ELECTRIC & HYBRID VEHICLE TESTING & DEVELOPMENT

pcb.com/ev | 1 800 828 8840
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.

**ACOUSTICS**

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
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.

**VIBRATION**

- **HIGH FREQUENCY ICP® ACCELEROMETER**
  - Model J353B18
  - Ground isolated
  - Frequency Range: (±5%) 1 - 8 kHz
  - Sensitivity: 10 mV/g
  - Quartz shear

- **GENERAL PURPOSE ICP® ACCELEROMETER**
  - Model J352C03
  - Ground isolated
  - Frequency Range: (±5%) 0.5 - 10 kHz
  - Sensitivity: 10 mV/g
  - Ceramic shear

- **HIGH SENSITIVITY ICP® ACCELEROMETER**
  - Model J352C33
  - Ground isolated
  - Frequency Range: (±5%) 0.5 - 10 kHz
  - Sensitivity: 100 mV/g
  - Ceramic shear
MINIATURE LIGHTWEIGHT ICP® ACCELEROMETER
MODEL 352A21
- Lightweight 0.02 oz (0.6 gm)
- Frequency Range: (±5%) 1.0 - 10 kHz
- 0.14 in (3.6 mm) height
- Adhesive mounting

GROUND ISOLATED TEDS TRIAXIAL ACCELEROMETER
MODELS J356A43, J356A44, J356A45
- Ground isolated
- Frequency Range: (±5%) 0.7 - 7 kHz
- 1/4 - 28 4-pin connector
- TEDS IEEE 1451.4 enabled

GROUND ISOLATED HIGH TEMP MINIATURE TRIAXIAL ACCELEROMETERS
SERIES HTJ356B01
- Ground isolated
- Frequency Range: (±5%) 2 - 8 kHz
- Temperatures up to +356 °F (+180 °C)
- 0.28 in (7.10 mm) height

GROUND ISOLATED HIGH SENSITIVITY ICP® ACCELEROMETER
MODEL 354C03
- Ground isolated
- Frequency Range: (±5 %) 0.5 - 2 kHz
- Sensitivity: 100 mV/g
- Thru-hole mounting

GROUND ISOLATED HIGH SENSITIVITY ICP® ACCELEROMETER
MODEL J352C68
- Ground isolated
- Frequency Range: (±5 %) 0.5 - 8 kHz
- Sensitivity: 100 mV/g
- 10-32 coaxial jack

CASE ISOLATED TRIAXIAL ICP® ACCELEROMETERS
MODELS 354A04, 354A05
- Case isolated
- Frequency Range: (±5%) .4 - 5 kHz
- Sensitivity: 10 or 100 mV/g options
- TEDS IEEE 1451.4 enabled

GROUND ISOLATED HIGH TEMP MINIATURE TRIAXIAL ACCELEROMETERS
SERIES HTJ356B01
- Ground isolated
- Frequency Range: (±5%) 2 - 8 kHz
- Temperatures up to +356 °F (+180 °C)
- 0.28 in (7.10 mm) height
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.

**FORCE, LOAD & TORQUE**

**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 Nm)
- 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
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.

### CABLES & SIGNAL CONDITIONERS

**LOW-NOISE COAXIAL CABLE**

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

**4-CONDUCTOR, SHIELDED, FEP CABLE**

- Used with triaxial ICP® accelerometers
- 4 conductor, shielded, FEP jacket
- 1/4-28, 4-socket plug to 3 BNC plugs

**4-CONDUCTOR, SHIELDED, FEP CABLE**

- Used with triaxial ICP® accelerometers
- 4 conductor, shielded, FEP jacket
- IP68 Rated 1/4-28, 4-socket plug to 3 BNC plugs

**4-CONDUCTOR, SHIELDED, POLYURETHANE CABLE**

- Used with triaxial ICP® accelerometers
- 4 conductor, shielded, flexible polyurethane jacket
- IP68 Rated 1/4-28, 4-socket plug to 3 BNC plugs

**ICP® SIGNAL CONDITIONER**

- 8 individual channels
- ICP® and voltage sensor input
- Selectable gain of x1, x10, x100
MTS Sensors, a division of MTS Systems Corporation (NASDAQ: MTSC), vastly expanded its range of products and solutions after MTS acquired PCB Piezotronics, Inc. in July, 2016. PCB Piezotronics, Inc. is a wholly owned subsidiary of MTS Systems Corp.; IMI Sensors and Larson Davis are divisions of PCB Piezotronics, Inc.; Accumetrics, Inc. and The Modal Shop, Inc. are subsidiaries of PCB Piezotronics, Inc.