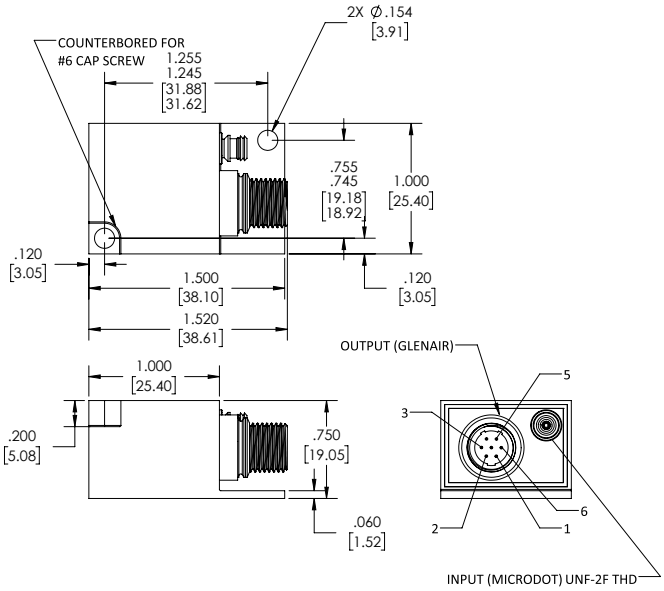
ENDEVCO
AN AMPHENOL COMPANY

Airborne charge amplifiers

Models 2680BM1-BM7, BM12, BM14



STANDARD TOLERANCE
INCHES [MILLIMETERS]
.XX = ± .02 [.X = ± .5]
.XXX = ± .010 [.XX = ± .25]

Key features

- For use with piezoelectric sensors
- Small, rugged, hermetic, light weight
- Dual outputs
- Digital gain adjustment, field programmable
- Selectable low pass filter options
- Meets MIL-STD-461G (EMC)
- Qualified to shock and vibration survivability testing
- Meets MIL-STD-202G (Hermeticity)

Description

Models 2680BM1-XXX through 2680BM7-XXX, 2680BM12-XXX and 2680BM14-XXX charge amplifiers are designed for use with piezoelectric sensors and are suitable for airborne applications. Surface mount construction results in small size, ruggedness and low power consumption. It has an output voltage proportional to the input charge. Units feature gain adjustment, dual outputs, and selectable low pass filter options.

The 2680B series has been designed to withstand the hostile environments in most flight applications. Units have been qualified to shock and vibration survivability testing and meet MIL-STD-461G. Accurate gain adjustment can be achieved by digital programming via the output connector of the unit, removing the need for any mechanical adjustment and allows for a hermetic seal. Units are field programmable with the use of an external programmer, Endevco Model 4876-KIT.

The 2680BM1-XXX through 2680BM7-XXX models have two outputs, a biased output and an unbiased output. Both outputs are adjustable with a common gain control. The M1 through M7 defines the charge gain per Table 1. The 2680BM12-XXX has has two outputs, a biased low gain output with a gain range of 1-10 mV/pC, and a biased high gain output with a gain range of 10-100 mV/pC. Both outputs are adjustable with a common gain control. The 2680BM14-XXX has two outputs, an unbiased, low gain output with a gain range of 1-10 mV/pC, and an unbiased high gain output with a gain range of 10-100 mV/pC. Both outputs are adjustable with a common gain control. The -XXX describes the upper cutoff frequency (-5% point) per Table 2. For example, a -103 has a low pass filter which is flat up to 10,000 Hz, a -502 has a low pass filter which is flat up to 5000 Hz.

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The following performance specifications are typical values, referenced at +75˚F (+24˚C) and 100 Hz, unless otherwise noted. Calibration data, traceable to National Institute of Standards and Technology (NIST), is supplied.

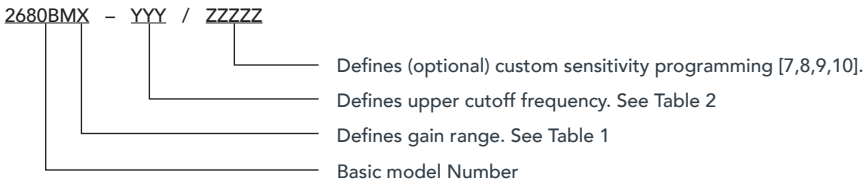
Specifications

Inputs		
Type	Piezoelectric single-ended with one side connected to signal ground	
Source resistance	See Figure 1	
Source capacitance	10 000 pF max	
Overload recovery	A half sine pulse of 1ms duration and with an amplitude as specified in Table 1 (or less) will cause no spurious effects at the amplifier output other than clipping.	
Outputs		
Type	Both biased and unbiased outputs are single-ended with one side connected to circuit ground.	
Load impedance	The parallel combination of both outputs load resistors shall be 10 kΩ or greater to meet all specifications.	
Output impedance	Biased output	50 Ω max, direct coupled
	Unbiased output	50 Ω max, in series with at least 22 µF
DC output bias voltage	Biased output	2.50 V ±3% with load resistances of 10 kΩ minimum
	Unbiased output	0.00 V +0.050 V / -0.00 V
Linear output voltage	Biased output	4.65 V pk-pk minimum with 10 kΩ load
	Unbiased output	4.65 V pk-pk minimum with 1 MΩ load
		4.25 V pk-pk minimum with 10 kΩ load
Limited output voltage (biased output)	0 to 8 V	
Limited output current (both outputs)	0.465 mA pk-pk minimum with 10 kΩ load	
Transfer Characteristics		
Gain range	Digitally Adjustable as specified in Table 1	
Overall gain accuracy	1% @ 100 Hz for any setting within adjustment range	
Gain stability	0.05% maximum change per 1000 pF change in shunt capacitance at the input	
Gain stability with supply voltage	0.10% maximum with changes in supply voltage over the specified limits	
Gain stability vs. temperature	±3% max over operating range	
Frequency response	See Table 2	
Amplitude linearity	±0.1% of reading from best fit straight line approximation	
Total Ouput Noise	See Table 4	
Shock and vibration sensitivity	0.01 pC/g maximum RTI	
Environmental Characteristics		
Temperature	Operating	-67°F to 212°F (-55°C to 100°C)
	Storage	-85°F to 257°F (-65°C to 125°C)
Humidity	Hermetically sealed in accordance with MIL-STD-202G, Method 112E, Test Condition C, Procedure IIIC	
Altitude	No effect.	
Vibration	120 mils D.A.	5 Hz to 55 Hz
	20 g	55 Hz to 2000 Hz
Shock	100g, 6.5 millisecond sawtooth	
EMC capability	MIL-STD-461G: Table V for Internally located DC Powered Equipment on Air Force Aircraft	
Power		
Voltage	20 to 32 VDC (28 VDC nominal)	
Quiescent Current	4 mA typical (15 mA max)	
Polarity protection	Not damaged by a polarity reversal of the 28 V supply	
Case isolation	Case and signal grounds isolated from each other by 50 MΩ or greater at 50 VDC	
Physical Characteristics		
Dimensions	1.00" l x 1.00" w x 0.75" h (25.4 mm x 25.4 mm x 19.1 mm) exclusive of mounting flange and connectors	
Mounting	Unit mounts with two 6-32 screws	
Case material	Aluminum with tin plated finish	
Weight	34 grams, max	
Connectors	Input	10-32 coaxial
	Output	Glenair 800-013-03ZL6 7-pin
		Compatible with Glenair 800-006-**-*-6-7(S/B/H)N through 800-009-**-*-6-7(S/B/H)N mating plugs

Accessories	
Description	**2680BM1-BM7, 2680BM12, 2680BM14**
EDVEHW172 - Lockwasher, #6, QTY 2	Included
EDVEH293 - Screw, CAP 6-32 X 3/4, QTY 1	Included
EDVEH535 - Screw, CAP 6-32 X 1/4, QTY 1	Included
4876-KIT - 2680B gain programmer	Optional
EDVEJ1125 - Mating connector - Glenair 800-008-06Z16-7SN	Optional

Notes

1. Maintain high levels of precision and accuracy using Endevco's factory calibration services. Call Endevco's inside sales force at 866-ENDEVCO for recommended intervals, pricing and turn-around time for these services as well as for quotations on our standard products.
2. 3rd order Butterworth filter
3. Relative to response at 100Hz
4. nF refers to total input capacitance (sensor + cable)
5. Sensitivity as defined in mV/pC
6. Model number definition:



7. Default sensitivity at shipment is the minimum value in the range
8. Alternate sensitivity settings require Model 4876-KIT programmer or custom factory programming
9. Custom factory programming can be specified with up to 0.3% precision within the model's available sensitivity range, using the below format. Allow an additional ± 1% tolerance for gain accuracy.

   2680BMX YYY / ZZZZ (ZZZZ may be less than 4 digits, depending on request)

   Examples:
   2680BM1-501 with custom setting of 0.10 mV/pC (± 1.3%)
   Model Number: 2680BM1-501/0.10

   2680BM3-202 with custom setting of 1.0 mV/pC (± 1.3%)
   Model Number: 2680BM3-202/1.0

   2680BM5-103 with custom setting of 10 mV/pC (± 1.3%)
   Model Number: 2680BM5-103/10

   2680BM7 with a custom setting of 100 mV/pC (± 1.3%)
10. Model Number: 2680BM7/100There is no limit on temporary sensitivity adjustments (resets after a power cycle). However, sensitivity can only be "burned in" (persists through power cycles) 17 times.

M#	Sensitivity	FSin(p-p)
M1	0.1 to 1 mV/pC	50,000pC to 5,000pC
M3	0.5 to 5 mV/pC	10,000pC to 1,000pC
M5	2 to 20 mV/pC	2,500pC to 250pC
M7	10 to 100mV/pC	500pC to 50pC
M12 & 14	1 to 100 mV/pC	5,000pC to 50pC

Table 1: Sensitivity ranges [7,8,9, 10]

Dash No.	Lower cutoff freq. [-5%]	Upper cutoff freq. [-5%]	-3dB typical	-12dB typical
501	5 Hz	500 Hz	775 Hz	1.15 kHz
202	5 Hz	2 kHz	3.1 kHz	4.6 kHz
502	5 Hz	5 kHz	7.75 kHz	11.5 kHz
103	5 Hz	10 kHz	15.5 kHz	23 kHz
203, no dash	5 Hz	20 kHz	31 kHz	46 kHz

Table 2: Frequency response [2,3]

Pinout	M1-M7	M12	M14
5	+28V DC	+28V DC	+28V DC
2	SIG & PWR GND	SIG & PWR GND	SIG & PWR GND
3	CASE GND	CASE GND	CASE GND
6	UNBIASED OUTPUT	X1-10 BIASED OUTPUT	X1-10 UNBIASED OUTPUT
1	BIASED OUTPUT	X10-100 BIASED OUTPUT	X10-100 UNBIASED OUTPUT
7	Gain prog. TX	Gain prog. TX	Gain prog. TX
4	Gain prog. RX	Gain prog. RX	Gain prog. RX

Table 3: Pinout

M#	Total Input Noise 3Hz-20kHz (pCrms)	Total Output Noise 3Hz-20kHz (uVrms)
M1	0.1pCrms+0.03pCrms/nF	(90 uVrms + 6 uVrms/nF) X Sensitivity
M3	0.02pCrms+0.015pCrms/nF	(20 uVrms + 4 uVrms/nF) X Sensitivity
M5	0.006pCrms+0.008pCrms/nF	(6 uVrms + 3.5 uVrms/nF) X Sensitivity
M7	0.003pCrms+0.006pCrms/nF	(3.2 uVrms + 3.3 uVrms/nF) X Sensitivity
M12 & 14	0.01pCrms+0.01pCrms/nF	(10 uVrms + 4 uVrms/nF) X Sensitivity

Table 4: Typical Noise [4,5]

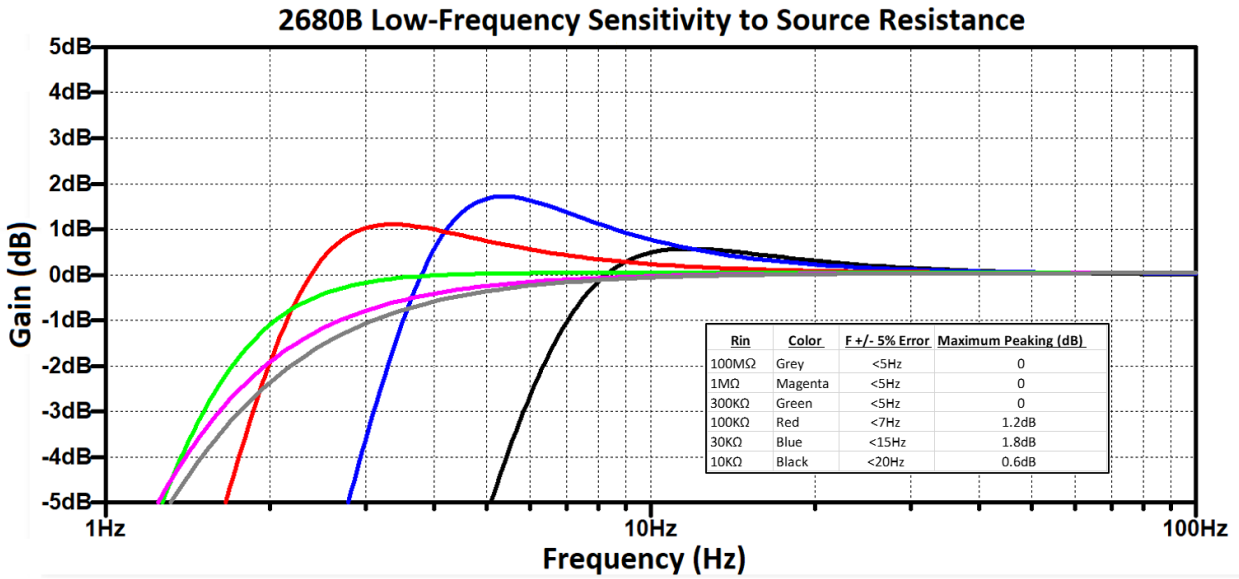


Figure 1: Source Resistance

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