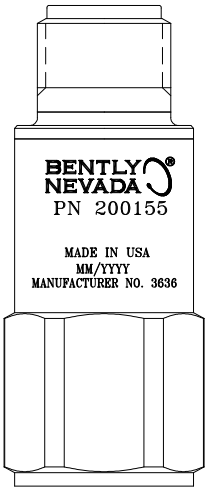
Specifications and Ordering Information

200150, 200155 & 200157 Accelerometers



Description

The 20015x Accelerometers are general purpose, wide frequency, case-mounted seismic transducers designed for use with Trendmaster® proTIMs.

The 200150 Accelerometer also operates with the Trendmaster 2000 system. The accelerometer interfaces with the 200100 Dual Acceleration to Velocity flexiTIM™ Module and the 89130-01 Acceleration-to-Velocity TIM (Transducer Interface Module), as well as the 1900/25 and 1900/27 monitors.

The 20015x Accelerometers feature a hermetically sealed, stainless steel case. This design provides an extremely rugged transducer, well-suited for harsh industrial environments. The transducer's top-mounted, 5-pin connector permits users to easily install and remove the interconnecting signal cable. A 3/8-24 threaded hole on the bottom of the sensor's casing accommodates several mounting options.

The 20015x Accelerometers contain a piezoelectric sensing device, which generates a charge when it is subjected to vibration. The accelerometers electronically convert this charge to a differential voltage signal, which is proportional to the acceleration that is parallel to the sensitive axis of the transducer.

Application Alert

Use of the 200155 and 200157 Accelerometers with 1900 monitors or with TIMs other than those listed in the table below will result in false readings.

Accelerometer	Used with ProTIM Option	Type of Application
200150	Standard Acceleration-to-Velocity channel type (-01)	General Application
200155	Low Frequency Acceleration-to-Velocity channel type (-05)	Fin-Fan, Slow Rotating Shafts
200157	Standard Acceleration-to-Velocity with Acceleration Enveloping channel type (-06)	Roller Element Bearing and Certain types of Cavitation Effects

Application Alert

The acceleration-to-velocity circuitry in the 200200 and 200250 proTIMs will attentuate frequencies above 1 kHz . Attempts to use the 200155 and 200157 to obtain higher frequency information will be ineffective.

Application Alert

The wider frequency range of the 200155 and 200157 Accelerometers may result in increased noise compared to the 200150. The 200155 is the recommended transducer for frequencies of interest below 10 Hz. Use the 200157 only if the application requires acceleration enveloping. Use of the 200155 or the 200157 in place of the 200150 may result in faulty readings. Refer to the proTIM datasheet for the proper frequency response of the system.

Caution

If you plan to use housing measurements for overall protection of the machine, give thought to the usefulness of the measurement for each application. Most common machine malfunctions (imbalance, misalignment, etc.) originate at the rotor and cause an increase (or at least a change) in rotor vibration. For the housing measurement alone to be effective for overall machine protection, the installation must faithfully transmit a significant amount of rotor vibration to the bearing housing or machine casing, or more specifically, to the mounting location of the transducer.

In addition, exercise care in the physical installation of the transducer. Improper installation can degrade the transducer's performance and/or the generation of signals that do not represent actual machine vibration.

Upon request, Bently Nevada can provide engineering services to determine the appropriateness of housing measurements for the machine in question and/or to provide installation assistance.

Application Alert

Operation outside the specified limits will result in false readings or loss of machine monitoring.

SPECIFICATIONS

All specifications are at +25 ºC (+77 ºF), unless otherwise specified.

Electrical

Specification		English Units	SI Units
Sensitivity @ 80 Hz (± 12%)		100 mV/g	10.2 mV/(m/s^2)
Measurement Range	200150	± 25 g	± 245 m/s^2
	200155	± 20 g	± 196 m/s^2
	200157	± 25 g	± 245 m/s^2
Frequency Range (reference to 80Hz)			
	200150 (±10%)	600 to 60,000 cpm	10 to 1000 Hz
	200155 (±10%)	90 to 600,000 cpm	1.5 to 10,000 Hz
	200157 (±10%)	600 to 600,000 cpm	10 to 10,000 Hz
Mounted Resonant Frequency		>1200 kcpm	>20 kHz
Amplitude Linearity (1 to 10g pk)		± 2%	± 2%
Transverse Sensitivity		≤ 7%	≤ 7%
Settling Time (see note below for 200155: within 5% of bias; *)			
	200150	≤300ms	≤300ms
	* 200155	≤ 2.0 sec	≤ 2.0 sec
	200157	≤300ms	≤300ms
Excitation Voltage		4.7 to 5.5 VDC	4.7 to 5.5 VDC
Polarity (acceleration from base to connector)		Sig+ Pos w/ respect to Sig-	Sig+ Pos w/ respect to Sig-
Quiescent Current		<800 µA	<800 µA
Output Bias Voltage		+2.5±0.23 VDC	+2.5±0.23 VDC
Broadband Electrical Noise (1 Hz to 15 kHz)			
	200150	1.5 mg	14.7 mm/sec^2
	200155	2.5 mg	24.5 mm/sec^2
	200157	1.5 mg	14.7 mm/sec^2
Electrical Isolation (Pin to Case)		600 VRMS	600 VRMS

Note: * The long settling time of the 200155 means the accelerometer can only be used with Low Frequency acceleration-to-velocity channel types on a proTIM, DSM, and System 1.

Environmental

Specification	English Units	SI Units
Shock Limit - Axial	5,000 g pk	49,050 m/s^2 pk
Temperature Range	-40 to 221 ºF	-40 to 105 ºC
Sealing (Hermetic)	$3.1X10^{-9}$ atm●in^3/s, max.	$5X10^{-8}$ atm●cc/s, max.
Relative Humidity	100% relative, condensing, non-submerged	

Physical

Specification	English Units	SI Units
Size (Hex x Height)	11/16 in x 1.8 in	17.5 mm x 45.7 mm
Weight (typical)	2.0 oz	58 g
Mounting Thread	3/8-24 Female	Use English Units
Mounting Torque	2 to 5 ft●lb	2.7 to 6.8 N●m
Sensing Element	Ceramic	Ceramic
Sensing Geometry	Shear	Shear
Housing Material	304L Stainless Steel	304L Stainless Steel
Electrical Connector (top)	5-Pin ½ -20	Use English Units

Cables

Specification		English Units	SI Units
Operating Temperature Range		-4 to +212º F	-20 to 100 ºC
		Note: These cables may be used at lower temperatures if the cable is not allowed to move or flex. Flexing these cables at temperatures below –20 ºC (-4º F) may damage the cables.	
Construction		4-conductor, 22 AWG with braided shield and drain wire (85% coverage, minimum), PVC outer jacket. Nickel-plated coupling nuts.	
Seal		Connectors provide an IP67 seal to transducers and mating hardware. Connectors are molded to the cable. Adding DC4 Electrical Insulating Compound in the connectors provides additional protection against moisture during a thermal shock.	
Minimum Bend Radius	200151	2.5 inch	63.5 mm
	200152	2.9 inch	73.7 mm
Maximum Cable Length **		82 ft	25 m

Note: **Longer cable lengths may be available through custom products for the 200150 and 200157 Accelerometers.

Adhesive Specifications (see Mounting Hardware Options below)

Specification	English Units	SI Units
Temperature Range	-67 to +250 ºF	-55 to 121 ºC
Cure Time	24 Hour	24 Hour

HAZARDOUS AREA APPROVALS

Multiple approvals for hazardous areas certified by Canadian Standards Association (CSA/NRTL/C) in North America and by LCIE in Europe.

Approvals	Zone 0, Zone 1, Division 1	Zone 2, Division 2
North American	Ex ia/AEx ia for Class I Zone 0 IIC T4 or Division 1, Groups A,B,C,D, when installed with an approved zener barrier or galvanic isolator per BN drawing 167535. T4 @ Ta = 80 °C (176 °F).	Ex nL/AEx nL Class I Zone 2 IIC T4 or Division 2 when installed without barriers per drawing 167535.
European/CENELEC	EEx ia IIC T4 for Zones 0, 1, and 2, Group IIC, EC certificate number LCIE04, ATEX 6028 X, when installed with intrinsically safe zener barriers or galvanic isolators. T4 @ Ta = 100°C (212 °F).	EEx nL for Class I, Zone 2, Group IIC, EC certificate number LCIE04, ATEX 6027 X.

ELECTROMAGNETIC COMPATIBILITY (CE MARK)

CE:	EMC Directive EN 61000-6-2
Radiated Emissions:	EN 55011 (1998), Class A
Electrostatic Discharge:	EN 61000-4-2 (1995), Criteria B
Radiated Susceptibility:	EN 61000-4-3 (1996), Criteria A
Conducted Susceptibility:	EN 61000-4-6 (1996), Criteria A
Electrical Fast Transient:	EN 61000-4-4 (1995), Criteria B
Surge Capability:	EN 61000-4-5 (1996), Criteria B
Magnetic Field:	EN 61000-4-8 (1998), Criteria A

ORDERING OPTIONS

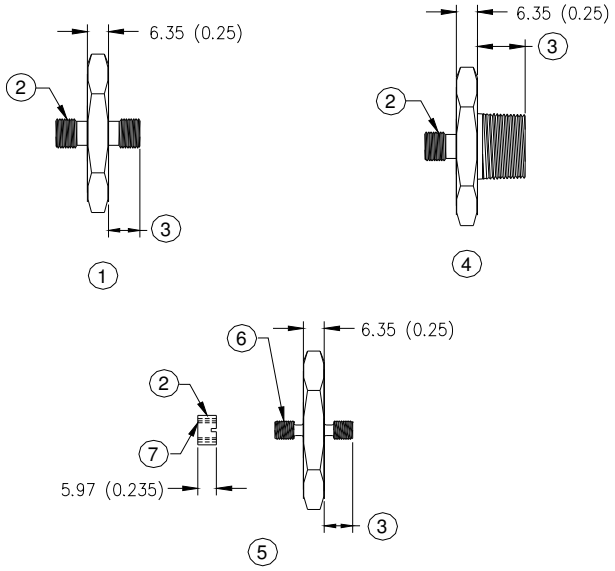
Note: All dimensions are in millimetres (inches) except as noted

(Select one of the accelerometers: 200150, 200155 and 200157)
200150 General Purpose Trendmaster® Pro or Trendmaster® 2000 Accelerometer
200155 Low Frequency Trendmaster® Pro Accelerometer
200157 Enveloping Trendmaster® Pro Accelerometer

Part Number-AA

A: *Mounting Stud Option*
0 0 No Mounting Stud Provided
X X See tables and drawings below

1-3/8 Inch Hex Plate Studs

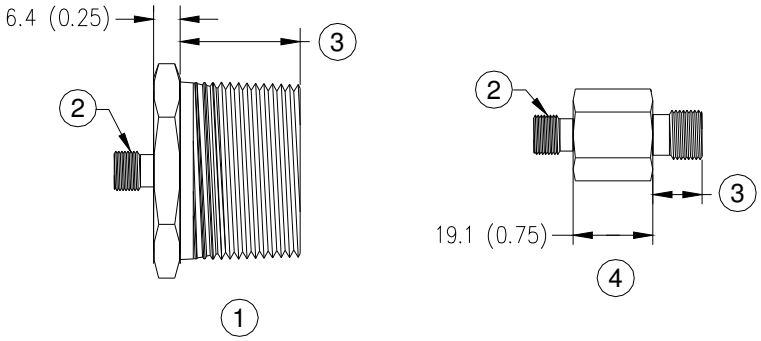


1	AA options 02, 03, 05, and 18	5	AA option 21
2	3/8 – 24 UNF 2A	6	M6 x 1.0 - 6H, 2 places
3	Stud length	7	M6 x 1.0 – 6H
4	AA option 04		

AA option	Thread Size	Maximum Torque*	Stud Length	Hex stud Replacement Part Number
02	3/8-24 to 3/8-24 UNF	22.6 N*m (200 in*lb)	6.0 mm (0.235 in)	107756-01
03	3/8-24 to ½ -20 UNF	22.6 N*m (200 in*lb)	12.1 mm (0.475 in)	107755-01
04	3/8-24 to ¼ NPT	22.6 N*m (200 in*lb)	16.5 mm (0.650 in)	107754-01
05	3/8-24 to ¼-28 UNF	7.3 N*m (65 in*lb)	8.3 mm (0.325 in)	128038-01
17	3/8-24 to 3/8-16 UNC	22.6 N*m (200 in*lb)	10.2 mm (0.400 in)	161961-01
18	3/8-24 to M8x1	10.2 N*m (90 in*lb)	8.3 mm (0.325 in)	125094-01
21	M6x1 to M6x1	3.4 N*m (30 in*lb)	8.9 mm (0.350 in)	107757-01
21	3/8-24 (OD) to M6x1 (ID)	N/A	N/A	87055-01
22	3/8-24 (OD) to M8x1.25 (ID)	10.2 N*m (90 in*lb)	8.3 mm (0.325 in)	125094-02

* Maximum torque value is for a curved mounting surface. For a flat surface, the torque value doubles.

Hex Studs



1	AA options 06 through 11	3	Stud length
2	3/8 – 24 UNF 2A	4	AA options 12 through 16

AA option	Thread Size	Stud Length	Hex Size	Hex Stud Replacement Part Number
06	3/8-24 to 1/4 NPT	18.2 mm (0.715 in)	3/4 in	131563-01
07	3/8-24 to 3/8 NPT	18.4 mm (0.725 in)	3/4 in	131563-02
08	3/8-24 to 1/2 NPT	23 mm (0.905 in)	1 in	131563-03
09	3/8-24 to 3/4 NPT	23.2 mm (0.915 in)	1-1/4 in	131563-04
10	3/8-24 to 1 NPT	28.1 mm (1.105 in)	1-3/8 in	131563-05
11	3/8-24 to 1 1/4 NPT	28.8 mm (1.135 in)	1-3/4 in	131563-06
12	3/8-24 to 1/4–20 UNC	11.6 mm (0.457 in)	3/4 in	131562-01
13	3/8-24 to 5/16-18 UNC	13 mm (0.512 in)	3/4 in	131562-02
14	3/8-24 to 3/8-24 UNF	6.1 mm (0.240 in)	3/4 in	131562-03
15	3/8-24 to 3/8-16 UNC	13.7 mm (0.540 in)	3/4 in	131562-04
16	3/8-24 to 1/2-13 UNC	16.8 mm (0.660 in)	3/4 in	131562-05
19	Quick-Set XDCR Adaptor	6.4 mm (0.250 in)	1 in	138648-01

All of these hex studs are torqued to 16.9 to 22.6 N*m (150 to 200 in*lb)

Adhesive Studs

Adhesive studs are sold in kits containing frames to hold the studs to the substrate while adhesive cures. Also in the kit is a packet of acrylic adhesive and materials to mix its two components. A scouring pad and alcohol wipe are provided for preparing the mounting surface.

AA	Thread Size	Descriptor	Part Number
01	3/8-24	2 Adhesive Mount Frames with Adhesive	04284020
20	3/8-24	1 Magnetic Mount Base	139153-01

Application Alert

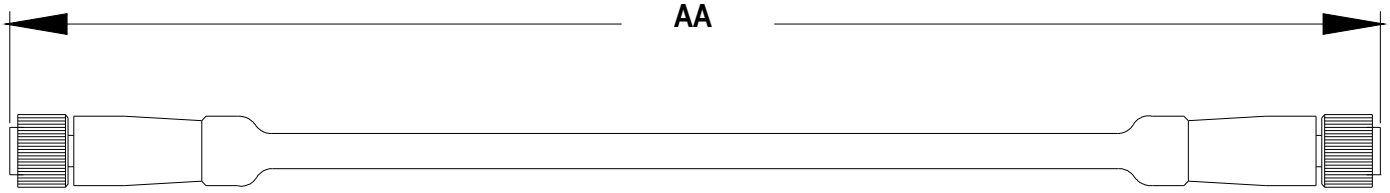
Use of adhesive and magnetic mounts will attenuate high frequency components that may be present.

Accelerometer Interconnect Cables

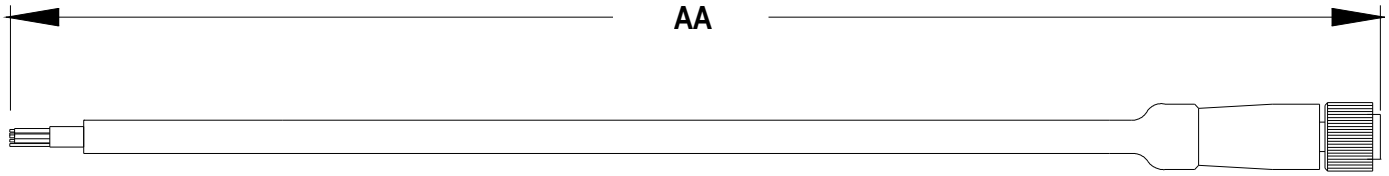
Part Title	Part Number	Notes
Standard Cable; Connector on both ends	**200151 – AA – BB – CC**	AA = 20 = 2.0 METER AA = 40 = 4.0 METER AA = 60 = 6.0 METER BB = 02 = Blue Cable; no Armor BB = 03 = Blue Cable; with Armor CC = 00 = Standard Coupling Nut CC[1] = 10 = Enhanced Coupling Nut CC = 02 = Nylon Coupling Nut
Standard Cable; Connector on one end	**200152 – AA – BB**	AA = 04 = 4.0 METER AA = 15 = 15.0 METER AA = 25 = 25.0 METER BB = 00 = Standard Coupling Nut BB[1] = 10 = Enhanced Coupling Nut

[1]The enhanced coupling nut option allows for better grip while tightening the cable to the accelerometer. The enhanced coupling nut is ONLY on the accelerometer end for cable 200152. For cable 200151 it is provided on both ends if selected.

200151

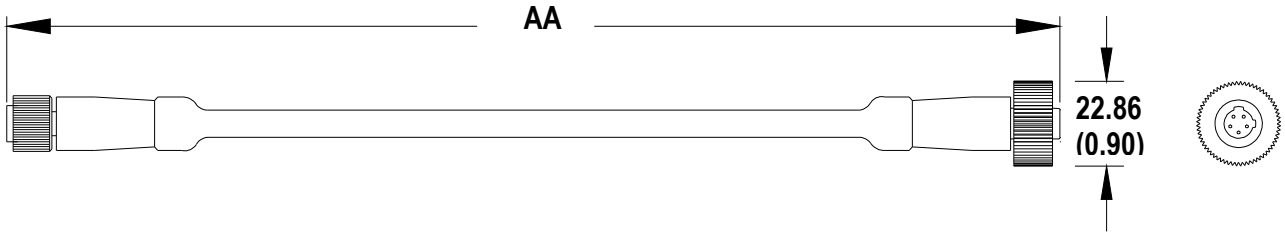


200152

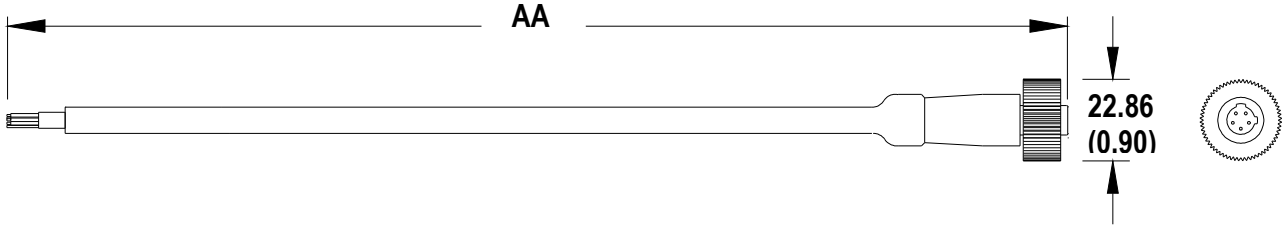


(Standard coupling nut shown without armor)

200151



200152



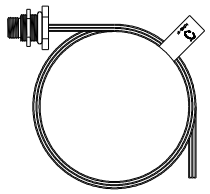
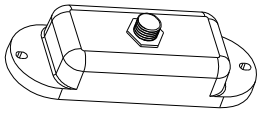
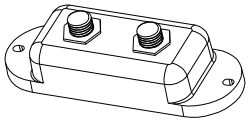
(Enhanced coupling nut shown without armor)

ACCESSORIES

Documentation

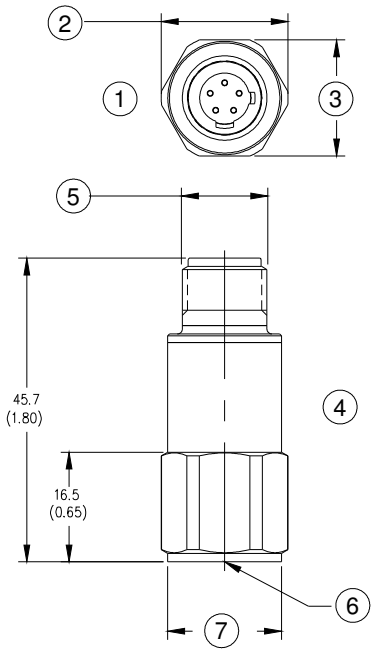
Part Title	Part Number
20015x Accelerometer Manual	**164985-01**
Trendmaster DSM System Manual	**162411**
Trendmaster DSM Datasheet	**149831-01**
ProTIM-R Datasheet	**163662-01**
ProTIM-C Datasheet	**163663-01**
Trendmaster 2000 Manual	**126709-01**
FlexiTIM Datasheet	**141574-01**
FlexiTIM Manual	**137230-01**
1900/25 Manual	**190125-01**
1900/25 Datasheet	**141485-01**
1900/27 Manual	**190127-01**
1900/27 Datasheet	**141486-01**
A-V TIM Datasheet	**141556-01**

Miscellaneous

Part Title	Part Number	Diagrams
Housing Cable Adapter	**142485-01**	
Conduit Cable Adapter; Single	**141887-01**	
Conduit Cable Adapter; Double	**141887-02**	

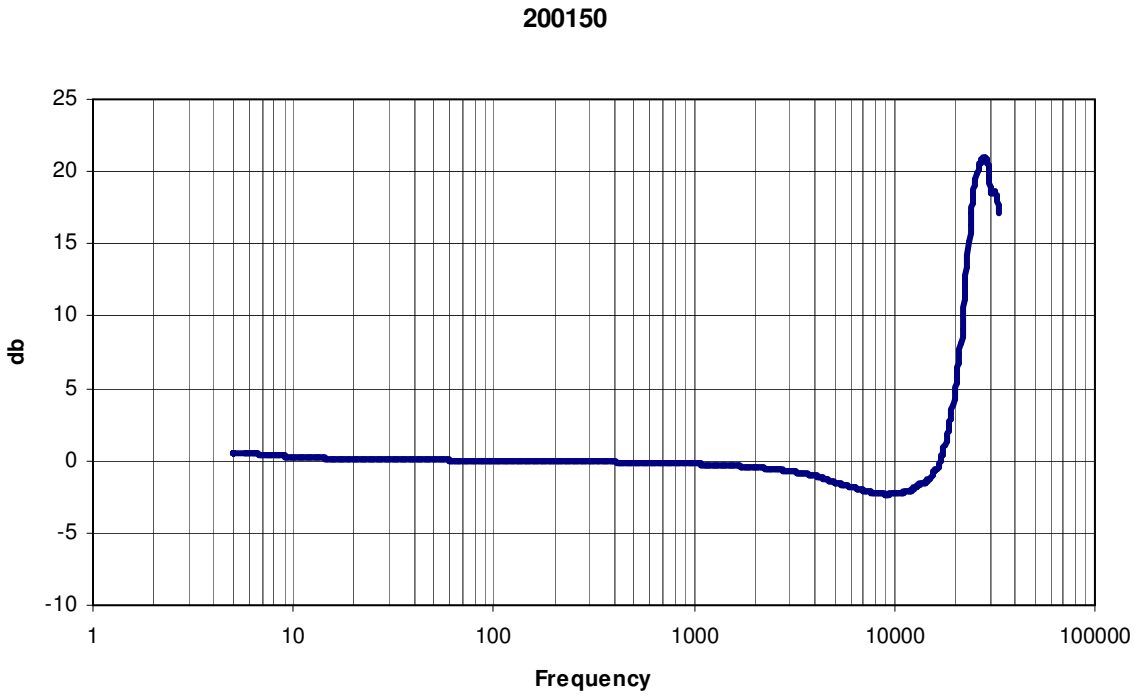
DIMENSIONAL DIAGRAM

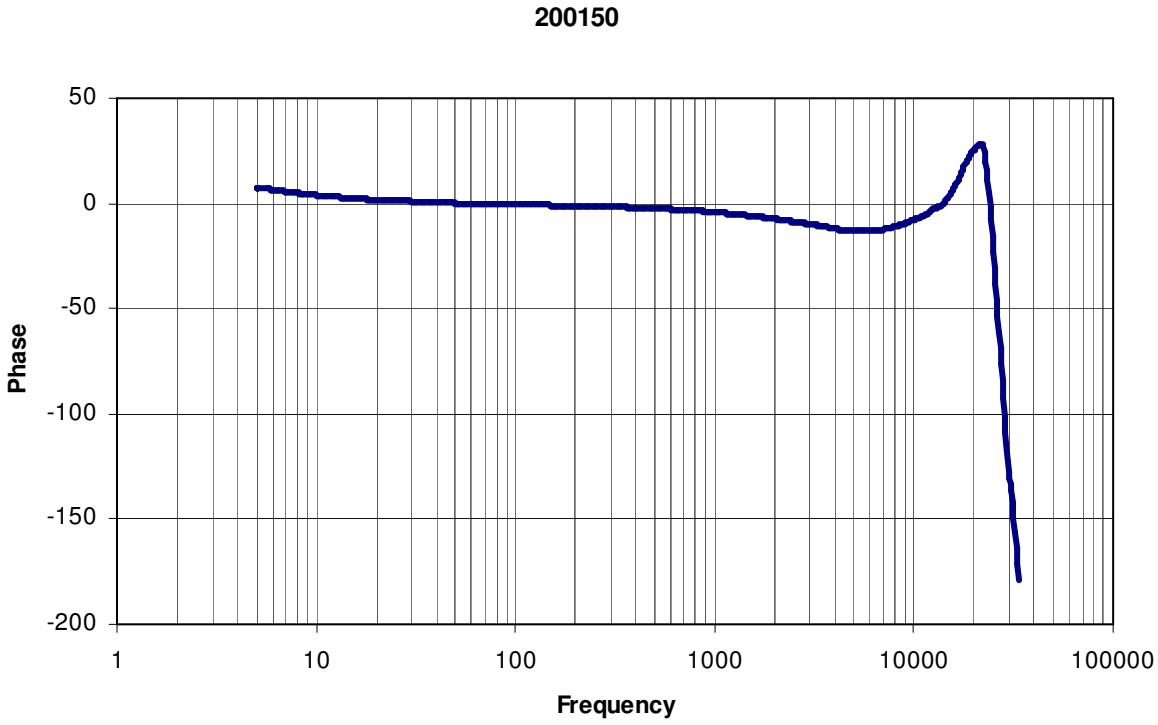
Note: All dimensions are in millimetres (inches) except as noted



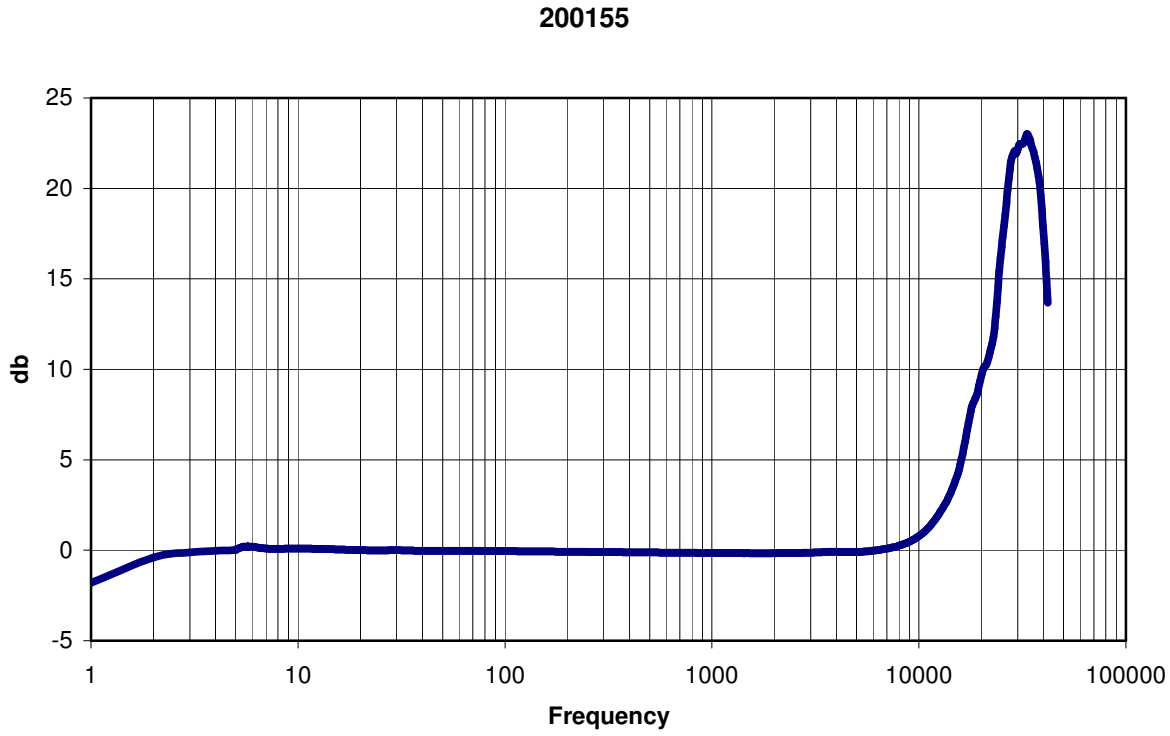
1	Top view	5	1/2 - 20 UNC-2A 5-pin connector
2	19.1 (0.750) diameter across corners	6	3/8 – 24 UNF-2B threads, 7.1 (0.28) deep, minimum
3	11/16 inch hexagonal	7	17 (0.67) diameter, typical
4	Side view		

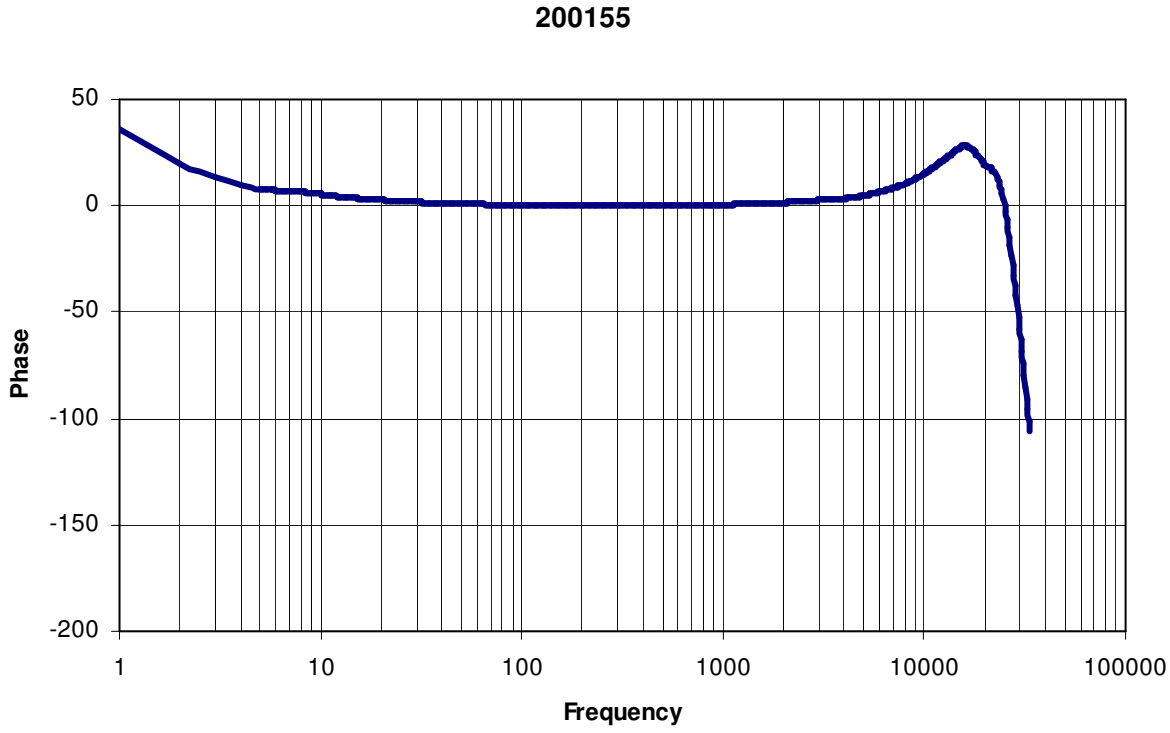
Typical Frequency Response Curves for 200150



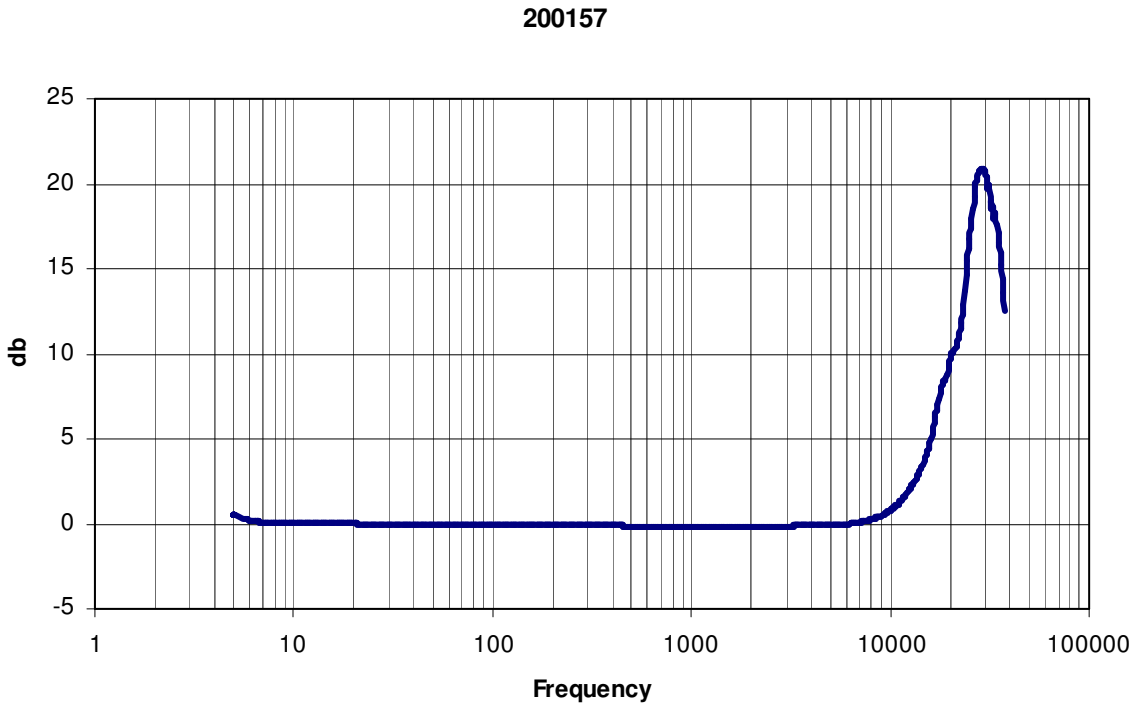


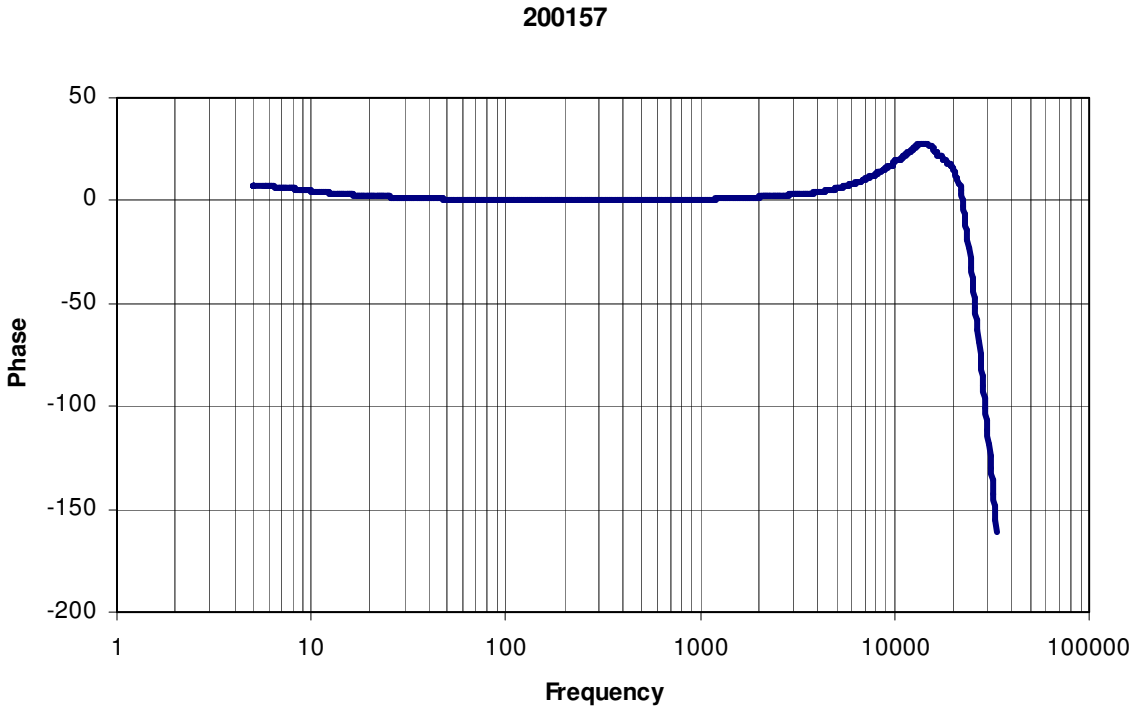
Typical Frequency Response Curves for 200155





Typical Frequency Response Curves for 200157





Typical Temperature Sensitivity Curve for all 20015x