

SENSORS FOR EXTREME TEMPERATURE AUTOMOTIVE TESTING

 **PCB PIEZOTRONICS**
AN AMPHENOL COMPANY

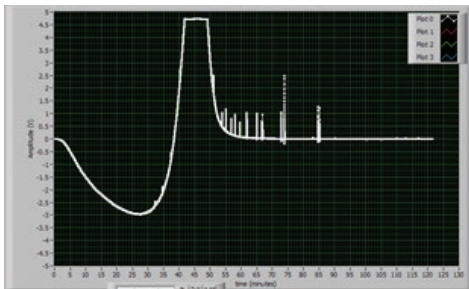
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WHAT IS UHT-12™?

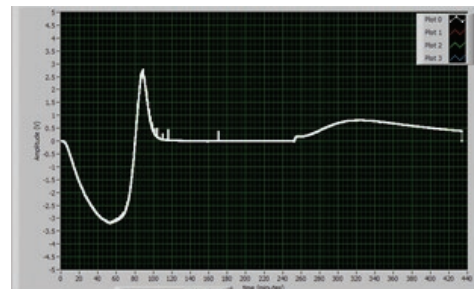
PCB® offers specially designed and tested ICP® accelerometers for conducting vibration and shock measurements under demanding environmental conditions of up to 356 °F (180 °C). These sensors combine proven quartz and ceramic shear sensing technology with specialized, built-in microelectronic signal conditioning circuitry to achieve dependable operation in extreme temperatures and through repetitive temperature cycling.

Charge mode output accelerometers from PCB use piezo-ceramic sensing elements that output an electrostatic charge signal proportional to the applied acceleration. These sensors can operate at extremely high temperatures (up to 1200 °F/ 649 °C) because they do not contain the built-in signal conditioning electronics that limit the temperature range of ICP® accelerometers.

UHT-12™ technology reduces the effects of temperature variation. Pyroelectricity phenomenon may occur during large temperature fluctuations, generating “spikes” and disrupting behavior of the accelerometer and the test results. Accelerometers made with UHT-12™ technology have an improved data quality.



WITHOUT UHT-12™



WITH UHT-12™

APPLICATIONS

Vibration testing of automotive exhaust, turbocharger and engine systems requires accelerometers that are designed to withstand very high temperatures. PCB’s accelerometers for research and development are manufactured from tough low mass materials such as titanium and Inconel, are hermetically sealed and have no moving parts.

The UHT-12™ family of accelerometers include Model 320C52, 320C53, 339B31, 339B32, 357A64, 339A30, 339A32, EX357E90, EX357E91, EX357E92, EX357E93, 357A63, EX356A73, EX611A00 and TLD339A37. UHT-12™ Pressure sensors are also available, such as series 176.

HIGHLIGHTS

Absence of pyroelectric noise spikes up to 1200 °F (649 °C)

Sensitivity that remains more consistent over a wide temperature change

Shear mode crystals isolated from base strain & transverse measurement errors

Proprietary crystal technology comes sealed in a hermetic package and has proven reliable performance in hundreds of automotive powertrain NVH installations for research and monitoring

PCB® ACCELEROMETERS ARE AVAILABLE TO 1200 °F (650 °C)

ICP® accelerometers available in single and triaxial versions to 356°F/180°C

Charge output accelerometers for testing or continuous monitoring cover temperature ranges to 1200 °F (650 °C)

UHT-12™ CHARGE OUTPUT ACCELEROMETERS

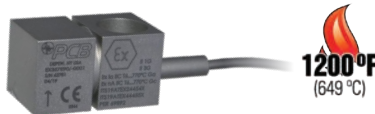
Testing of turbocharger, exhaust systems and catalytic converters requires an ultra high temperature sensor. These sensors are designed specifically for demanding automotive testing environments and feature integral hard line cables.



EXTREME TEMPERATURE, DIFFERENTIAL CHARGE ACCELEROMETER

MODEL EX611A00

- Sensitivity: (±5%) 10.0 pC/g
- Measurement Range: ±200 g pk
- Frequency Range: (±5%) 2.8 kHz
- Hazardous area approved



CHARGE OUTPUT ACCELEROMETER, WITH UHT- 12™ SHEAR SENSING CRYSTAL

MODELS EX357E90 & EX357E91

- Sensitivity: (±10%) 5 pC/g
- Measurement Range: ±1000 g pk
- Frequency Range: (±5%) 3 kHz
- Hazardous area approved



CHARGE OUTPUT ACCELEROMETER, WITH UHT- 12™ SHEAR SENSING CRYSTAL

MODELS EX357E92 & EX357E93

- Sensitivity: (±10%) 2.3 pC/g
- Measurement Range: ±1000 g pk
- Frequency Range: (±5%) 3 kHz
- Hazardous area approved



CHARGE OUTPUT ACCELEROMETER, WITH UHT- 12™ SHEAR SENSING CRYSTAL

MODELS EX357A94 & EX357A95

- Sensitivity: (±10%) 3.3 pC/g
- Measurement Range: ±1000 g pk
- Frequency Range: (±5%) 3 kHz
- Hazardous area approved



VERY HIGH TEMPERATURE, SINGLE-ENDED CHARGE TRIAXIAL ACCELEROMETER

SERIES EX356A73

- Sensitivity: (±5%) 3.12 pC/g
- Measurement Range: 500 g pk
- Frequency Range: (+/-5%) 4 kHz
- Hazardous area approved



VERY HIGH TEMPERATURE, SINGLE-ENDED CHARGE ACCELEROMETER

MODEL 357A63

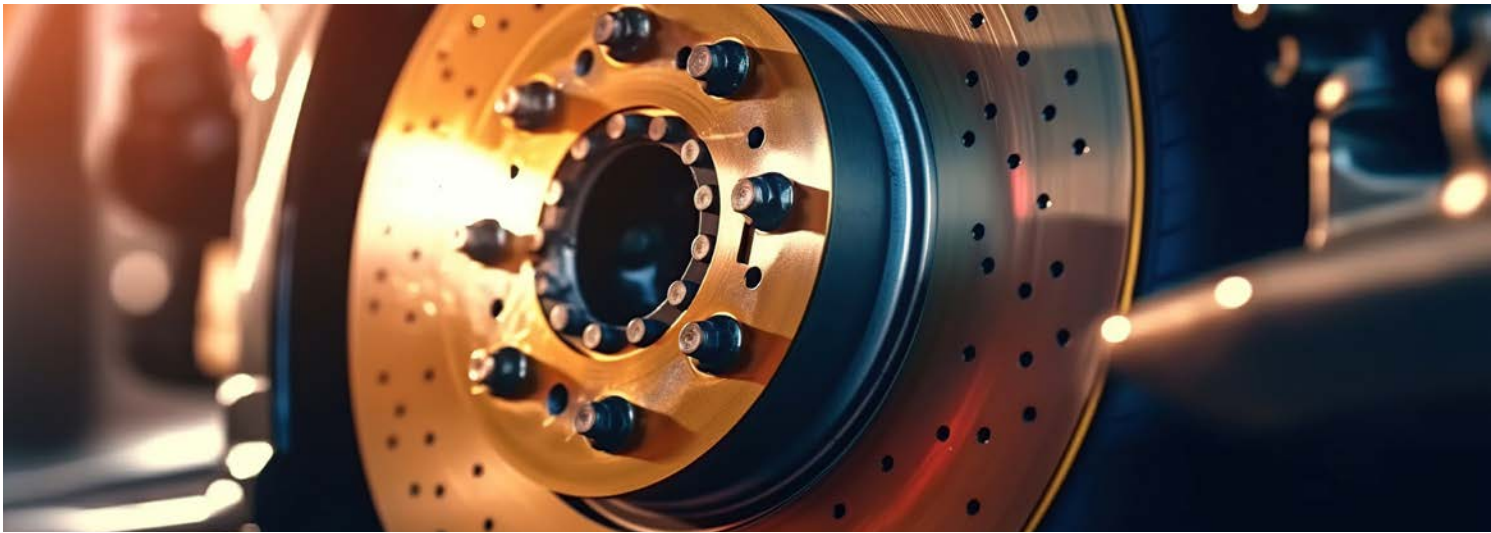
- Sensitivity: (±10%) 0.53 pC/g
- Measurement Range: ±5000 g pk
- Frequency Range: (±10%) 10 kHz



VERY HIGH TEMPERATURE, SINGLE-ENDED CHARGE ACCELEROMETER

MODEL 357A64

- Sensitivity: (±10%) 1.15 pC/g
- Measurement Range: ±1000 g pk
- Frequency Range: (±10%) 10 kHz



UHT-12™ ICP® ACCELEROMETERS

LOW THERMAL COEFFICIENT ACCELEROMETERS FOR STABLE SENSITIVITY OVER A WIDE TEMPERATURE RANGE

PCB® single and triaxial ICP® accelerometers are designed with a low thermal coefficient, wide operating temperature range, and good broadband resolution, making them ideal for powertrain development and powertrain NVH applications and for any vibration measurement requiring tight control of amplitude sensitivity over a wide thermal gradient.

Temperature coefficient as low as 0.005%/F (0.009%/C)

Available in stud, adhesive and through hole configurations

Measurement frequency to 10 kHz at +/- 5%

Titanium housed & hermetically sealed
ICP® up to 356°F/180°C



TRIAXIAL ICP® ACCELEROMETER

MODEL 339A30 & 339A30/NC

Sensitivity: (±10%) 10 mV/g

Measurement Range: ±500 g pk

Broadband Resolution: 0.008 g rms

Model 339A30/NC does not include mating cable



ICP® ACCELEROMETER

MODELS 320C52 & 320C53

Sensitivity: (±10%)
10 mV/g / (±20%) 1 mV/g

Measurement Range:
±500 g pk / ±5000 g pk

Broadband Resolution:
0.004 g rms / 0.04 g rms



UHT-12™ TRIAXIAL ICP® ACCELEROMETER

MODELS 339B31 & 339B31/NC

Sensitivity: (± 10%) 10 mV/g

Measurement Range: ±500 g pk

Broadband Resolution: .008 g rms

Model 339B31/NC does not include mating cable



325°F
(163°C)

TRIAxIAL ICP® ACCELEROMETER

MODELS 339B32 & 339B32/NC

Sensitivity: ($\pm 10\%$) 10 mV/g

Measurement Range: ± 500 g pk

Broadband Resolution: 0.003 g rms

Model 339B32/NC does not include mating cable



325°F
(163°C)

QUARTZ SHEAR TRIAXIAL ICP® ACCELEROMETER

MODELS TLD339A34 & TLD339A36

Sensitivity: ($\pm 10\%$) 50 mV/g / 10 mV/g

Measurement Range: ± 100 g pk / ± 500 g pk

Broadband Resolution: .005 g rms / .003 g rms



356°F
(180°C)

UHT-12™ SHEAR TRIAXIAL ICP® ACCELEROMETER

MODEL TLD339A37

Sensitivity: ($\pm 10\%$) 100 mV/g (10.2 mV/(m/s²))

Measurement Range: ± 100 g pk (± 490.5 m/s² pk)

Broadband Resolution: .002 g rms

ACCESSORIES

CHARGE CONVERTERS

In-line ICP® charge converters serve to convert high impedance charge mode piezoelectric sensor signals into low impedance voltage signals for input into readout, recording, and analysis instruments. Powered by ICP® sensor signal conditioners, series 422 converters are placed between the sensor and signal conditioner. They can also connect directly to a DAQ system or readout device if the system includes ICP® power.



IN-LINE CHARGE CONVERTER

MODEL 422E38

Sensitivity: 0.1 mV/pC

Input range: 25000 pC

Low frequency (-5%): 5 Hz



IN-LINE CHARGE CONVERTER

MODEL 422E35

Sensitivity: 1 mV/pC

Input range: 2500 pC

Low frequency (-5%): 5 Hz



IN-LINE CHARGE CONVERTER

MODEL 422E35

Sensitivity: 10 mV/pC

Input range: 250 pC

Low frequency (-5%): 5 Hz



CE

MODEL 422M182

In-line differential charge converter

Sensitivity: ($\pm 5\%$) 4 mV/pC

2-pin Mil input to BNC output



SIGNAL CONDITIONERS

The 482C/483C series are 4 and 8 channel signal conditioners that range from units with simple stand-alone operation to more complex units with front panel keypad / display, RS-232, or Ethernet control. All models power ICP® sensors and in-line ICP® charge converters. Models directly compatible with charge output piezoelectric sensors are also available.



MODEL 482C15

4-channel
Line-powered
ICP® sensor signal conditioner
x1, x10, x100 gain



MODEL 482C16

4-channel
Line-powered
ICP® sensor signal conditioner
Incremental gain, RS-232



MODEL 482C64

4-channel
Line-powered
ICP®/Charge sensor
signal conditioner
TEDS, Incremental gain,
RS-232, Ethernet



MODEL 483C41

8-channel
Line-powered
ICP®/Charge sensor
signal conditioner
Incremental gain, Selectable LPF,
Ethernet

COMPLETE HIGH TEMPERATURE ACCELEROMETER LISTING

Temp	Model	
<p>≥ 325 to < 500 °F (162 °C < 260 °C)</p>	320C15	
	320C18	
	320C52	
	320C53	
	339B31*	
	339B32*	
	356A70	
	356A71	
	357A09	
	357C10	
	357C10/NC	
	HT356A43	
	HT356A44	
	HT356B01	
	HTJ356B01	
	P357A09	
	TLD339A34	
	TLD339A36	
TLD339A37*		
<p>≥ 500 to < 1200 °F (≥ 260 °C to < 650 °C)</p>	357A07/NC	
	357A100*	
	357A63*	
	357B03	
	357B04	
	357B11	
	357B61	
	357B61/NC	
	357B69	
	357B69/NC	
	357C71	
	357C72	
	357C73	
	EX356A73*	
	EX600B1X*	
357A64*		
EX357E90*		
EX357E91*		
EX357E92*		
EX357E93*		
EX357A94*		
EX357A95*		
EX611A20		

*UHT-12™ sensing technology



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Auto-UHT12-0923