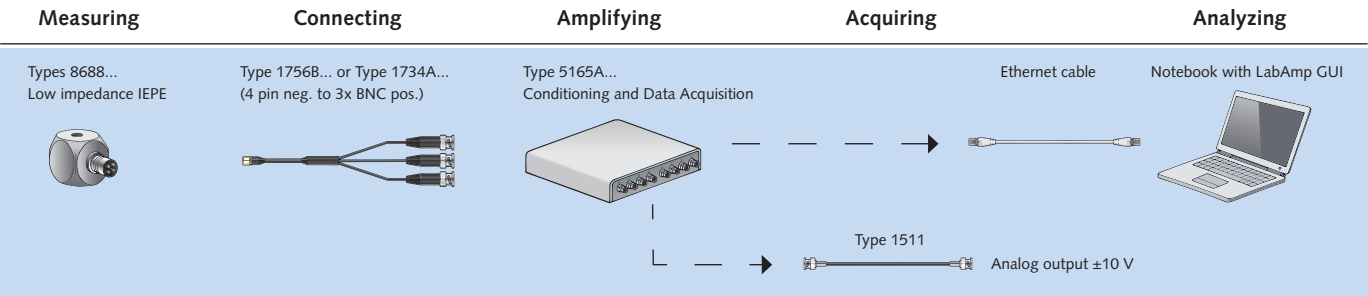
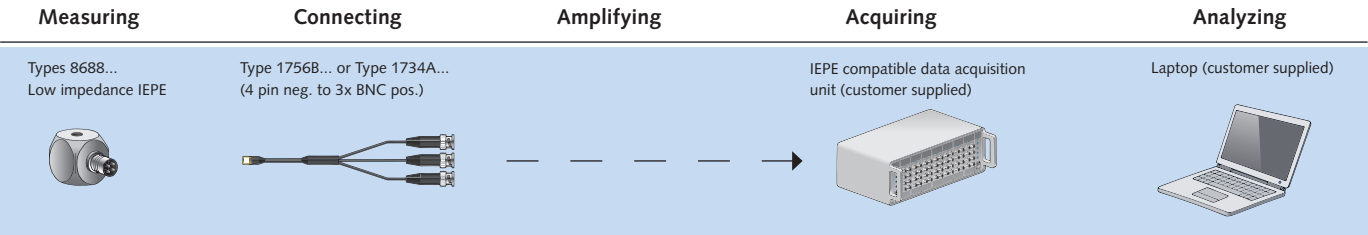
Standard	–
Default IEEE 1451.4 V0.9 Template 0 (UTID 1)	T
IEEE 1451.4 V0.9 Template 24 (UTID 116225)	T01
LMS Template 117, Free format Point ID	T02
LMS Template 118, Automotive Format (Field 14 Geometry = 0)	T03
LMS Template 118, Aerospace Format (Field 14 Geometry = 1)	T04
P1451.4 V1.0 template 25 – Transfer Function Disabled	T05
P1451.4 V1.0 template 25 – Transfer Function Enabled	T06



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Measuring chains

IEPE sensor and customer IEPE compatible DAQ



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