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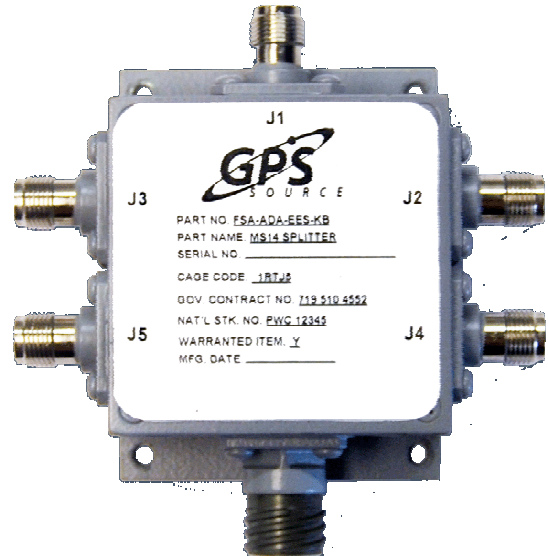*Your source for quality GNSS Networking Solutions and Design Services, Now!*

MS14 Military Qualified Splitter

Technical Product Data

Features

- **Designed & Manufactured to Military Specifications**

- **Amplified & Passive Versions Available**

- **Passes GPS, Galileo & GLONASS L1/L2**

- **Excellent Gain Flatness**
  Gain | L1 - L2 | < 2 dB

Description

The military qualified MS14 GPS splitter is a one-input, four-output GPS device. This product typically finds application where an input from an active GPS roof antenna is split evenly between four receiving GPS units. The MS14 can be configured to pass DC from an RF output (J2) to the antenna input port (J1) in order to power an active GPS antenna on that port. The remaining RF outputs (J3, J4, and J5) would feature a 200 Ohm DC load to simulate an antenna DC current draw for any receiver connected to that port. Alternatively, the MS14 can be configured with a MIL-STD-704 compliant 28 VDC Power Supply that will power the active GPS antenna connected to J1.

The MS14 splitter comes with many available options to meet your specific needs. Please call, fax, email (sales@gpssource.com), or visit our website (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-461
MIL-STD-704	

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Electrical Specifications, Operating Temperature -40 to 85^{0}C

Parameter		Conditions	Min	Typ	Max	Units
Freq. Range		Ant – Any Port, Unused Ports - 50 Ω	1.2		1.7	GHz
Gain -Amplified (Normal)		Ant – Any Port, Unused Ports - 50 Ω	9	10	11	dB
-Amplified (Custom)		As Specified (xdB, 0 to 10dB)	X-1	X	X+1	dB
Loss-Passive		Ant-Any Port, Unused Ports - 50 Ω	6.5	7.5	8.5	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 = 10dB			3	dB
Gain Flatness -Amplified:		|L1 - L2|, Ant - Any Port, Unused Ports - 50 Ω			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		$\tau_{d,max}$ - $\tau_{d,min}$, J2 – J1 (Ant)			1	Ns
Isolation						dB
-Amp/Pass(Norm) (Gain =10dB)		Adjacent Ports Ant - 50Ω	16			
		Opposite Ports: Ant - 50Ω	24			
-Amplified (Hi Iso.) (Gain=3dB)		Adjacent Ports Ant - 50Ω	27			
		Opposite Ports: Ant - 50Ω	31			
Output IP$_3$ (Amplified)		Ant-Any Port, Unused Ports - 50 Ω, Gain = 10dB, Tone spacing = 1 MHz		18		dBm
Output P$_{1dB}$ (Amplified)		Ant-Any Port, Unused Ports - 50 Ω, Gain = 10dB		4		dBm
DC IN	DC Blk	Any DC Blocked Port with a 200 Ω Load			14	VDC
	Pass DC -Amplified	Non-Powered Configuration, DC Input on J2, J3 or J4			16	VDC
	-Passive		5		16	
	Powered	Powered, Mil. Conn. (Normal & Emergency conditions as defined by MIL-STD-704F)	16	28	32$^{(1)}$	VDC
DC out (Powered)[2]		Amplified, Powered, Mil. Conn., Ant thru current = 75mA	5		9	VDC
Current(I$_{internal}$)		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 -Amplified		Max RF input without damage			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, 7.5V or 9V (default is 5V).
3. Available power connector options.

MS3102R10SL-4P Pin A = Positive Pin B = GND	
JD38999/20WA98PN Pin A = Positive Pin B = GND Pin C = NC	

General Specifications

Weight
The weight of MS14 is **.624** pounds (283 grams)

MTBF
Mean Time Between Failure (MTBF) for GPS Source's 1x4 (MS14) military spec splitter (Passive configuration) is 367,456 hours at 29℃ and 332,884 hrs at 71℃.

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Environmental Specifications

Temperature and Altitude
The MS14 complies with the temperature-altitude tests per MIL-STD-810C, Method 504, and Category 5.

Explosive Atmosphere
The MS14 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 MS14 does not produce surface temperatures or heat in excess of 400°F. The MS14 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 MS14 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.

Salt Fog
The MS14 meets the requirements of Salt Fog conditions per Paragraph 3.2.24.9 of MIL-E-5400. The MS14 can withstand a salt concentration of 5 percent at a temperature of 35° C for 48 hours without degradation.

Fungus
The MS14 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. MS14 can withstand exposure to 95% relative humidity at a temperature of 30° C for 28 days.

Humidity
The MS14 is capable of meeting the requirements of a ten-day humidity test conducted per MIL-STD-810C, Method 507.1, Procedure I.

Sand & Dust
The MS14 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 dur ation of 22 hours.

Vibration
The MS14 is designed to meet the requirements of random vibration per conditions (MIL-STD-810C, Method 514.2, and 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 Figure 1.
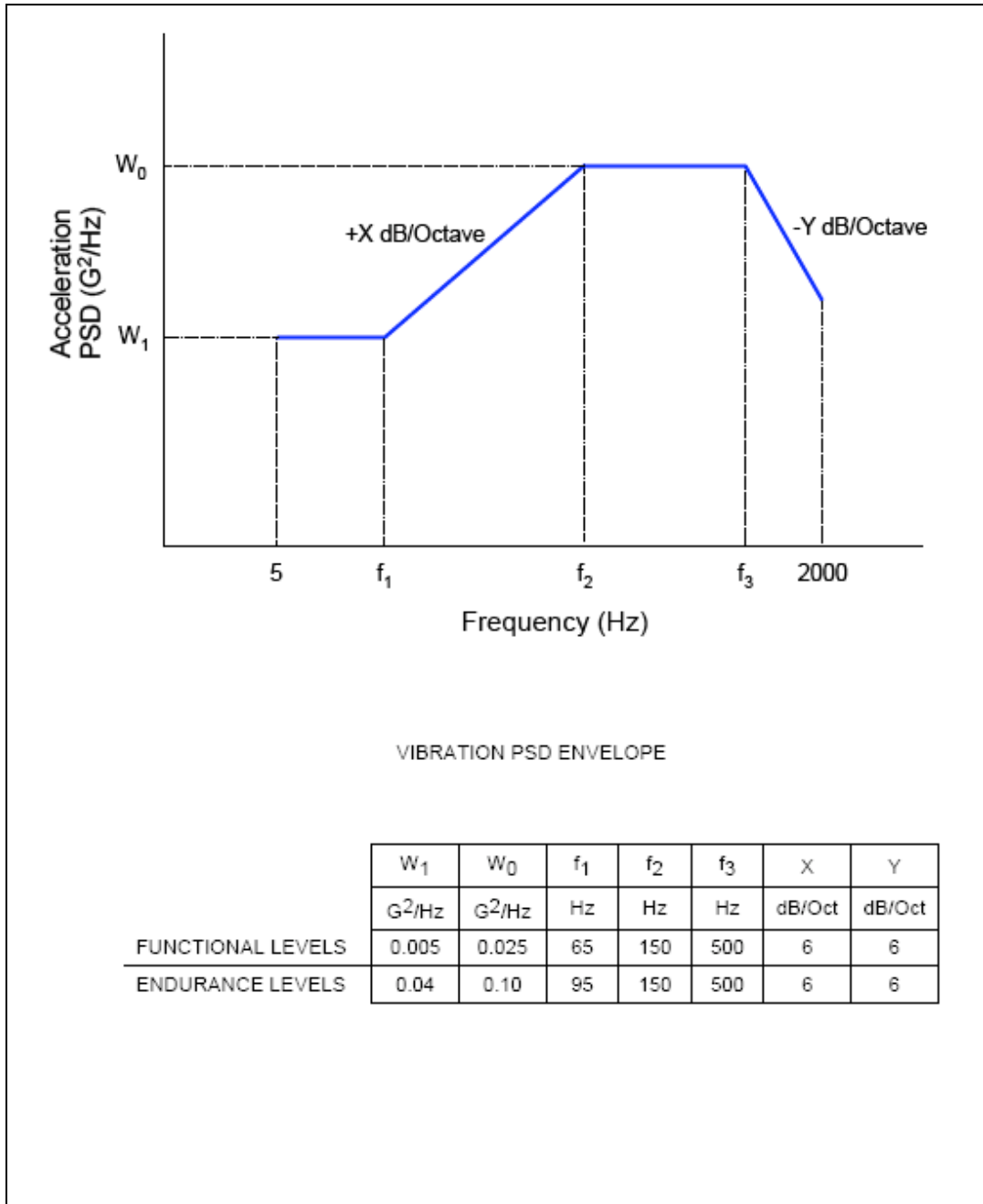
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VIBRATION PSD ENVELOPE

	W_1	W_0	f_1	f_2	f_3	X	Y
	G^2/Hz	G^2/Hz	Hz	Hz	Hz	dB/Oct	dB/Oct
FUNCTIONAL LEVELS	0.005	0.025	65	150	500	6	6
ENDURANCE LEVELS	0.04	0.10	95	150	500	6	6

Figure 1

Shock

The MS14 is designed to withstand the shock levels specified in the
Shock spectrum of Figure 3. and the saw tooth shock pulse parameter specified in Figure 2.
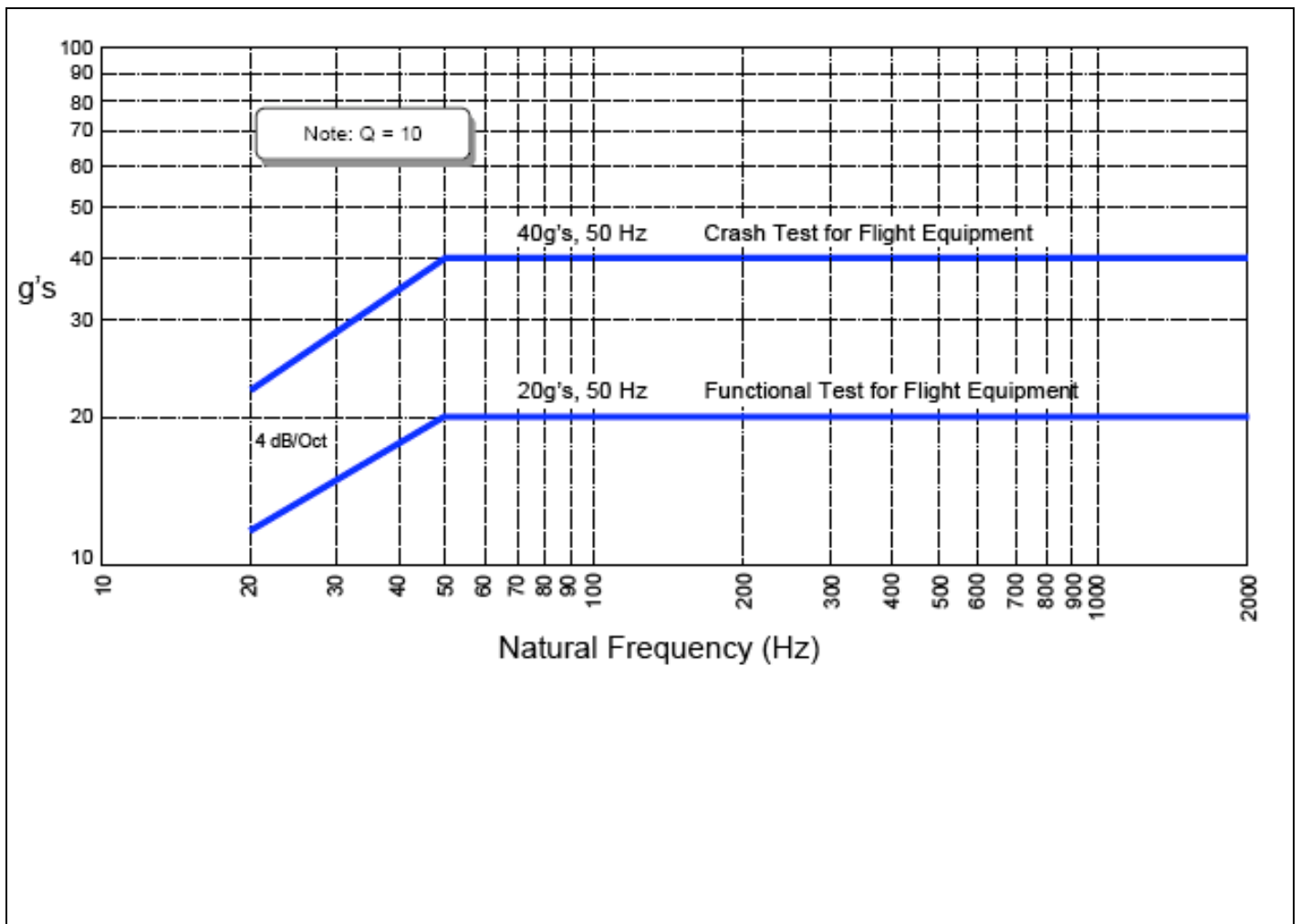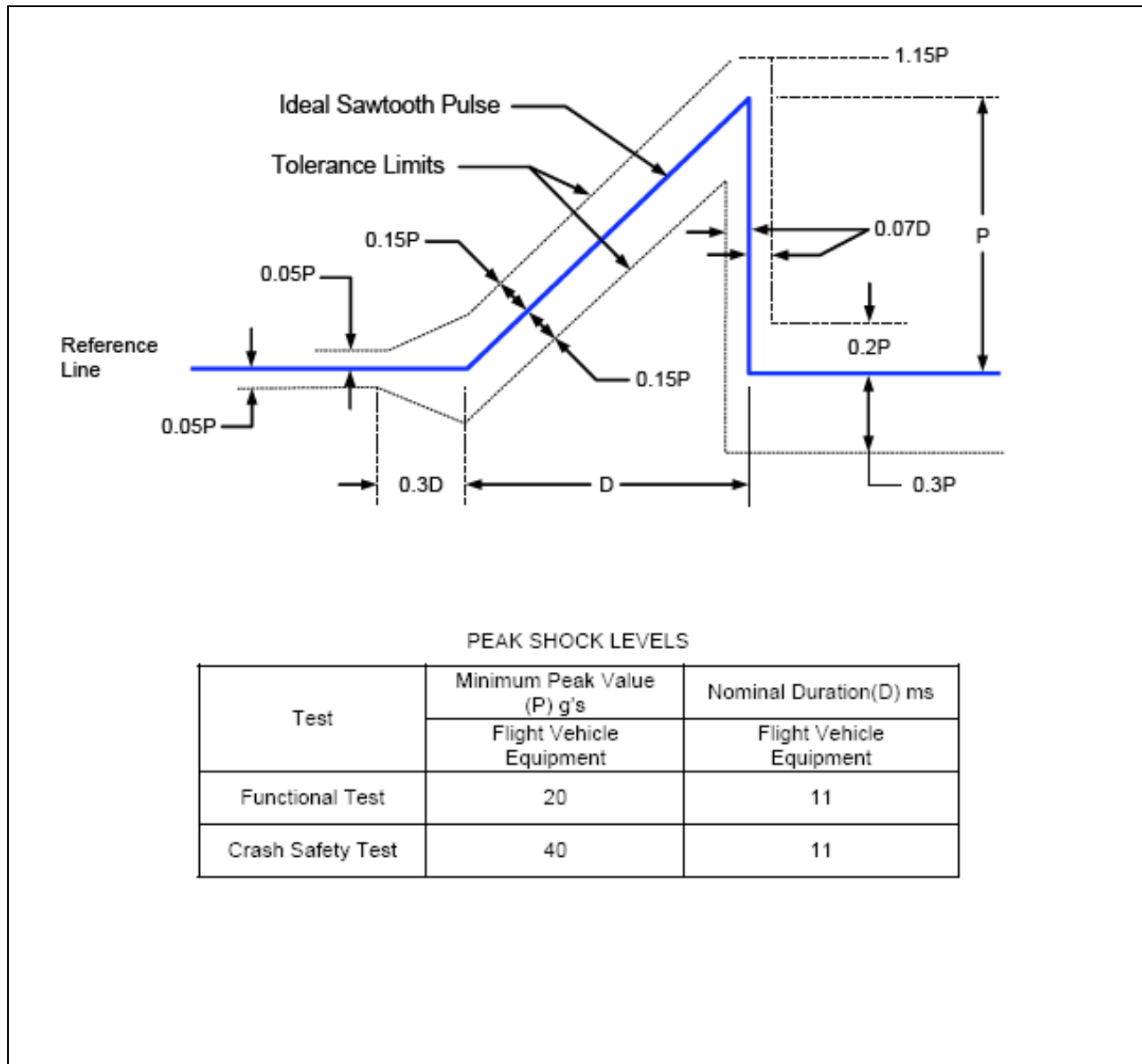

Figure 2

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Ideal Sawtooth Pulse

Tolerance Limits

1.15P

0.07D

P

0.15P

0.05P

0.2P

Reference Line

0.15P

0.05P

0.3P

0.3D

D

PEAK SHOCK LEVELS

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

Figure 3

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Decompression

The MS14 is designed to meet the performance standards 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 MS14 will remain operating for 5 minutes at 50,000 feet before being returned to normal cabin pressure.

Overpressure

MS14 is capable of withstanding, for 3 minutes, while not operating, a 12.1 psi compartment pressure with no physical distortion or permanent set. The MS14 will operate satisfactorily upon return to normal pressure.

Temperature Shock

The MS14 will withstand without degradation (while not operating) Method 503.1, Procedure I of MIL-STD-810C.

Flammability

The MS14 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.

Finish and Colors

All case surfaces of the MS14 is treated with chemical film per MIL-DTL-5441, TYPE II, CLASS 3. The MS14 bottom contact surface is free of paint, or non-conductive finishes. The MS14 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.

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Electromagnetic Interference and Compatibility Test

Electromagnetic compatibility requires that the GPS MS14 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 MS14 is designed to meet the following requirements of MIL-STD-461E:

Test	Description
CE102	Conducted Emissions, Power Leads, 10 kHz to 10 MHz
CE106	Conducted Emissions, Antenna Terminal, 10 kHz to 40 GHz
CS101	Conducted Susceptibility, Power Leads, 30 Hz to 150 kHz
CS103	Conducted Susceptibility, Antenna Port, Intermodulation, 15 kHz to10 GHz
CS105	Conducted Susceptibility, Antenna Port, Cross-Modulation, 30 Hz to 20 GHz
CS114	Conducted Susceptibility, Bulk Cable Injection, 10 kHz to 200 MHz
CS115	Conducted Susceptibility, Bulk Cable Injection, Impulse Excitation
CS116	Conducted Susceptibility, Damped Sinusoidal Transients, Cables and Power Leads, 10 kHz to 100 MHz
RE102	Radiated Emissions, Electric Field, 10 kHz to 18 GHz
RS103	Radiated Susceptibility, Electric Field, 2 MHz to 40 GHz

Electrical Power Service Conditions

The MS14 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 MS14.

The MS14 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

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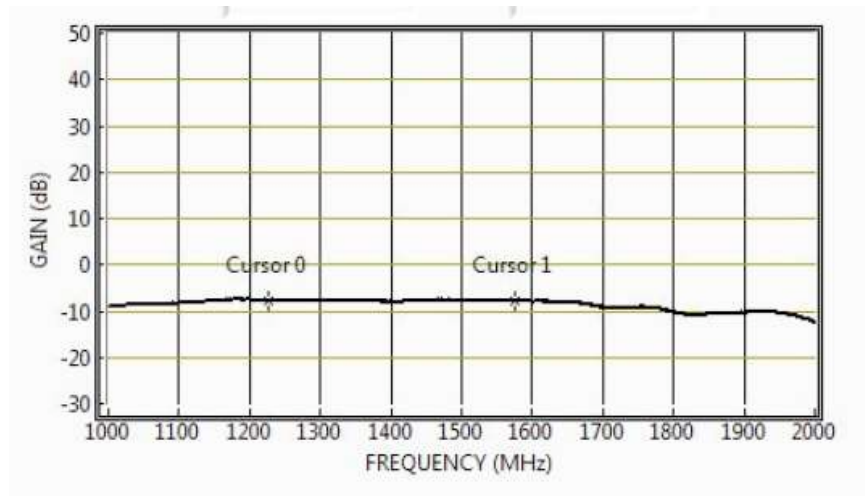
Performance Data:

MS14 – Passive

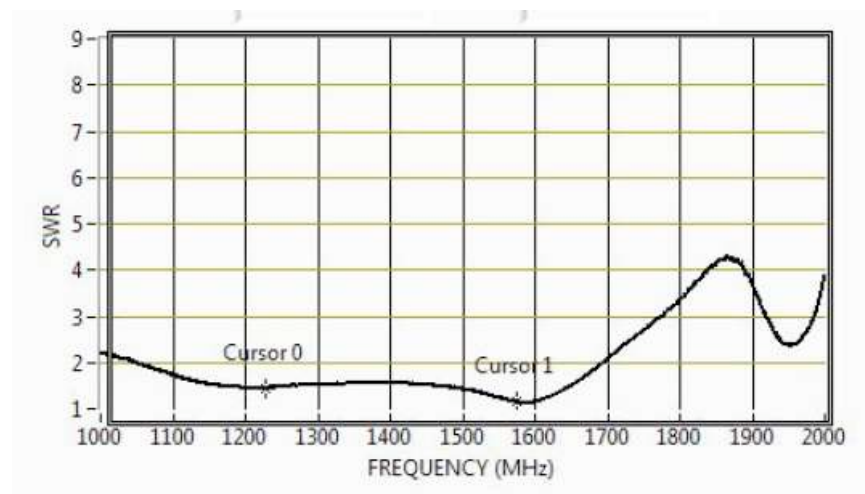Figure 4. Gain vs. Frequency for Passive MS14 Splitter

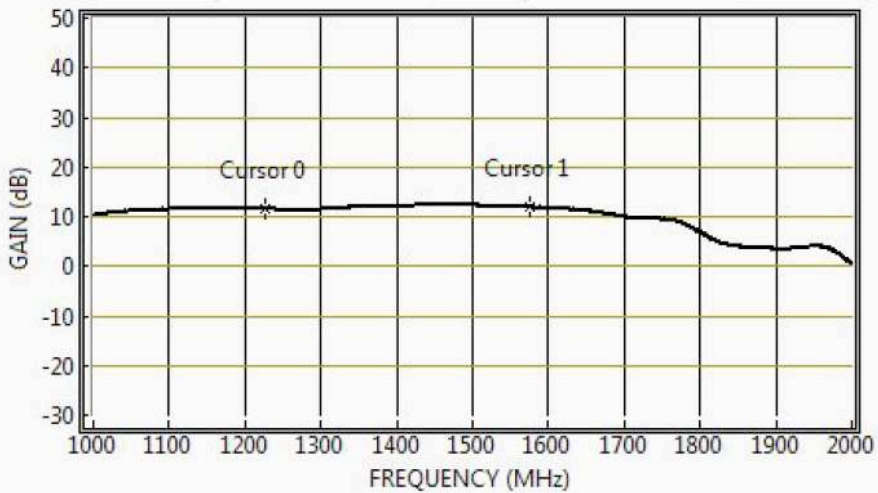Figure 5. SWR vs. Frequency Plot for Passive MS14 Splitter

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MS14 – Active
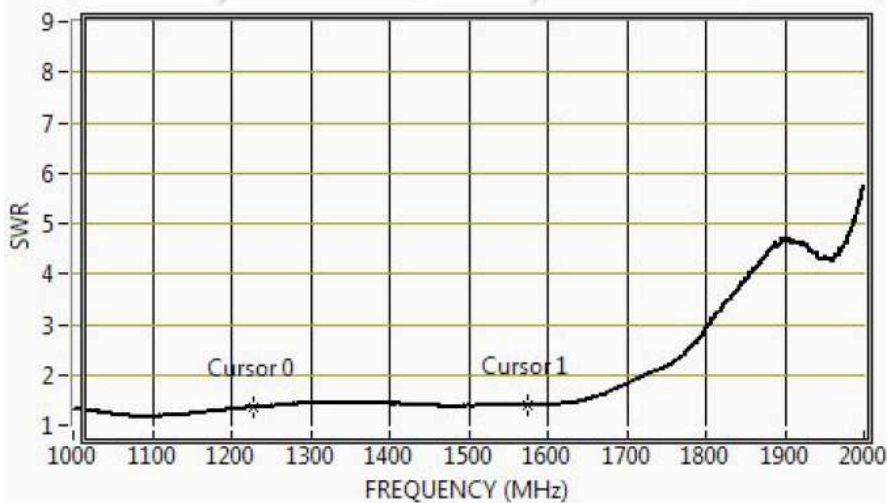

Figure 6. Gain vs. Frequency Plot for Active MS14 Splitter

Figure 7. SWR vs. Frequency Plot for Active MS14 Splitter

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Available Options:

Power Supply Options:		
Source Voltage Options	**Voltage Input**	**Type**
	DC 16-28 VDC	Military Style Connector
Output Voltage Options[1]	**DC Voltage Out**	
	5	
	7.5	
	9	

RF Connector Options:		
Connector Options	**Connector Type**	**Limitations**
	N (Female/Male)	
	SMA (Female/Male)	
	TNC (Female/Male)	

Port Options:	
Pass DC[1]	All Ports Pass DC
DC Blocked[1]	J3,J4,J5 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

Part Number:

MS14 – A – PMS / 5 – SF

Product:
  Military Qualified
  1x4 Splitter
  (Pass DC J2-Ant (J1), Block DC- J3, J4, J5)

Gain Option:
  A – Amplified
  AS – Amplified Custom Gain
  Blank – Passive

Source Voltage:
  PM   – Military Connector (User supplies DC)
  PMS – Military Connector (User supplies DC
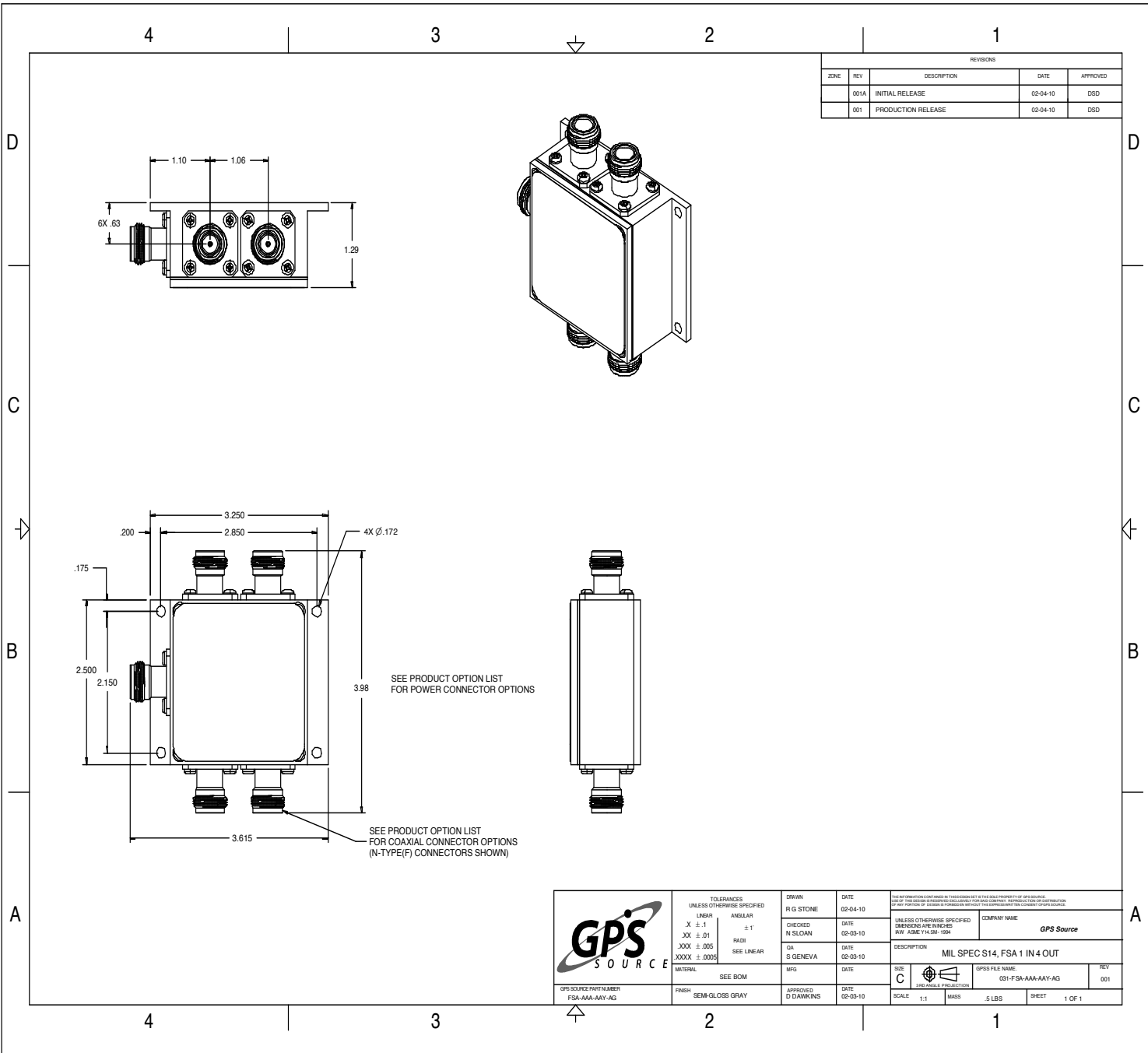   & 1275B Compliant)

Output Voltage:
  5, 7.5, 9V

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 or visit our website at www.gpssource.com.

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		REVISIONS		
ZONE	REV	DESCRIPTION	DATE	APPROVED
	001A	INITIAL RELEASE	02-04-10	DSD
	001	PRODUCTION RELEASE	02-04-10	DSD

1.10   1.06

6X .63

1.29

3.250
2.850
.200
4X Ø.172
.175

2.500
2.150

3.98

SEE PRODUCT OPTION LIST
FOR POWER CONNECTOR OPTIONS

3.615

SEE PRODUCT OPTION LIST
FOR COAXIAL CONNECTOR OPTIONS
(N-TYPE(F) CONNECTORS SHOWN)

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.X ±.1	±1°	QA	S GENEVA	DATE	02-03-10			
.XX ±.01	RADII	MFG		DATE		DESCRIPTION	MIL SPEC S14, FSA 1 IN 4 OUT	
.XXX ±.005	SEE LINEAR							
.XXXX ±.0005						SIZE C	GPSS FILE NAME 031-FSA-AAA-AAY-AG	REV 001
MATERIAL	SEE BOM					3RD ANGLE PROJECTION		
GPS SOURCE PART NUMBER FSA-AAA-AAY-AG	FINISH SEMI-GLOSS GRAY	APPROVED D DAWKINS		DATE 02-03-10		SCALE 1:1	MASS .5 LBS	SHEET 1 OF 1