GENERAL DYNAMICS
Mission Systems

GPSS Operations Enabled

MS14GT

4 Port Ruggedized GPS Splitter

Description

The MS14GT has been specifically designed for rugged applications. Built to withstand the rigors of Aircraft or Ground Vehicle applications, the MS14GT makes it possible to use a single GPS antenna and cable arrangement for multiple critical systems.

The MS14GT features an antenna DC bias select circuit. This allows for the active antenna DC input to be applied to any or all RF outputs. With this feature, one DC voltage will be chosen to power the antenna while other inputs will be switched to DC blocked outputs with 200 Ohm resistive loads to ground. Designed for redundancy, if the selected DC bias input should fail or is removed, the DC bias will automatically switch to another DC input to ensure an uninterrupted supply to the active antenna.

The MS14GT includes the EMI shielding and hermetically sealed options standard, to provide increased reliability.

Features

- EMI Shielding
- Hermetically Sealed
- Amplified to Offset Splitter Losses
- Standard Antenna DC Bias Select
- RoHS/REACH/WEEE Compliant

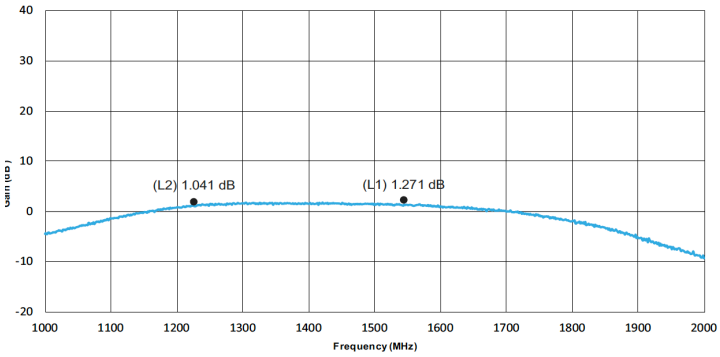
Electrical Specifications

Operating Temperature -40°C to 85°C

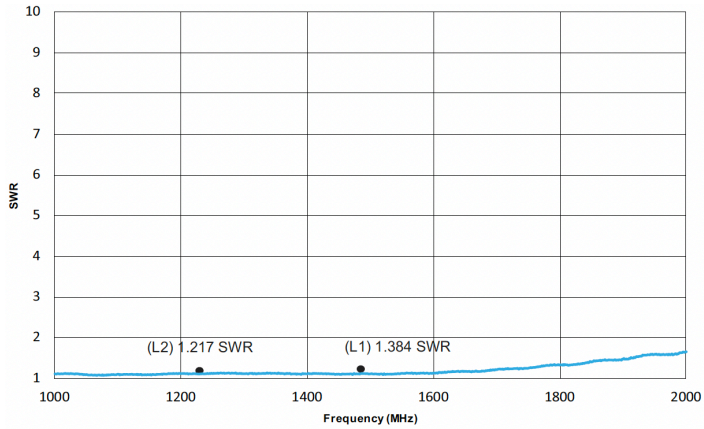
Parameter		Conditions	Min	Type	Max	Units
Frequency Range		Ant: Any Port; Unused Ports: 50 Ω	1.1		1.7	GHz
Gain	00dB 10dB	Ant: Any Port; Unused Ports: 50 Ω	-3	0	+3	dB
Input/Output SWR		All Ports 50 Ω		2:0:1		-
Noise Figure		Ant: Any Port; Unused Ports: 50 Ω Gain = 0dB			2	dB
Gain Compression Point (IP1dB)		Gain = 00dB	-35			dBm
3rd Order Intercept (IIP3) (Gain = 0dB)		f1 = 1600.42MHz f2 = 1625.42MHz 2f1 - f1 = fL1	-24			dBm
RF Input (Damage Threshold)		Max RF Input Without Damage			0	dBm
Amp. Balance		[J1 – J2] Ant: Any Port: Unused Ports: 50 Ω			1	dB
Phase Balance		Phase (J1 – J2) Ant: Any Port; Unused Ports: 50 Ω			1	Degree
Delay - Amplified		Ant: Any Port; Unused Ports: 50 Ω, L1			5	ns
Isolation - Amplified (Gain = 0dB)		Adjacent Ports: Ant – 50 Ω	30			dB
		Opposite Ports: Ant – 50 Ω	40			dB
DC IN		DC Input on any RF Output	3.3		12	VDC
Device Current		Current Consumption of Active Device (excludes Ant. Cur.)		18	20	mA

Performance Data

Frequency Response (0dB)



Output SWR (0dB)



Operational Description

RF Signal Processing System

The RF signal processing system consists fundamentally of amplification stages and classical Wilkinson Splitter elements which divide the RF signal from the antenna input evenly between four RF output ports. The standard gain is 00dB.

Gain Option

In the Amplified High Isolation Configuration (standard 00dB), 50Ω signal attenuators are in the RF output paths to provide additional isolation between each RF port. The MS14GT does not require 50Ω terminations on unused ports in order for the splitter to operate correctly. This standard configuration is chosen if it is possible for spurious emissions from one GPS receiver on one port of the splitter to cause interference with GPS receivers connected to other output ports.

To some extent, the port-to-port isolation performance is a function of the input-to-output gain. The port-to-port isolation is maximized when the gain is 00dB.

Antenna DC Bias Select

GPS Source RF signal splitters are unique relative to other generic RF signal splitters as they typically operate in conjunction with an active GPS antenna (a GPS antenna that includes an integrated Low Noise Amplifier). Consequently, a GPS RF signal splitter must have provisions for managing the DC voltage to the active GPS antenna.

The MS14GT splitter requires a DC voltage be applied to one or more of the RF output ports by way of the RF connector center conductor. If DC voltages are applied to more than one of the RF output ports, the MS14GT DC bias select circuit will choose one of these DC inputs to power the active circuitry of the MS14GT and will also pass this DC voltage through the splitter to the center conductor of the RF input port. Ports without an external DC voltage applied, or from which an external DC voltage is removed, are internally pulled-down to ensure that the false input voltage indications do not occur. The DC voltage available on the RF input port can be used to power the application's active antenna.

The DC voltages applied to the RF outputs that are not chosen by the DC bias select circuitry will automatically switch through an RF choke to 200Ω DC loads. The DC bias select circuit will always select the DC voltage on the lowest numbered RF port that has a DC voltage applied to power the MS14GT and the application's antenna. If the chosen DC input is removed or fails, the DC bias select circuit will automatically switch to the next higher numbered RF port to which a DC voltage is applied.

Example 1: Assume DC voltages are applied to RF outputs 1, 3, and 4. In this scenario, the DC voltage on port 1 will be used to power the MS14GT and the application antenna. Ports 3 and 4 will be switched to 200Ω DC loads.

Example 2: Now assume the DC voltage on port 1 is removed. The MS14GT will automatically terminate the input internally with a pull-down resistor and switch the operation of the splitter and antenna to the DC voltage applied to the next high numbered port with a DC voltage applied, port 3. Port 4 will remain switched to a 200Ω load.

MS14GT Connection

To install the MS14GT, connect the coaxial cable feeding the active GPS antenna prior to connecting the RF outputs. Once the antenna coaxial cable is attached, coaxial cables with or without DC voltages can be connected to the outputs.

At least one coaxial cable connected to any output of the device must provide a DC voltage suitable for operating the active GPS antenna and the MS14GT.

Certifications and Approvals

Certifications and Approvals	
EMC/Emissions	FCC part 15B and R&TTE equivalent
Safety/Low Voltage	EN60950-1
Environmental	IEC 60529, IP55 (Optional) Note: Not currently qualified to MIL-STD 810G.

Environmental Requirements

Temperature and Altitude

The MS14GT complies with the temperature-altitude tests per MIL-STD-810C, Method 504, Procedure 1 Equipment Category 5.

Temperature Shock

The MS14GT is designed to withstand without degradation (while not operating) Method 503.1, Procedure I of MILSTD-810C.

Explosive Atmosphere

The MS14GT 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 -1,800ft to 50,000ft. The MS14GT does not produce surface temperatures or heat in excess of 400°F. The MS14GT 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 MS14GT 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 x 10-7cc/s are exempt from this requirement.

Decompression

The MS14GT 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 feet) from a airplane flight altitude of 50,000 feet within 15 seconds. The MS14GT will remain operating for five minutes at 50,000 feet before being returned to normal cabin pressure.

Overpressure

The MS14GT is capable of meeting the performance standards per RTCA-DO-160E para 4.6.3 by withstanding a 12.1 psi chamber pressure for up to 10 minutes with no physical damage or degradation. The MS14GT will operate with no loss of operational integrity after being returned to normal chamber pressure

Salt Fog

The MS14GT is designed to meet the requirements of Salt Fog conditions per Paragraph 3.2.24.9 of MIL-E-5400 and MIL-STD-810C Method 509.1. The MS14GT is designed to withstand a salt concentration of five percent at a temperature of 35°C for 48 hours without degradation.

Fungus

The MS14GT is designed to meet 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 MS14GT is capable of meeting the requirements of a ten-day humidity test conducted per MIL-STD-810C, Method 507.1; Procedure I. The MS14GT is designed to withstand exposure to 95% relative humidity at a temperature of 30°C for 28 days.

Sand and Dust

The MS14GT is capable of meeting the requirements of Sand and Dust conditions of method 510 of MIL-STD-810C, for a temperature of 145°F for a duration of 22 hours.

Flammability

The MS14GT is self-extinguishing or nonflammable and is designed to 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 MS14GT are treated with chemical film per MIL-DTL-5441, TYPE II, CLASS 3. The MS14GT bottom contact surface is free of paint or non-conductive finishes. The MS14GT 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: 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

MS14GT performs its intended function and 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 compatibiity testing. The MS14GT is designed to meet the requirements of MIL-STD-461F:

Test	Description	
CE106	Conducted Emissions Antenna Terminal	10kHz to 31.5GHz
CS114	Conducted Susceptibility Bulk Cable Injection	10kHz to 200MHz
RE102	Radiated Emissions Electric Field	10kHz to 18GHz

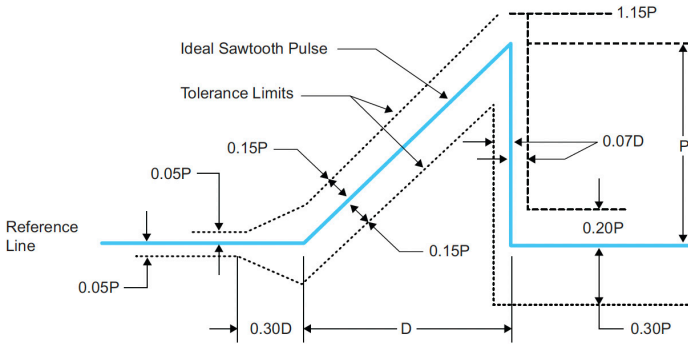
Note: 1. For additional detail regarding Indirect Lightning, please contact GPS Source.

MS14GT

Shock

The MS14GT is designed to withstand the shock levels specified in the saw tooth shock pulse parameter specified in the figure and table below. It is designed to meet the requirements of MIL-STD-810C Method 516.2 Proc. III.

Peak Shock Levels



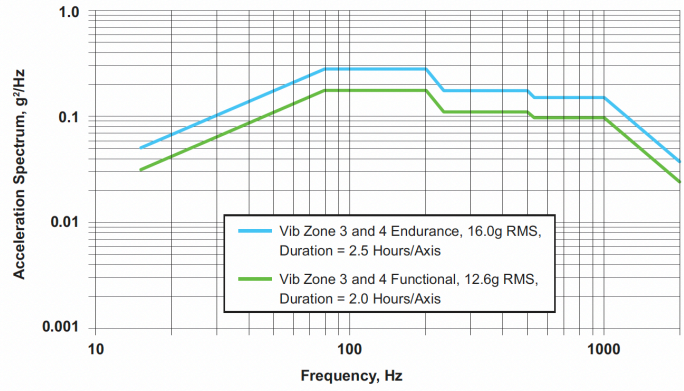
Peak Shock Levels

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

Vibration

The MS14GT 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 the figure below. Amplitudes for the functional levels and endurance level requirements are as shown in the table below.

Zone 3 and 4 Broadband Random Vibration



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

Product Code Decoder

MS14GT - A00 - TF

Splitter
MS14GT= 1X4 Qualified DC Bias Select Ruggedized Splitter

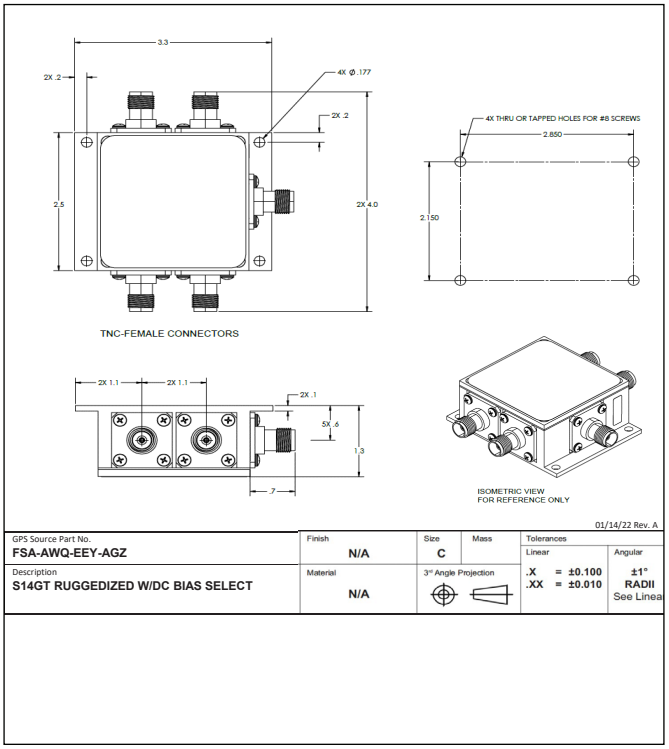
Gain
A00 = 00dB
A10 = 10dB

Connector
TF = TNC Female
SF = SMA Female
NF = N Female

Note: To have product/part codes customized to meet exact needs, contact GPS Source at GPSS-Sales@gd-ms.com or visit the website at www.gpssource.com.

Mechanical Drawings

Ruggedized 1x4 Splitter



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