

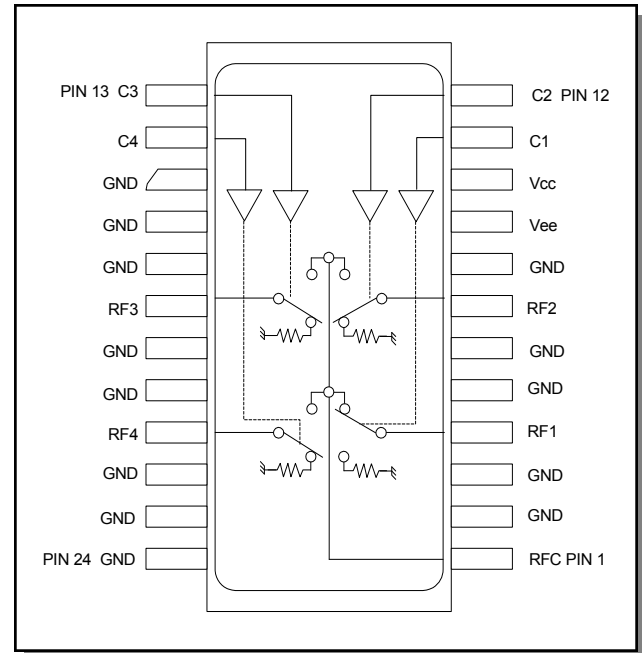
## Features

- Integral TTL Driver
- Isolation: 50 dB Typ. At 1 GHz
- Low DC Power Consumption
- Surface Mount Package
- Low Cost/High Performance
- 50 Ohm Nominal Impedance
- Lead-Free CR-14 Package
- 260°C Reflow Compatible
- RoHS\* Compliant

## Description

M/A-COM's SW15-0314 is a GaAs MMIC SP4T absorptive switch with an integral silicon ASIC driver. This device is in a 24-lead ceramic surface mount package. These switches exhibit excellent performance from DC to 3 GHz, with very low DC power dissipation. The SW15-0314 is ideally suited for wireless infrastructure applications. Available with enhanced performance as fully hermetic version. Environmentally screenable as SW-314.

## Functional Block Diagram



## Pin Configuration

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1       | RFC      | 13      | C3       |
| 2       | GND      | 14      | C4       |
| 3       | GND      | 15      | GND      |
| 4       | RF1      | 16      | GND      |
| 5       | GND      | 17      | GND      |
| 6       | GND      | 18      | RF3      |
| 7       | RF2      | 19      | GND      |
| 8       | GND      | 20      | GND      |
| 9       | Vee      | 21      | RF4      |
| 10      | Vcc      | 22      | GND      |
| 11      | C1       | 23      | GND      |
| 12      | C2       | 24      | GND      |

The metal bottom of the case must be connected to RF and DC ground.

## Ordering Information

| Part Number  | Package           |
|--------------|-------------------|
| SW15-0314    | Bulk Packaging    |
| SW15-0314-TB | Sample Test Board |

Note: Reference Application Note M513 for reel size information.

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

**GaAs SP4T Absorptive Switch,  
DC-3.0 GHz**

Rev. V6

**Electrical Specifications:  $T_A = 25^\circ\text{C}^{1,2}$** 

| Parameter        | Test Conditions                                              | Frequency        | Units | Min  | Typ   | Max  |
|------------------|--------------------------------------------------------------|------------------|-------|------|-------|------|
| Insertion Loss   | —                                                            | DC - 0.5 GHz     | dB    | —    | 1.0   | 1.3  |
|                  |                                                              | DC - 1.0 GHz     | dB    | —    | 1.2   | 1.4  |
|                  |                                                              | DC - 2.0 GHz     | dB    | —    | 1.2   | 1.6  |
|                  |                                                              | DC - 3.0 GHz     | dB    | —    | 1.4   | 1.8  |
| Isolation        | —                                                            | DC - 0.5 GHz     | dB    | 50   | 60    | —    |
|                  |                                                              | DC - 1.0 GHz     | dB    | 40   | 50    | —    |
|                  |                                                              | DC - 2.0 GHz     | dB    | 30   | 40    | —    |
|                  |                                                              | DC - 3.0 GHz     | dB    | 25   | 35    | —    |
| VSWR             | RFC, RF1 - RF4 (On)                                          | DC - 0.5 GHz     | Ratio | —    | 1.6:1 | —    |
|                  |                                                              | DC - 1.0 GHz     | Ratio | —    | 1.6:1 | —    |
|                  |                                                              | DC - 2.0 GHz     | Ratio | —    | 1.6:1 | —    |
|                  |                                                              | DC - 3.0 GHz     | Ratio | —    | 1.6:1 | —    |
| VSWR             | RF1 - RF4 (Off)                                              | DC - 0.5 GHz     | Ratio | —    | 1.3:1 | —    |
|                  |                                                              | DC - 1.0 GHz     | Ratio | —    | 1.5:1 | —    |
|                  |                                                              | DC - 2.0 GHz     | Ratio | —    | 1.9:1 | —    |
|                  |                                                              | DC - 3.0 GHz     | Ratio | —    | 2.4:1 | —    |
| Trise, Tfall     | 10% to 90%                                                   | —                | ns    | —    | 50    | —    |
| Ton, Toff        | 50% Control to 90% / 10% RF                                  | —                | ns    | —    | 150   | —    |
| Transients       | In-Band (peak-peak)                                          | —                | mV    | —    | 50    | —    |
| 1 dB Compression | Input Power                                                  | 0.05 GHz         | dBm   | —    | +20   | —    |
|                  |                                                              | 0.5 GHz to 3 GHz | dBm   | —    | +27   | —    |
| IP3              | Two-Tone Input Power up to +5 dBm                            | 0.05 GHz         | dBm   | —    | +35   | —    |
|                  |                                                              | 0.5 GHz to 3 GHz | dBm   | —    | +46   | —    |
| IP2              | Two-Tone Input Power up to +5 dBm                            | 0.05 GHz         | dBm   | —    | +45   | —    |
|                  |                                                              | 0.5 GHz to 3 GHz | dBm   | —    | +60   | —    |
| Vcc              | —                                                            | —                | V     | 4.5  | 5.0   | 5.5  |
| Vee              | —                                                            | —                | V     | -8.0 | —     | -5.0 |
| Icc              | Vcc = 4.5 to 5.5 V<br>Vctl = 0 to 0.8V, or Vcc – 2.1V to Vcc | —                | mA    | —    | 0.2   | 4.0  |
| Iee              | Vee = -5.0V to -8.0V                                         | —                | mA    | —    | 0.1   | 1.0  |

1. All specifications apply when operated with bias voltages of +5V for Vcc and –5V for Vee.
2. When DC blocks are used, a 10K ohm return to GND is required on the RFC port.

# GaAs SP4T Absorptive Switch, DC-3.0 GHz

Rev. V6

## Absolute Maximum Ratings<sup>3,4,5</sup>

| Parameter                                                 | Absolute Maximum                        |
|-----------------------------------------------------------|-----------------------------------------|
| Max Input Power<br>0.05 GHz<br>0.5 - 3.0 GHz <sup>5</sup> | +27 dBm<br>+34 dBm                      |
| $V_{CC}$                                                  | $-0.5V \leq V_{CC} \leq +7.0V$          |
| $V_{EE}$                                                  | $-8.5V \leq V_{EE} \leq +0.5V$          |
| $V_{CC} - V_{EE}$                                         | $-0.5V \leq V_{CC} - V_{EE} \leq 14.5V$ |
| $V_{in}$ <sup>6</sup>                                     | $-0.5V \leq V_{in} \leq V_{CC} + 0.5V$  |
| Operating Temperature                                     | $-40^{\circ}C$ to $+85^{\circ}C$        |
| Storage Temperature                                       | $-65^{\circ}C$ to $+150^{\circ}C$       |

- Exceeding any one or combination of these limits may cause permanent damage to this device.
- M/A-COM does not recommend sustained operation near these survivability limits.
- When the input power is applied to the terminated port, the absolute maximum is +30 dBm.
- Standard CMOS TTL interface, latch-up will occur if logic signal is applied prior to power supply.

## Handling Procedures

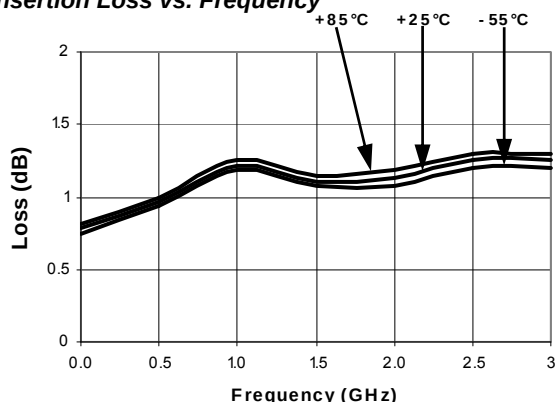
Please observe the following precautions to avoid damage:

## Static Sensitivity

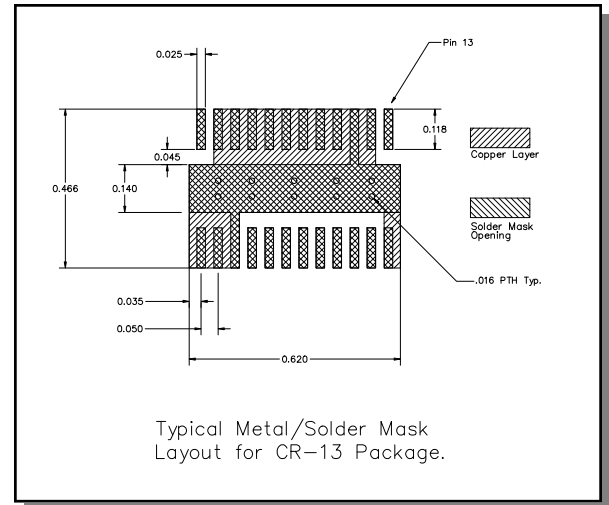
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

## Typical Performance Curves

Insertion Loss vs. Frequency



## Recommended PCB Configuration

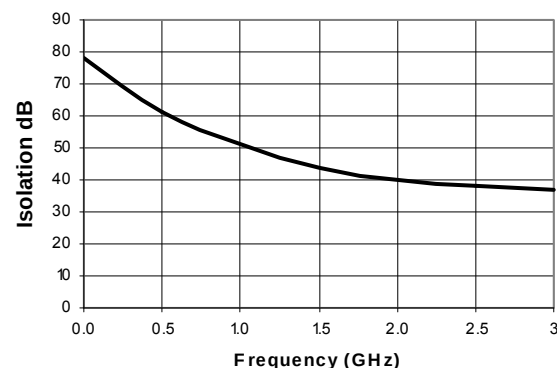


## Truth Table (Switch)

| TTL Control Inputs |    |    |    | Condition of Switch       |     |     |     |
|--------------------|----|----|----|---------------------------|-----|-----|-----|
|                    |    |    |    | RF Common to Each RF Port |     |     |     |
| C1                 | C2 | C3 | C4 | RF1                       | RF2 | RF3 | RF4 |
| 1                  | 0  | 0  | 0  | On                        | Off | Off | Off |
| 0                  | 1  | 0  | 0  | Off                       | On  | Off | Off |
| 0                  | 0  | 1  | 0  | Off                       | Off | On  | Off |
| 0                  | 0  | 0  | 1  | Off                       | Off | Off | On  |

0 = TTL Low; 1 = TTL High

Isolation vs. Frequency



**ADVANCED:** Data Sheets contain information regarding a product M/A-COM Technology Solutions is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.

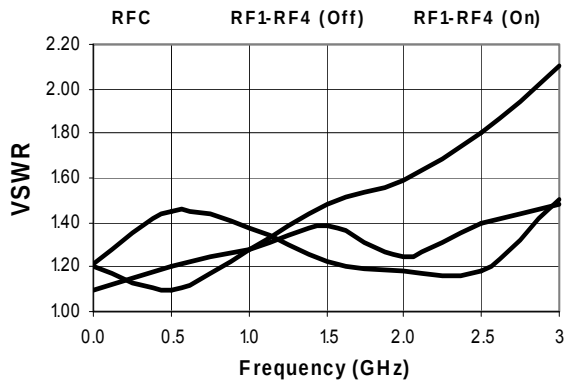
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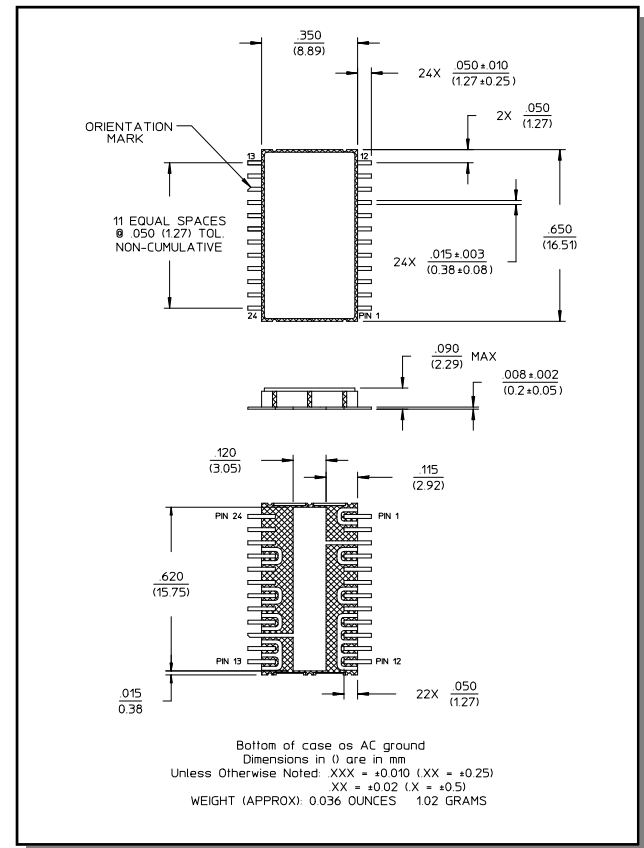
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## Typical Performance Curves

**VSWR vs. Frequency**



## Lead-Free, CR-14 Ceramic Package<sup>†</sup>



<sup>†</sup> Reference Application Note M538 for lead-free solder reflow recommendations.