

GaAs SPST Switch DC - 6.0 GHz

Rev. V6

Features

- Low Insertion Loss, 0.6 dB @ 1.0 GHz
- Fast Switching Speed, 10 ns
- Ultra Low DC Power Consumption
- Integral Static Protection
- RoHS* Compliant

Description

The MASW6020G is a GaAs MMIC SPST switch die. This die is ideally used where low power consumption is required.

Typical applications include transmit / receive switching, switch matrices and switched filter banks, WLAN IEEE 802.11a and 802.11 b/g systems. Other applications include cordless phones and base stations.

Ordering Information

Part Number	Package
MASW6020G	DIE ¹

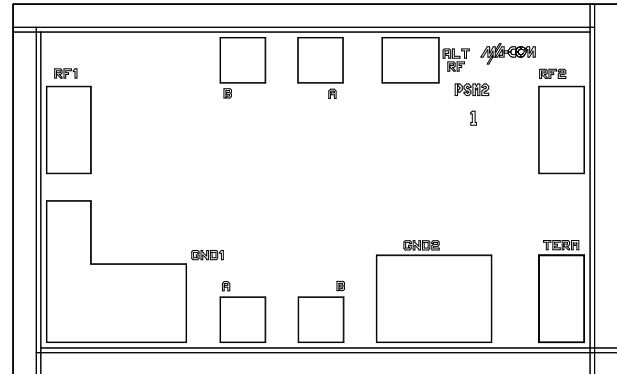
1. Die quantity varies.

Absolute Maximum Rating ^{2,3}

Parameter	Absolute Maximum
Control Value (A/B)	-8.5 VDC
Max Input RF Power	+34 dBm (500 MHz - 4 GHz)
Storage Temperature	-65°C to +175°C
Operating Temperature	+175°C

- Exceeding any one or combination of these limits may cause permanent damage to this device.
- M/A-COM Technology Solutions does not recommend sustained operation near these survivability limits.

Pad Layout



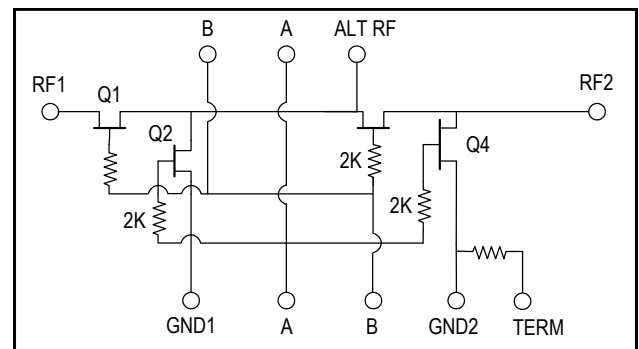
Die Size - Inches (mm)

0.05 x 0.03 x 0.004 (1.270 x 0.770 x 0.250)

Bond Pad Dimensions

Bond Pad	Dimensions - Inches (mm)
RF1, RF2	0.004 x 0.008 (0.100 x 0.200)
Alt RF	0.004 x 0.005 (0.100 x 0.125)
A, B	0.004 x 0.004 (0.100 x 0.100)
GND1	0.012 x 0.007 (0.300 x 0.175)
GND2	0.009 x 0.008 (0.225 x 0.200)
Term	0.004 x 0.008 (0.100 x 0.200)

Schematic



*Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

GaAs SPST Switch DC - 6.0 GHz

Rev. V6

Electrical Specifications: 0 / -5 V

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	DC - 1.0 GHz L/T/H	dB	—	0.8 / 1.0 / 0.9	—
	DC - 2.0 GHz L/T/H		—	0.9 / 1.1 / 1.0	—
	DC - 6.0 GHz L/T/H		—	2.5 / 2.7 / 2.5	—
Isolation	DC - 1.0 GHz L/T/H	dB	—	30 / 63 / 64	—
	DC - 2.0 GHz L/T/H		—	22 / 46 / 52	—
	DC - 6.0 GHz L/T/H		—	11 / 14 / 19	—
VSWR	DC - 1.0 GHz L/T/H	Ratio	—	1.1:1 / 1.1:1 / 1.1:1	—
	DC - 2.0 GHz L/T/H		—	1.3:1 / 1.2:1 / 1.1:1	—
	DC - 6.0 GHz L/T/H		—	2.0:1 / 2.7:1 / 2.0:1	—
Input P1dB	Above 500 MHz - 0/-5V / 0/-8V 100 MHz - 0/-5V / 0/-8V	dBm	— —	+27 / +33 +21 / +26	— —
IP2	Two Tone Input Power up to +5 dBm Above 500 MHz	dBm	—	+68	—
	100 MHz		—	+62	—
IP3	Two Tone Input Power up to +5 dBm Above 500 MHz	dBm	—	+46	—
	100 MHz		—	+40	—
Control Current	V _{IN} Low (0 to -0.2 V) V _{OUT} High (-5 V @ 50 μA Typ to -8 V)	μA	— —	— —	20 300
T-rise, T-fall	10% to 90% RF and 90% to 10% RF	ns	—	10	—
T _{ON} , T _{OFF}	50% control to 90% RF, and 50% control to 10% RF	ns	—	10	—
Transients	(In Band)	mV	—	10	—

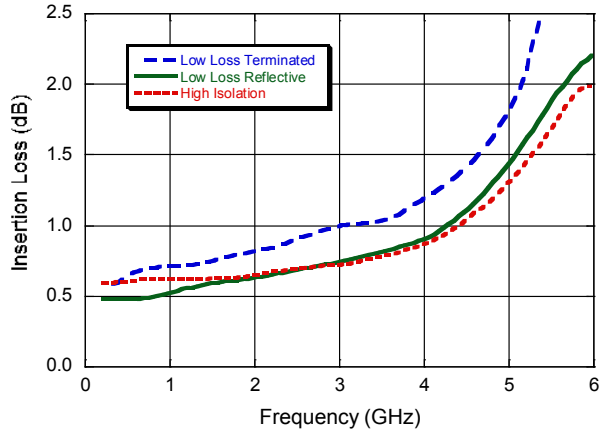
Truth Table ^{4,5}

Option	Control Voltage		Switch Condition & Bonding			Ground Bonds		
	A	B	RF1	RF2	ALT	GND1	GND2	Term
T	1	0	on	on		G		G
	0	1	off	off		G		G
L	1	0		on	on	G	G	
	0	1		off	off	G	G	
H	1	0	on	on		G	G	
	0	1	off	off		G	G	

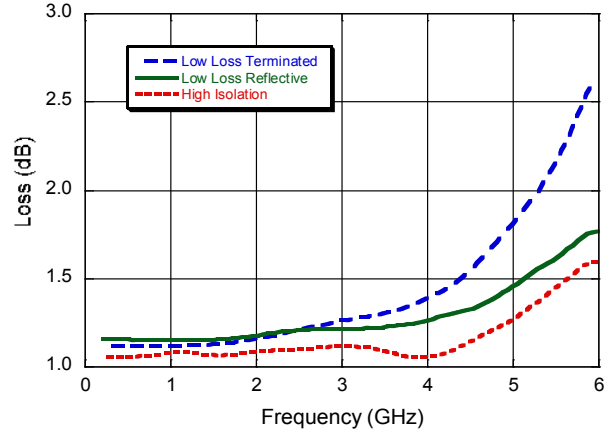
- Differential voltage, V (state 1) -V (state 2), must be 2.5 V minimum.
- 0 = 0 to -0.2 V, 1 = -5 V @ 10 μA typical to -8 V.

Typical Performance

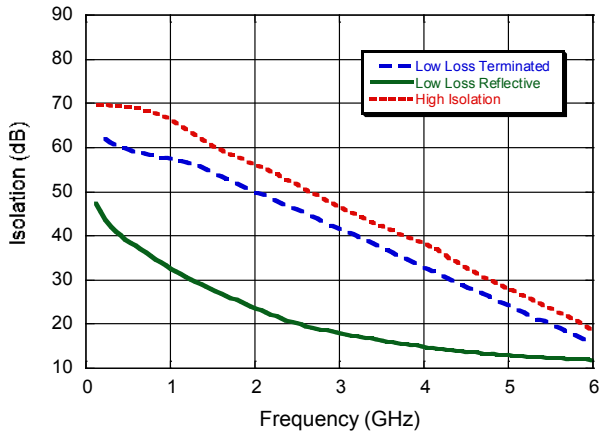
Insertion Loss



VSWR



Isolation



Handling Precautions

Permanent damage to the MASW6020G may occur if the following precautions are not adhered to:

- A. Cleanliness—MASW6020G should be handled in a clean environment. DO NOT attempt to clean unit after the MASW6020G is installed.
- B. Static Sensitivity—All chip handling equipment and personnel should be DC grounded.
- C. Transient—Avoid instrument and power supply transients while bias is applied to the MASW6020G. Use shielded signal and bias cables to minimize inductive pick-up.
- D. Bias—Apply voltage to either of the complementary control ports only when the other is grounded. No port should be allowed to “float”.
- E. General Handling—It is recommended that the MASW6020G chip be handled along the long side of the die with a sharp pair of bent tweezers. DO NOT touch the surface of the chip with fingers or tweezers.

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Mounting

The MASW6020G is back-metallized with Pd/Ni/Au (100/1,000, 10,000 Å) metallization. It can be die-mounted with AuSn eutectic preforms or with thermally conductive epoxy. The package surface should be clean and flat before attachment.

Eutectic Die Attach:

- A. A 80/20 gold/tin preform is recommended with a work surface temperature of approximately 255°C and a tool temperature of 265°C. When not 90/10 nitrogen/hydrogen gas is applied, tool tip temperature should be approximately 290°C.
- B. DO NOT expose the MASW6020G to a temperature greater than 320°C for more than 20 seconds. No more than 3 seconds for scrubbing should be required for attachment.

Epoxy Die Attach:

- A. Apply a minimum amount of epoxy and place the MASW6020G into position. A thin epoxy fillet should be visible around the perimeter of the chip.
- B. Cure epoxy per manufacturer's recommended schedule.
- C. Electrically conductive epoxy may be used by is not required.

Wire Bonding

- A. Ball or wedge with 1.0 mil diameter pure gold wire. Thermosonic wirebonding with a nominal stage temperature of 150°C and a ball bonding force of 40 to 50 grams or wedge bonding force of 18 to 22 grams is recommended. Ultrasonic energy and time should be adjusted to the minimum levels achieve reliable wirebonds.
- B. Wirebonds should be started on the chip and terminated on the package.

M/A-COM Technology Solutions Inc. All rights reserved.

Information in this document is provided in connection with M/A-COM Technology Solutions Inc ("MACOM") products. These materials are provided by MACOM as a service to its customers and may be used for informational purposes only. Except as provided in MACOM's Terms and Conditions of Sale for such products or in any separate agreement related to this document, MACOM assumes no liability whatsoever. MACOM assumes no responsibility for errors or omissions in these materials. MACOM may make changes to specifications and product descriptions at any time, without notice. MACOM makes no commitment to update the information and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to its specifications and product descriptions. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document.

THESE MATERIALS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, CONSEQUENTIAL OR INCIDENTAL DAMAGES, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. MACOM FURTHER DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. MACOM SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS, WHICH MAY RESULT FROM THE USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[MACOM:](#)

[MASW6020G](#)