# MASWSS0202

## GaAs Broadband SPDT Switch
## DC - 6.0 GHz

Rev. V1

### Features

- 802.11a + b/g Dual Band Applications
- Broadband Performance: DC - 6.0 GHz
- Low Insertion Loss: 0.75 dB @ 5.8 GHz
- High Isolation: 22 dB @ 5.8 GHz
- Fast Switching Speed: 0.5 µm GaAs PHEMT
- Lead-Free 3 mm 12-Lead PQFN Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- 260°C Reflow Compatible
- RoHS* Compliant Version of MASWSS0070

### Description

M/A-COM's MASWSS0202 is a broadband GaAs PHEMT MMIC SPDT switch in a lead-free 3 mm 12-lead PQFN package. The MASWSS0202 is ideally suited for applications where very small size and low cost are required.

Typical applications are for WLAN IEEE 802.11a and 802.11b/g PC cards and access points. Other applications include cordless phones and base stations. Designed for high power, this SPDT switch maintains high linearity up to 6.0 GHz.

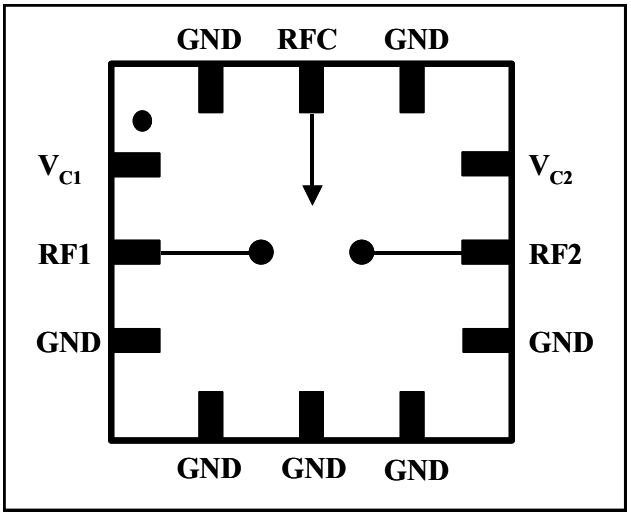
The MASWSS0202 is fabricated using a 0.5 micron gate length GaAs PHEMT process. The process features full passivation for performance and reliability.

### Ordering Information [1]

| Part Number | Package |
|---|---|
| MASWSS0202TR-3000 | 3000 piece reel |
| MASWSS0202SMB | Sample Test Board (Includes 5 Samples) |

1. Reference Application Note M513 for reel size information.

### Functional Schematic




### Pin Configuration [2]

| Pin No. | Pin Name | Description |
|---|---|---|
| 1 | $V_{C1}$ | Control 1 |
| 2 | RF1 | RF Port |
| 3 | GND | Ground |
| 4 | GND | Ground |
| 5 | GND | Ground |
| 6 | GND | Ground |
| 7 | GND | Ground |
| 8 | RF2 | RF Port |
| 9 | $V_{C2}$ | Control 2 |
| 10 | GND | Ground |
| 11 | RFC | RF Port |
| 12 | GND | Ground |
| 13 | Paddle[2] | RF and DC Ground |

2. The exposed pad centered on the package bottom must be connected to RF and DC ground.

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



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### Electrical Specifications: $T_A$ = 25°C, $Z_0$ = 50 Ω, Vc = 0 V/ 3 V, 8 pF Capacitor [3]

| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|---|---|---|---|---|---|
| Insertion Loss [4] | 2 - 3 GHz<br>3 - 4 GHz<br>4 - 5 GHz<br>5 - 6 GHz | dB<br>dB<br>dB<br>dB | —<br>—<br>—<br>— | 0.55<br>0.55<br>0.65<br>0.75 | 0.9<br>0.9<br>1.0<br>1.1 |
| Isolation | 2 - 6 GHz | dB | 22 | 25 | — |
| Return Loss | DC - 6 GHz | dB | — | 20 | — |
| IIP2 | Two Tone, +5 dBm / Tone, 5 MHz Spacing<br>$V_C$ = 0.0 V/3 V @ 2.4 GHz<br>$V_C$ = 0.0 V/3 V @ 5.8 GHz<br>$V_C$ = 0.0 V/5 V @ 2.4 GHz<br>$V_C$ = 0.0 V/5 V @ 5.8 GHz | <br>dBm<br>dBm<br>dBm<br>dBm | <br>—<br>—<br>—<br>— | <br>91<br>81<br>99<br>91 | <br>—<br>—<br>—<br>— |
| IIP3 | Two Tone, +5 dBm / Tone, 5 MHz Spacing<br>$V_C$ = 0.0 V/3 V @ 2.4 GHz<br>$V_C$ = 0.0 V/3 V @ 5.8 GHz<br>$V_C$ = 0.0 V/5 V @ 2.4 GHz<br>$V_C$ = 0.0 V/5 V @ 5.8 GHz | <br>dBm<br>dBm<br>dBm<br>dBm | <br>—<br>—<br>—<br>— | <br>52<br>50<br>53<br>51 | <br>—<br>—<br>—<br>— |
| Input P-1dB | $V_C$ = 0.0 V/3 V @ 2.4 GHz<br>$V_C$ = 0.0 V/3 V @ 5.8 GHz<br>$V_C$ = 0.0 V/5 V @ 2.4 GHz<br>$V_C$ = 0.0 V/5 V @ 5.8 GHz | dBm<br>dBm<br>dBm<br>dBm | —<br>—<br>—<br>— | 32<br>29<br>37<br>35 | —<br>—<br>—<br>— |
| 2nd Harmonic | 2.4 GHz, $P_{IN}$ = +20 dBm<br>5.3 GHz, $P_{IN}$ = +20 dBm<br>5.8 GHz, $P_{IN}$ = +20 dBm | dBc<br>dBc<br>dBc | —<br>—<br>— | -88<br>-91<br>-77 | —<br>—<br>— |
| 3rd Harmonic | 2.4 GHz, $P_{IN}$ = +20 dBm<br>5.3 GHz, $P_{IN}$ = +20 dBm<br>5.8 GHz, $P_{IN}$ = +20 dBm | dBc<br>dBc<br>dBc | —<br>—<br>— | -87<br>-81<br>-85 | —<br>—<br>— |
| T-rise, T-fall | 10% to 90% RF and 90% to 10% RF | nS | — | 13 | — |
| Ton, Toff | 50% control to 90% RF, 50% control to 10% RF | nS | — | 35 | — |
| Transients | — | mV | — | 14 | — |
| Control Current | $\|V_C\|$ = 3 V | µA | — | 10 | 25 |

3. For positive voltage control, external DC blocking capacitors are required on all RF ports.
4. Insertion loss can be optimized by varying the DC blocking capacitor value.

### Truth Table [5]

| Control V1 | Control V2 | RFC– RF1 | RFC—RF2 |
|---|---|---|---|
| 1 | 0 | On | Off |
| 0 | 1 | Off | On |

5. 1 = +2.9 V to +5 V, 0 = 0 V ± 0.2 V.

### Absolute Maximum Ratings [6,7]

| Parameter | Absolute Maximum |
|---|---|
| Input Power @ 3 V Control | +32 dBm |
| Input Power @ 5 V Control | +34 dBm |
| Operating Voltage | +8.5 volts |
| Operating Temperature | -40°C to +85°C |
| Storage Temperature | -65°C to +150°C |

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



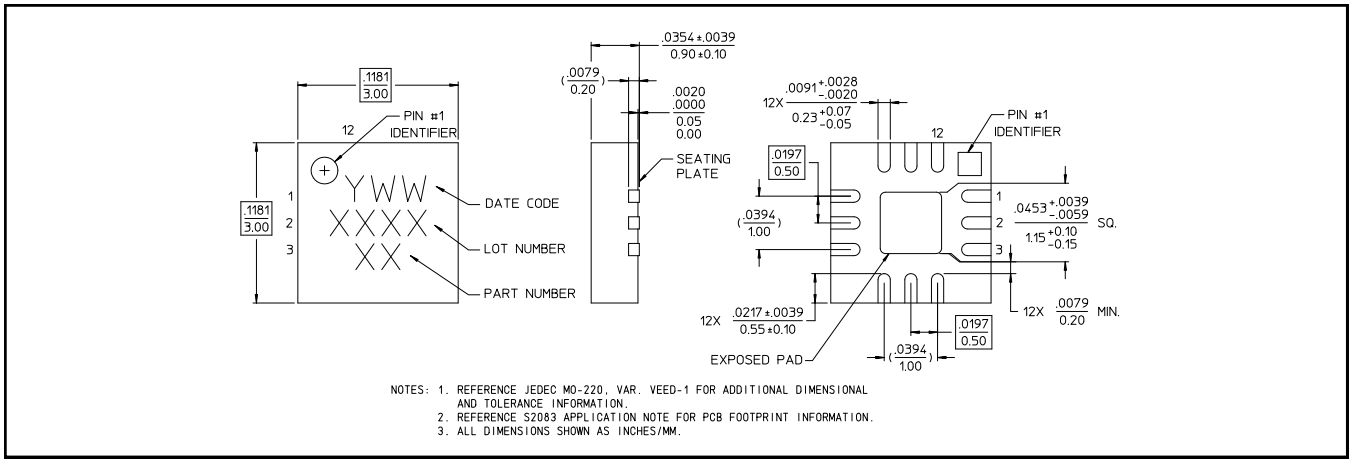
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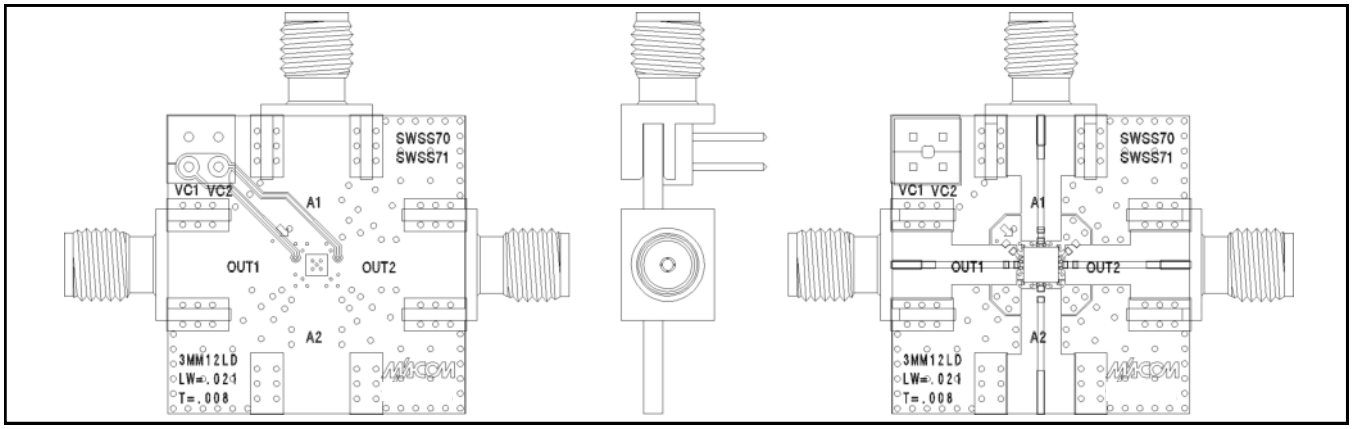
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### *Lead-Free* 3 mm 12-Lead PQFN†

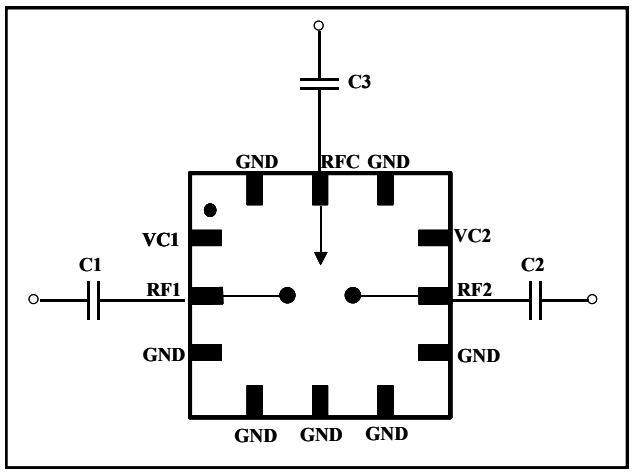



† Reference Application Note M538 for lead-free solder reflow recommendations.

### Evaluation Board




### Application Schematic




### Application #1:
### Optimized for 802.11a (5-6 GHz)

| Qty. | Description |
|---|---|
| 3 | Capacitor, 3.0 pF, 0402, SMT, 5% (C1-C3) |

### Application #2:
### Optimized for 802.11b/g (2.4 GHz)

| Qty. | Description |
|---|---|
| 3 | Capacitor, 8.0 pF, 0402, SMT, 5% (C1-C3) |

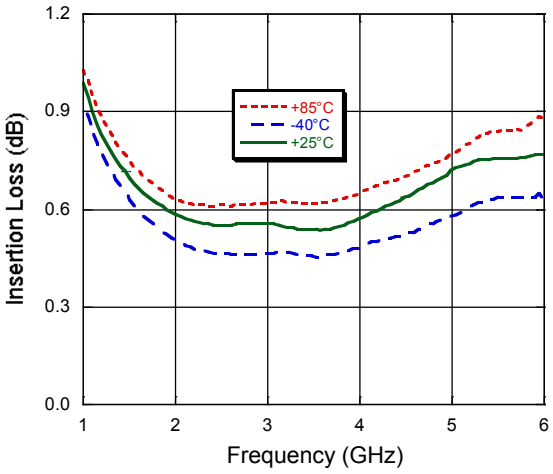


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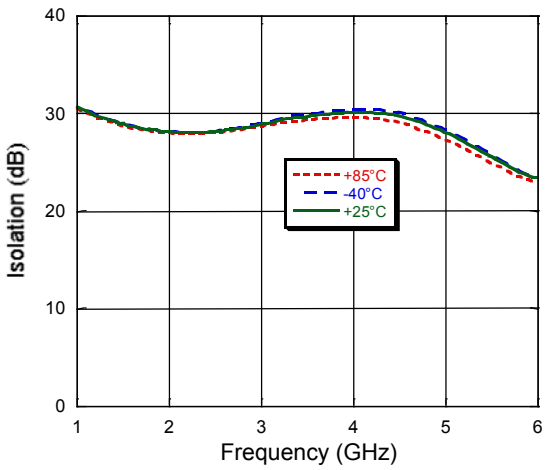
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## Typical Performance Curves with 0 / 3 V Control, 8 pF Capacitors

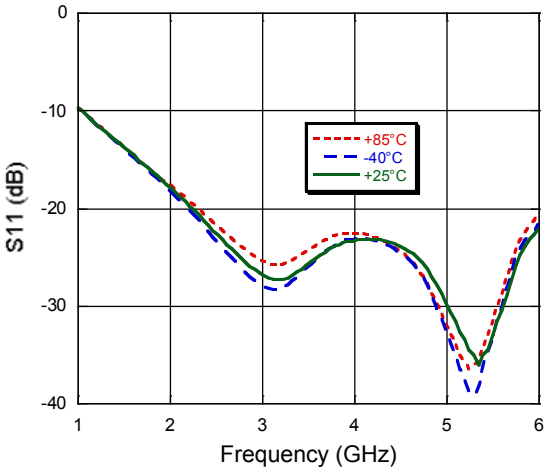
***Insertion Loss***




***Isolation***




***Return Loss***




## 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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