MASWSS0192

GaAs SPDT Switch
DC - 3.0 GHz

Rev. V1

Features

- Test and Measurement and Low/Medium Power Telecommunication Applications
- Low Insertion Loss: 0.18 dB @ 1 GHz
- Moderate Isolation: 25 dB @ 1 GHz
- Low Power Consumption: < 2 μA @ 2.5 V
- Fast Settling for Low Gate Lag Requirements
- Lead-Free SC-70 (SOT-363) Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- RoHS* Compliant and 260°C Reflow Compatible

Description

M/A-COM's MASWSS0192 is a GaAs PHEMT MMIC SPDT switch in a lead-free SC-70 (SOT-363) surface mount plastic package. The MASWSS0192 is ideally suited for applications where very small size and low cost are required.

The MASWSS0192 can be used for low / medium power, low loss requirements in all systems operating up to 3 GHz, including PCS, GSM, DCS, Blue Tooth, T&M, and other receive chain applications.

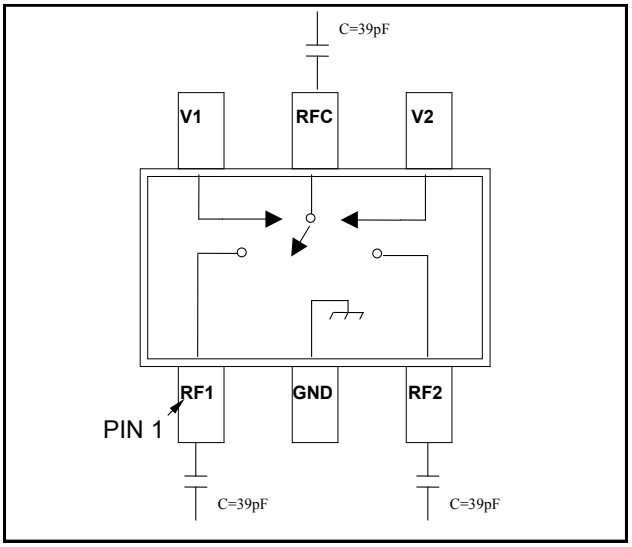
The MASWSS0192 is fabricated using a 0.5 micron gate length GaAs PHEMT process. The process features full passivation for performance and reliability.

Ordering Information [1]

Part Number	Package
MASWSS0192	Bulk Packaging
MASWSS0192TR-3000	3000 piece reel
MASWSS0192SMB	Sample Board

1. Reference Application Note M513 for reel size information.

Functional Schematic



Pin Configuration

Pin No.	Pin Name	Description
1	RF1	RF Port 1
2	GND	Ground
3	RF2	RF Port 2
4	V2	Control 2
5	RFC	RF Input
6	V1	Control 1

Absolute Maximum Ratings [2,3]

Parameter	Absolute Maximum
Input Power (0.5 - 3.0 GHz) 2.5 V Control 5.0 V Control	 +25 dBm +34 dBm
Operating Voltage	+8.5 volts
Operating Temperature	-40 °C to +85 °C
Storage Temperature	-65 °C to +150 °C

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

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

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Electrical Specifications: T_A = 25°C, V_C = 0 V / 2.5 V [4], P_{IN} = +10 dBm, Z_0 = 50 Ω [5]

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss [6]	DC - 1.0 GHz DC - 3.0 GHz	dB dB	— —	0.18 0.35	0.40 0.60
Isolation	DC - 1.0 GHz DC - 3.0 GHz	dB dB	20.0 9.5	24.0 13.5	— —
VSWR	DC - 1.0 GHz DC - 3.0 GHz	Ratio Ratio	— —	1.1:1 1.2:1	— —
IP2	1 GHz, Two Tone, +7 dBm / tone, 20 MHz Spacing, 3 V	dBm	—	93	—
IP3	1 GHz, Two Tone, +7 dBm / tone, 20 MHz Spacing, 3 V	dBm	—	53	—
P1dB	V_C = 0.2 V / 2.7 V V_C = 0.2 V / 3.0 V	dBm dBm	— —	27.5 28.5	— —
Trise, Tfall	10% to 90% RF and 90% to 10% RF	nS	—	22	—
Ton, Toff	50% control to 90% RF, 50% control to 10% RF	nS	—	5	—
Transients	In-band	mV	—	36	—
Control Current	—	µA	—	0.20	5
R_{ON}	t > 90 mS after OFF to ON Switching (settled)	Ω	—	2.50	4.7
Gate Lag	|ΔRon| between 15 µS and 90 mS after OFF to ON Switching	Ω	—	0.15	0.7

4. Alternate voltage operation of V_C = 0 V / 5 V or -5 V / 0 V will yield similar insertion loss, isolation, VSWR, switching, R_{ON}, and gate lag results.
5. For positive voltage control, external DC blocking capacitors are required on all RF ports.
6. Insertion loss can be optimized by varying the DC blocking capacitor value, e.g. 1000 pF for 100 MHz - 1 GHz, 39 pF for 0.5 - 3 GHz.

Truth Table [7,8]

Control V1	Control V2	RFC-RF1	RFC-RF2
1	0	On	Off
0	1	Off	On

7. Differential voltage, V (state 1) - V (state 0), must be 2.5 V minimum, but must not exceed 8.5 V.
8. 0 = 0 V to 0.5 V; 1 = 2.5 V to 5 V or
   0 = -5 V to -2.5 V, 1 = -0.5 to 0 V.

Qualification

Qualified to M/A-COM specification REL-201, Process Flow –2.

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.

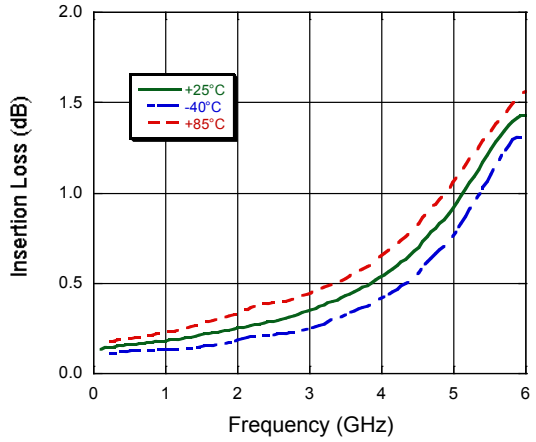
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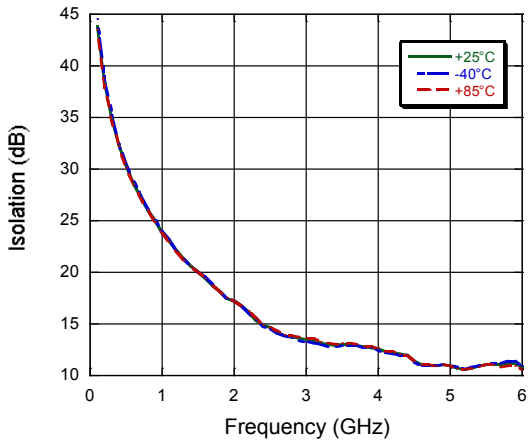
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Typical Performance Curves

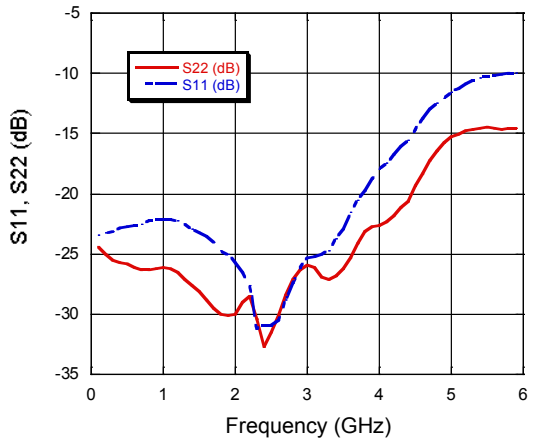
Insertion Loss



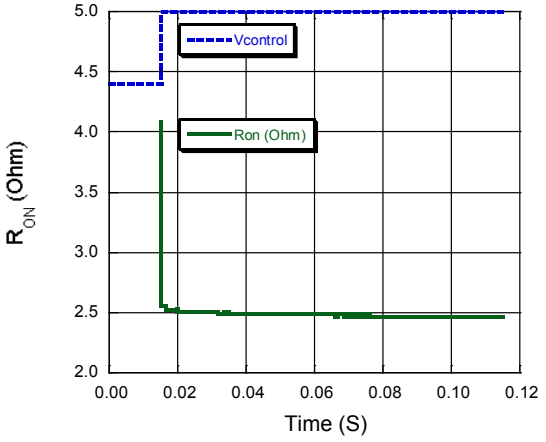
Isolation



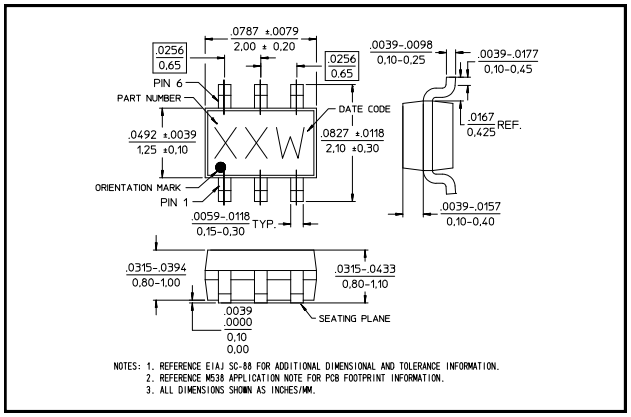
S11, S22



Gate Lag (R_{ON} vs. Time) Including V_{CTL}, 0-3 V Step



Lead-Free SC-70 (SOT-363)†



† Reference Application Note M538 for lead-free solder reflow recommendations.

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