PERFORMANCE SPECIFICATION
CHARGE AMPLIFIER
(Model 2777A)

Document Number	Rev	Date	Entered by	Description of Change	Change Accountable Engineer	ECO
EDVPS2777A	E	11/18/24	NAD	Update to reflect ROHS compliant output mating connector	EPL	55294

1.0 DESCRIPTION

The ENDEVCO® Model 2777A Differential Remote Charge Converter (DRCC) is a low noise ruggedized three-wire input device designed for use with differential piezoelectric transducers. This device converts the transducer's high impedance charge input to a low impedance voltage output. The acceleration output is integrated to produce an AC voltage proportional to velocity output.

The low impedance output from the DRCC provides less susceptibility to noise in the cabling from the DRCC to the main signal conditioning instrument, and it also makes the system's noise level insensitive to the capacitance of the cable connecting the DRCC to the main conditioner.

This is a low noise device with a frequency response of 10 Hz to 10 kHz. The DRCC operates over the temperature range of 5°F to 185°F (-15°C to 85°C).

All specifications are typical and measured at room temperature 72°F to 82°F (22°C to 28°C) unless otherwise noted.

1.1 KEY FEATURES

- Acceleration and Velocity Outputs
- 4-Wire Output Device
- Low Noise
- Frequency Response (10 Hz - 10 kHz)
- Two Option Gains

2.0 INPUTS

2.1 DIFFERENTIAL PE INPUT

This input accepts differential piezo-electric (PE) accelerometers.

2.1.1	Input Connections	Differential with shield connected to case.
2.1.2	Input Source Resistance	The input is restricted to capacitive devices and must be loaded with 50 KΩ minimum.
2.1.3	Input Source Capacitance	The allowable source capacitance to meet all specifications is 30 000 pF maximum.
2.1.4	Maximum Input Charge	37,500 pC pk for all gains (in the pass-band) for instantaneous recovery (see Figure 2).

2.1.5	Maximum Input Velocity	With gain 2mV/IPS/pC/g: $VEL_{max} = \frac{5K\ IPS}{S}$ for $f < f_1$ =923 Hz $VEL_{max} = \frac{5K\ IPS}{S} \frac{f_1}{f}$ for $f > f_1$ = 923 Hz With gain 10mV/IPS/pC/g: $VEL_{max} = \frac{1K\ IPS}{S}$ for $f < f_1$ = 4.6 kHz $VEL^{max} = \frac{1K\ IPS}{S} \frac{f_1}{f}$ for $f > f_1$ = 4.6 kHz Where S is transducer sensitivity in pC/g
2.1.6	Common Mode Rejection Ratio	40 dB minimum at 400 Hz.

3.0 OUTPUTS

3.1 ACCELERATION AND VELOCITY OUTPUTS
These outputs provide the AC filtered acceleration and velocity signals.

3.1.1	Output Connections	Single ended with body shell isolated from signal ground.
3.1.2	Output Impedance	50 Ω maximum
3.1.3	Capacitance Load	30 000 pF maximum.
3.1.4	DC Output Bias (DC Offset)	9.0 VDC ±1.5 VDC over the temperature range 5°F to 185°F (-15°C to 85°C)
3.1.5	Linear Output Voltage	10 Vpk-pk minimum
3.1.6	Limited Output Voltage	15 Vpk-pk with 22 VDC minimum compliance voltage
3.1.7	Output Current	15 mA maximum
3.1.8	Linearity	±1% of reading from the best straight line
3.1.9	Residual Noise (RTO)	-02-YYY: 1.0 mV RMS maximum referred to output -10-YYY: 5 mV RMS maximum referred to output.

4.0 TRANSFER CHARACTERISTICS

4.1	DIFFERENTIAL PE INPUT TO ACCELERATION AND VELOCITY OUTPUTS	
4.1.1	Gain (Cs = 1000 pF)	-02-YYY: 2 mV/EU per pC/g (see Figure 3) -10-YYY: 10 mV/EU per pC/g (see Figure 4) (For acceleration - EU = g) (For velocity - EU = IPS)
4.1.2	Gain Error	±3.0% at 100 Hz for Cs < 1000 pF (at 25°C)
4.1.3	Gain Stability with Source Capacitance	(Independent of Source Capacitance)
4.1.4	Gain Stability with Temperature	The gain will change less than ±1% from the gain at 25°C over the temperature 5°F to 185°F (-15°C to 85°C)
4.1.5	Total Harmonic Distortion	Less than 1%
4.1.6	Magnitude Frequency Response	Flat within the lower and upper cut-off frequencies.
4.1.6.1	Lower Cut-off Frequency (Reference Frequency 100 Hz)	Acceleration: High-Pass Roll-off - 36 dB/octave at f<2.27 Hz Velocity: High-Pass Roll-off - 42 dB/octave at f <2.27 Hz -5% Corner Frequency YYY = 10/15/20/25/150 Hz ±10% -3 dB Corner Frequency = 5.73/8.59/11.5/14.3/113 Hz ± 10%
4.1.6.2	Upper Cutoff Frequency (Reference Frequency 100 Hz)	Low-Pass Roll-off-12dB/octave -5% Corner = 10 kHz ± 5%, -3dB Corner = 17.5 kHz ± 10%

5.0 POWER REQUIREMENTS

The ENDEVCO Model 2777A is designed to be powered from a positive constant voltage supply.

5.1	DC VOLTAGE REQUIREMENT	22 VDC to 31 VDC
5.2	DC CURRENT REQUIREMENT	15mA nominal
5.3	WARM UP TIME	10 sec.

6.0 PHYSICAL CHARACTERISTICS

6.1	DIMENSIONS	1.72"h x 1.67"w x 5.5"d (46.5 mm x 43.7 mm x 139.7 mm)
6.2	WEIGHT	8.0 oz maximum
6.3	CASE MATERIAL	Aluminum
6.4	FINISH	Black powder coat, fine texture using Cardinal P141-BK03 or equivalent
6.5	INPUT CONNECTOR	2-pin: Amphenol Aerospace PC02A-8-2S-023 Pin A: +Qin Pin B: -Qin

(signal ground is outer case shield)

6.6 OUTPUT CONNECTOR — 6-pin: Amphenol Aerospace PT02E-10-6P-023
Pin B: VDC Power IN
Pin D: Acceleration Output
Pin E: - Verification
Pin F: + Verification
Pin A: Power Ground (inner shield)
Pin C: Velocity Output

6.7 MOUNTING — Unit can be mounted with the mounting flange plate.

7.0 ENVIRONMENTAL CHARACTERISITICSS

7.1 OPERATING TEMPERATURE — 5°F to 185°F (-15°C to 85°C)

7.2 SHORT TERM OPERATING TEMPERATURE — -10°F to 185°F (-23.3°C to 85°C)

7.3 STORAGE TEMPERATURE — -76°F to 257°F (-65°C to 125°C)

7.4 HUMIDITY — The unit will withstand 95% relative humidity.

7.5 VIBRATION — 7 g-pk from 55 Hz to 2 kHz.

7.6 SHOCK — 100 g-pk with 3.6 ms haver-sine pulse.

7.7 RADIATION — 10^5 Rads (integrated Gamma)

7.8 NATIONAL ELECTRICAL CODE — Class I, Group D, Division II

7.9 RELIABILITY (MTBF) — 30 000 hours or greater

8.0 ORDERING INFORMATION

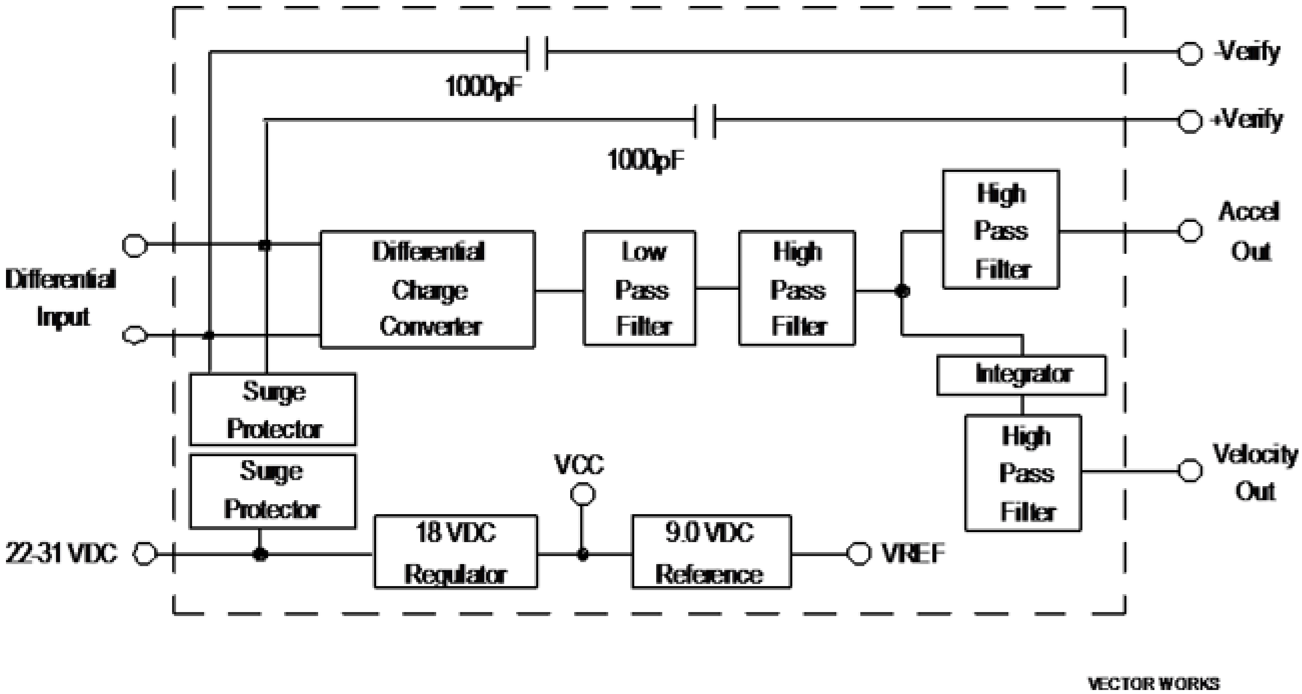
Model No.	Gain	
	Accel. Out	Vel. Out
2777A-02-YYY	2 mV/pC	2 mV/IPS/pC/g
2777A-10-YYY	10 mV/pC	10 mV/IPS/pC/g

Where YYY is 10 , 15, 20, 25 or 150 Hz lower cut-off frequency

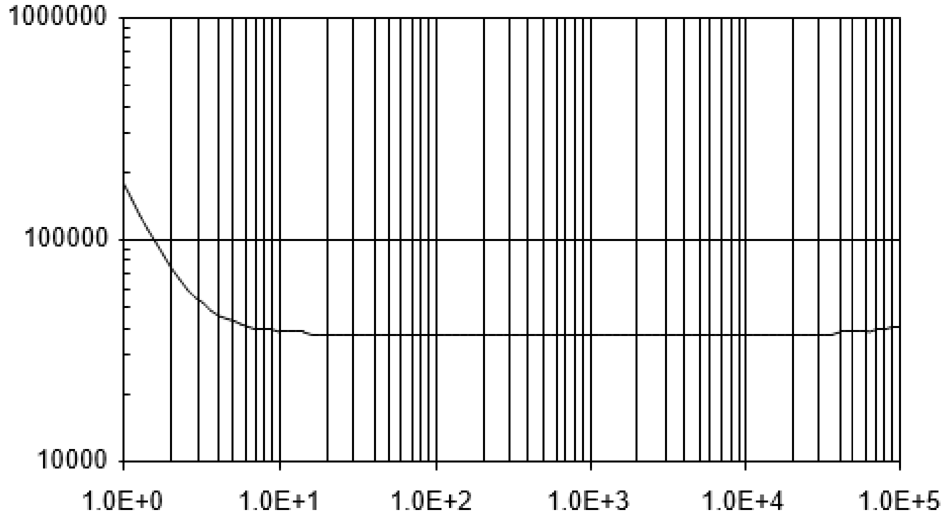
9.0 ACCESSORIES

Mating Connectors

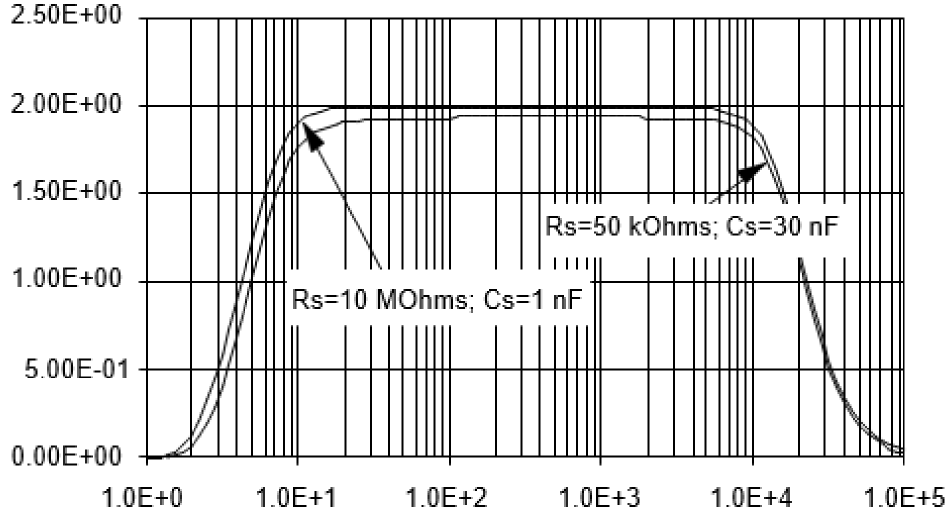
EJ720	Input Connector	Bendix 2 Pin Straight Plug, PC06A-8-2P (SR)
EJ721	Output Connector	Bendix 6 Pin Socket Plug, PT06A-10-6S (SR)



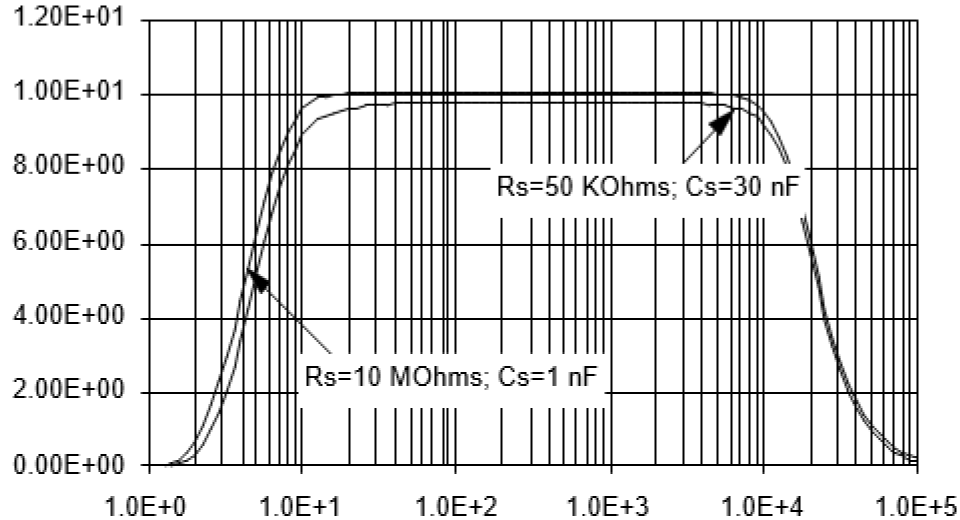
BLOCK DIAGRAM
FIGURE 1



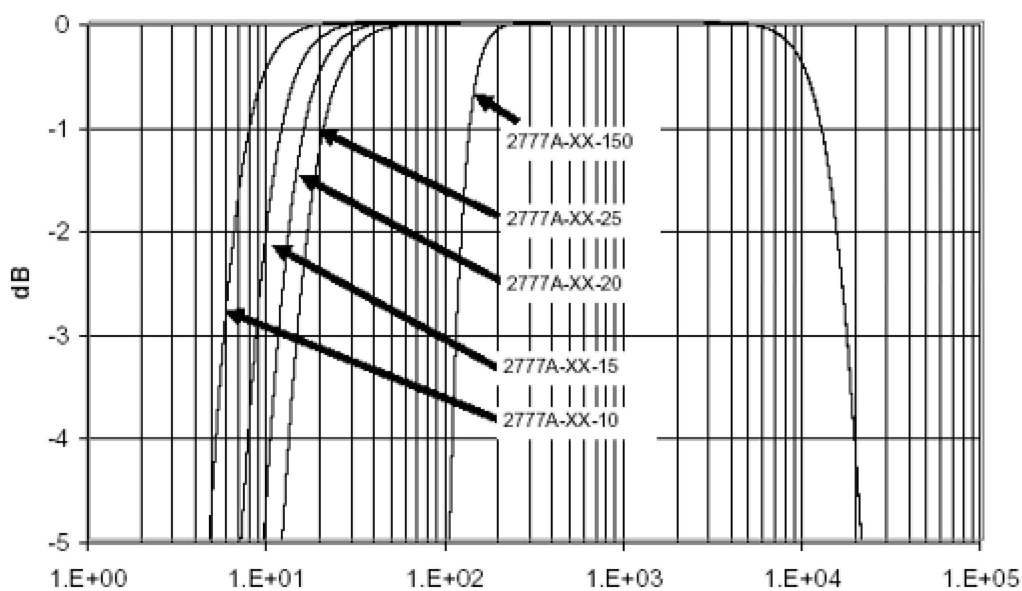
MAXIMUM CHARGE INPUT pC-pk VS. FREQUENCY FOR INSTANTANEOUS RECOVERY
FIGURE 2



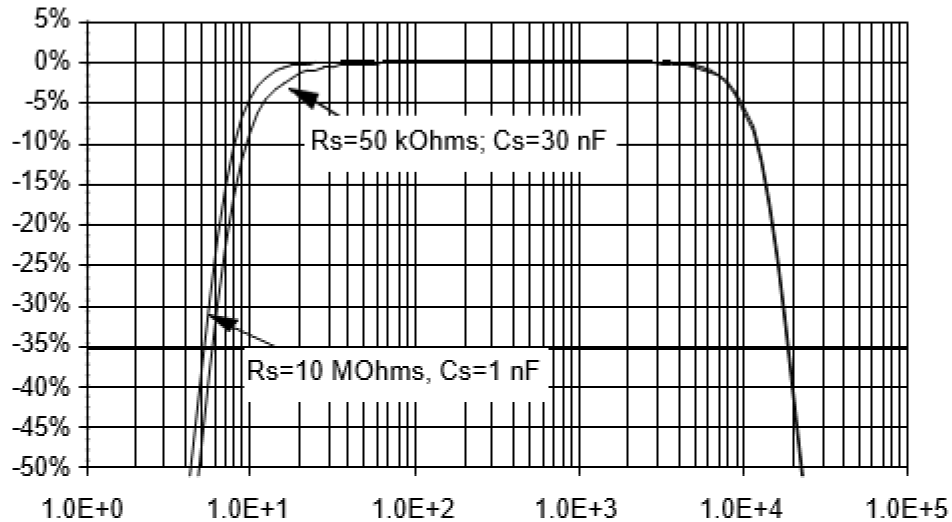
TYPICAL MAGNITUDE (mV/pC) FREQUENCY RESPONSE FOR ACCELERATION OUTPUT
(NOMINAL GAIN = 2 mV/pC AT 100 Hz REFERENCE)
FIGURE 3



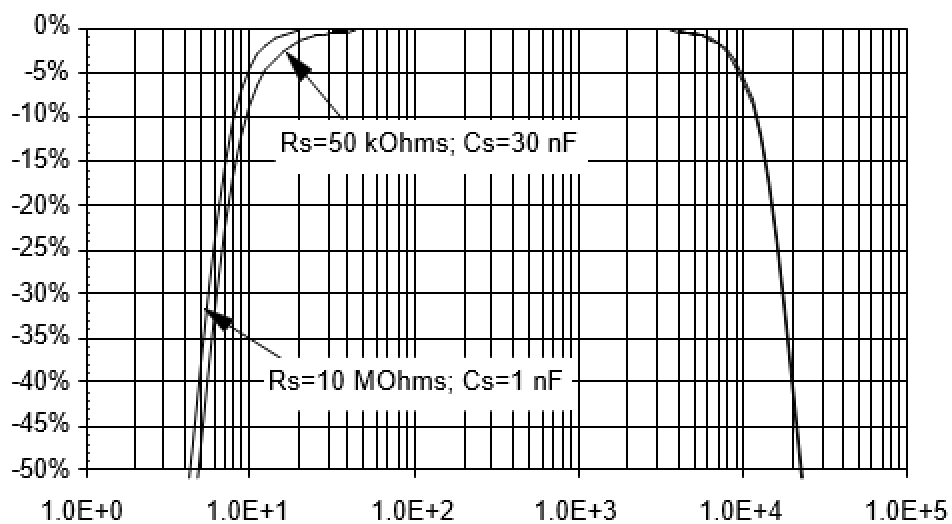
TYPICAL MAGNITUDE (mV/pC) FREQUENCY RESPONSE FOR ACCELERATION OUTPUT
(NOMINAL GAIN = 10 mV/pC AT 100 Hz REFERENCE)
FIGURE 4



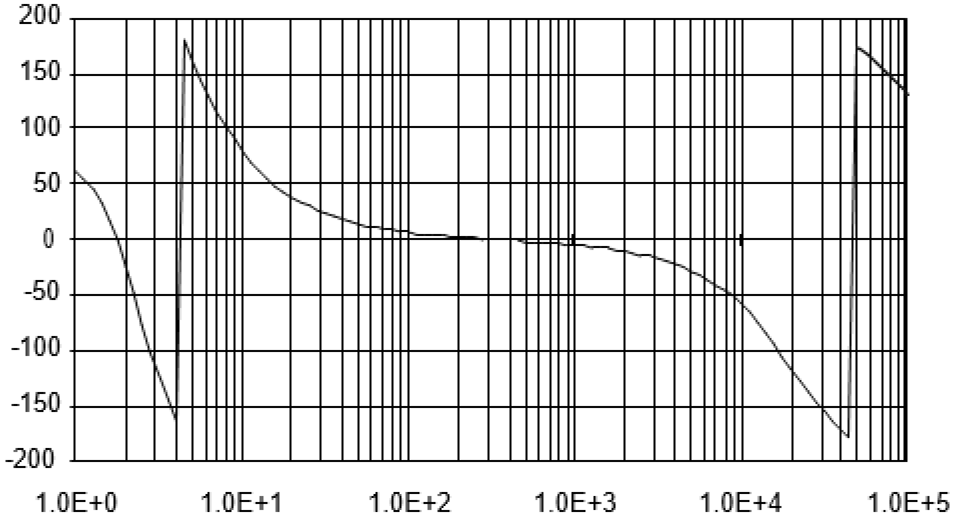
TYPICAL NORMALIZED FREQUENCY RESPONSE FOR ACCELERATION OUTPUT FOR 2777A-02-10/15/20/25/150
(NOMINAL GAIN = 2 mV/pC AT 100 Hz REFERENCE)
FIGURE 5



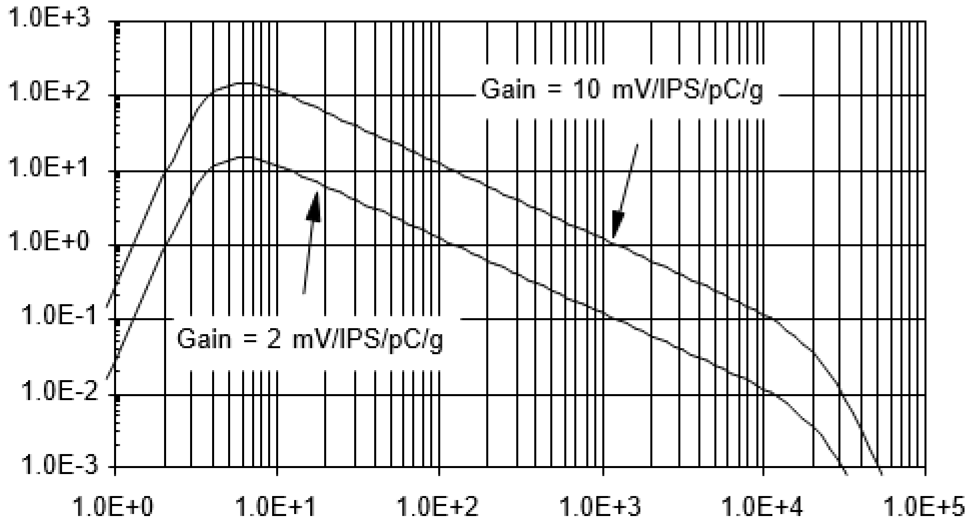
TYPICAL NORMALIZED FREQUENCY RESPONSE FOR ACCELERATION OUTPUT
(NOMINAL GAIN = 2 mV/pC AT 100 Hz REFERENCE)
FIGURE 6



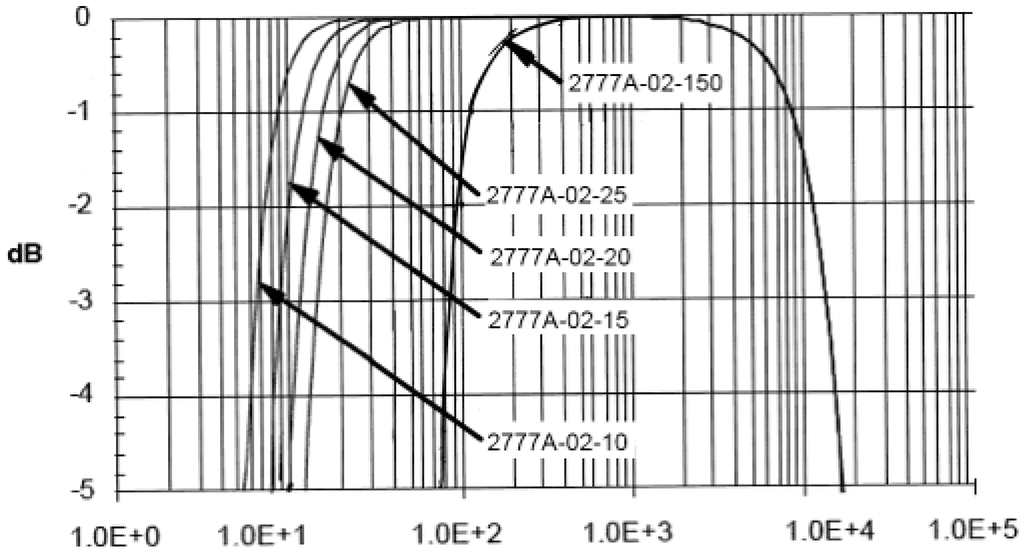
TYPICAL NORMALIZED FREQUENCY RESPONSE FOR ACCELERATION OUTPUT
(NOMINAL GAIN = 10 mV/pC AT 100 Hz REFERENCE)
FIGURE 7



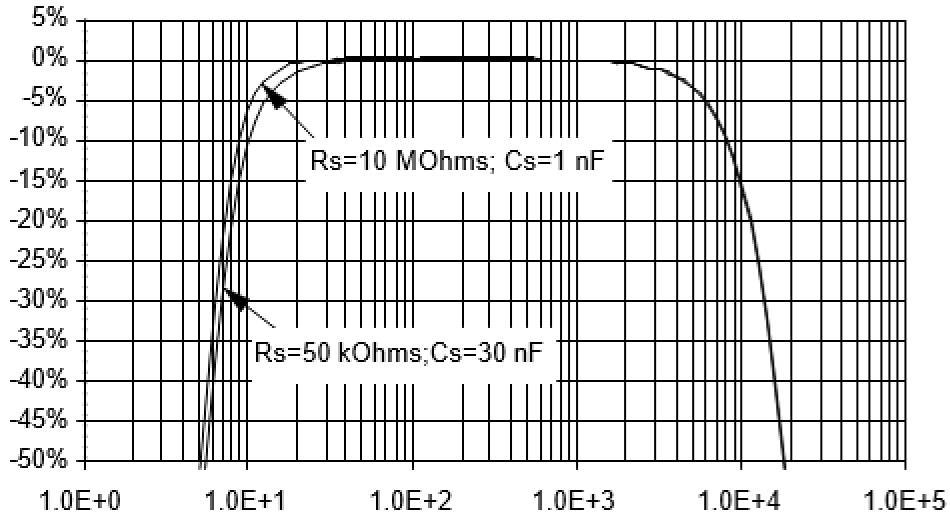
TYPICAL PHASE FREQUENCY RESPONSE FOR ACCELERATION OUTPUT
FIGURE 8



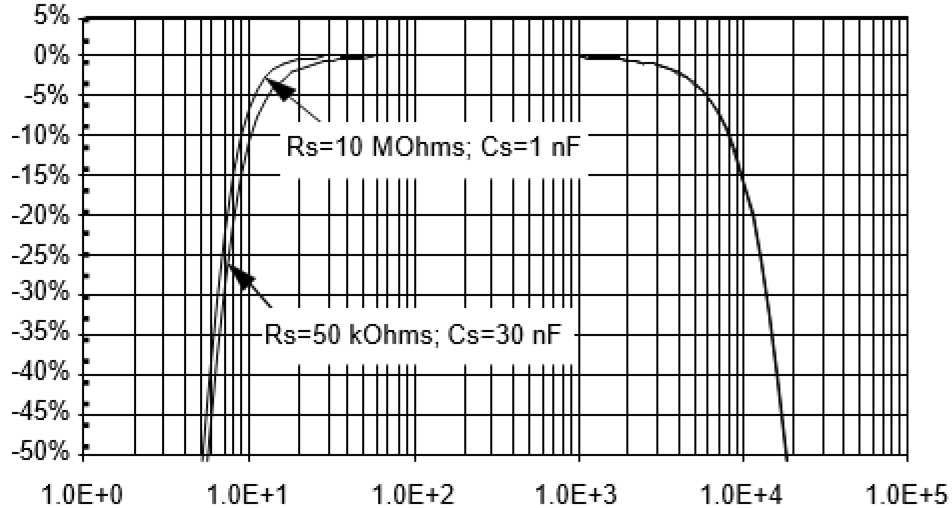
TYPICAL MAGNITUDE (mV/pC) FREQUENCY RESPONSE FOR VELOCITY OUTPUT
FIGURE 9



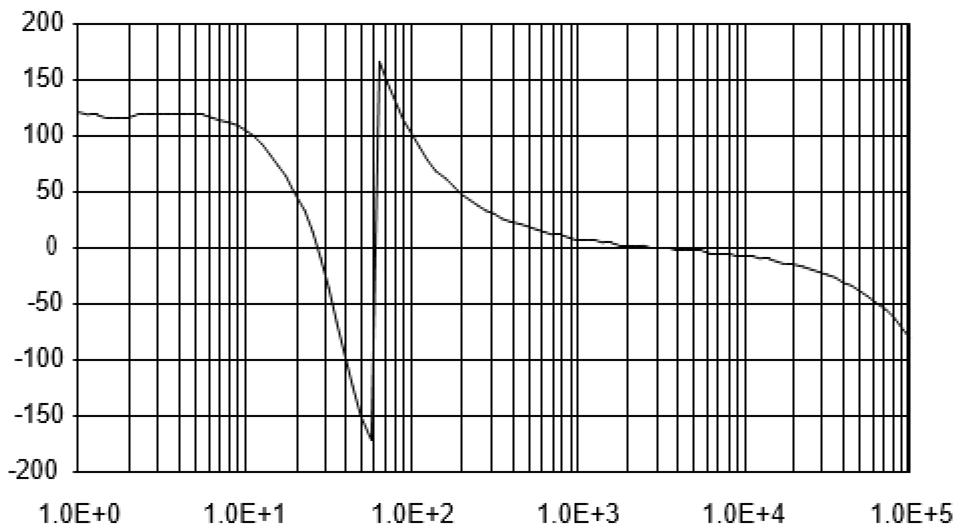
TYPICAL NOMINALIZED FREQUENCY RESPONSE FOR VELOCITY OUTPUT FOR 2777A-02-10/15/20/25/150
(NOMINAL GAIN = 2 mV/IPS PER pC/g AT 100 Hz REFERENCE)
FIGURE 10



TYPICAL NOMINALIZED FREQUENCY RESPONSE FOR VELOCITY OUTPUT
(NOMINAL GAIN = 2 mV/IPS PER pC/g AT 100 Hz REFERENCE)
FIGURE 11

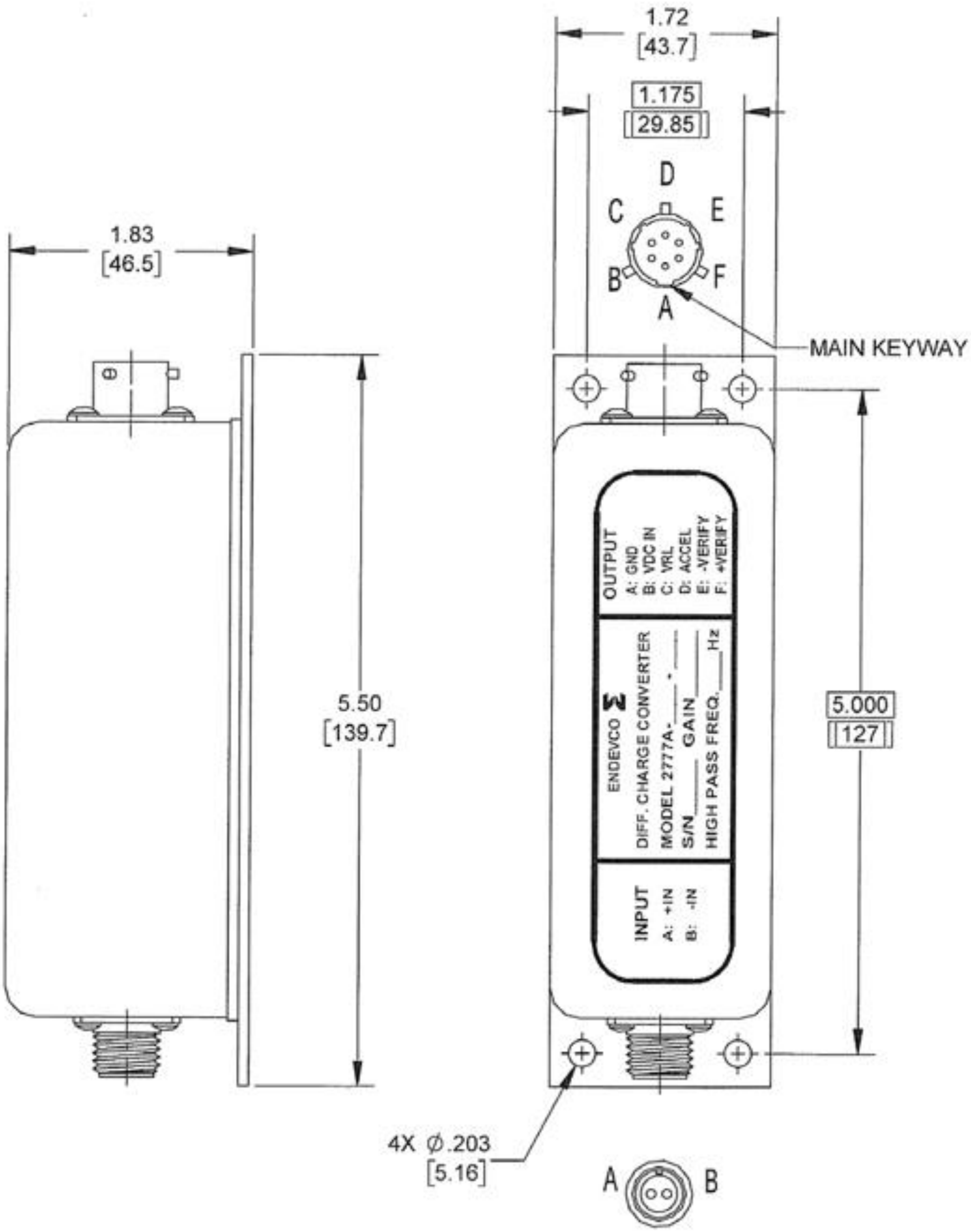


TYPICAL NOMINALIZED FREQUENCY RESPONSE FOR VELOCITY OUTPUT
(NOMINAL GAIN = 10 mV/IPS PER pC/g AT 100 Hz REFERENCE)
FIGURE 12



TYPICAL PHASE FREQUENCY RESPONSE FOR VELOCITY OUTPUT
FIGURE 13

OUTLINE DRAWING FIGURE 14



STANDARD TOLERANCE
INCHES [MILLIMETERS]
.XX = ± .03 [.X = ± .8]
.XXX = ± .010 [.XX = ± .25]

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