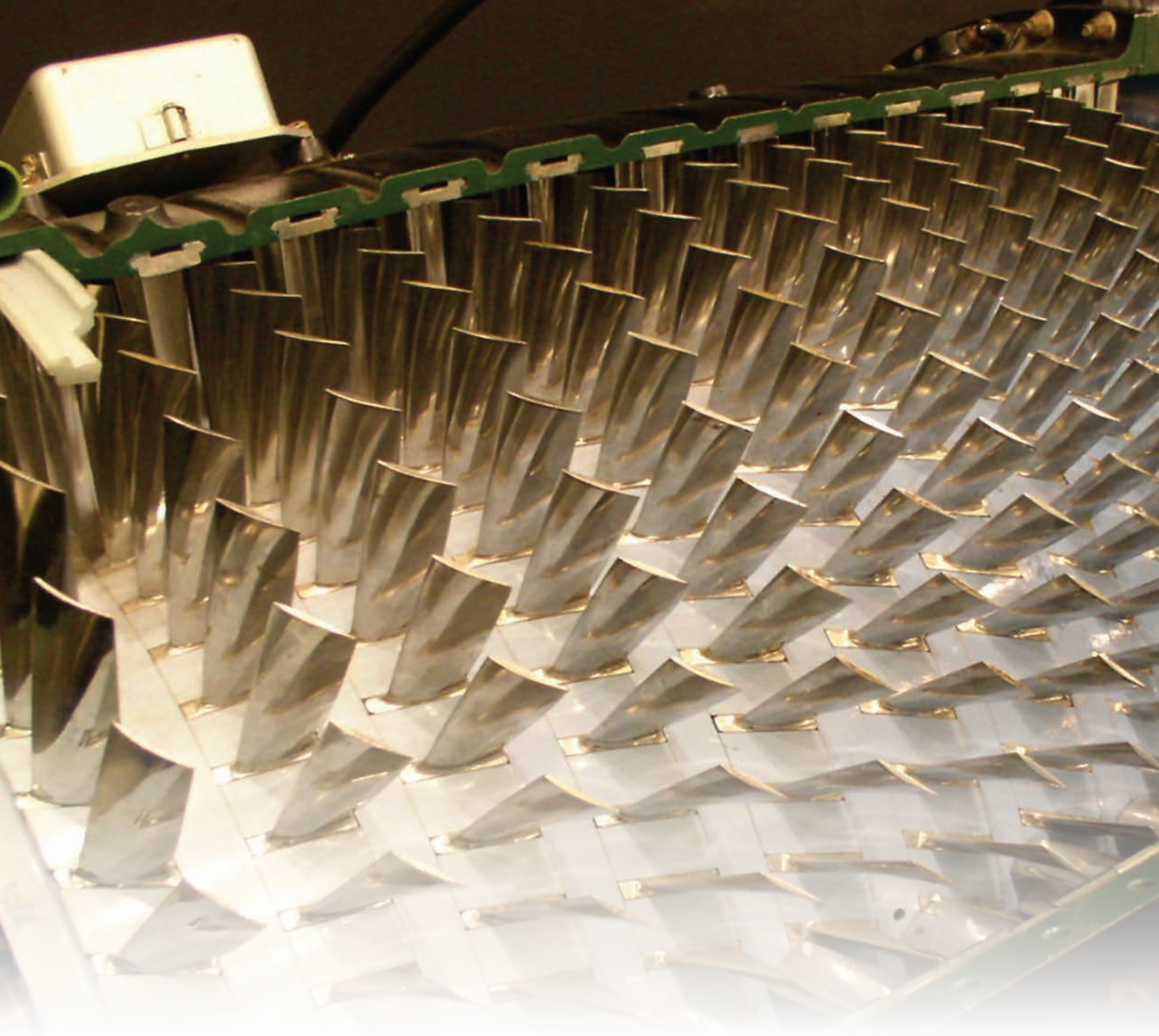

CHARGE AMPLIFIERS

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CHARGE AMPLIFIERS

Charge amplifiers convert a high impedance input signal into a low impedance output signal and are capable of operating with high-temperature (+500 °F) charge-mode sensors lower insulation resistance values. There are two types:

- Single-Ended Charge Amplifiers: Single-ended charge amplifiers are designed to operate in conjunction with single-ended, charge-mode accelerometers and pressure sensors. Single-ended sensors use coaxial connectors and cables where the connector pin/ cable conductor carries the signal and the connector shell/ cable shield carries the ground. Single-ended sensor chains depend on shielding and a good ground to reject common-mode noise.
- Differential Charge Amplifiers: As a charge amplifier designed to operate with differential sensors, these models can accept the simultaneous positive and negative signals output by the differential sensor that are equal in amplitude but opposite in phase. Differential sensors output these simultaneous signals on the premise that common-mode noise will affect both signals equally. The charge amplifier can effectively identify and reject the noise while still passing though the valid signal. This methodology lessens the system's dependence on a good ground for noise rejection.

HIGHLIGHTS

- Convert high impedance output from charge-mode sensors to low-impedance voltage or current output
- Can be paired with charge-mode accelerometers and pressure sensors
- Variety of mounting configurations available (DIN rail, surface)
- Electronics include high and low pass frequency fitting

APPLICATIONS

- Gas Turbine Bearing Health Monitoring
- Commissioning of Nuclear Power Plants
- Condition Monitoring of Power Generation Turbines
- Machinery Protection in Extremely High Temperature Environments
- Turbine Health Management
- Structural Damages on Gas Turbines
- Combustion Dynamics Monitoring

SINGLE-ENDED, NON RADIATION HARDENED

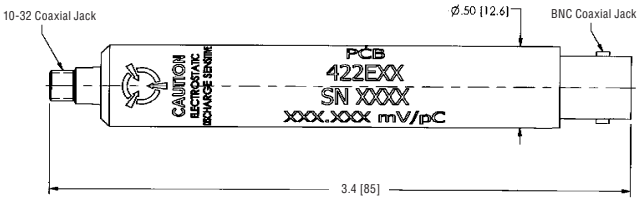
Models 422E35, 422E36, 422E38 & 422E55/D

IN-LINE CHARGE CONVERTER

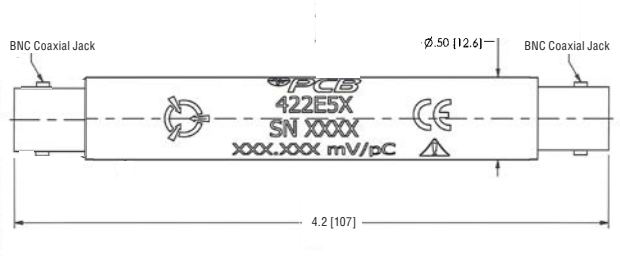
MODELS 422E35, 422E36, 422E38 & 422E55/D

- Variety of sensitivities available
- ICP® powered
- Frequency response down to 0.5 Hz

Models 422E35, 422E36 & 422E38



Model 422E55/D



SPECIFICATIONS				
Model Number	**422E35**	**422E36**	**422E38**	**422E55/D**
Performance				
Conversion Sensitivity	1 mV/pC	10 mV/pC	0.1 mV/pC	0.5 mV/pC
Measurement Range	± 2500 pC	± 250 pC	± 25000 pC	± 10000 pC
Low Frequency Response (-5%)	5 Hz			0.5 Hz
High Frequency Response (2.2 mA)	30 kHz	50 kHz	4 kHz	N/A
High Frequency Response (4 mA)	60 kHz	75 kHz	15 kHz	N/A
High Frequency Response (20 mA)	100 KHz			N/A
High Frequency Response (-5%)	N/A			100 KHz
Non-Linearity	≤ 1.0 %			
Environmental				
Overload Limit (Shock)	1000 g pk			5000 g pk
	9810 m/s² pk			49050 m/s² pk
Temperature Range	-65 to ±250 °F			
	-54 to +121 °C			
Electrical				
Excitation Voltage	+18 to 28 VDC			
Constant Current Excitation	2.2 to 20 mA			2 to 20 mA
Output Impedance	<10 Ohm			<100 Ohm
Output Bias Voltage	+12 to 15 VDC			+9 to 13 VDC
Output Voltage	±2.5 V			±5.0 V
Broadband Electric Noise (1 to 10000 Hz)	14 µV	26 µV	14 µV	33 µV
Spectral Noise (1 Hz)	8.90 µV/√Hz	13 µV/√Hz	8.90 µV/√Hz	9.8 µV/√Hz
Spectral Noise (10 Hz)	0.85 µV/√Hz	2.20 µV/√Hz	0.85 µV/√Hz	3.0 µV/√Hz
Spectral Noise (100 Hz)	0.31 µV/√Hz	0.50 µV/√Hz	0.31 µV/√Hz	0.8 µV/√Hz
Spectral Noise (1 kHz)	0.17 µV/√Hz	0.19 µV/√Hz	0.17 µV/√Hz	0.4 µV/√Hz
Spectral Noise (10 kHz)	0.07 µV/√Hz	0.10 µV/√Hz	0.07 µV/√Hz	0.2 µV/√Hz
Capacitance (Maximum Allowable at Input)	20000 pF	2000 pF	20000 pF	2000 pF
Resistance (Minimum Allowable at Input)	10000 Ohm			$1.5x10^9$ Ohm
Source Capacitance Loading	<0.005%/PF			
Physical				
Housing Material	Stainless Steel			
Sealing	Welded			
Electrical Connector (Input)	10-32 Coaxial Jack			BNC Jack
Electrical Connector (Output)	BNC Jack			
Weight	1.1 oz			1.15 oz
	31 g			32.7 g

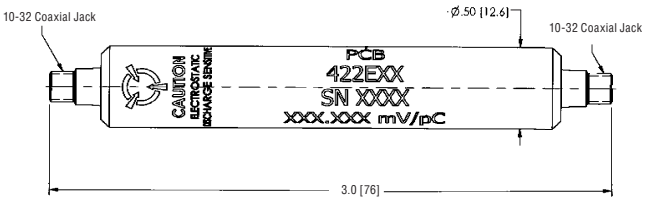
SINGLE-ENDED, RADIATION HARDENED

Models 422E65/A & 422E66/A

IN-LINE CHARGE CONVERTER

MODELS 422E66/A & 422E66/A

- 1 mV/pC or 10 mV/pC sensitivity
- Able to withstand radiation exposure



SPECIFICATIONS		
Model Number	**422E65/A**	**422E66/A**
Performance		
Conversion Sensitivity	1 mV/pC	10 mV/pC
Measurement Range	± 5000 pC	± 500 pC
Low Frequency Response (-5%)	5 Hz	
High Frequency Response (4 mA)	35 kHz	90 kHz
Non-Linearity	≤ 1.0 %	
Environmental		
Overload Limit (Shock)	1000 g pk	
	9810 m/s² pk	
Temperature Range	-65 to +250 °F	
	-54 to +121 °C	
Radiation Exposure Limit (Integrated Gamma Flux)	1 E8 rad	
Radiation Exposure Limit (Integrated Neutron Flux)	1 E10 N/cm²	
Electrical		
Excitation Voltage	+18 to 28 VDC	
Constant Current Excitation	2.2 to 20 mA	
Output Impedance	<20 Ohm	
Output Bias Voltage	+9 to 14.5 VDC	
Output Voltage	±5 V	
Broadband Electrical Noise (1 to 10000 Hz)	7.0 µV	17 µV
Spectral Noise (1 Hz)	5.0 µV/√Hz	10 µV/√Hz
Spectral Noise (10 Hz)	1.0 µV/√Hz	2 µV/√Hz
Spectral Noise (100 Hz)	0.1 µV/√Hz	0.3 µV/√Hz
Spectral Noise (1 kHz)	0.1 µV/√Hz	0.05 µV/√Hz
Spectral Noise (10 kHz)	0.05 µV/√Hz	0.05 µV/√Hz
Capacitance (Maximum Allowable at Input)	20000 pF	
Resistance (Minimum Allowable at Input)	10000 Ohm	
Source Capacitance Loading	<0.0005 % /pF	
Physical		
Housing Material	Stainless Steel	
Sealing	Welded	
Electrical Connector (Input)	10-32 Coaxial Jack	
Electrical Connector (Output)	10-32 Coaxial Jack	
Weight	0.8 oz	
	23 g	

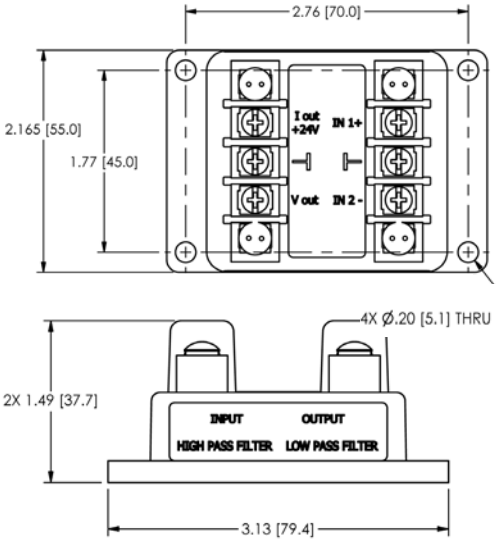
DIFFERENTIAL CHARGE

Models 421B30, 421B31 & 421B3X

DIFFERENTIAL CHARGE AMPLIFIER

MODELS 421B30, 421B31, & 421B3X

- Variety of input sensitivities allows pairing with charge-mode accelerometers and pressure sensors.
- Ability to convert from an input sensitivity in one engineering unit to an output signal in a different engineering unit.
- Voltage (mV) and current (µA) outputs for applications with long signal transmission distances.
- Configurable high-pass and low-pass filters allow for application-specific frequency response.



SPECIFICATIONS			
Performance	**421B30**	**421B31**	**421B3X**
Conversion Sensitivity	20.6 mV/pC 20.6 µV/pC	10 mV/pC 10 µV/pC	Configurable
Measurement Sensitivity	17 pC/psi	10 pC/g	Configurable
Output Sensitivity	350 mV/psi 350 µV/psi	100 mV/g 100 µV/g	Configurable
Input Range	± 242 pC	± 500 pC	Configurable
Low Frequency Response (-3 dB)	10 Hz	10 Hz	Configurable
High Frequency Response (-1 dB)	5 kHz	1 kHz	Configurable
Non-Linearity	≤ 1.0 % FS		
Environmental			
Temperature Range	-22 to +185 °F		
	-30 to +85 °C		
Electrical			
Excitation Voltage	22 to 28 VDC		
Output Bias Voltage	7.3 to 7.7 VDC		
Output Voltage	±5 V/pk		
Output Bias Current	11 to 13 mA		
Output Current	±5 mA/pk		
Output Impedance	<770 Ohm		
Broadband Electrical Noise (1 to 10,000 Hz)	1040 µV	478 µV	Configurable
Spectral Noise (1 Hz)	38 µV/√Hz	19 µV/√Hz	Configurable
Spectral Noise (10 Hz)	54 µV/√Hz	26 µV/√Hz	Configurable
Spectral Noise (100 Hz)	13 µV/√Hz	7 µV/√Hz	Configurable
Spectral Noise (1 kHz)	10 µV/√Hz	6 µV/√Hz	Configurable
Spectral Noise (10 kHz)	10 µV/√Hz	4 µV/√Hz	Configurable
Resistance (Minimum Required at Input)	10000 Ohm		
Source Capacitance Loading	0.0009 %/pF		
Physical			
Housing Material	Aluminum		
Electrical Connection (Input)	Terminal		
Electrical Connection (Output)	Terminal		
Weight	6.5 oz 184 gm		

SERIES 421 MODEL MATRIX

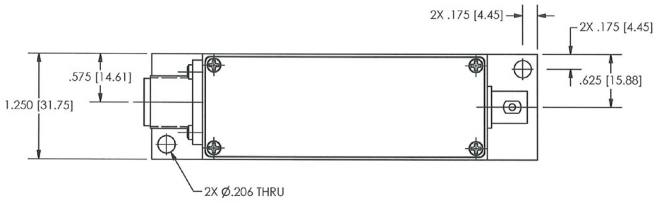
421B3X	XXXX	X	XXXX	X	XX	XXX
Differential Charge Amplifier	**Input Sensitivity**	**Input Units**	**Output Sensitivity**	**Output Units**	**High Pass Filter**	**Low Pass Filter**
	0001-1000 pC/bar	B=bar	0001-0010 mV/mbar	B=mbar	X5=0.5 Hz	002=200 Hz
	0001-0100 pC/psi	P=psi	0001-1000 mV/psi	P=psi	01= 1 Hz	005=500 Hz
	0001-0200 pC/g	G=g's	0010-2000 mV/g	G=g's	02=2 Hz	010=1000 Hz
			0010/0020/0030/0060 mm/s	M=mm/s	05=5 Hz	020=2000 Hz
			0001/0002/0003/0004 ips	I=ips	10= 10 Hz	050=5000 Hz
						100=10000 Hz
						200=20000 Hz

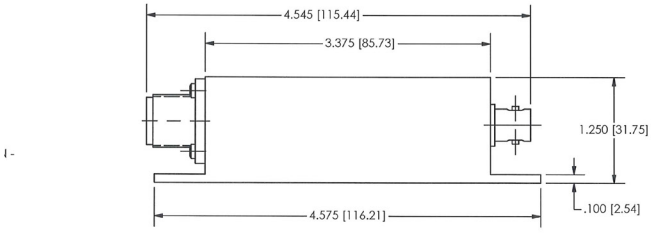
DIFFERENTIAL CHARGE (MODEL 422M182)

IN-LINE CHARGE CONVERTER

MODEL 422M182

- 4 mV/pC sensitivity
- ICP® powered
- Surface mount





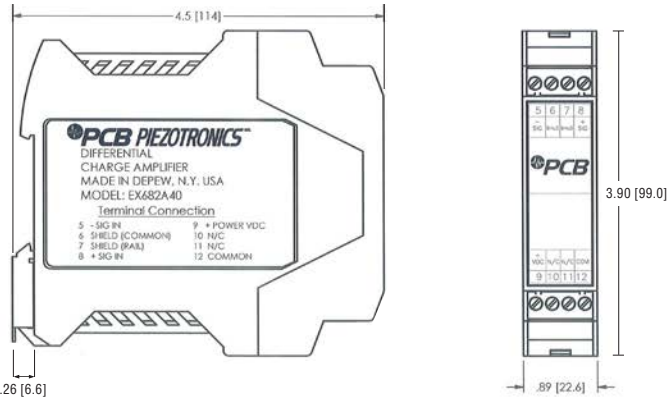
SPECIFICATIONS	
Model Number	**422M182**
Performance	
Conversion Sensitivity	4 mV/pC
Measurement Range	±1250 pC
Low Frequency Response (-5%)	2 Hz
High Frequency Response (2.2 mA)	30 kHz
High Frequency Response (4 mA)	45 kHz
High Frequency Response (20 mA)	55 KHz
Non-Linearity	≤ 1.0 %
Environmental	
Temperature Range	-60 to ±185 °F
	-51 to +85 °C
Electrical	
Excitation Voltage	+22 to 28 VDC
Constant Current Excitation	2.2 to 20 mA
Output Impedance	<250 Ohm
Output Bias Voltage	+12 to 16 VDC
Output Voltage	±5 V
Broadband Electrical Noise (1 to 10000 Hz)	28 µV
Spectral Noise (1 Hz)	10 µV/√Hz
Spectral Noise (10 Hz)	3.2 µV/√Hz
Spectral Noise (100 Hz)	1.0 µV/√Hz
Spectral Noise (1 kHz)	0.56 µV/√Hz
Spectral Noise (10 kHz)	0.56 µV/√Hz
Resistance (Minimum Required at Input)	500000 Ohm
Source Capacitance Loading	0.0009 %/pF
Physical	
Housing Material	Aluminum
Electrical Connector (Input)	2-pin MIL
Electrical Connector (Output)	BNC Coaxial Jack
Weight	3.5 oz
	109 g

DIFFERENTIAL CHARGE (MODEL EX682A40)

DIFFERENTIAL CHARGE AMPLIFIER

MODEL EX682A40

- 10 mV/pC sensitivity
- DIN Rail mount
- Hazardous Area Approved (ATEX, CSA, IECEx)



SPECIFICATIONS	
Model Number	**EX682A40**
Performance	
Conversion Sensitivity	10 mV/pC
Measurement Range	±250 pC
Low Frequency Response (±5%)	5 Hz
High Frequency Response (±5%)	10 kHz
Non-Linearity	≤ 1.0 % FS
Environmental	
Temperature Range	-40 to +176 °F
	-40 to +80 °C
Hazardous Area Approval	ATEX, CSA, IECEx
Electrical	
Excitation Voltage	22 to 28 VDC
Constant Current Excitation	3.1 to 4.1 mA
Output Bias Voltage	10 to 12 VDC
Output Voltage	± 2.5 V/pk
Broadband Electrical Noise (1 to 10,000 Hz)	200 µV
Spectral Noise (1 Hz)	50 µV/√Hz
Spectral Noise (10 Hz)	15 µV/√Hz
Spectral Noise (100 Hz)	5 µV/√Hz
Spectral Noise (1 kHz)	2 µV/√Hz
Spectral Noise (10 kHz)	2 µV/√Hz
Resistance (Minimum Required at Input)	>50000 Ohm
Source Capacitance Loading	0.0003 %/pF
Physical	
Housing Material	Injected Molded Nylon
Electrical Connection (Input)	Terminal Strip
Electrical Connection (Output)	Terminal Strip
Weight	5.1 oz
	145 gm

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3425 Walden Avenue, Depew, NY 14043 USA

pcb.com/imi-sensors | imi@pcb.com | 800 959 4464 | +1 716 684 0003

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