MA11M

Military Qualified Amplifier

Features

- **Designed & Manufactured to Military Specifications**
- **Excellent Gain**
  G = 30dB
- **Passes GPS, Galileo & GLONASS L1/L2**
- **Excellent Gain Flatness**
  Gain | L1 - L2 | <2 dB
- **RoHS & WEEE Compliant**

Description

The military qualified MA11M GPS Amplifier is designed with the thin link margins of satellite navigation systems in mind; and is a single stage gain block that covers the GPS, Galileo, and GLONASS frequencies. The device features 30dB of gain and excellent gain flatness of less than 1dB.

The MA11M 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	MIL-STD-1275B

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

Parameter	Conditions	Min	Typ	Max	Units
Freq. Range	IN – OUT, IN/OUT-50Ω	1		1.7	GHz
Impedance	IN, OUT		50		Ω
Gain 1227 MHz 1575 MHz	IN – OUT, IN/OUT-50Ω	 30 30	 31 31	 32 32	dB
Input SWR	OUT Port - 50Ω			2.0:1	-
Output SWR	IN Port - 50Ω			2.0:1	-
Noise Figure	Ant-Any Port, Unused Ports – 50 Ω, Gain = 10dB			3.2	dB
Gain Flatness	|L1 - L2|, Ant - Any Port, Unused Ports - 50 Ω			2	dB
Group Delay Flatness	$\tau_{d,max} - \tau_{d,min}$, IN-OUT			1	nS
Reverse Isolation	OUT -IN	30			dB
Input IP_3	IN – OUT, IN/OUT-50Ω Gain = 30dB, Tone spacing = 1 MHz	-22			dBm
Input P_{1dB}	IN – OUT, IN/OUT-50Ω Gain = 30dB	-12			dBm
DC IN	Non-Powered Configuration, DC Input on OUT port	5		7	VDC
Device Current	Current Consumption of device			65	mA
Ant/Thru Pass DC Current	Non-Powered Configuration, DC Input on OUT port			250	mA
Max RF Input	Max RF input without damage			30	dBm

General Specifications

Weight

The weight of MA11M is **.25** pounds (113.4 grams)

MTBF

Mean Time Between Failure (MTBF) for GPS Source's MA11M military amplifier 567,466 hours at 29°C and 534,862 hrs at 71°C.

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Author: Preetha Sayuj
Department: R&D

Description: MA11M Data Sheet
Doc. No.: 1596-TS-MA11M-GPS-Amplifier-01
Date: 01/16/2013
www.gpssource.com

Environmental Specifications

Temperature and Altitude
The MA11M complies with the temperature-altitude tests per MIL-STD-810C, Method 504, and Procedure 1 Equipment Category 5.

Explosive Atmosphere
The MA11M 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 MA11M does not produce surface temperatures or heat in excess of 400°F. The MA11M 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 MA11M 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 MA11M 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 MA11M can withstand a salt concentration of 5 percent at a temperature of 35° C for 48 hours without degradation.

Fungus
The MA11M 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.

Humidity
The MA11M is capable of meeting the requirements of a ten-day humidity test conducted per MIL-STD-810C, Method 507.1; Procedure I. MA11M can withstand exposure to 95% relative humidity at a temperature of 30° C for 28 days.

Sand & Dust
The MA11M 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 MA11M 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 Table 1.

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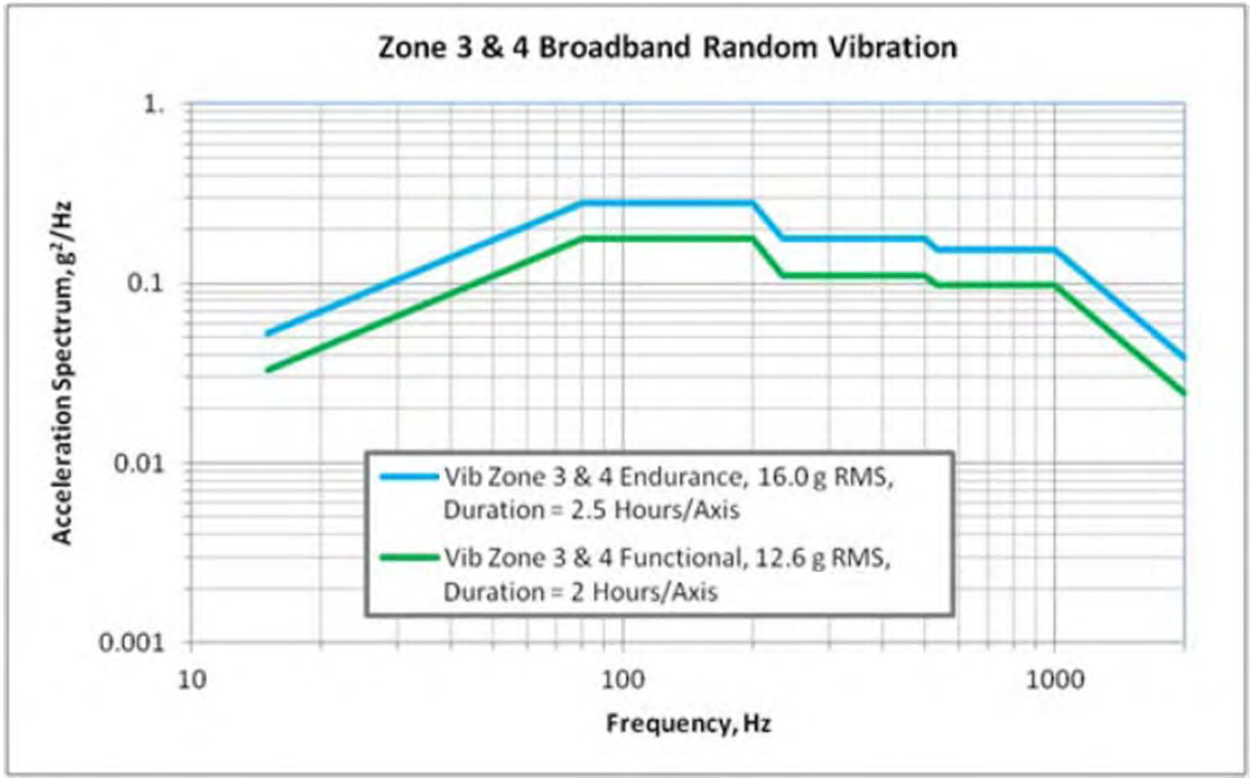

Figure 1

Vib Zone 3 & 4 Functional, 12.6 g 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

Table 1

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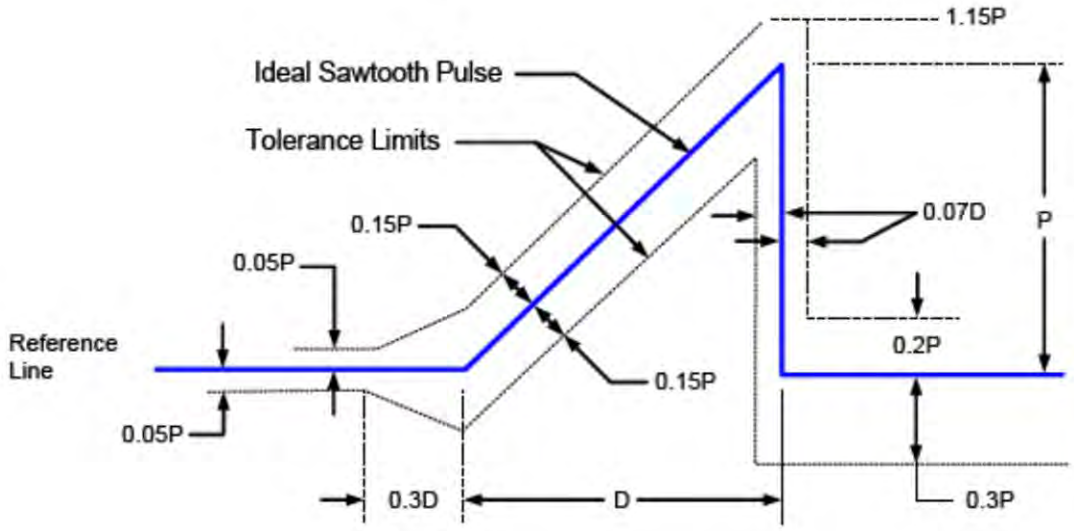
Shock

The MA11M is designed to withstand the shock levels specified in the saw tooth shock pulse parameter specified in Figure 2.



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 2

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Decompression
The MA11M 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 MA11M will remain operating for 5 minutes at 50,000 feet before being returned to normal cabin pressure.

Overpressure
MA11M 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 MA11M will operate satisfactorily upon return to normal pressure.

Temperature Shock
The MA11M will withstand without degradation (while not operating) Method 503.1, Procedure I of MIL-STD-810C.

Flammability
The MA11M 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 MA11M are treated with chemical film per MIL-DTL-5441, TYPE II, and CLASS 3. The MA11M bottom contact surface is free of paint, or non-conductive finishes. The MA11M 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 MA11M 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 MA11M is designed and tested to meet the following requirements of MIL-STD-461E:

Test	Description
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
RE102	Radiated Emissions, Electric Field, 10 kHz to 18 GHz
RS103	Radiated Susceptibility, Electric Field, 2 MHz to 18 GHz
Indirect Lightning	Damped Sinusoidal transients, RF Leads,10kHz to 100 MHz Damped Sinusoidal transients, Power Leads,10kHz to 100 MHz

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Performance Data:

MA11M

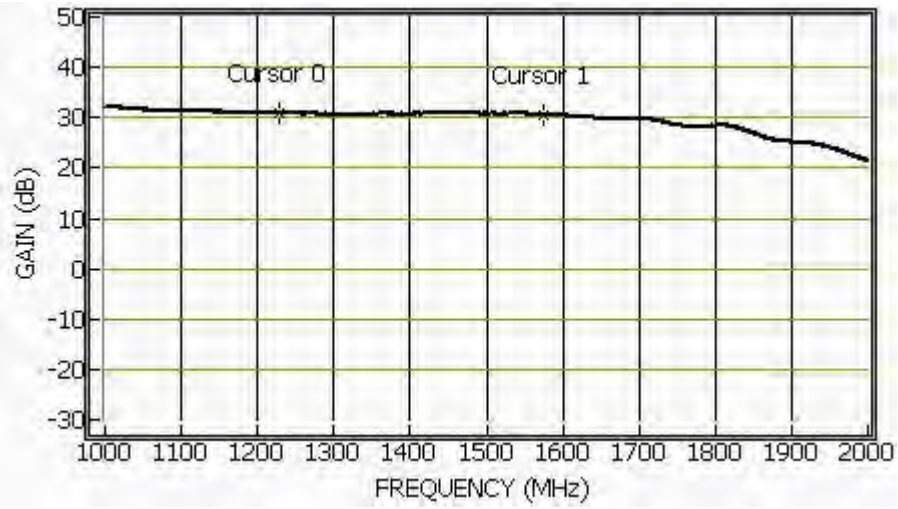

Figure 4. Gain vs. Frequency for an MA11M Amplifier

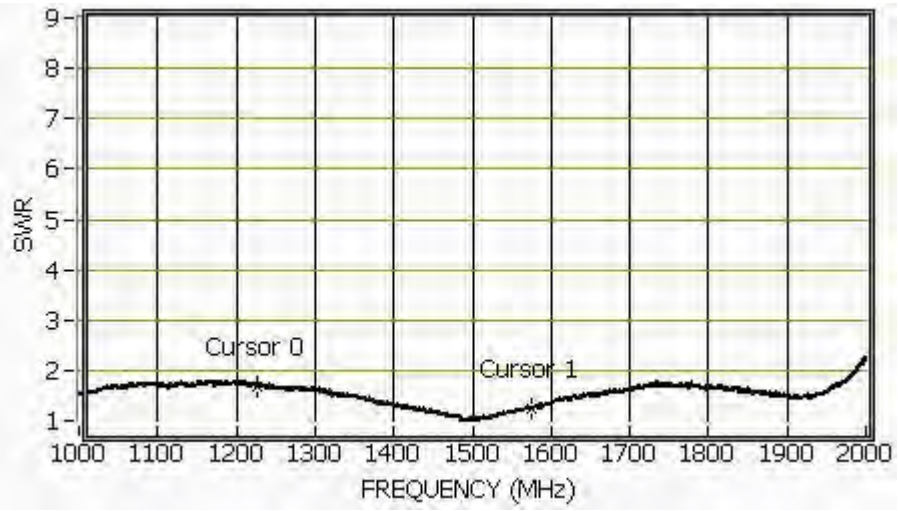

Figure 5. SWR vs. Frequency Plot for an MA11M Amplifier

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Available Options:

RF Connector Options:		
Connector Options	**Connector Type**	**Limitations**
	N (Male & Female)	
	SMA (Male & Female)	
	TNC (Male & Female)	
	SMB (Female)	
	SMC (Female)	
	BNC (Male & Female)	Performance Not Guaranteed
Housing Options:		
Housings	**Housing Type**	**Limitations**
	Mini	Powered Option Not Ava.
Port Options:		
Pass DC	IN Port Passes DC	
DC Blocked	IN Port Blocks DC	

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MA11M

Part Number

MA11M - 2GAD

Product:
Military Qualified
Amplifier
(J1 & J2 may be configured for Block or Pass DC)

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

For help in creating the part number to meet your exact needs, contact Sales@gpssource.com or visit our website at www.gpssource.com.

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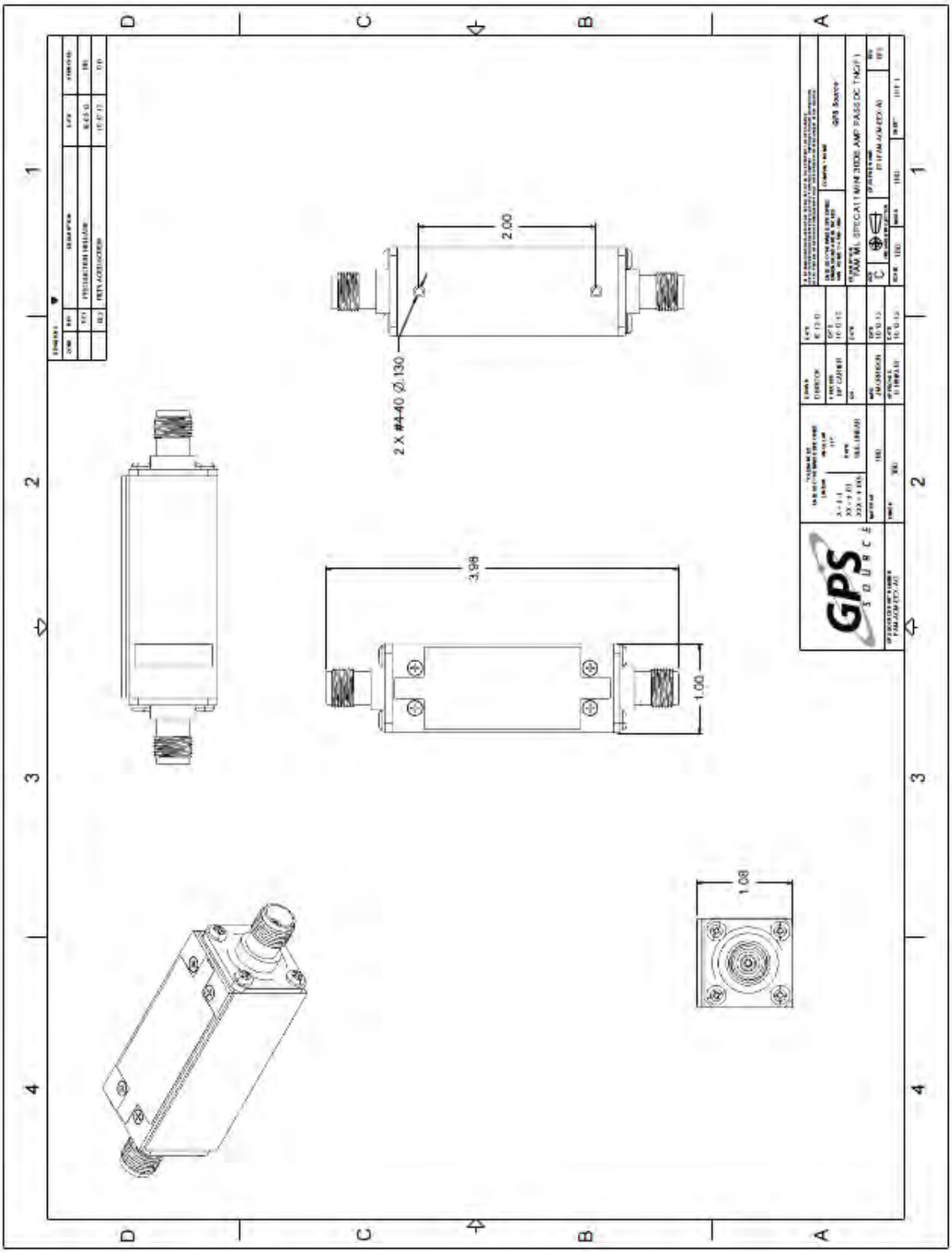
Mechanical



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