TECHNICAL PRODUCT DATA SHEET

MS18 REGULAR HOUSING

Military Qualified 1x8 GPS Splitter

DESCRIPTION

MS18, a military qualified one-input; eight-output GPS splitter. Typical application is input from an active GPS roof antenna split evenly between eight receiving GPS end-units. The MS18 can be configured to pass DC from an RF output (J2) to the antenna input port (J1) to power an active GPS antenna on that port. The remaining RF outputs (J3 thru J9) feature a 200Ω DC load to simulate an antenna DC current draw for any receiver connected to that port. The MS18 can be configured with a MIL-STD-704 or MIL-STD-1275 compliant 28VDC power supply that will power the active GPS antenna connected to J1.

FEATURES

- Designed and Manufactured to Military Specifications
- Passes GPS GNSS signals
- Gain Flatness (Gain |L1 - L2 | < 3dB)
- Amplified and Custom Gain Options

The MS18 is for military applications and environments where high reliability is required. It has been designed to the following MIL standards.

MIL Standards	
MIL-STD-810	MIL-E-5400
MIL-STD-1472	MIL-HDBK-454
MIL-STD-202	MIL-STD-1587
MIL-STD-883	MIL-STD-461F
MIL-STD-704	MIL-STD-1275B

OPTIONS

Please contact GPS Source via phone, email, or visit the website for further information on product options and specifications.

1. MS18 Specifications

1.1 Electrical Specifications

Table 1-1. Electrical Specifications

Operating temperature -40°C to 85°C

Parameter			Conditions	Min	Typ	Max	Units
Frequency Range			Ant: Any Port; Unused Ports: 50Ω	1.1		1.7	GHz
Gain	Standard	Amplified	Ant: Any Port; Unused Ports: 50Ω	14	15	16	dB
	Custom	Amplified	As Specified (xdB, from 0 to 20dB)	X - 1.5	X	X + 1.5	
Input SWR			All Ports 50Ω			2.0:1	—
Output SWR			All Ports 50Ω			2.0:1	—
Noise Figure	15dB Gain	Amplified	Ant: Any Port; Unused Ports: 50Ω			3.8	dB
Gain Flatness		Amplified	[L1 – L2] Ant: Any Port; Unused Ports: 50Ω			3	dB
Amp. Balance			[J2 – J3] Ant: Any Port: Unused Ports: 50Ω			0.5	dB
Phase Balance			Phase (J2 – J3) Ant: Any Port; Unused Ports: 50Ω			1.0	Degree
Group Delay Flatness			$T_{d,max}$ - $T_{d,min}$; J2 – J1 (Ant)			1.0	nS
Isolation	Normal 15dB Gain	Amplified	Adjacent Ports: Ant – 50Ω	16			dB
			Opposite Ports: Ant – 50Ω	22			
	High 7dB Gain	Amplified	Adjacent Ports: Ant – 50Ω	27			
			Opposite Ports: Ant – 50Ω	31			
Input I_{P3}			Ant: Any Port; Unused Ports 50Ω 1MHz Tone Spacing	-12			dBm
Input P_{1dB}			Ant: Any Port; Unused Ports 50Ω	-22			dBm
Current ($_{internal}$)			Current Consumption of Device (Excludes Draw)			65	mA
Draw Current	Pass DC		Non-Powered Configuration, DC Input on J2			250	mA
	Powered		Powered, Military or Quick Connect Option			60	
Max RF Input		Amplified	Max RF Input Without Damage			30	dBm

Table 1-2. DC IN and OUT Specifications

Parameter		Condition	Min	Typ	Max	Units
DC IN	DC Block	Any DC Blocked Port with a 200Ω Load			14	VDC
	Pass DC	Non-Powered Configuration, DC Input on J2, J3, J4, J5, J6, J7, J8, or J9	5		7	
	Powered	Military Connector MIL-STD-704 & 1275 Normal and Emergency Conditions	9	28	32(1)	
DC OUT(2)	Powered	Military Connection; Antenna thru Current 60mA	5		7	VDC

Notes: 1. The 1275 spike and surge protection assumes a 28V system. 33.3V or greater will trigger over voltage protection circuitry.
2. DC output voltage to the antenna port (J1) can be customized to 5V or 7V (5V default).

1.1.1 Power Connector Options

Figure 1-1. Power Connector Options PMS-1275/XX and PMS-704/XX

Pin	Description	
A	Positive	
B	Ground	

Note: 1. Image is not to scale.
2. Included standard.

1.1.2 Power Connector Options

Figure 1-2. Power Connector Options PMS38999-1275/XX and PMS38999-704/XX

Input	Description	
A	Positive	
B	Ground	
C	No Connect	

Note: 1. Image is not to scale.
2. Not included.

2. Performance Data

2.1 MS18 — Active

Figure 2-1. Active MS18 Splitter: Gain vs. Frequency

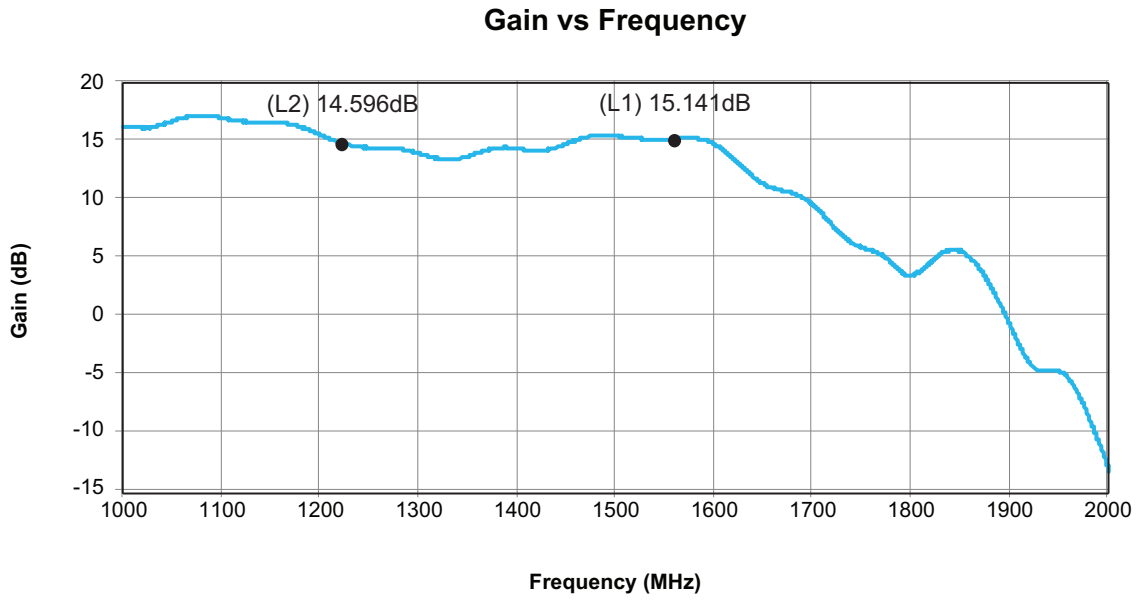
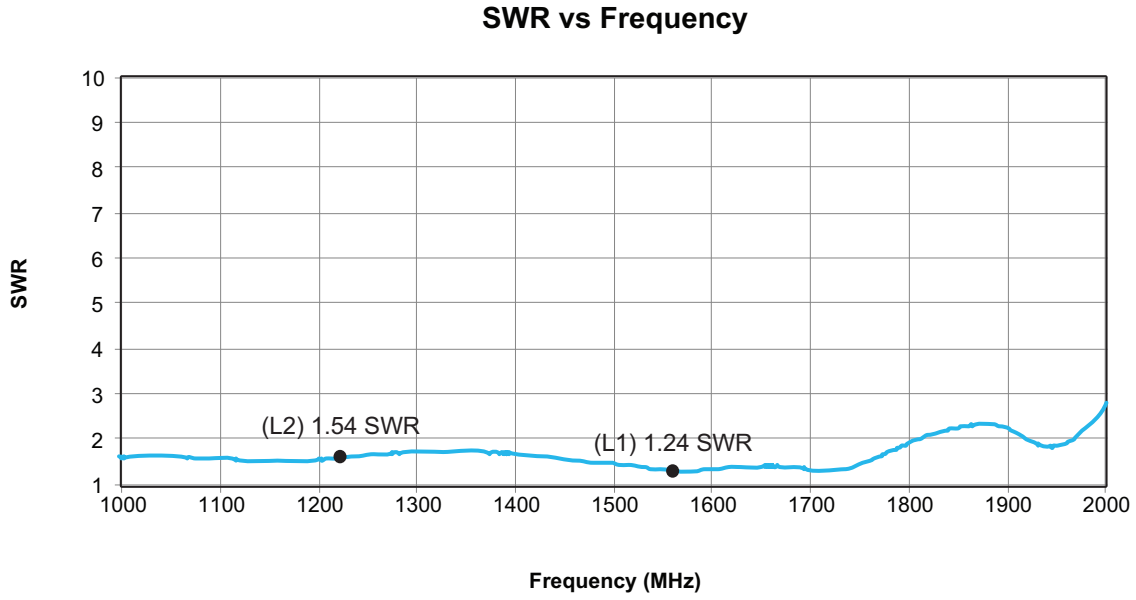


Figure 2-2. Active MS18 Splitter: SWR vs. Frequency



3. Environmental Requirements

3.1 Temperature and Altitude

The MS18 complies with the temperature-altitude tests per MIL-STD-810C, Method 504, Procedure 1 Equipment Category 5.

3.2 Temperature Shock

The MS18 will withstand without degradation (while not operating) Method 503.1, Procedure 1 of MIL-STD-810C.

3.3 Explosive Atmosphere

The MS18-A is designed for operation in the presence of explosive mixtures of air and jet fuel without causing explosion or fire at atmospheric pressures corresponding to altitudes from −1,800 feet to 50,000 feet The MS18 does not produce surface temperatures or heat in excess of 400°F. The MS18 does not produce electrical discharges at an energy level sufficient to ignite the explosive mixture when the equipment is turned on or off or operated. The MS18 is designed to meet the requirements of MIL-STD-810C, Method 511.1, and Procedure II. Hermetically sealed equipment meeting the Requirements of MIL-STD-202, Method 112D, or MIL-STD-883, Method 1014.7 (as applicable), and not exceeding a Helium leakage rate of 1 x 10-7 cc/sec, are exempt from this requirement.

3.4 Decompression

The MS18-A is designed to meet the performance standards per RTCA-DO-160E PARA 4.6.2 cat D during and following a rapid and complete loss of normal cabin compartment pressurization (10,000 ft.) from an airplane flight altitude of 50,000 feet within 15 seconds. The MS18 will remain operating for 5 minutes at 50,000 feet before being returned to normal cabin pressure.

3.5 Overpressure

MS18-A is capable of withstanding, for 10 minutes, while not operating, a 12.1 psi compartment pressure with no physical distortion or permanent set per RTCA-DO-160E PARA 4.6.3. The MS18 will operate satisfactorily upon return to normal pressure.

3.6 Salt Fog

The MS18-A meets the requirements of Salt Fog conditions per Paragraph 3.2.24.9 of MIL-E-5400 and MIL-STD-810C Method 509.1. The MS18 can withstand a salt concentration of 5 percent at a temperature of 35o C for 48 hours without degradation

3.7 Fungus

The MS18-A meets the requirements of Fungus conditions per Paragraph 3.2.24.8 of MIL-E-5400 and MIL-STD-810C Method 509.1 i.e. fungus inert materials per requirement 4 of MIL-HDBK-454.

3.8 Humidity

The MS18-A is capable of meeting the requirements of a ten-day humidity test conducted per MIL-STD-810C, Method 507.1, Procedure I. MS18 can withstand exposure to 95% relative humidity at a temperature of 30o C for 28 days.

3.9 Sand and Dust

The MS18-A meet be capable of meeting the requirements of Sand and Dust conditions of method 510 of MIL-STD-810C, for a temperature of 145°F for duration of 22 hours.

3.10 Flammability

The MS18-A is self-extinguishing or nonflammable and meets the Requirements of Paragraph 5.2.4 of MIL-STD-1587 and requirement 3 of MIL-HDBK-454.

3.11 Finish and Colors

All case surfaces of the MS18-A is treated with chemical film per MIL-DTL-5441, TYPE II, CLASS 3. The MS18-A bottom contact surface is free of paint, or non-conductive finishes. The MS18 bottom contact surfaces are protected from corrosion by a conductive coating (MIL-DTL-5541).All other surfaces, except connector mating surfaces are primed per MIL-PRF-23377, TYPE 1 CLASS C and painted per MIL-PRF-85285, TYPE 1 COLOR NUMBER (26231), military gray (not lusterless variety) per FED-STD-595 (exceptions are bottom and connector surfaces are free of paint).

3.12 Human Factors

Human Engineering principles and criteria (including considerations for human capabilities and limitations) using MIL-STD-1472 in all phases of design, development, testing, and procedures development. The design is free of all sharp edges, according to MIL-STD-1472.

3.13 Electromagnetic Interference and Compatibility Test

MS18 perform its intended function, and its operation does not degrade the performance of other equipment or subsystems. The MS18 is designed to meet the following requirements of MIL-STD-461F:

Table 3-1. Compatibility Test

Test	Description	
CE102	Conducted Emissions Power Leads	10kHz to 10MHz
CE106	Conducted Emissions Antenna Terminal	10kHz to 40GHz
CS101	Conducted Susceptibility Power Leads	30Hz to 150kHz
CS103	Conducted Susceptibility Antenna Port	Intermodulation, 15kHz to10GHz
CS105	Conducted Susceptibility Antenna Port	Cross-Modulation, 30Hz to 20GHz
CS114	Conducted Susceptibility Bulk Cable Injection	10kHz to 200MHz
RE102	Radiated Emissions Electric Field	10kHz to 18GHz
RS103	Radiated Susceptibility Electric Field	2MHz to 18GHz
Indirect Lightning(1)	Damped Sinusoidal transients,	RF Leads,10kHz to 100MHz
		Power Leads,10kHz to 100MHz

Note: 1. For additional detail regarding Indirect Lightning, please contact GPS Source.

3.14 Electrical Power Service Conditions

The MS18-A is able to accommodate the +28 VDC aircraft power. Consequently, it must perform its intended function when supplied with the Normal, Emergency and Starting Operation types of electrical power defined by MIL-STD-704F. The transfer operation, as defined by MIL-STD-704F, shall not change the operating mode or damage the MS18-A.

The MS18 is designed to meet the following test requirements of MIL-STD-704F:

Table 3-2. MIL-STD-704F Test Requirements

Paragraph	Description
MIL-STD-704F, 5.3.2	DC Full Performance Characteristics, 28VDC system.
MIL-STD-704F, 5.3.2.1	Normal Operation.
MIL-STD-704F, 5.3.2.2	Abnormal Operation.
MIL-STD-704F, 5.3.2.3 and 5.3.2.4	DC Steady State Voltage in the Emergency or Starting Operation.

3.15 Shock

The MS18 is designed to withstand the shock levels specified in the saw tooth shock pulse parameter specified in Figure 3-1 and Table 3-3. It is designed to meet the requirements of MIL-STD-810C Method 516.2 Proc. III.

Figure 3-1. Peak Shock Levels

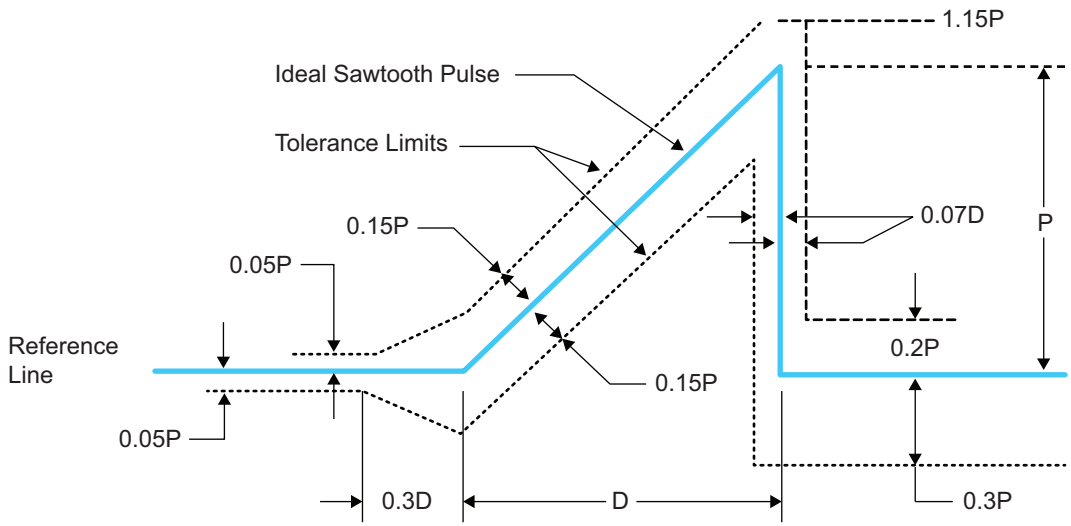


Table 3-3. Peak Shock Levels

Test	Flight Vehicle Equipment	
	Minimum Peak Value (P) g's	Nominal Duration (D) ms
Functional	20	11
Crash Safety	40	11

3.16 Vibration

The MS18 is designed to meet the requirements of random vibration per conditions (MIL-STD-810C, Method 514.2, Procedure 1A) to the levels defined below. Acceleration Power Spectral Density (PSD) for the random vibration envelope is shown in Figure 3-2. Amplitudes for the functional levels and endurance level requirements are as shown in Table 3-4.

Figure 3-2. Zone 3 and 4 Broadband Random Vibration

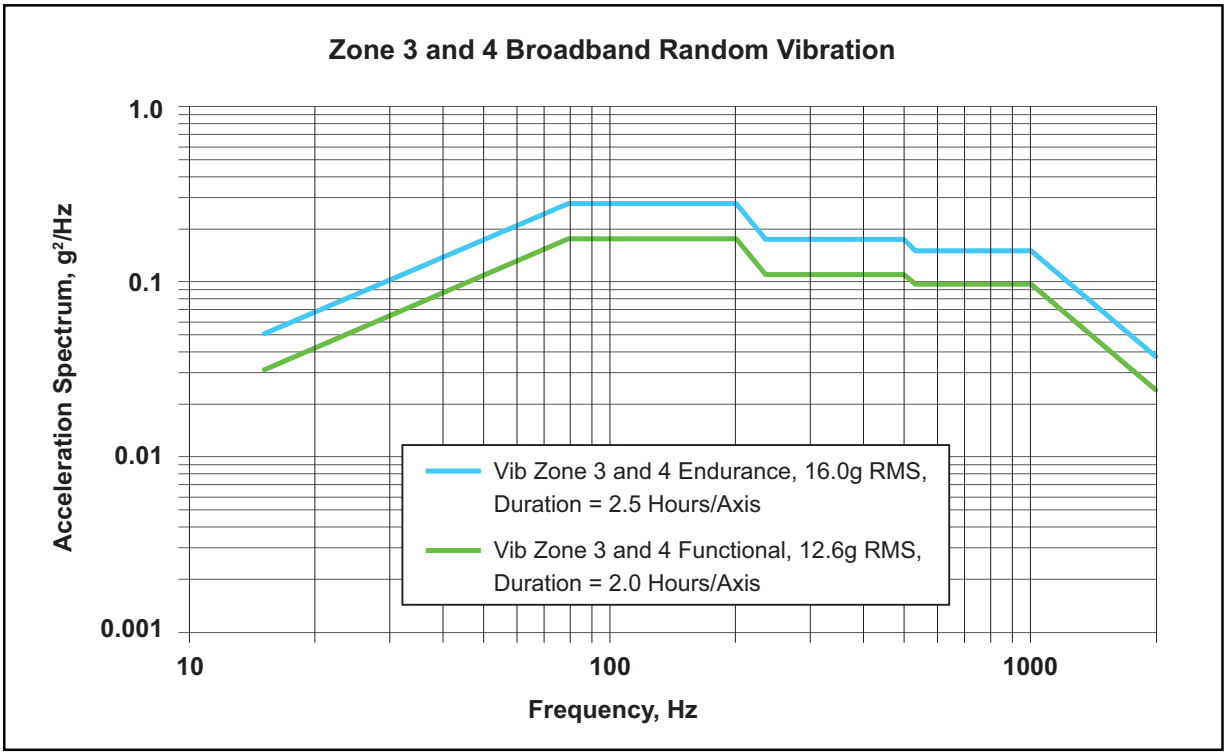


Table 3-4. Vibration Zone 3 and 4

Vibration Zone 3 and 4 Functional, 12.6g RMS Duration = 2 Hours/Axis	
Freq. Hz	**g^2/Hz**
15	0.033
80	0.177
200	0.177
234	0.111
500	0.111
535	0.097
1000	0.097
2000	0.024

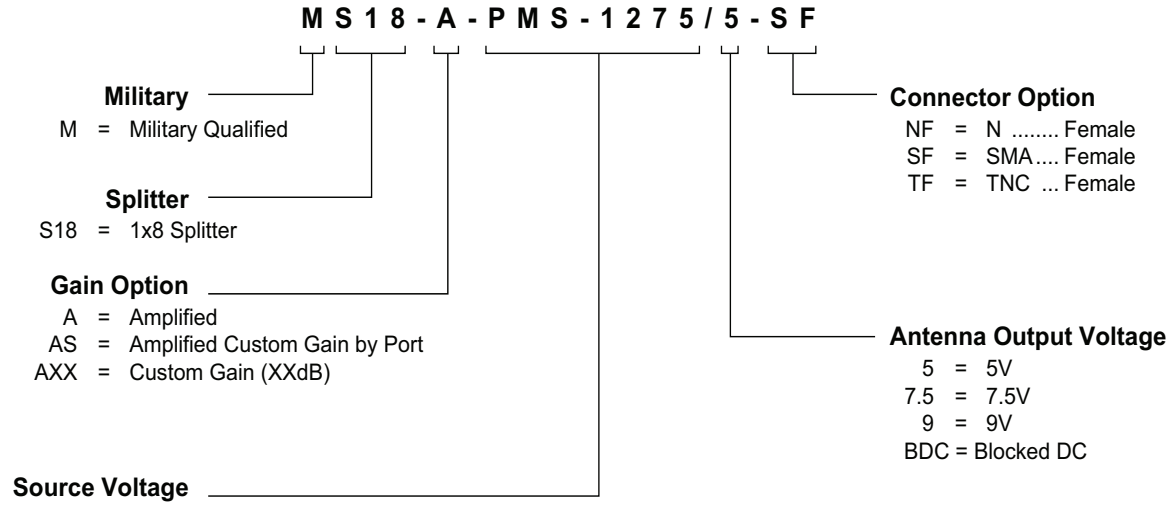
4. Product Options

Table 4-1. MS18 Available Options

Power Supply		
Source Voltage	**Voltage Input**	**Type**
	DC 12-32VDC	Military Style Connector
Output Voltage [1]	**DC Voltage Out**	
	5	
	7.5	
		9
RF Connector		
Connector	**Connector Type**	**Limitations**
	N (Female/Male)	
	SMA (Female/Male)	
	TNC (Female/Male)	
Port [1]		
Pass DC (2)	DC is passed J2 to ANT(J1), J3, J4, J5, J6, J7, J8, and J9 are DC Blocked with 200Ω Load	
DC Blocked (3)	All output ports DC blocked J2 - J9 with 200Ω Load	

Note:
1. Source Voltage Option: Any RF ports (input or output) can be DC Blocked or can pass through the powered DC voltage.
2. J10 is not mounted with inline voltage.
3. When J10 (external power) is mounted all outputs are DC blocked standard.

5. Product Code Decoder



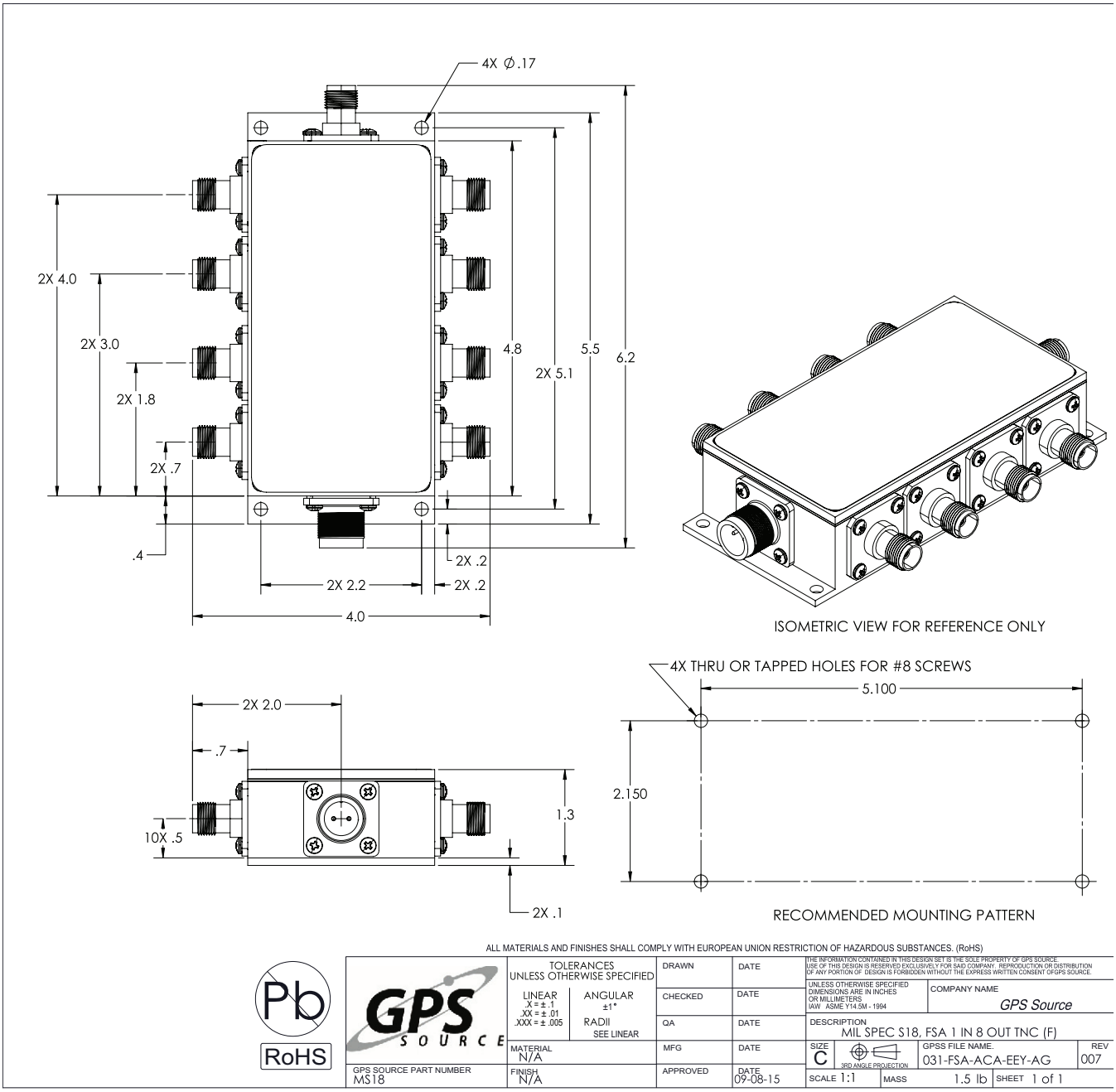
PMS-1275 = Military Connector and 1275B Compliant *(User supplies DC, PM mating connector include standard)*
PMS-704 = Military Connector and 704F Compliant *(User supplies DC, PM mating connector included standard)*
PMS38999-1275 = Military 38999 Connector and 1275B Compliant *(User supplies DC, PM mating connector NOT included)*
PMS38999-704 = Military 38999 Connector and 704F Compliant *(User supplies DC, PM mating connector NOT included)*
Blank = Pass DC J2-Ant (J1), Block DC-J3 thru J9

Notes:
- Use -AXX if all ports are same gain or -AS and prvide gain on each port in description field
- Standard amplification is 15dB
- Custom gain range is 0-20dB
- $50 each tethered load, call for help configuring correct port allocation

Notes: 1. To have product/part codes customized to meet exact needs, contact GPS Source at sales@gpssource.com or visit the website at www.gpssource.com.

6. Mechanical Drawing

MS18 Regular Housing — FSA-ACA-EEY-AG



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