SW90-0004A

GaAs SP6T Switch, Absorptive, Single Supply
DC - 4.0 GHz

Rev. V8

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 are Available
- CSP-2 Package

Description

M/A-COM's SW90-0004A is a SP6T 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 SW90-0004A is ideally suited for wireless infrastructure applications.

Ordering Information

Part Number	Package
SW90-0004A	Bulk Packaging
SW90-0004ATR	1000 piece reel
SW90-0004A-TB	Sample Test Board

Note: Reference Application Note M513 for reel size information.

Pin Configuration[1,2,3,4]

Pin No.	Function	Pin No.	Function
1	CP2	19	GND
2	V_{EE}	20	NC
3	NC	21	GND
4	C6	22	RFC
5	C5	23	GND
6	C4	24	GND
7	C3	25	RF4
8	C2	26	GND
9	C1	27	RF5
10	NC	28	GND
11	GND	29	RF6
12	NC	30	GND
13	GND	31	NC
14	RF1	32	V_{EE}
15	GND	33	Vcc
16	RF2	34	NC
17	GND	35	Vcc
18	RF3	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 MLF Packages)

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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, 5, 6	DC - 3.0 GHz 3.0 - 4.0 GHz	dB dB	— —	— —	2.1 2.4
Isolation	—	DC - 4.0 GHz	dB	25	—	—
VSWR	On (RFC, RF1-RF6) Logic per Truth Table Off (RF1-RF6) 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	—	20	—
	Toff (50% Control to 10% RF)	—	ns	—	15	—
	Trise (10% to 90% RF)	—	ns	—	5	—
	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

Truth Table (Switch)

Control Inputs "0" is TTL Low, "1" is TTL High						Condition of Switch RF Common to Each RF Port					
C1	C2	C3	C4	C5	C6	RF1	RF2	RF3	RF4	RF5	RF6
1	0	0	0	0	0	On	Off	Off	Off	Off	Off
0	1	0	0	0	0	Off	On	Off	Off	Off	Off
0	0	1	0	0	0	Off	Off	On	Off	Off	Off
0	0	0	1	0	0	Off	Off	Off	On	Off	Off
0	0	0	0	1	0	Off	Off	Off	Off	On	Off
0	0	0	0	0	1	Off	Off	Off	Off	Off	On

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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.

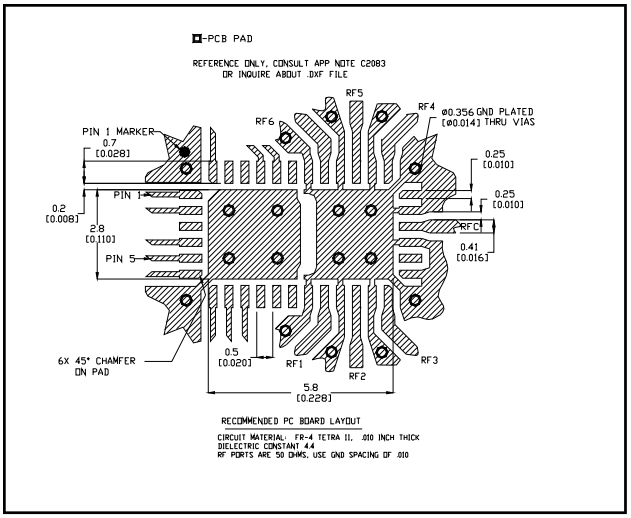
Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

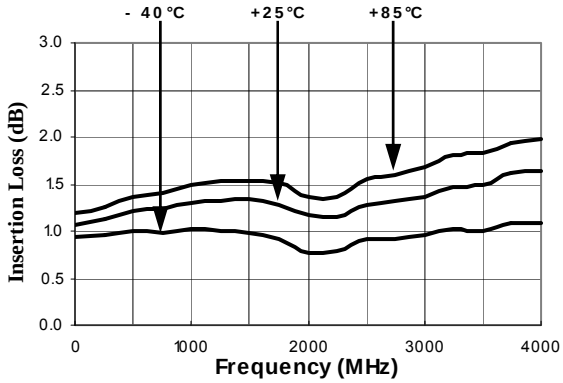
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Recommended PCB Configuration

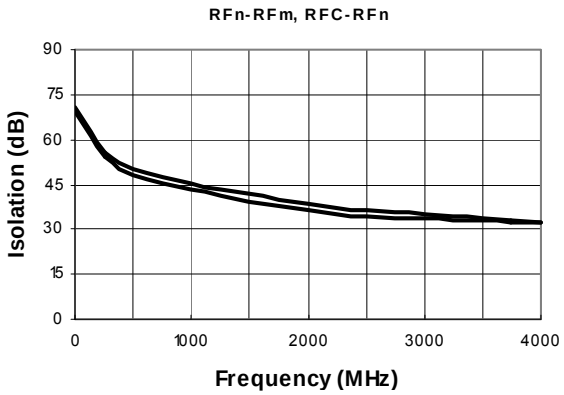


Typical Performance Curves

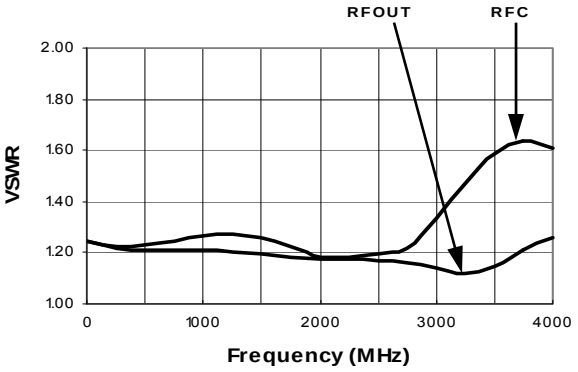
Insertion Loss vs. Frequency



Isolation (dB) vs. Frequency



On VSWR vs. Frequency



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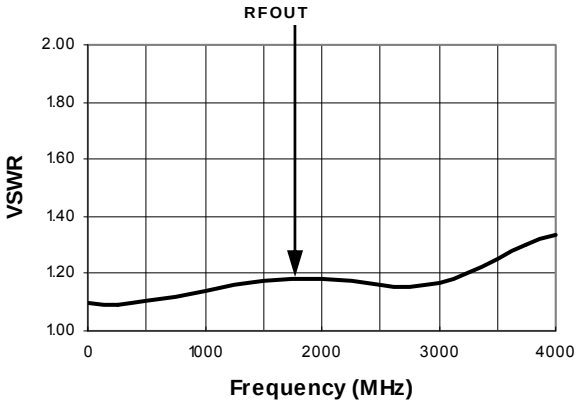
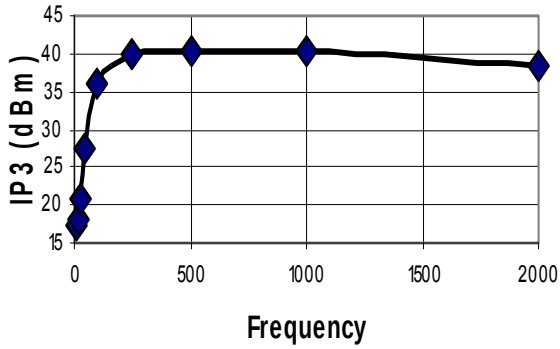
Typical Performance Curves

VSWR (Terminations) vs. Frequency

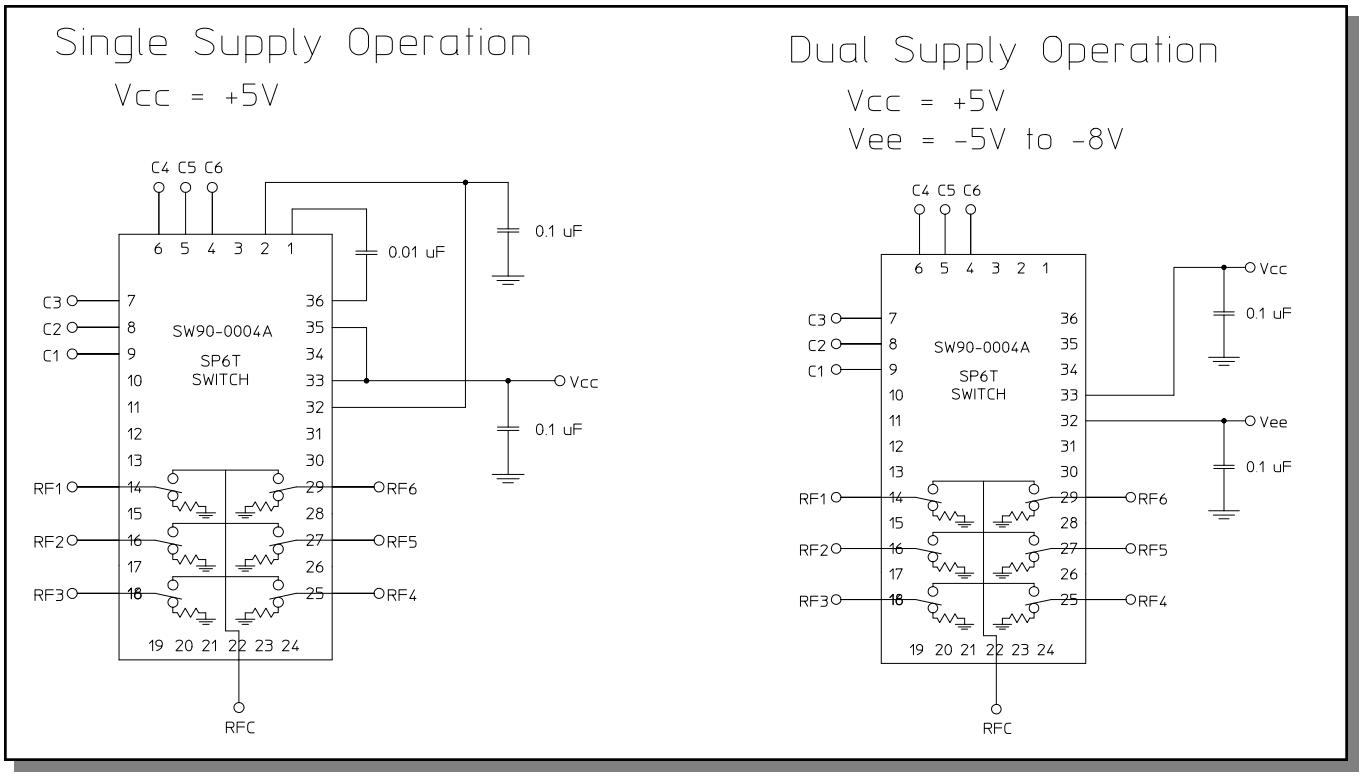


IP3 Results [11]



11. All testing done with the second tone 5 MHz above the frequency on the plot, except for the 10 MHz point, where the second tone is at 11 MHz. Both tones are +5 dBm.

Functional Schematic



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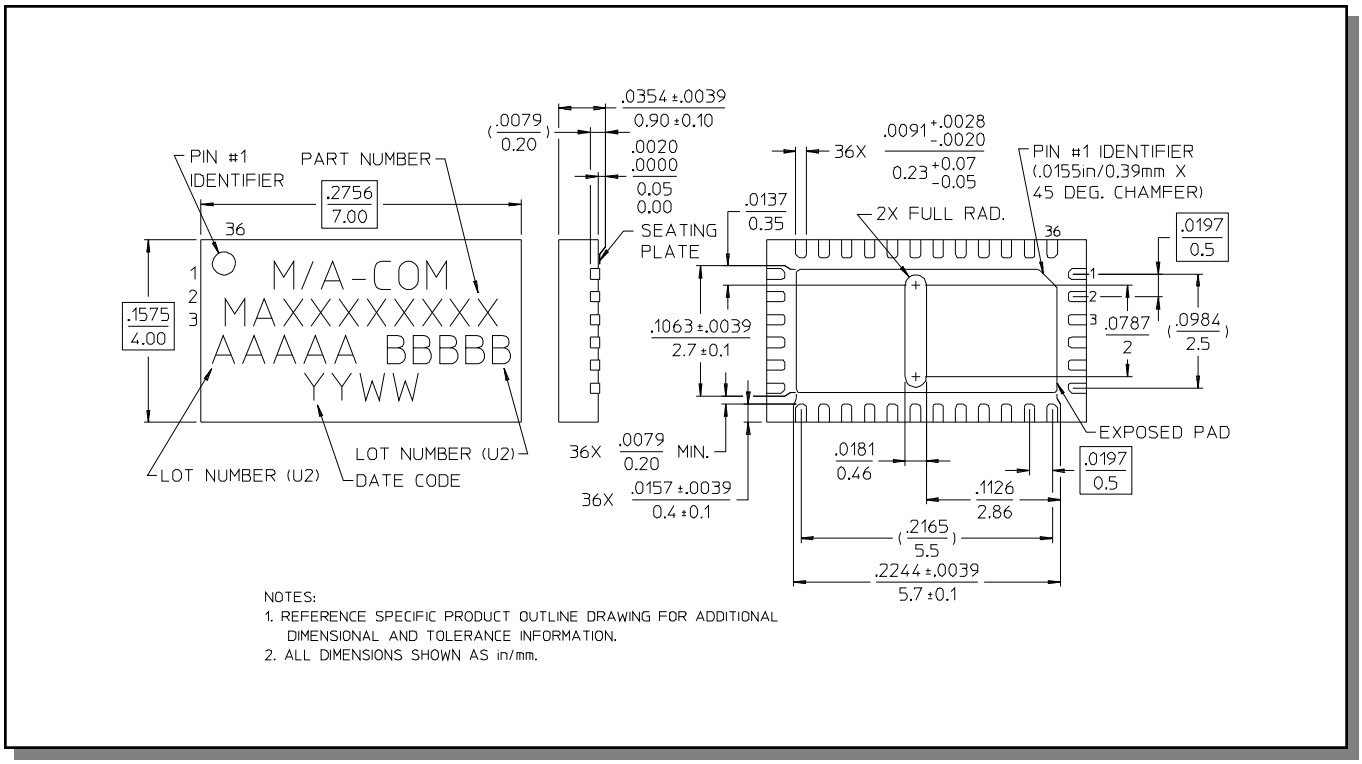
CSP-2, 4 x 7 mm, 36-lead PQFN†



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

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