



ELECTRIC & HYBRID VEHICLE TESTING & DEVELOPMENT

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 **PCB** *PIEZOTRONICS*^{INC.}
MTS SYSTEMS CORPORATION

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ACOUSTICS

Noise sources are distinct between electric vehicles and conventional vehicles due to their different types of power. Electric vehicles have systems that contribute differently to the interior and exterior noise levels and quality. PCB's line of microphones are ideally suited with the precision needed to make accurate measurements in electric and hybrid vehicles.



1/2" FREE-FIELD ICP® MICROPHONE SYSTEM

Model 378B02

- Sensitivity: 50 mV/Pa
- Frequency Range: 3.75 Hz – 20 kHz
- Dynamic Range: 137 dB re 20 µPa
- Cost effective



1/2" LOW NOISE ICP® MICROPHONE SYSTEM

Model 378A04

- Prepolarized (industry's first)
- Frequency Range: 10 Hz - 16 kHz
- Less than 6.5 dBA noise floor
- High sensitivity, 450 mV/Pa



1/2" RANDOM INCIDENCE ICP® MICROPHONE SYSTEM

Model 378A21

- Random incidence covering full audible range
- Frequency Range: 4 Hz – 25 kHz
- Dynamic Range: 22 dBA – 150 dB
- Industry Exclusive design



1/2" WATER AND DUST RESISTANT ICP® MICROPHONE SYSTEM

Model 130A24

- ICP® water resistant array microphone and preamplifier
- Frequency Range: 20 Hz - 16 kHz
- IP55 Rated for harsh environments
- Cost effective



1/4" FREE-FIELD ICP® ARRAY MICROPHONE SYSTEM

Series 130F

- Low noise floor: 24 dBA
- Frequency Range: 10 Hz - 20 kHz (+/- 4 dB)
- Integral preamplifier & SMB jack connector
- Cost effective



SURFACE MICROPHONE

Model 130B40

- Low profile 1/8" (3 mm) microphone system
- Dynamic Range: 150 dB before clipping
- Water and dust resistant grid cap
- Integral 5 ft cable



VIBRATION

Hybrid and electric vehicles present NVH testing challenges due to vehicle complexity and potential for problems with electrical isolation. NVH issues related to the addition of new electrical devices, gear whine, and vehicle resonances increase the number of NVH areas to be tested. Our broad line of accelerometers is engineered to meet these challenges, by incorporating ground and case isolation. Electrically isolated accelerometers help avoid measurement errors and poor test data that can result when ground loops and stray electrical signals are present during testing.



HIGH FREQUENCY ICP® ACCELEROMETER

Models J353B18

- Ground isolated
- Frequency Range: ($\pm 5\%$)
1 - 8 kHz
- Sensitivity: 10 mV/g
- Quartz shear



GENERAL PURPOSE ICP® ACCELEROMETER

Model J352C03

- Ground isolated
- Frequency Range: ($\pm 5\%$)
0.5 - 10 kHz
- Sensitivity: 10 mV/g
- Ceramic shear



HIGH SENSITIVITY ICP® ACCELEROMETER

Model J352C33

- Ground isolated
- Frequency Range: ($\pm 5\%$)
0.5 - 10 kHz
- Sensitivity: 100 mV/g
- Ceramic shear



GROUND ISOLATED TEDS TRIAXIAL ACCELEROMETER

Model J356A43, J356A44, J356A45

- Ground isolated
- Frequency Range: ($\pm 5\%$)
0.7 - 7 kHz
- ¼ - 28 4-pin connector
- TEDS IEEE 1451.4 enabled



GROUND ISOLATED HIGH TEMP MINIATURE TRIAXIAL ACCELEROMETERS

Series HTJ356B01

- Ground isolated
- Frequency Range: ($\pm 5\%$)
2 - 8 kHz
- Temperatures up to +356 °F (+180 °C)
- 0.28 in (7.10 mm) height



CASE ISOLATED TRIAXIAL ICP® ACCELEROMETERS

Model 354A04, 354A05

- Case isolated
- Frequency Range: ($\pm 5\%$)
.4 - 5 kHz
- Sensitivity: 10 or 100 mV/g options
- TEDS IEEE 1451.4 enabled



MINIATURE LIGHTWEIGHT ICP® ACCELEROMETER

Model 352A21

- Lightweight 0.02 oz (0.6 gm)
- Frequency Range: ($\pm 5\%$)
1.0 - 10 kHz
- 0.14 in (3.6 mm) height
- Adhesive mounting



GROUND ISOLATED TRIAXIAL HIGH SENSITIVITY ICP® ACCELEROMETER

Model 354C03

- Ground isolated
- Frequency Range: ($\pm 5\%$)
0.5 - 2 kHz
- Sensitivity: 100 mV/g
- Thru-hole mounting



GROUND ISOLATED HIGH SENSITIVITY ICP® ACCELEROMETER

Model J352C68

- Ground isolated
- Frequency Range: ($\pm 5\%$)
0.5 - 8 kHz
- Sensitivity: 100 mV/g
- 10-32 coaxial jack



FORCE, LOAD & TORQUE

PCB® load cells feature advanced structural design, making them extremely durable, perfect for vehicle life cycle testing and structural testing. The TORKDISC® torque sensor system is designed for vehicle applications requiring in-line rotary torque measurements such as drive line measurements, while our force sensors are excellent for automotive fatigue testing applications.



TORKDISC® TELEMETRY SYSTEM

Model 5302D-02A

- 16 bit telemetry
- Measurement range: 5,000 in-lb (565 Nm)
- 15,000 RPM max



ICP® FORCE SENSOR

Model 208C03

- 0.625 in (15.88 mm) height
- 500 lb (2.224 kN) compression, tension
- Low frequency response 0.0003 Hz



ROTARY TORQUE SENSOR

Model 3125-01A

- Measurement Range: 5,000 in-lb (565 N-m)
- Mounting: Keyed shaft
- Maximum speed: 7,900 rpm



REACTION TORQUE SENSOR

Model 2302-02A

- Measurement Range: 20,000 lbf-in (2,259 Nm)
- 50% static overload protection
- 5 in (127 mm) steel flange



PEDAL FORCE LOAD CELL

Model 1515-110-03A

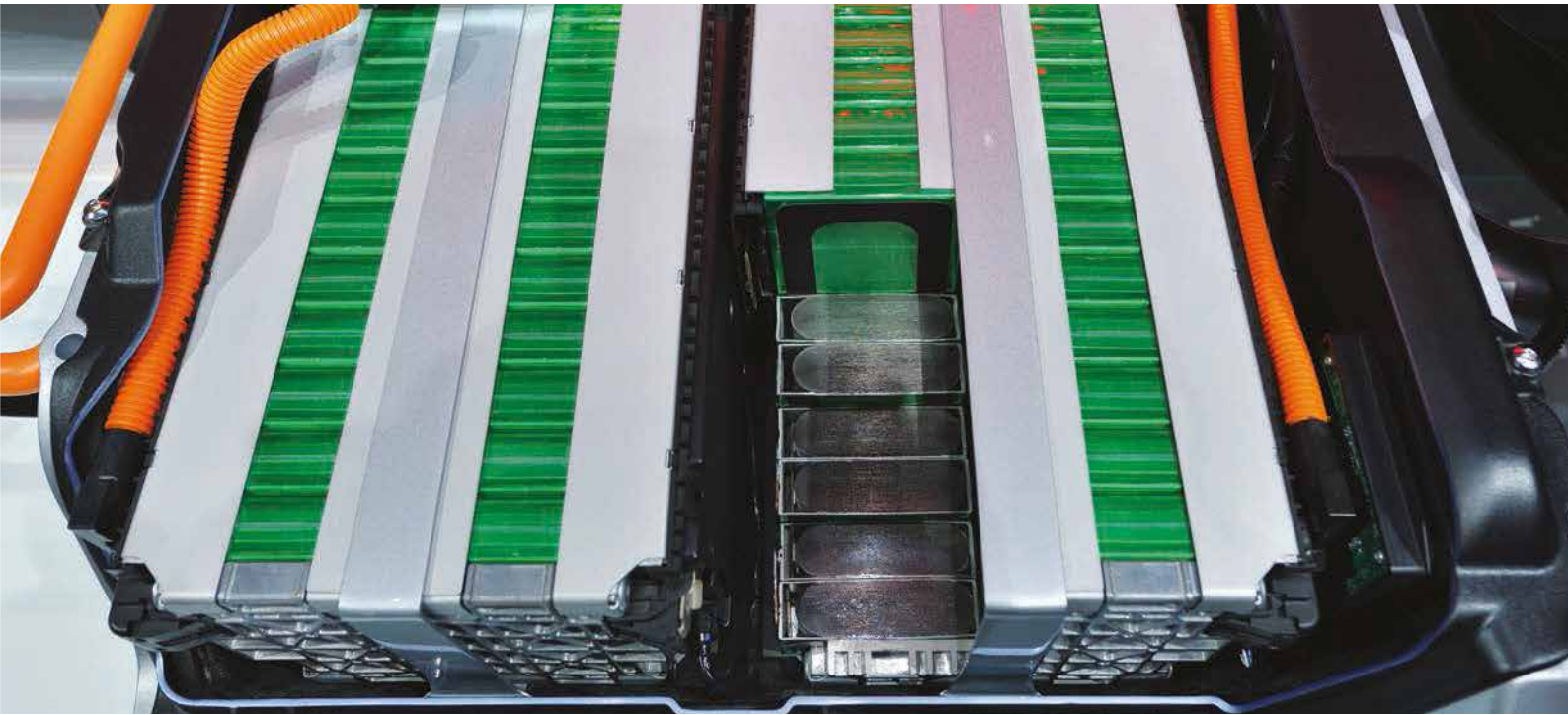
- Measurement Range: 300 lbf (1,334 N)
- 10 ft integral cable
- 0.84 in (21.4 mm) height



FATIGUE RATED LOAD CELL

Model 1403-11A

- 250 lbf (1112 N) rated capacity
- Low profile, 2.50 in (63.4 mm) height
- 1 mV/V output



SIGNAL CONDITIONERS & CABLES

PCB® offers a wide selection of signal conditioners, accessories, and cables that complement our sensors for testing electric vehicles, hybrid electric vehicles, and fuel cell vehicles. See our website for the complete offering of these products.



Series 003CXX

- Used with single axis ICP® accelerometers
- Low-noise coaxial cable
- 10-32 coaxial plug to BNC plug



ICP® SIGNAL CONDITIONER

Model 483C15

- 8 individual channels
- ICP® and voltage sensor input
- Selectable gain of x1, x10, x100



Model 010G05

- Used with triaxial ICP® accelerometers
- 4 conductor, shielded
- 4-socket plug to 3 BNC plugs



SENSORS FOR RESEARCH & DEVELOPMENT



PCB *PIEZOTRONICS*^{INC.}
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PCB® is a designer and manufacturer of microphones, vibration, pressure, force, torque, load, and strain sensors, as well as the pioneer of ICP® technology used by design engineers and predictive maintenance professionals worldwide for test, measurement, monitoring, and control requirements in automotive, aerospace, industrial, R&D, military, educational, commercial, OEM applications, and more. With a worldwide customer support team and a global distribution network **PCB® IS COMMITTED TO TOTAL CUSTOMER SATISFACTION.**

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