

Features

- Operates DC - 4 GHz on Single Supply
- ASIC TTL / CMOS Driver
- Leadless 4 x 7 mm Chip Scale Plastic Package
- Low DC Power Consumption
- 50 Ohm Nominal Impedance
- Test Boards are Available
- Tape and Reel is Available
- Lead-Free CSP-2 Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- 260°C Reflow Compatible
- RoHS* Compliant Version of SW90-0003

Description

M/A-COM's MASWCC0010 is a SP4T absorptive pHEMT switch with integral TTL driver. This device is in an MLP plastic surface mount package. This switch offers excellent broadband performance and repeatability from DC to 4 GHz, while maintaining low DC power dissipation. The MASWCC0010 is ideally suited for wireless infrastructure applications.

Ordering Information

| Part Number | Package |
|---------------|-------------------|
| MASWCC0010 | Bulk Packaging |
| MASWCC0010TR | 1000 piece reel |
| MASWCC0010-TB | Sample Test Board |

Note: Reference Application Note M513 for reel size information.

Pin Configuration^{2, 3, 4}

| Pin No. | Function | Pin No. | Function |
|---------|-----------------|---------|-----------------|
| 1 | CP2 | 19 | GND |
| 2 | Vee | 20 | NC ¹ |
| 3 | NC ¹ | 21 | GND |
| 4 | C4 | 22 | RFC |
| 5 | C3 | 23 | GND |
| 6 | C2 | 24 | NC ¹ |
| 7 | C1 | 25 | RF3 |
| 8 | NC ¹ | 26 | GND |
| 9 | NC ¹ | 27 | NC ¹ |
| 10 | NC ¹ | 28 | GND |
| 11 | NC ¹ | 29 | RF4 |
| 12 | NC ¹ | 30 | GND |
| 13 | GND | 31 | NC ¹ |
| 14 | RF1 | 32 | Vee |
| 15 | GND | 33 | Vcc |
| 16 | NC ¹ | 34 | NC ¹ |
| 17 | GND | 35 | Vcc |
| 18 | RF2 | 36 | CP1 |

1. NC = No Connection
2. For single supply operation VEE is internally generated and must remain isolated from external power supplies. Generated noise is typical of switching DC-DC converters. Connections and external components shown in functional schematic are required. 0.1µF Capacitors need to be located near pins 32 & 33.
3. The exposed pad centered on the package bottom must be connected to RF and DC ground. (For PQFN Packages)

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

Electrical Specifications: $T_A = 25^\circ\text{C}$

| Parameter | Test Conditions | Frequency | Units | Min. | Typ. | Max. |
|---|--|---------------|--------------------|------|------|-------|
| Insertion Loss | RFC-RF1, 2, 3, 4 | DC - 4.0 GHz | dB | — | — | 2.3 |
| Isolation | — | DC - 4.0 GHz | dB | 38 | — | — |
| VSWR | On (RFC, RF1-RF4) Logic per Truth Table | DC - 4.0 GHz | Ratio | — | — | 2.0:1 |
| | Off (RF1-RF4) Logic per Truth Table | DC - 4.0 GHz | Ratio | — | — | 2.0:1 |
| 1 dB Compression | — | 50 MHz | dBm | — | +15 | — |
| | — | 0.5 - 4.0 GHz | dBm | — | +27 | — |
| Input IP_3 | Two-tone inputs up to +5 dBm | 50 MHz | dBm | — | 30 | — |
| | | 0.5-4.0 GHz | dBm | — | 40 | — |
| Switching Speed | Ton (50% Control to 90% RF) | — | ns | — | 35 | — |
| | Toff (50% Control to 10% RF) | — | ns | — | 20 | — |
| | Trise (10% to 90% RF) | — | ns | — | 12 | — |
| | Tfall (90% to 10% RF) | — | ns | — | 2 | — |
| V_{CC} | — | — | V | 4.5 | 5.0 | 5.5 |
| V_{IL} V_{IH} | LOW-level input voltage | — | V | 0.0 | — | 0.8 |
| | HIGH-level input voltage | — | V | 2.0 | — | 5.0 |
| I_{in} (Input Leakage Current) | $V_{in} = V_{CC}$ or GND | — | μA | -1.0 | — | 1.0 |
| $I_{CC}^{5,7}$ | V_{CC} min to max, Logic "0" or "1" | — | mA | — | 5 | 8 |
| I_{CC}^8 (Quiescent Supply Current) | $V_{cntrl} = V_{CC}$ or GND | — | μA | — | 250 | 400 |
| Turn-on Current ⁶ | For guaranteed start-up | — | mA | — | — | 125 |
| ΔI_{CC} (Additional Supply Current Per TTL Input Pin) | $V_{CC} = \text{Max}$, $V_{cntrl} = V_{CC} - 2.1 \text{ V}$ | — | mA | — | — | 1.0 |
| Switching Noise | Generated from DC-DC Converter with recommended capacitors | 3.5 MHz | dBm | — | -93 | — |
| Thermal Resistance θ_{jc} | — | — | $^\circ\text{C/W}$ | — | 15 | — |

5. During turn-on, the device requires an initial start up current (I_{CC}) specified as "Turn-on Current". Once operational, I_{CC} will drop to the specified levels. This is not applicable to dual supply operation.
6. The DC-DC converter is guaranteed to start in 100 μs as long as the power supplies have the maximum turn-on current available for start-up.
7. For single supply operation
8. For dual supply operation

Absolute Maximum Ratings^{9,10}

| Parameter | Absolute Maximum |
|---|---|
| Max. Input Power 0.05 GHz 0.5 - 4.0 GHz ¹¹ | +27 dBm +34 dBm |
| V_{CC} ⁷ | $-0.5V \leq V_{CC} \leq +6.0V$ |
| V_{CC} ⁸ | $-0.5V \leq V_{CC} \leq +7.0V$ |
| V_{EE} ⁸ | $-8.5V \leq V_{EE} \leq +0.5V$ |
| $V_{CC} - V_{EE}$ ⁸ | $-0.5V \leq V_{CC} - V_{EE} \leq 14.5V$ |
| V_{in} ¹² | $-0.5V \leq V_{in} \leq V_{CC} + 0.5V$ |
| Operating Temperature | -40°C to +85°C |
| Storage Temperature | -65°C to +125°C |

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

Truth Table (Switch)

| C1 | C2 | C3 | C4 | RFC-RF1 | RFC-RF2 | RFC-RF3 | RFC-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

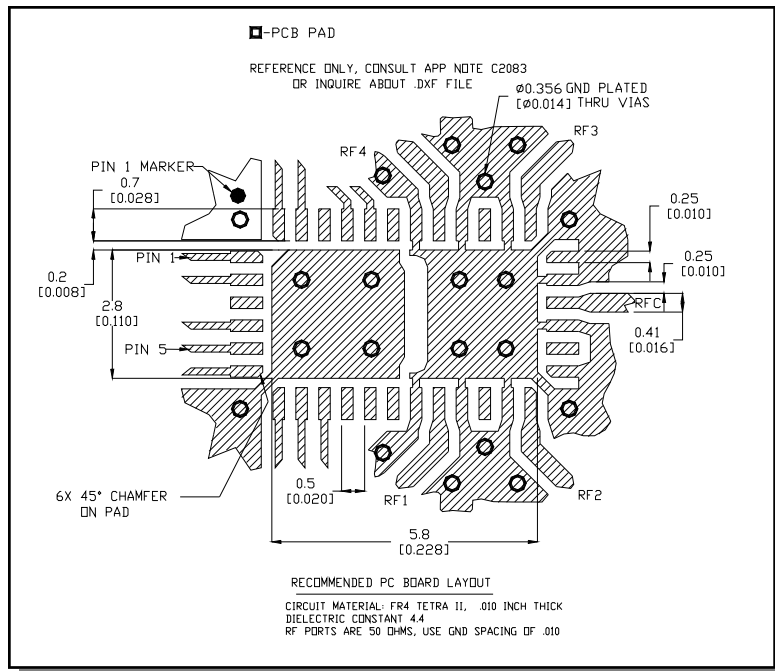
Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

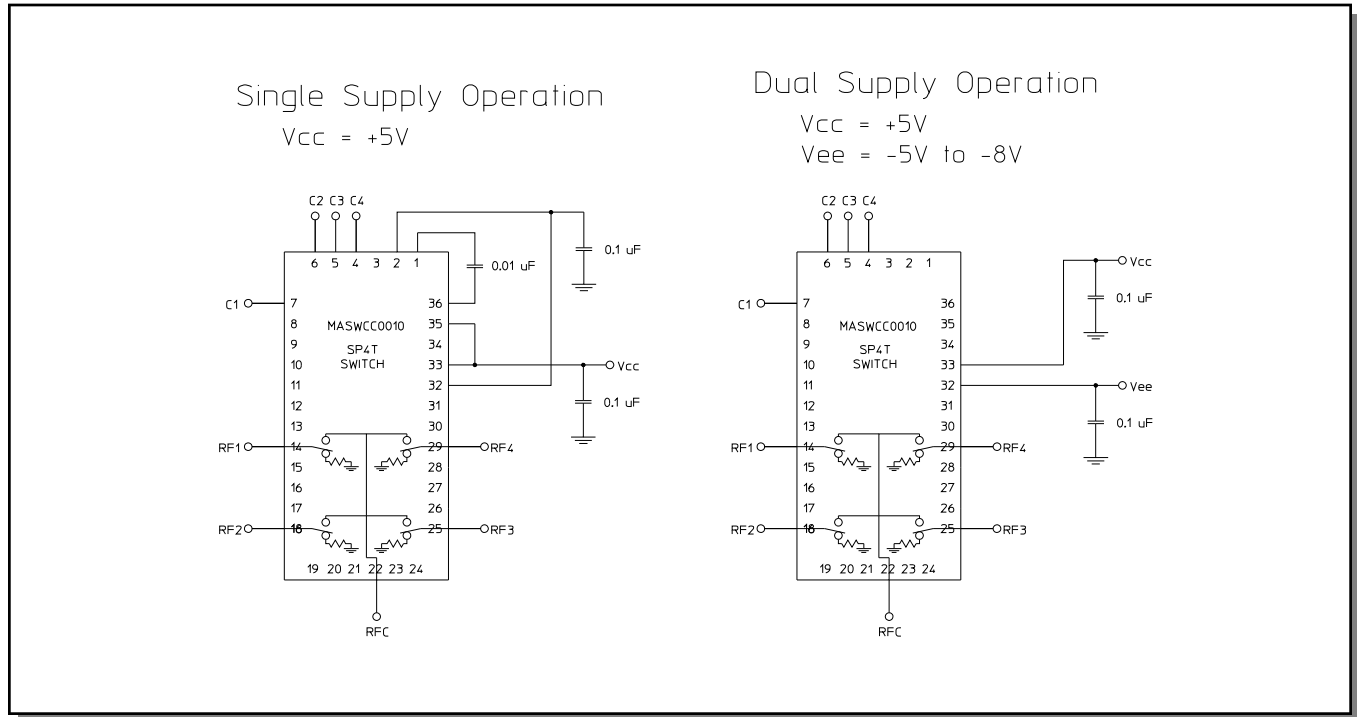
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Recommended PCB Configuration¹³



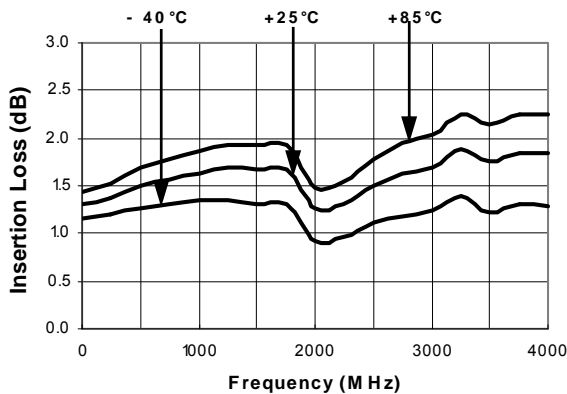
13. Application Note C2083 is available on line at www.macomtech.com

Functional Schematic

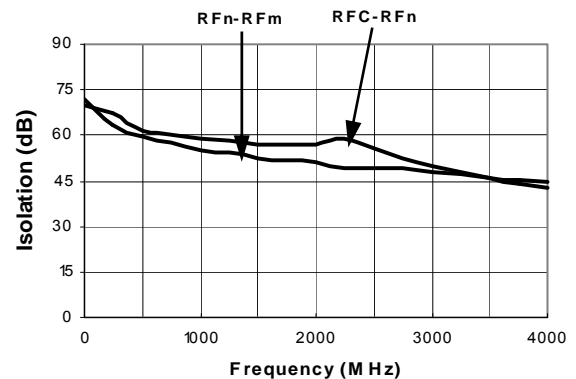


Typical Performance Curves

Insertion Loss vs. Frequency

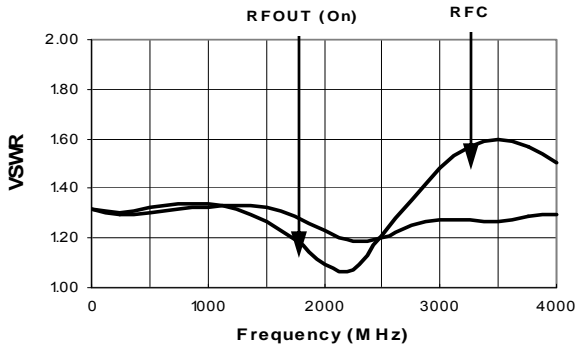


Isolation (dB) vs. Frequency

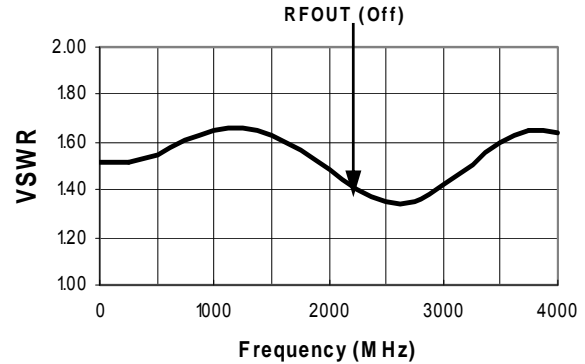


Typical Performance Curves

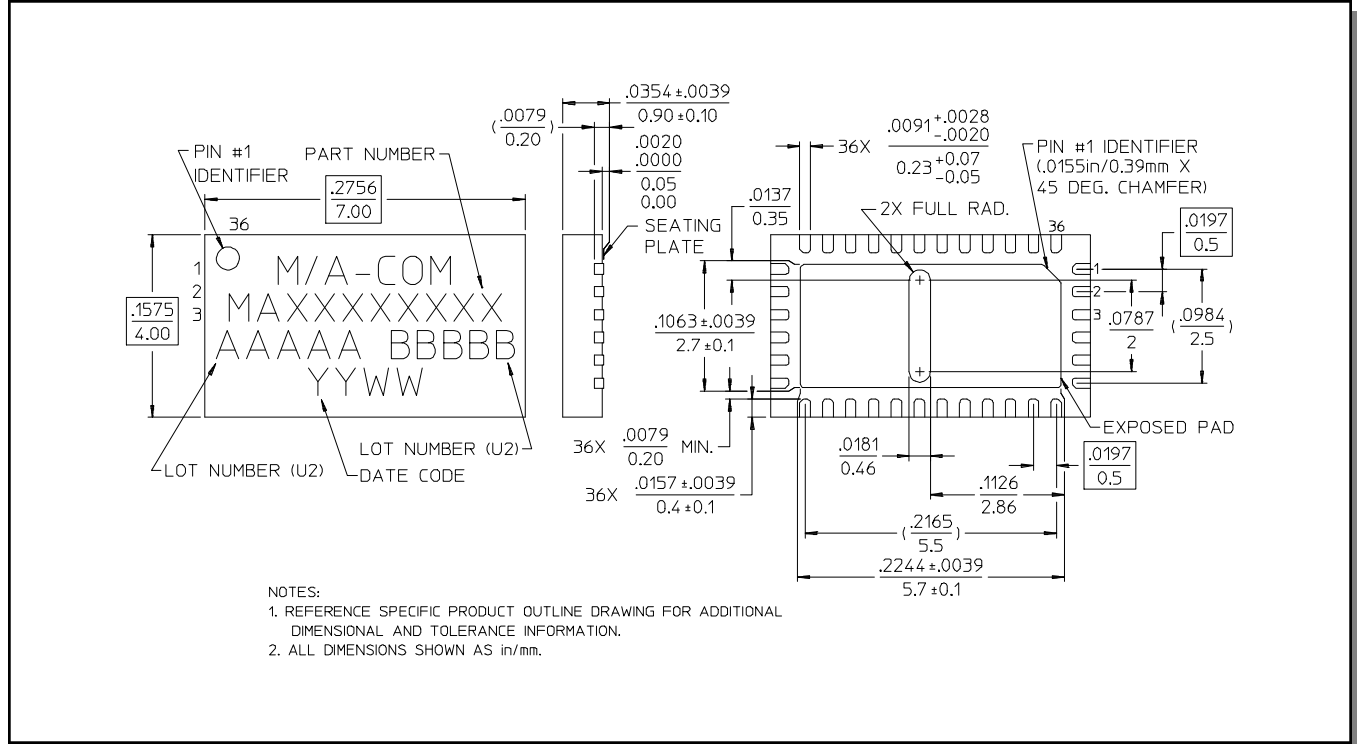
On VSWR vs. Frequency



VSWR (Terminations) vs. Frequency



CSP-2, Lead-Free, 4 x 7 mm, 36-lead, PQFN†



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

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