

# MS12

## Military Qualified 1X2 GPS Splitter

### Features

- ❖ **Designed & Manufactured to Military Specifications**
- ❖ **Amplified & Passive Versions Available**
- ❖ **Passes GPS (including M Code), Galileo & GLONASS L1/L2**
- ❖ **Excellent Gain Flatness**  
(Gain |L1 – L2| < 2dB)



### Description

The military qualified MS12 GPS splitter is a one-input, two-output GPS device. This product typically finds application where an input from an active GPS roof antenna is split evenly between two receiving GPS units. The MS12 can be configured to pass DC from an RF output (J2) to the antenna input port in order to power an active GPS antenna on that port. The remaining RF output would feature a 200 Ohm DC load to simulate an antenna DC current draw for any receiver connected to that port. Alternatively, the MS12 can be configured with a MIL-STD-704 or MIL-STD-1275 compliant 28 VDC Power Supply that will power the active GPS antenna connected to J1.

The MS12 splitter comes with many available options to meet your specific needs. Please call, fax, email ([sales@gpssource.com](mailto:sales@gpssource.com)), or visit our website ([www.gpssource.com](http://www.gpssource.com)) for further information on product options and specifications. This device is designed for military applications and environments where high reliability is required.

This device has been designed and/or tested to the following 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

**MS12**

**Electrical Specifications, Operating Temperature -40 to 85°C**

Parameter	Conditions	Min	Typ	Max	Units
Freq. Range	Ant – Any Port, Unused Ports - 50 Ω	1		1.7	GHz
Gain					
-Amplified (Normal)	Ant – Any Port, Unused Ports - 50 Ω	14	15	16	dB
-Amplified (Custom)	As Specified (xdB, from 0 to 15dB)	X-1	X	X+1	dB
Loss-Passive	Ant-Any Port, Unused Ports - 50 Ω	3.5	4	5	dB
Input SWR	All Ports 50Ω			2.0:1	-
Output SWR	All Ports 50Ω			2.0:1	-
Noise Figure-Amplified	Ant-Any Port, Unused Ports – 50 Ω, Gain = 15dB			3	dB
Gain Flatness	L1 - L2 , Ant - Any Port, Unused Ports - 50 Ω				
-Amplified:				2	dB
-Passive:				1	
Amp. Balance	J2 – J3 , Ant-Any Port, Unused Ports - 50 Ω			0.5	dB
Phase Balance	Phase (J2 – J3), Ant - Any Port, Unused Ports - 50 Ω			1.0	Deg
Group Delay Flatness	T <sub>d,max</sub> - T <sub>d,min</sub> , J2 – J1 (Ant)			1	ns
Isolation					
-Amp/Pass(Norm) (Gain = 15dB)	Opposite Ports: Ant - 50Ω	16			
-Amplified (Hi Iso.) (Gain=8dB)	Opposite Ports: Ant - 50Ω	27			dB
Output IP <sub>3</sub> (Amplified)	Ant-Any Port, Unused Ports - 50 Ω, Gain = 15dB, Tone spacing = 1MHz		21		dBm
Output P <sub>1dB</sub> (Amplified)	Ant-Any Port, Unused Ports - 50 Ω, Gain = 15dB		8		dBm
DC IN	DC Blk	Any DC Blocked Port with a 200 Ω Load		14	VDC
	Pass DC -Amplified -Passive	5 3.3		7.5 16	VDC
	Powered	16	28	32 <sup>(1)</sup>	VDC
	(Normal & Emergency conditions as defined by MIL-STD-704F)				
DC out (Powered) <sup>(2)</sup>	Amplified, Powered, Mil. Conn., Ant thru current = 75mA	5		7.5	VDC
Current(I <sub>internal</sub> )	Current Consumption of device, excludes Ant. Cur.		45	50	mA
Ant/Thru Current	Pass DC	Non-Powered Configuration, DC Input on J2		250	mA
	Powered	Powered, Mil. Conn. or Quick Connect Option		75	mA
Max RF Input	Max RF input without damage				
-Amplified				20	dBm
-Passive				40	



**Notes:**

1. By design 1275B spike & surge protection assumes a 28 volt system, 33.3 V or greater will trigger over voltage protection circuitry.
2. DC output voltage to the antenna port (J1) may be specified by customer: 5V or 7.5V (default is 5V)
3. Available power connector options

<p>Pin A = Positive Pin B = GND</p> <p>Available with options: -PMS-1275/XX -PMS-704/XX</p>			
<p>Pin A = Positive Pin B = GND Pin C = NC</p> <p>Available with options: -PMS38999-1275/XX -PMS38999-704/XX</p>			

**General Specifications**

**Weight**

The weight of MS12 is **.624** pounds (283 grams)

**MTBF**

Mean Time Between Failure (MTBF) for GPS Source's 1x2 (MS12) military spec splitter (Passive configuration) is 389,141 hours at 29°C and 350,812 hrs at 71°C.

Mean Time Between Failure (MTBF) for GPS Source's 1x2 (MS12) military spec splitter (Active configuration) is 386,470 hours at 29°C and 330,433 hrs at 71°C.

## Environmental Requirements

### Temperature and Altitude

The MS12 complies with the temperature-altitude tests per MIL-STD-810C, Method 504, Procedure 1 Equipment Category 5.

### Explosive Atmosphere

The MS12 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 MS12 does not produce surface temperatures or heat in excess of 400°F. The MS12 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 MS12 meets 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  $1 \times 10^{-7}$  cc/sec, are exempt from this requirement.

### Salt Fog

The MS12 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 MS12 can withstand a salt concentration of 5 percent at a temperature of 35° C for 48 hours without degradation.

### Fungus

The MS12 meets the requirements of Fungus conditions per Paragraph 3.2.24.8 of MIL-E-5400 i.e fungus inert materials per requirement 4 of MIL-HDBK-454.

### Humidity

The MS12 is capable of meeting the requirements of a ten-day humidity test conducted per MIL-STD-810C, Method 507.1; Procedure I. MS12 is designed to withstand exposure to 95% relative humidity at a temperature of 30° C for 28 days.

### Sand & Dust

The MS12 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.

### Vibration

The MS12 meets 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 1. Amplitudes for the functional levels and endurance level requirements are as shown in Table 1.

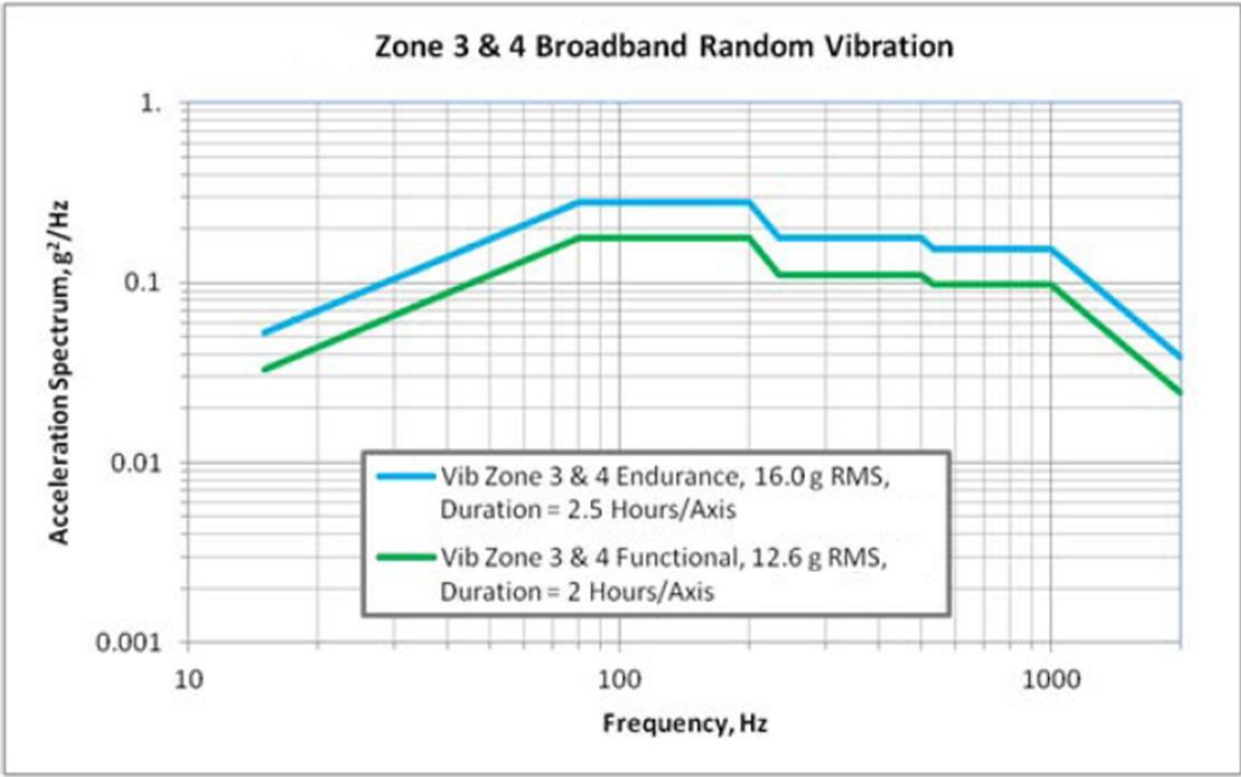


Figure 1

Vib Zone 3 & 4 Functional, 12.6 g RMS, Duration = 2 Hours/Axis	
Freq, Hz	g <sup>2</sup> /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

Table 1

**Shock**

The MS12 is designed to withstand the shock levels specified in the saw tooth shock pulse parameter specified in Figure 2. It is tested to MIL-STD-810C Method 514.2 Proc. IA.

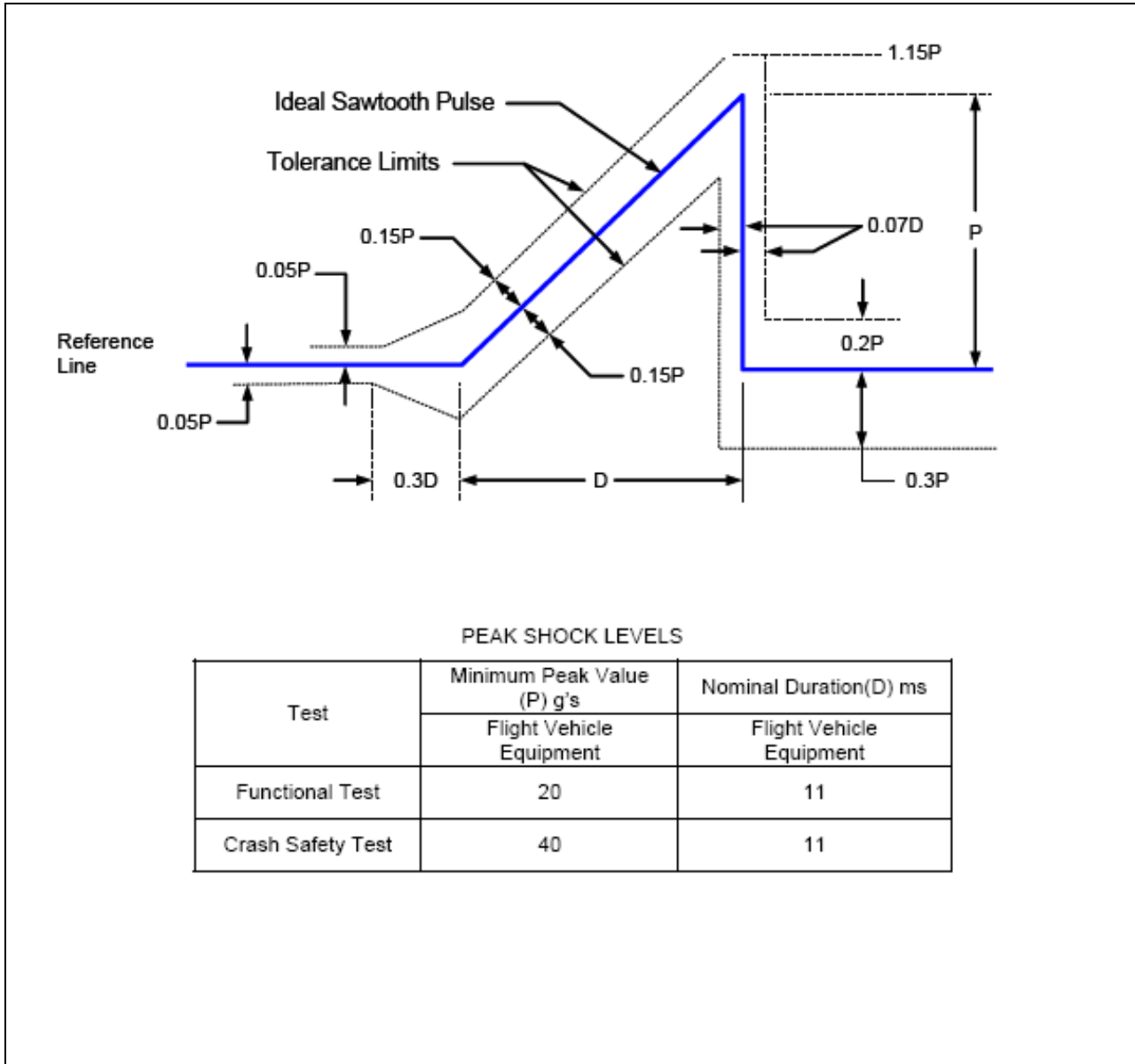


Figure 2

**Decompression**

The MS12 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 MS12 will remain operating for 5 minutes at 50,000 feet before being returned to normal cabin pressure.

**Overpressure**

MS12 is capable of withstanding, for 10 minutes, while not operating, a 12.1 psi compartment pressure with no physical distortion or permanent set RTCA-DO-160E PARA 4.6.3. The MS12 will operate satisfactorily upon return to normal pressure.

**Temperature Shock**

The MS12 is designed to withstand without degradation (while not operating) Method 503.1, Procedure I of MIL-STD-810C.

**Flammability**

The MS12 is self-extinguishing or nonflammable and meet the Requirements of Paragraph 5.2.4 of MIL-STD-1587 and requirement 3 of MIL-HDBK-454.

**Finish and Colors**

All case surfaces of the MS12 are treated with chemical film per MIL-DTL-5441, TYPE II, CLASS 3. The MS12 bottom contact surface is free of paint, or non-conductive finishes. The MS12 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).

**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.

**Electromagnetic Interference and Compatibility Test**

Electromagnetic compatibility requires that the GPS MS12 perform its intended function and that its operation does not degrade the performance of other equipment or subsystems. The following table defines the test requirements and test procedures for conducting the required electromagnetic compatibility testing.

The MS12 is designed and tested to meet the requirements of MIL-STD-461F:

Test	Description
CE102	Conducted Emissions, Power Leads, 10 kHz to 10 MHz
CE106	Conducted Emissions, Antenna Terminal, 10 kHz to 31.5 GHz
CS101	Conducted Susceptibility, Power Leads, 30 Hz to 150 kHz
CS103	Conducted Susceptibility, Antenna Port, Intermodulation
CS105	Conducted Susceptibility, Antenna Port, Cross-Modulation
CS114	Conducted Susceptibility, Bulk Cable Injection, 10 kHz to 200 MHz
RE102	Radiated Emissions, Electric Field, 10 kHz to 18 GHz
RS103	Radiated Susceptibility, Electric Field, 2 MHz to 18 GHz
Indirect Lightning <sup>(1)</sup>	Damped Sinusoidal transients, RF Leads, 10kHz to 100 MHz Damped Sinusoidal transients, Power Leads, 10kHz to 100 MHz

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

**Electrical Power Service Conditions**

The MS12 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 MS12.

The MS12 is designed to meet the following test requirements of MIL-STD-704F:

Paragraph	Description
MIL-STD-704F, 5.3.2	DC Full Performance Characteristics, 28 VDC 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 & 5.3.2.4	DC Steady State Voltage in the Emergency or Starting Operation





Performance Data:

MS12 – Passive

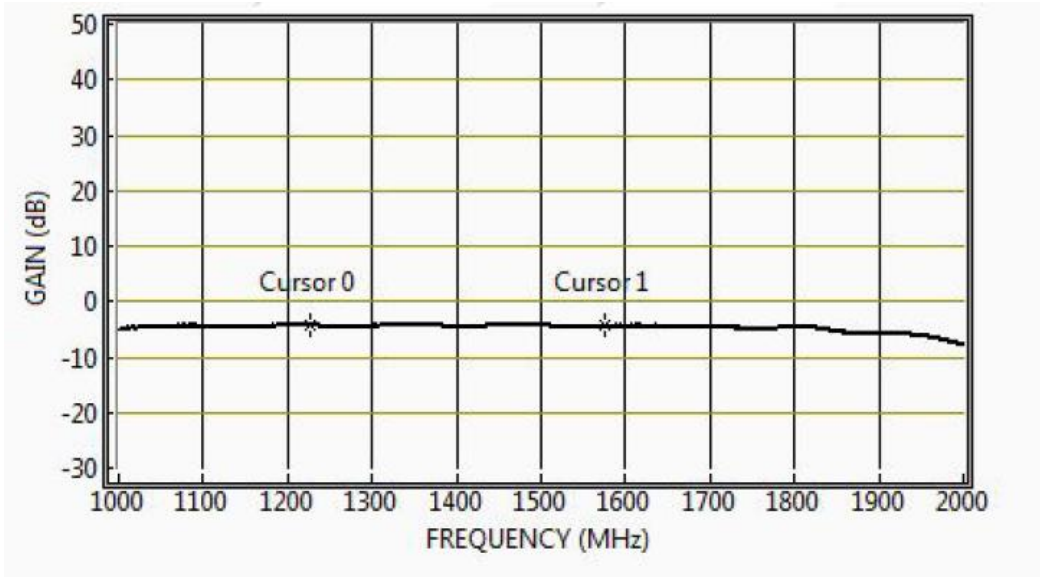


Figure 3. Gain vs. Frequency for Passive MS12 Splitter

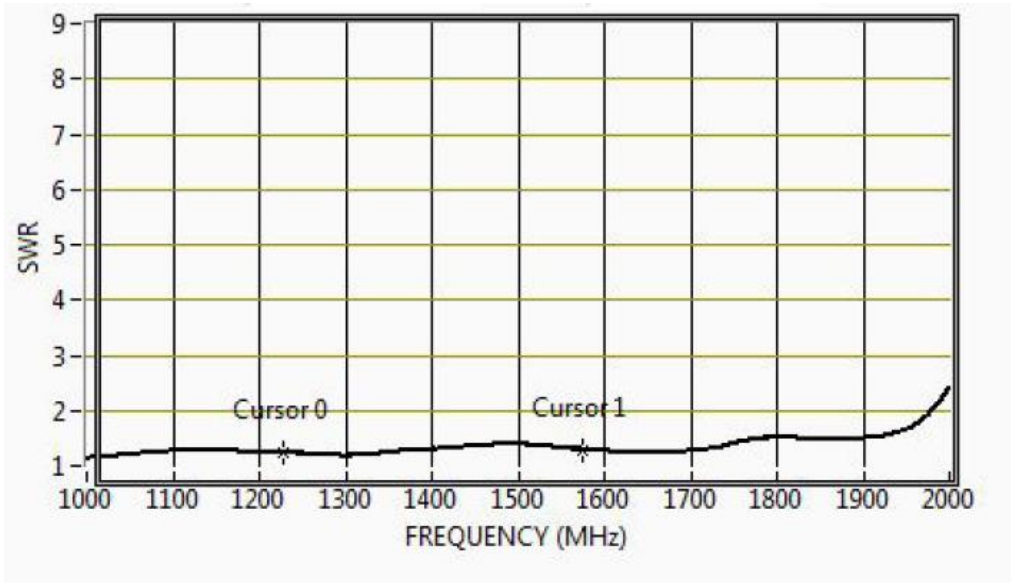


Figure 4. SWR vs. Frequency for Passive MS12 Splitter

MS12 – Active

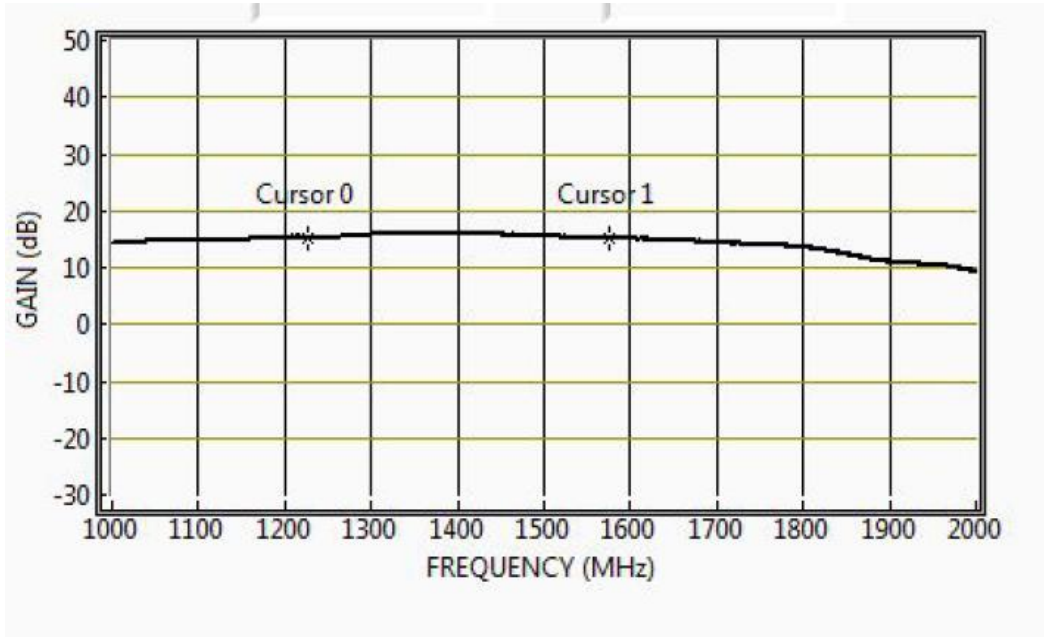


Figure 5. Gain vs. Frequency for Active MS12 Splitter

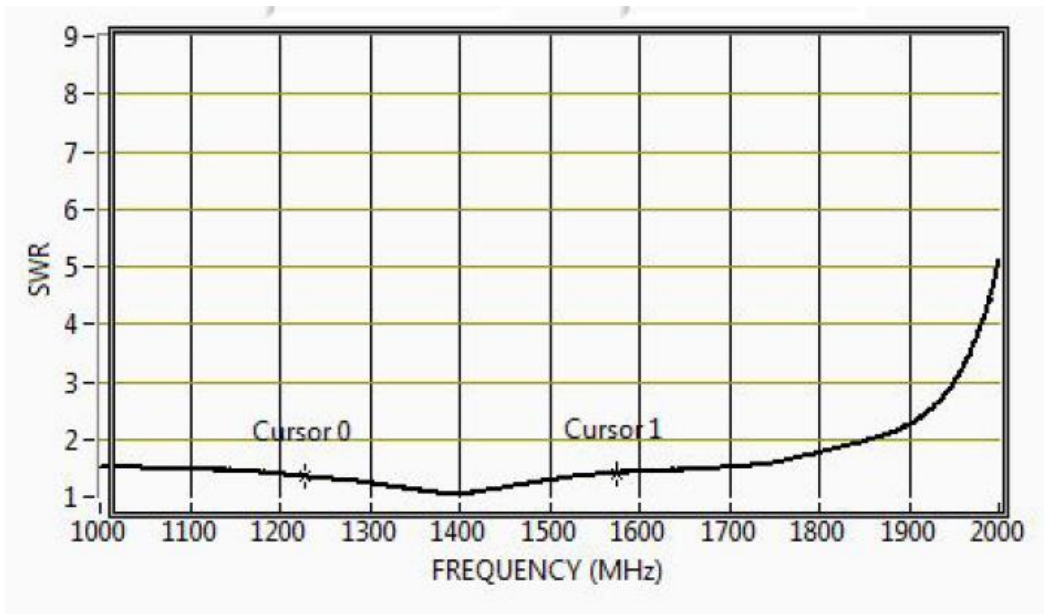


Figure 6. SWR vs. Frequency for Active MS12 Splitter

Available Options:

Power Supply Options:		
Source Voltage Options	Voltage Input	Type
	DC 16-32 VDC	Military Style Connector
Output Voltage Options <sup>(1)</sup>	DC Voltage Out	
	3.3 (Passive Only)	
	5	
	7.5	
RF Connector Options:		
Connector Options	Connector Type	Limitations
	N (Female/Male)	N/A
	SMA (Female/Male)	N/A
	TNC (Female/Male)	N/A
Port Options:		
Pass DC <sup>(1)</sup>	All Ports Pass DC	
DC Blocked <sup>(1)</sup>	J3 is DC Blocked & 200Ω Load, DC is passed J2 to ANT(J1)	

More Notes:

1. With source voltage option, any or all RF ports (input or output) can be DC Blocked or can pass the powered DC voltage



**“CAUTION” --- “ELECTROSTATIC SENSITIVE DEVICE REMOVE ELECTROSTATIC PROTECTION AT USE OR IN PROTECTED AREA REUSE PACKAGING MATERIALS FOR THE UNSERVICEABLE ITEM SEE DOD-HDBK-263 FOR PROTECTIVE HANDLING OR TESTING MEASURES FOR THIS ITEM “**

**Part Number:**

**MS12 – A – PMS / 5 – SF**

Military Qualified 1x2 Splitter  
(Pass DC J2-Ant (J1), Block DC- J3)

Gain Option:  
**A** – Amplified  
**AS** – Amplified Custom Gain by Port  
**AXX** – Custom Gain (XXdB)  
**Blank** – Passive

Source Voltage:  
**PMS-1275** – Military Connector (User supplies DC & 1275B Compliant)  
**PMS-704** – Military Connector (User supplies DC & 704F Compliant)  
**PMS38999-1275** - Military 38999 Connector & 1275B Compliant  
**PMS38999-704** – Military 38999 Connector & 704F Compliant  
**Blank** – Pass DC J2-Ant (J1), Block DC-J3

Output Voltage:  
**(3.3V Passive Only), 5V, 7.5V**

Connector Options:  
**NF** – N, Female  
**SF** – SMA, Female  
**TF** – TNC, Female  
**NM** – N, Male  
**SM** – SMA, Male  
**TM** – TNC, Male

For help in creating the part number to meet your exact needs, contact us at [Sales@gpssource.com](mailto:Sales@gpssource.com) or visit our website at [www.gpssource.com](http://www.gpssource.com).



**Mechanical:**

