

# Miniature PiezoBeam® Accelerometer

Type 8688A...

## Lightweight, IEPE Triaxial TEDS Accelerometer

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,  $\pm 5$  g,  $\pm 10$  g, and  $\pm 50$  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 **CE**

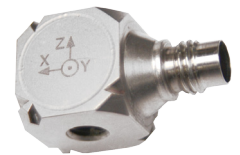
### Description

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.

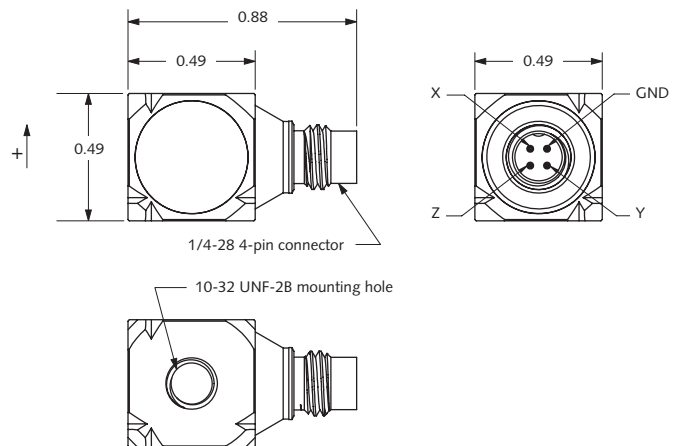
Type 8688A... is a miniature and lightweight triaxial accelerometer that reduces mass loading on thin-walled structures important to multi-channel modal applications or general vibration measurements.

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's Type 5134B... or Type 5000M04 with TEDS Editor software. The Interface provides negative current excitation (reverse polarity), altering the operating mode of the PiezoSmart sensor and allowing the program editor software to read or add information contained in the memory chip.

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## Technical Data

Type Number	Unit	8688A5 / 8688A5T	8688A10 / 8688A10T	8688A50 / 8688A50T
Acceleration range	g	±5	±10	±50
Acceleration limit	g <sub>pk</sub>	±8	±16	±80
Threshold (1 ... 10 kHz)	g <sub>rms</sub>	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 µe	g/µe	0.004	0.004	0.004
Random vibration max.	g <sub>rms</sub>	50	50	100
Shock limit (1 ms pulse)	g <sub>pk</sub>	7,000	7,000	10,000
Temperature coeff. of sensitivity	%/°F	0.09	0.13	0.13
Operating temperature range	°F	-40 ... 130	-40 ... 150	-40 ... 150

## Output

Bias nom.	VDC	13	13	13
Impedance	Ω	<100	<100	<100
Voltage full-scale **	V	±5	±5	±5

## Power supply \*

Voltage **	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	Hermetic	Hermetic	Hermetic
Connector	type	¼–28, 4 pin pos.	¼–28, 4 pin pos.	¼–28, 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	in-lbf	6.5	6.5	6.5

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

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

1 g = 9.80665 m/s<sup>2</sup>, 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 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 8688A... series provides detailed information regarding mounting surface preparation.



Fig. 1: Mounting accessories

**Accessories Included**

- Ground isolated mounting clip **Type** 800M155
- Ground isolated adhesive mounting clip **Type** 800M157
- Mounting wax **Type** 8432

**Optional Accessories**

- Magnetic mounting base **Type** 800M159

**Optional Cables**

- Fluoropolymer jacketed breakout cable, **Type** 1756B...  
¼–28 4 pin neg. to 3x BNC pos.
- Flexible silicone jacketed breakout cable, **Type** 1734A...  
¼–28 4 pin neg. to 3x BNC pos.

**Ordering Key**

Measuring range		Type 8688A...
±5 g	5	□
±10 g	10	□
±50 g	50	□

**TEDS Templates / Variants**

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

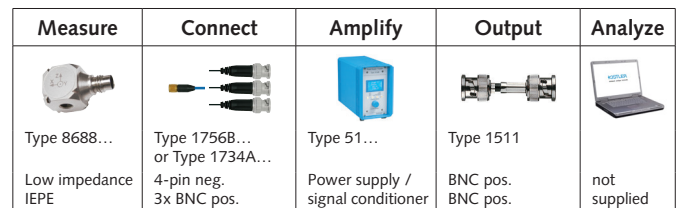


Fig. 2: Measuring chain

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