MASW-000105

GaAs SP6T 2.5 V High Power Switch
Dual- / Tri- / Quad-Band GSM Applications

Rev. V1

Features

- Dual- / tri- / quad-band GSM / GPRS / EDGE
- 2.5V Operation
- Harmonics: -70 dBc @ +34.5 dBm & 1 GHz
- Insertion Loss: 0.5 dB @ 1 GHz
- T_X - R_X Isolation: 41 dB @ 2 GHz
- Lead-Free 4 mm 20-Lead PQFN Package
- RoHS Compliant* and 260°C Reflow Compatible

Description

M/A-COM's MASW-000105 is a GaAs PHEMT MMIC single pole six throw (SP6T) high power switch in a 4 mm PQFN package. Designed for dual-, tri-, or quad-band GSM/GPRS/EDGE mobile devices, the MASW-000105 is ideally suited for applications where high power, low control voltage, low insertion loss, high isolation, small size and low cost are required. This part can be used in all systems operating up to 2.5 GHz requiring high power at low control voltage.

The MASW-000105 is fabricated using a 0.5 micron gate length GaAs PHEMT process. The process features full passivation for performance and reliability.

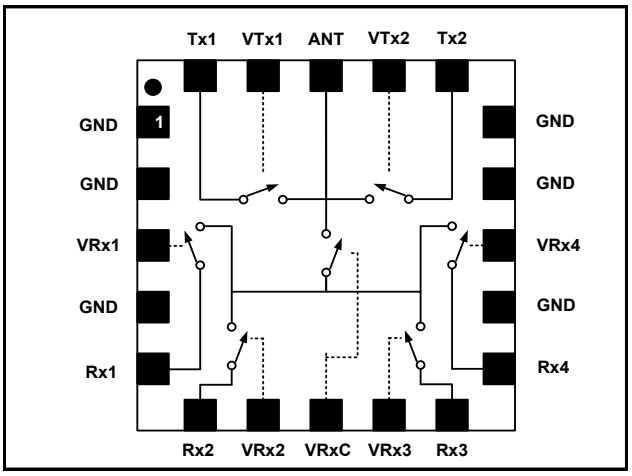
The MASW-000105 can also be purchased in die form as the MASWSS0091.

Ordering Information [1,2]

Part Number	Package
MASW-000105-TR3000	3000 piece reel
MASW-000105-001SMB	Sample Test Board

1. Reference Application Note M513 for reel size information.
2. All sample boards include 5 loose parts.

Functional Block Diagram



Pin Configuration

Pin No.	Function	Description
1	GND	Ground
2	GND	Ground
3	VRx1	Rx1 Control
4	GND	Ground
5	Rx1	Rx1 Port
6	Rx2	Rx2 Port
7	VRx2	Rx2 Control
8	VRxC	Rx Common Control
9	VRx3	Rx3 Control
10	Rx3	Rx3 Port
11	Rx4	Rx4 Port
12	GND	Ground
13	VRx4	Rx4 Control
14	GND	Ground
15	GND	Ground
16	Tx2	Tx2 Port
17	VTx2	Tx2 Control
18	ANT	ANT Pad
19	VTx1	Tx1 Control
20	Tx1	Tx1 Port
21	Paddle[3]	RF and DC Ground

3. The exposed pad centered on the package bottom must be connected to RF and DC ground.

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

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Electrical Specifications: T_A = 25°C, V_C = 0V/2.5V, Z_0 = 50 Ω [4]

Parameter	Test Conditions		Units	Min.	Typ.	Max.
Insertion Loss [5]	Ant - T_X	0.5 - 1.0 GHz 1.0 - 2.0 GHz	dB	- -	0.5 0.7	0.7 -
	Ant - R_X	0.5 - 1.0 GHz 1.0 - 2.0 GHz	dB	- -	1.0 1.3	1.2 -
Isolation	T_X to R_X, T_X On	0.5 - 1.0 GHz 1.0 - 2.0 GHz	dB	40 -	47 41	- -
	T_X to T_X, T_X On	0.5 - 1.0 GHz 1.0 - 2.0 GHz	dB	20 -	27 21	- -
	R_X to T_X, R_X On	0.5 - 1.0 GHz 1.0 - 2.0 GHz	dB	- -	26 21	- -
	R_X to R_X, R_X On	0.5 - 1.0 GHz 1.0 - 2.0 GHz	dB	- -	37 33	- -
Return Loss	0.5 - 1.0 GHz 1.0 - 2.0 GHz		dB	- -	18 16	- -
T_X P0.1dB	V_C = 0 V / 2.5 V		dBm	-	36	-
R_X P1dB	V_C = 0 V / 2.5 V		dBm	-	24	-
IP3	T_X to ANT ANT to R_X		dBm	- -	60 50	- -
2nd Harmonic	0.5 - 1.0 GHz 1.0 - 2.0 GHz		dBc	- -	71 70	- -
3rd Harmonic	0.5 - 1.0 GHz 1.0 - 2.0 GHz		dBc	- -	74 66	- -
Trise, Tfall	10% to 90% RF, 90% to 10% RF		µs	-	0.5	-
Ton, Toff	50% control to 90% RF, 50% control to 10% RF		µs	-	0.9	-
Transients	In Band		mV	-	30	-
Control Current	$\|V_C\|$ = 2.5 V		µA	-	20	50

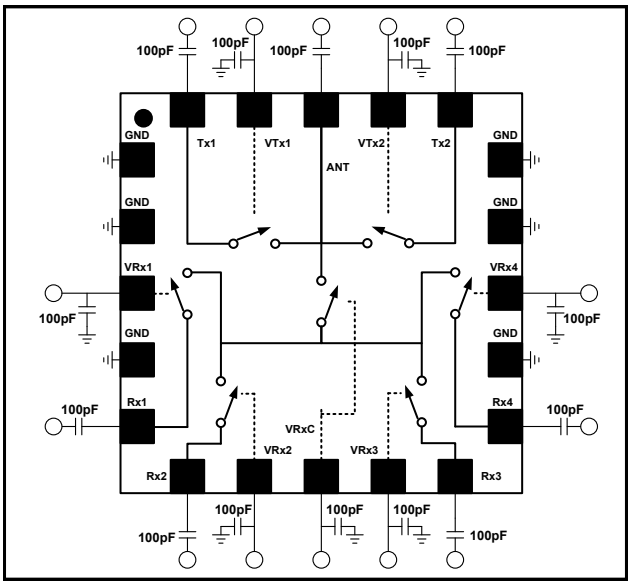
4. External DC blocking capacitors are required on all RF ports.
5. Insertion loss can be optimized by varying the DC blocking capacitor value, e.g. 100 pF for 0.5 GHz - 2.0 GHz.

Absolute Maximum Ratings [6,7]

Parameter	Absolute Maximum
Input Power (0.5 - 2.5 GHz, 2.5V Control)	+38 dBm
Voltage	+8.5 volts
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

6. Exceeding any one or combination of these limits may cause permanent damage to this device.
7. M/A-COM does not recommend sustained operation near these survivability limits.

Functional Schematic



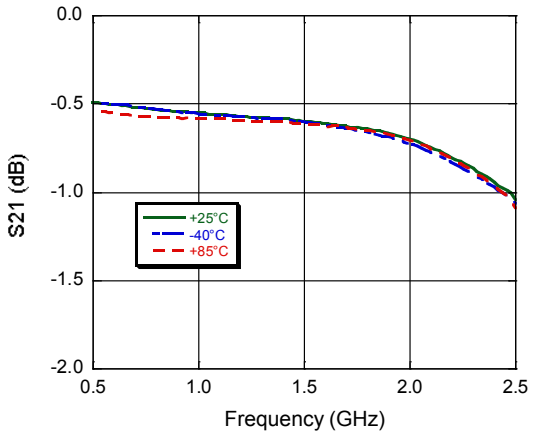
Truth Table [8,9]

VTx1	VTx2	VRxC	VRx1	VRx2	VRx3	VRx4	ANT-Tx1	ANT-Tx2	ANT-Rx1	ANT-Rx2	ANT-Rx3	ANT-Rx4
1	0	0	0	0	0	0	On	Off	Off	Off	Off	Off
0	1	0	0	0	0	0	Off	On	Off	Off	Off	Off
0	0	1	1	0	0	0	Off	Off	On	Off	Off	Off
0	0	1	0	1	0	0	Off	Off	Off	On	Off	Off
0	0	1	0	0	1	0	Off	Off	Off	Off	On	Off
0	0	1	0	0	0	1	Off	Off	Off	Off	Off	On

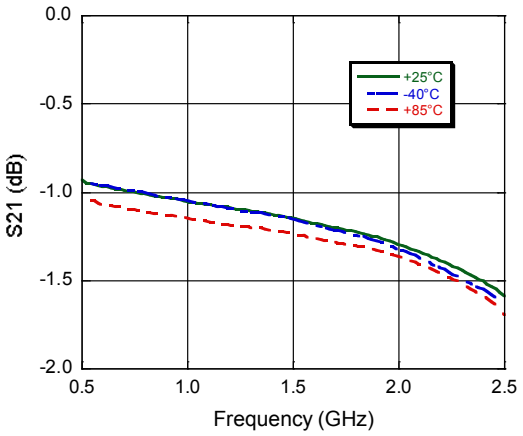
8. Differential voltage, V (state 1) -V (state 0), must be 2.5 V minimum.
9. State 0 = 0 V to +0.2 V, State 1 = 2.5 V to 5 V.

Typical Performance Curves

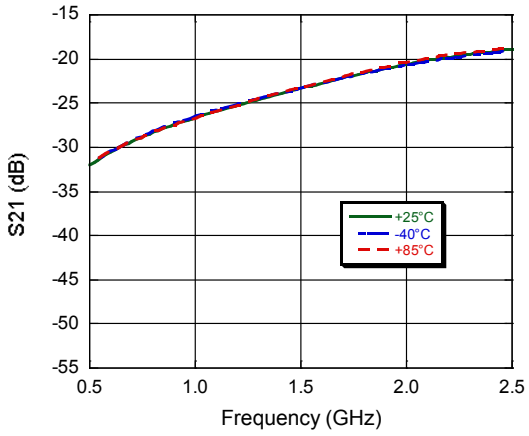
T_X Insertion Loss



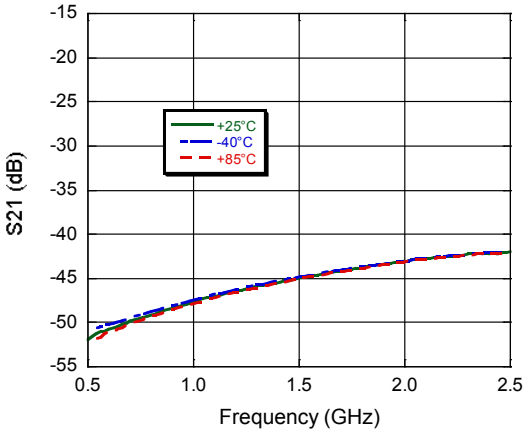
R_X Insertion Loss



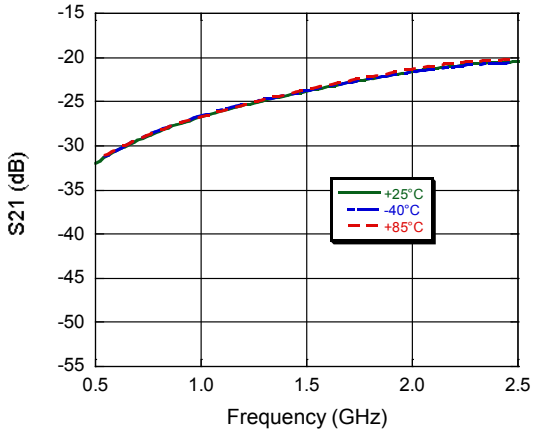
T_X - T_X Isolation



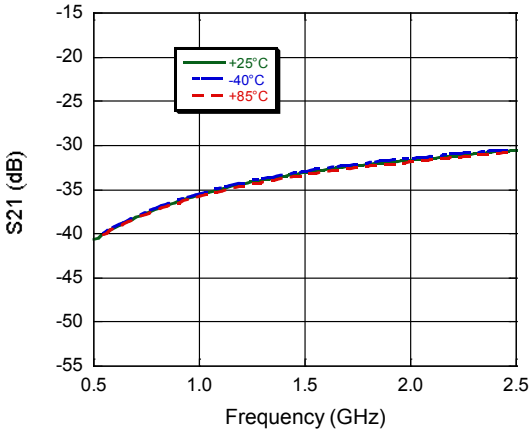
T_X - R_X Isolation



R_X - T_X Isolation

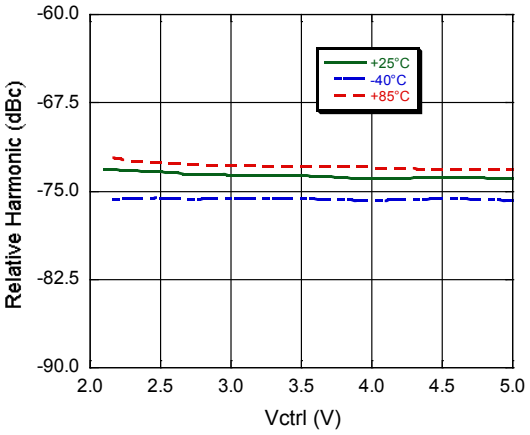


R_X - R_X Isolation



Typical Performance Curves

3rd Harmonic vs. Vctrl @ 1 GHz, Pin = +35 dBm, 100% Duty Cycle



Qualification

Qualified to M/A-COM specification REL-201, Process Flow –2.

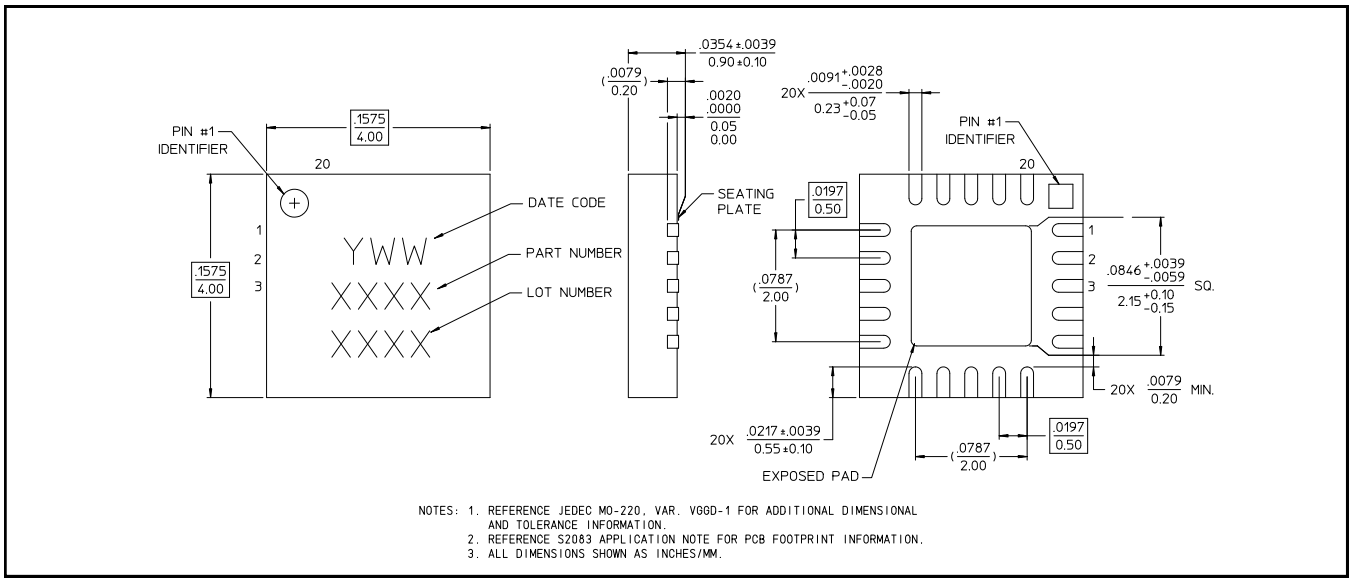
Handling Procedures

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.

Lead Free 4 mm 20-lead PQFN †



† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is 100% matte tin over copper.

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