

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

MASW-007071-000100

V1

Features

- Operates DC - 4 GHz on Single Supply
- ASIC TTL / CMOS Driver
- Low DC Power Consumption
- 50 Ohm Nominal Impedance
- Test Boards are Available
- Tape and Reel are Available
- Lead-Free 4 x 6 mm PQFN Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- 260°C Reflow Compatible
- RoHS* Compliant Version of SW90-0002

Description

M/A-COM's MASW-007071-000100 is a SPDT absorptive pHEMT switch with integral TTL driver. This device is in an PQFN plastic surface mount package. This switch offers excellent broadband performance and repeatability from DC to 4 GHz, while maintaining low DC power dissipation. The MASW-007071-000100 is ideally suited for wireless infrastructure applications.

Pin Configuration^{1,2,3,4}

Pin No.	Function	Pin No.	Function
1	NC	17	NC
2	GND	18	C1
3	RFC	19	NC
4	GND	20	V _{CC}
5	NC	21	NC
6	NC	22	NC
7	GND	23	CP1
8	RF1	24	CP2
9	GND	25	NC
10	NC	26	V _{EE}
11	NC	27	NC
12	V _{EE}	28	NC
13	NC	29	NC
14	V _{CC}	30	GND
15	NC	31	RF2
16	NC	32	GND

1. NC = No Connection
2. 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. 0.1 μ F Capacitors need to be located near pins 20 & 26.
4. The exposed pad centered on the package bottom must be connected to RF and DC ground. (For PQFN Packages)

Ordering Information

Part Number	Package
MASW-007071-000100	Bulk Packaging
MASW-007071-0001TR	1000 piece reel
MASW-007071-0001TB	Sample Test Board

Note: Reference Application Note M513 for reel size information.

Note: Die quantity varies.

Truth Table (Switch)

Control Input	Condition of the Switch	
	RF Common to each RF Port	
C1	RF1	RF2
0	Off	On
1	On	Off

"0" = TTL Low

"1" = TTL High

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

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Electrical Specifications: $T_A = 25^\circ\text{C}$, $Z_0 = 50\Omega$

Parameter	Test Conditions	Frequency	Units	Min	Typ	Max
Insertion Loss	RFC—RF1,RF2 (Logic per truth table)	DC - 4.0 GHz	dB	—	—	1.8
Isolation	RF1—RF2 (All Logic "0")	DC - 4.0 GHz	dB	30	—	—
VSWR	On (RFC,RF1, RF2) (Logic per truth table)	DC - 4.0 GHz	Ratio	—	—	2.0:1
VSWR	Off (RF1, RF2) (Logic per truth table)	DC - 4.0 GHz	Ratio	—	—	1.8:1
1 dB Compression	— —	50 MHz 0.5 - 4.0 GHz	dBm dBm	— —	18 29	—
Input IP ₃	Two-tone inputs up to +5 dBm	50 MHz 0.5 - 4.0 GHz	dBm dBm	— —	36 46	—
Switching Speed	Ton (50% Control to 10% RF)		ns	—	31	—
	Toff (50% Control to 90% RF)		ns	—	19	—
	Trise (10% to 90% RF)		ns	—	6	—
	Tfall (90% to 10% RF)		ns	—	2	—
V _{cc}	—	—	V	4.5	5.0	5.5
Logic "0"	Sink Current is 20 μA max.	—	V	0.0	—	0.8
Logic "1"	Source Current is 20 μA max.	—	V	2.0	—	5.0
I _{cc} ⁵	V _{cc} min to max, Logic "0" or "1"	—	mA	—	5	8
Turn-on Current ⁶	For guaranteed start-up	—	mA	—	—	125
Switching Noise	Generated from DC-DC Converter with recommended capacitors	3.5 MHz	dBm	—	-93	—
Thermal Resistance θ_{jc}	—	—	°C/W	—	15	—

- 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.
- 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.

Absolute Maximum Ratings^{7,8}

Parameter	Absolute Maximum
Max. Input Power 0.05 GHz 0.5 - 4.0 GHz ⁹	+27 dBm +34 dBm
Bias Voltages V _{cc} Control Voltage ¹⁰	-0.5V \leq V _{cc} \leq +6.0V -0.5V to V _{cc} +0.5V
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +125°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 RF input is applied to the terminated port, the absolute maximum power 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.

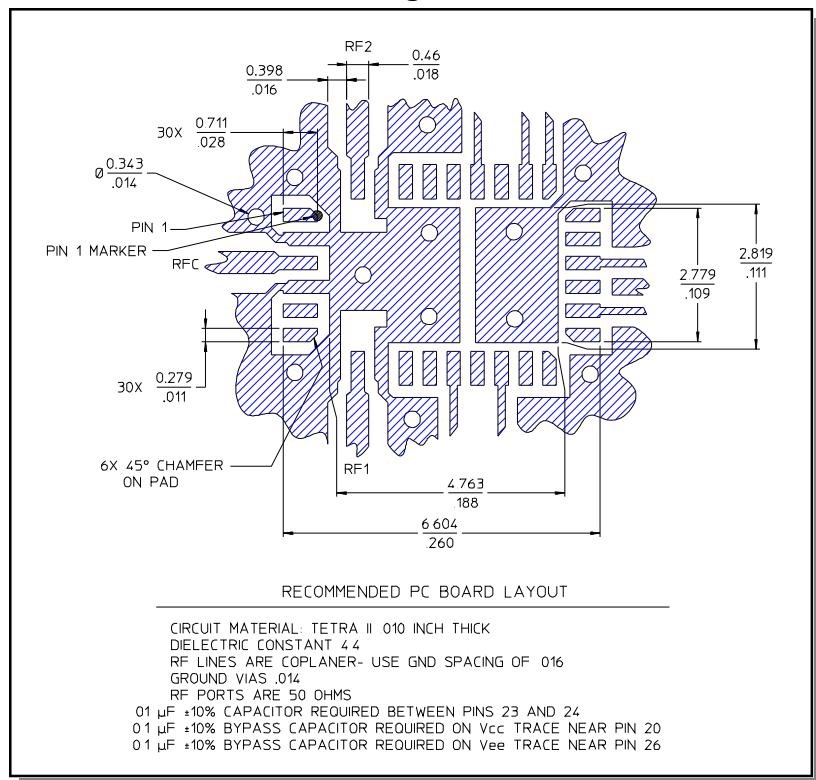
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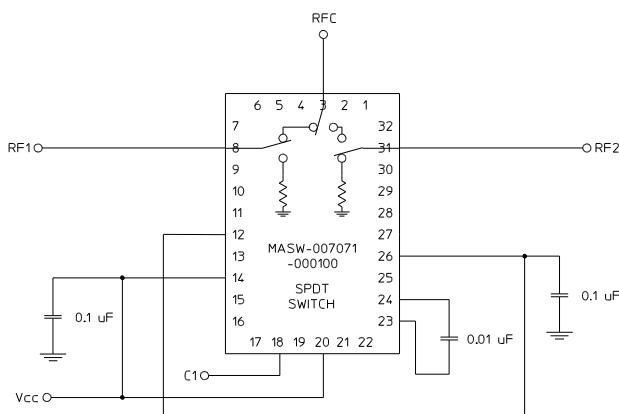
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Recommended PCB Configuration¹¹11. Application Note S2083 is available on line at www.macom.comFunctional Schematic¹²

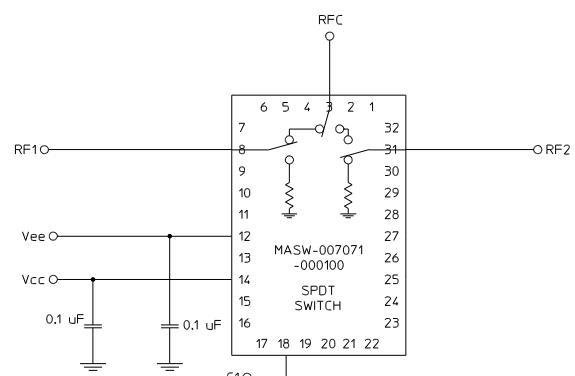
Single Supply Operation

Vcc = +5V



Dual Supply Operation

Vcc = +5V, Vee = -5V to -8V



12. Dual Supply Operation will eliminate the start-up current mentioned in Note 5. It will also eliminate spurious signals caused by the DC-DC converter that are present in single supply operation.

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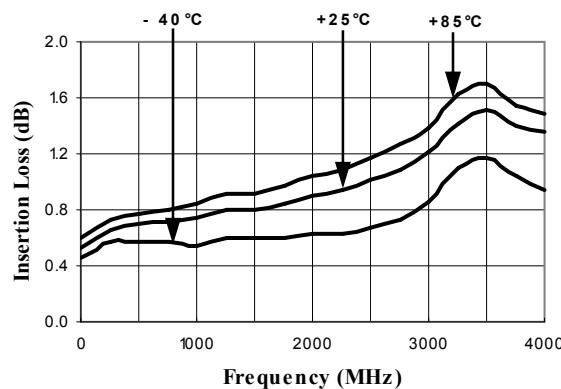
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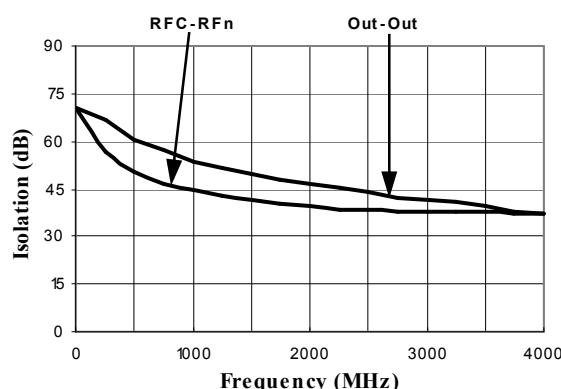
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Typical Performance Curves

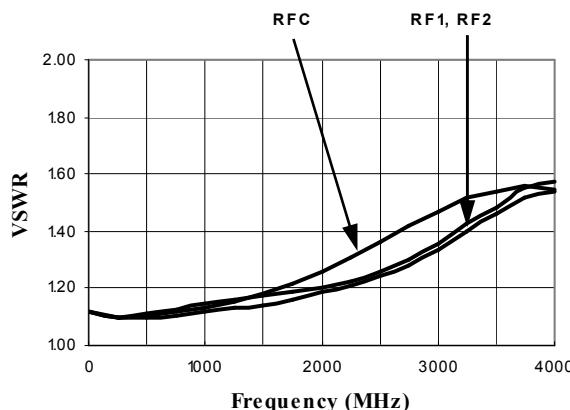
Insertion Loss vs. Frequency



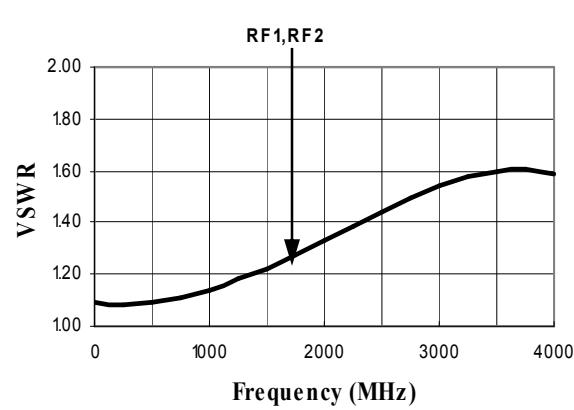
Isolation (dB) vs. Frequency



On VSWR vs. Frequency



VSWR (Terminations) vs. Frequency

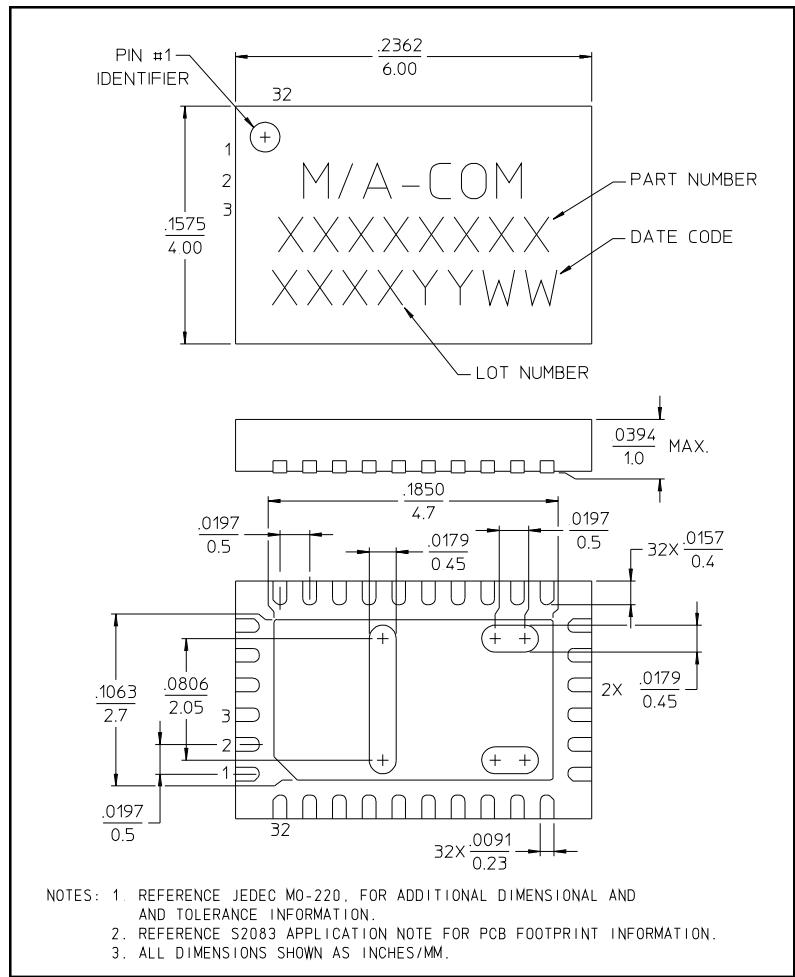


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CSP-1, Lead-Free 4 x 6 mm, 32-lead PQFN[†]



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