GaAs SP4T Absorptive Switch, DC-3.0 GHz



Rev. V6

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

Ordering Information

Part Number

SW15-0314

SW15-0314-TB

information.

Note: Reference Application Note M513 for reel size

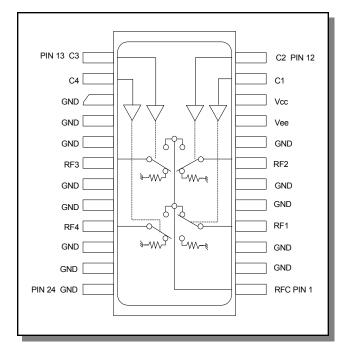
Commitment to produce in volume is not guaranteed.

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 around.

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

Package

Bulk Packaging

Sample Test Board

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

| Parameter | Test Conditions | Frequency | Units | Min | Тур | Max |
|------------------|---|--|----------------------------------|----------------------|----------------------------------|--------------------------|
| Insertion Loss | - | DC - 0.5 GHz DC - 1.0 GHz DC - 2.0 GHz DC - 3.0 GHz | dB dB dB dB | | 1.0 1.2 1.2 1.4 | 1.3 1.4 1.6 1.8 |
| Isolation | _ | DC - 0.5 GHz DC - 1.0 GHz DC - 2.0 GHz DC - 3.0 GHz | dB dB dB dB | 50 40 30 25 | 60 50 40 35 | |
| VSWR | RFC, RF1 - RF4 (On) | DC - 0.5 GHz DC - 1.0 GHz DC - 2.0 GHz DC - 3.0 GHz | Ratio Ratio Ratio Ratio | | 1.6:1 1.6:1 1.6:1 1.6:1 | |
| VSWR | RF1 - RF4 (Off) | DC - 0.5 GHz DC - 1.0 GHz DC - 2.0 GHz DC - 3.0 GHz | Ratio Ratio Ratio Ratio | | 1.3:1 1.5:1 1.9:1 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 0.5 GHz to 3 GHz | dBm dBm | | +20 +27 | _ |
| IP3 | Two-Tone Input Power up to +5 dBm | 0.05 GHz 0.5 GHz to 3 GHz | dBm dBm | | +35 +46 | |
| IP2 | Two-Tone Input Power up to +5 dBm | 0.05 GHz 0.5 GHz to 3 GHz | dBm dBm | | +45 +60 | |
| Vcc | — | — | V | 4.5 | 5.0 | 5.5 |
| Vee | — | — | V | -8.0 | — | -5.0 |
| Icc | Vcc = 4.5 to 5.5 V Vctl = 0 to 0.8V, or Vcc – 2.1V to Vcc | - | mA | — | 0.2 | 4.0 |
| lee | 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.

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Absolute Maximum Ratings ^{3,4,5}

| Parameter | Absolute Maximum | | |
|---|--|--|--|
| Max Input Power 0.05 GHz 0.5 - 3.0 GHz ⁵ | +27 dBm +34 dBm | | |
| V _{cc} | $-0.5 V \le V_{CC} \le +7.0 V$ | | |
| V _{EE} | $-8.5 \text{V} \leq \text{V}_{\text{EE}} \leq +0.5 \text{V}$ | | |
| V _{CC} - V _{EE} | $-0.5 V \leq V_{CC} - V_{EE} \leq 14.5 V$ | | |
| Vin ⁶ | $-0.5V \le Vin \le V_{CC} + 0.5V$ | | |
| Operating Temperature | -40°C to +85°C | | |
| Storage Temperature | -65°C to +150°C | | |

3. 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.
- 5. When the input power is applied to the terminated port, the absolute maximum is +30 dBm.
- 6. Standard CMOS TTL interface, latch-up will occur if logic signal is applied prior to power supply.

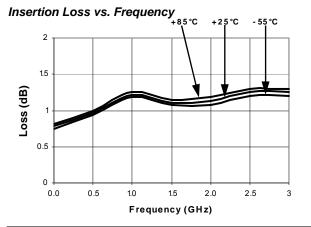
Handling Procedures

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

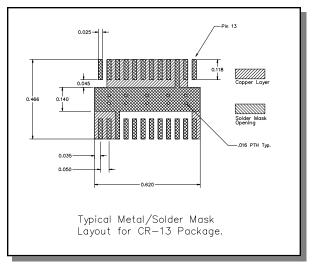


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Recommended PCB Configuration

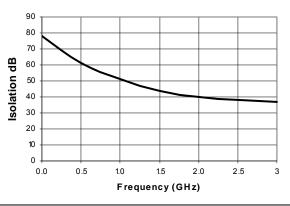


Truth Table (Switch)

| 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



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