MASWCC0010

GaAs SP4T Switch, Absorptive, Single Supply DC - 4.0 GHz

Rev. V4

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.
3. Connections and external components shown in functional schematic are required. 0.1µF Capacitors need to be located near pins 32 & 33.
4. 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.

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Electrical Specifications: T_A = 25°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 Off (RF1-RF4) Logic per Truth Table	DC - 4.0 GHz DC - 4.0 GHz	Ratio Ratio	— —	— —	2.0:1 2.0:1
1 dB Compression	— —	50 MHz 0.5 - 4.0 GHz	dBm dBm	— —	+15 +27	— —
Input IP_3	Two-tone inputs up to +5 dBm	50 MHz 0.5-4.0 GHz	dBm dBm	— —	30 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	—
Vcc	—	—	V	4.5	5.0	5.5
V_{IL} V_{IH}	LOW-level input voltage HIGH-level input voltage	— —	V V	0.0 2.0	— —	0.8 5.0
Iin (Input Leakage Current)	Vin = V_{CC} or GND	—	uA	-1.0	—	1.0
Icc[5,7]	Vcc min to max, Logic “0” or “1”	—	mA	—	5	8
Icc[8] (Quiescent Supply Current)	Vcntrl = V_{CC} or GND		uA	—	250	400
Turn-on Current[6]	For guaranteed start-up	—	mA	—	—	125
ΔIcc (Additional Supply Current Per TTL Input Pin)	V_{CC} = Max, Vcntrl = V_{CC} - 2.1 V	—	mA	—	—	1.0
Switching Noise	Generated from DC-DC Converter with recommended capacitors	3.5 MHz	dBm	—	-93	—
Thermal Resistance θjc	—	—	°C/W	—	15	—

5. During turn-on, the device requires an initial start up current (Icc) specified as “Turn-on Current”. Once operational, Icc 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

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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 ≤ V_{CC} ≤ +6.0V
V_{CC}[8]	-0.5V ≤ V_{CC} ≤ +7.0V
V_{EE}[8]	-8.5V ≤ V_{EE} ≤ +0.5V
V_{CC} - V_{EE}[8]	-0.5V ≤ V_{CC} - V_{EE} ≤ 14.5V
Vin[12]	-0.5V ≤ Vin ≤ V_{CC} + 0.5V
Operating Temperature	-40ºC to +85ºC
Storage Temperature	-65ºC to +125ºC

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

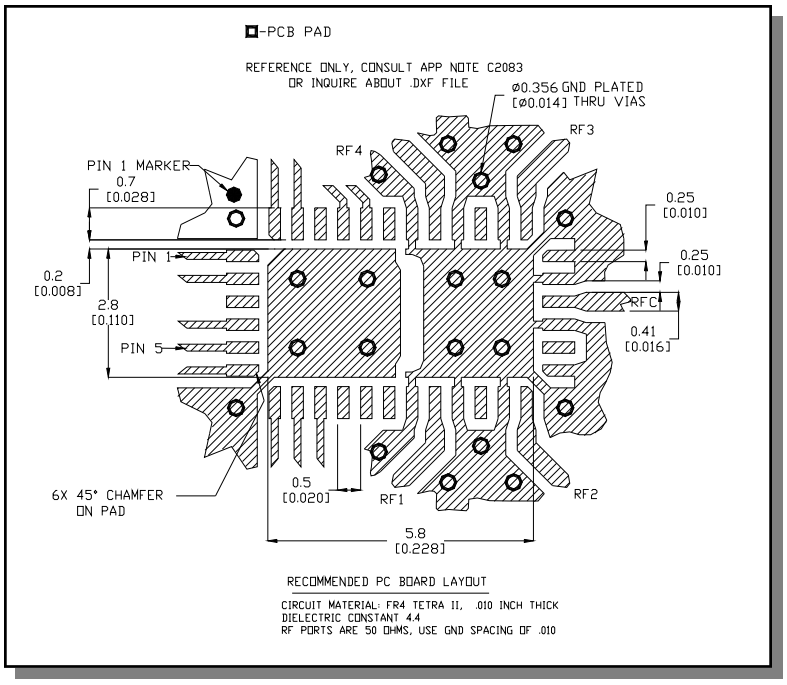
Handling Procedures

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 Configuration[13]



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

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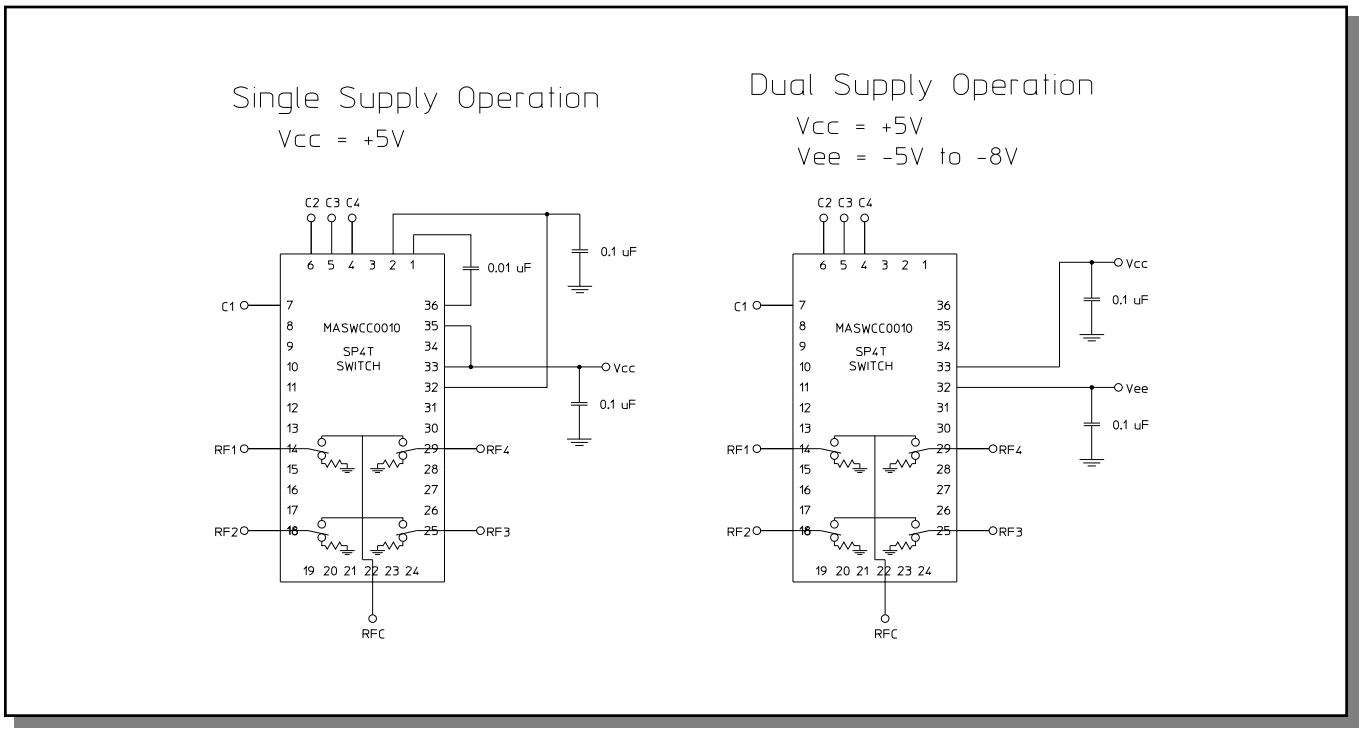
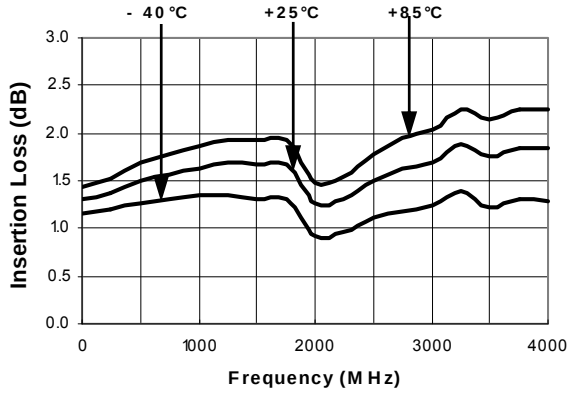
Functional Schematic

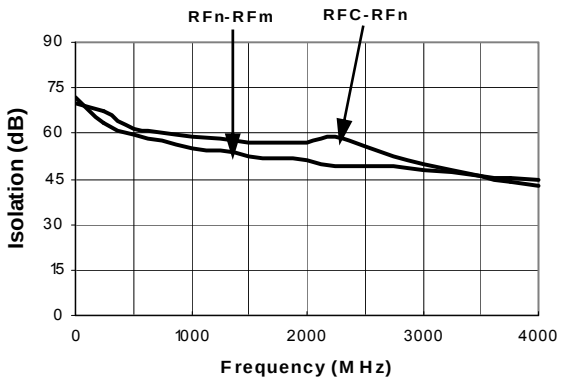


Typical Performance Curves

Insertion Loss vs. Frequency



Isolation (dB) vs. Frequency



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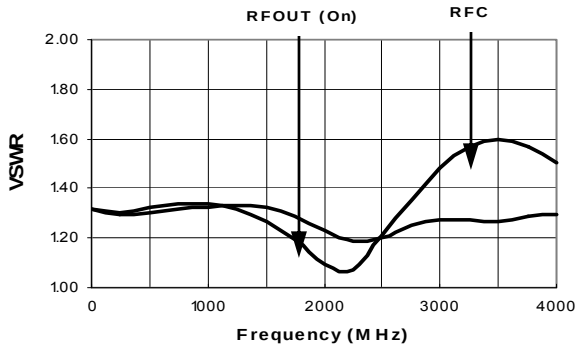
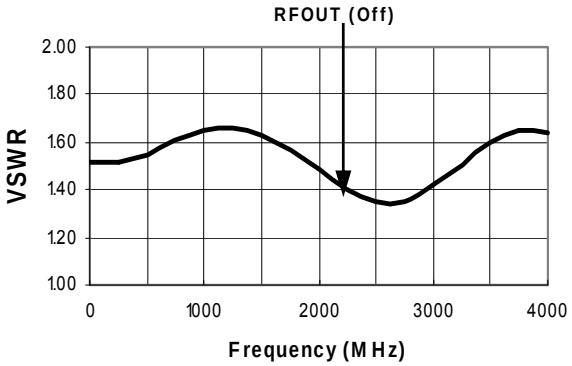
Typical Performance Curves

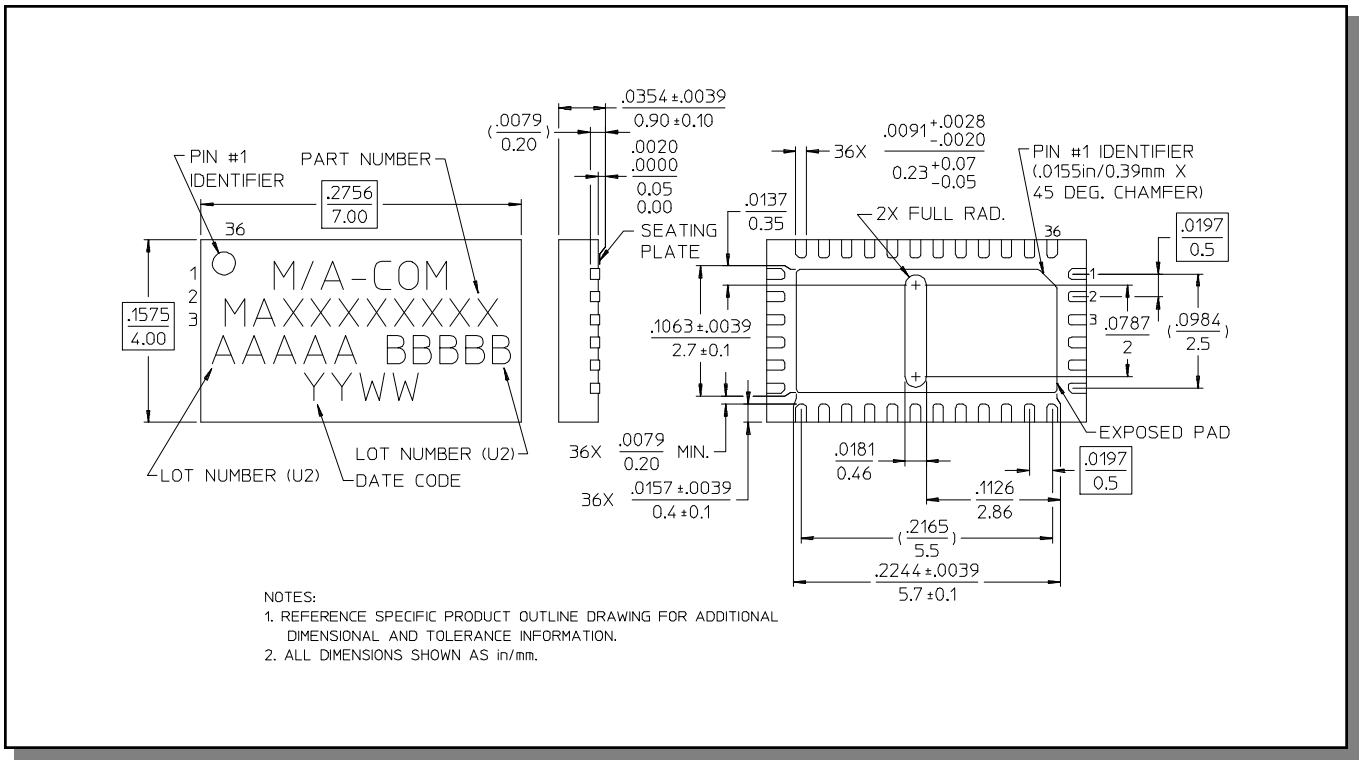
On VSWR vs. Frequency



VSWR (Terminations) vs. Frequency



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



NOTES:
1. REFERENCE SPECIFIC PRODUCT OUTLINE DRAWING FOR ADDITIONAL DIMENSIONAL AND TOLERANCE INFORMATION.
2. ALL DIMENSIONS SHOWN AS in/mm.

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

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