GaAs SP3T 2.5V High Power Switch DC - 2.5 GHz

SW-489

Feb 12 2002

Preliminary

Features

- Low Voltage Operation 2.5V
- Low Harmonics > 65 dBc at +34 dBm & 1 GHz
- Low Insertion Loss 0.5 dB at 1 GHz
- High Isolation 18.5 dB at 2 GHz
- Miniature FQFP 12-lead 3x3mm Package
- 0.5 micron GaAs pHEMT Process

Description

M/A-COM's SW-489 is a GaAs PHEMT MMIC single pole three throw (SP3T) high power switch in a low cost miniature FQFP 12-lead 3x3mm thin profile package. The SW-489 is ideally suited for applications where high power, low control voltage, low insertion loss, high isolation, small size and low cost are required. Typical applications are for GSM and DCS handset systems that connect separate transmit and receive functions to a common antenna, as well as other handset and related applications. This part can be used in all systems operating up to 2.5 GHz requiring high power at low control voltage.

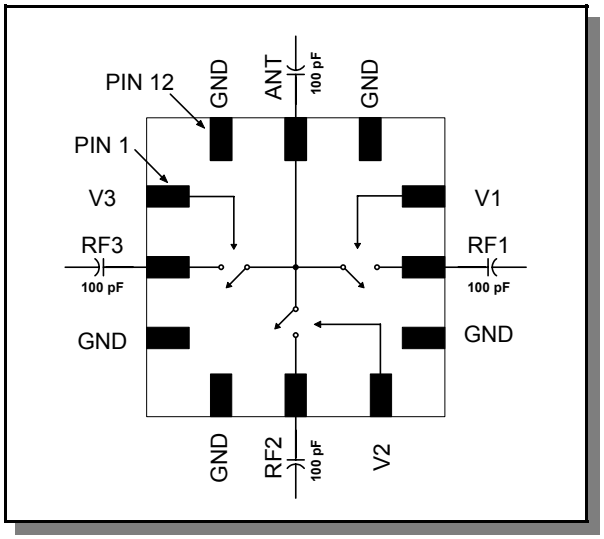
The SW-489 is fabricated using a 0.5 micron gate length GaAs PHEMT process. The process features full passivation for performance and reliability.

Absolute Maximum Ratings [1]

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

1. Exceeding any one or combination of these limits may cause permanent damage.

Functional Schematic



Pin Configuration

PIN No.	PIN Name	Description
1	V3	Control 3
2	RF3	RF Port 3
3	GND	RF Ground
4	GND	RF Ground
5	RF2	RF Port 2
6	V2	Control 2
7	GND	RF Ground
8	RF1	RF Port 1
9	V1	Control 1
10	GND	RF Ground
11	ANT	Antenna Port
12	GND	RF Ground
13	GND (paddle)	RF Ground

Electrical Specifications: T_A = 25°C, Z_0 = 50Ω [2]

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	DC – 1 GHz 1 – 2 GHz 2 - 2.5 GHz	dB dB dB		0.5 0.6 0.8	0.65 0.8 1.0
Isolation	DC – 1 GHz 1 – 2 GHz 2 - 2.5 GHz	dB dB dB	23 18 15	25 18.5 16	
Return Loss	DC – 2.5 GHz	dB		20	
P1dB	Vc = 0V/2.5V	dBm		38	
2nd Harmonic	1 GHz, P_{IN} = +34 dBm, Vc = 0V/2.5V	dBc	65		
3rd Harmonic	1 GHz, P_{IN} = +34 dBm, Vc = 0V/2.5V	dBc	65		
Trise, Tfall	10% to 90% RF, 90% to 10% RF	µS		1	
Cross Modulation ANT - CELL[3] ANT - PCS[3]	 Two Tone +22 dBm, 1 MHz Spacing, 820 MHz, Two Tone +19 dBm, 1 MHz Spacing, 1950 MHz,	 dBm dBm		 59 57	
Cross Modulation ANT - CELL ANT - PCS	 Two Tones +22 dBm @ 820 & 821 MHz, One Tone –27 dBm @ 865 MHz Two Tones +17 dBm @ 1950 & 1951 MHz, One Tone –27 dBm @ 1870 MHz	 dBm dBm		 -108 TBD	
Ton, Toff	50% control to 90% RF, and 50% control to 10% RF	µS		1	
Transients	In Band	mV		10	
Gate Leakage	|Vc| = 2.5V	uA			100

2. Insertion Loss can be optimized by varying the DC Blocking Capacitor value, ie. 1000 pF for 100 MHz - 500 MHz, 100 pF for 0.5 GHz - 2.5 GHz.

3. IP3 slope versus input power is approximately 1.5:1.

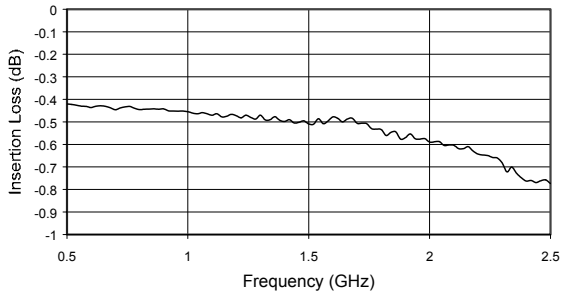
Truth Table [4]

V1	V2	V3	ANT– RF1	ANT - RF2	ANT - RF3
+2.5 to +5V	0 ± 0.2V	0 ± 0.2V	On	Off	Off
0 ± 0.2V	+2.5 to +5V	0 ± 0.2V	Off	On	Off
0 ± 0.2V	0 ± 0.2V	+2.5 to +5V	Off	Off	On

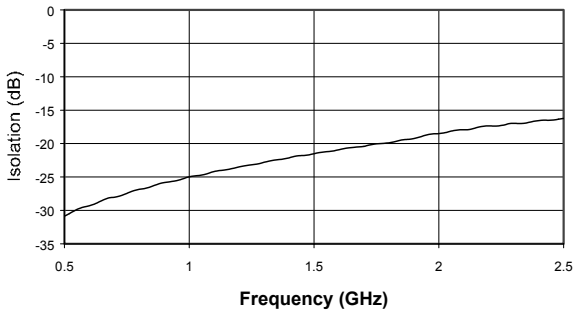
4. External DC blocking capacitors are required on all RF ports

Typical Performance Curves

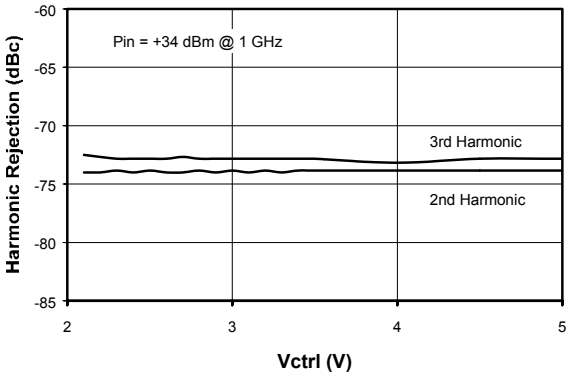
Insertion Loss vs. Frequency, 25 °C, 100 pF



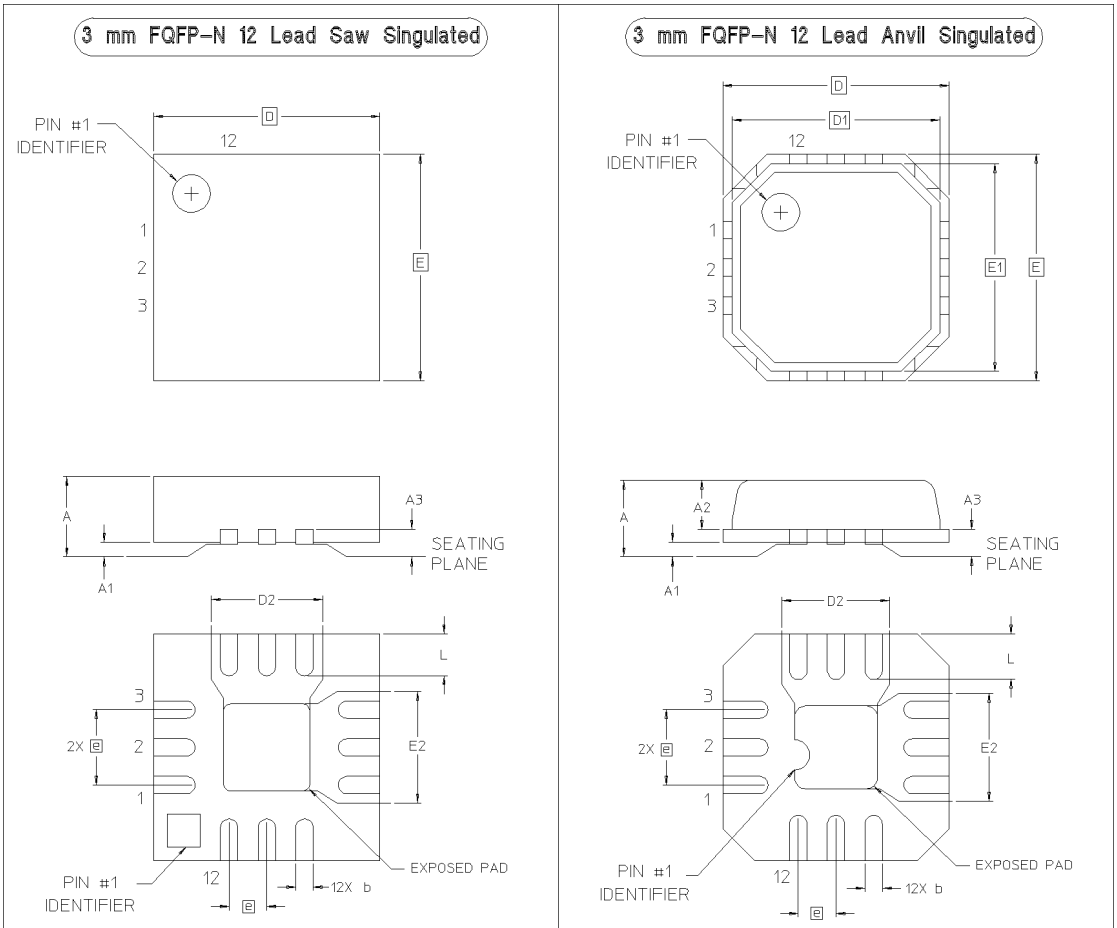
Isolation vs. Frequency, 25 °C, 100 pF



Harmonic Rejection vs. Frequency, 25 °C, 100 pF



FQFP 12-lead 3x3 mm



DIMENSION SYMBOL	MEASUREMENT (mm)		
	MIN	NOM	MAX
A	0.80	0.90	1.00
A1	0	0.02	0.05
A3		0.25 REF	
b	0.18	0.23	0.30
D		3.00 BSC	
D2	0.25	0.70	1.25
e		0.50 BSC	
E		3.00 BSC	
E2	0.25	0.70	1.25
L	0.35	0.55	0.75

DIMENSION SYMBOL	MEASUREMENT (mm)		
	MIN	NOM	MAX
A	0.80	0.90	1.00
A1	0	0.02	0.05
A2	0	0.65	1.00
A3		0.25 REF	
b	0.18	0.23	0.30
D		3.00 BSC	
D1		2.75 BSC	
D2	0.25	0.70	1.25
e		0.50 BSC	
E		3.00 BSC	
E1		2.75 BSC	
E2	0.25	0.70	1.25
L	0.35	0.55	0.75

NOTES: 1. REFERENCE JEDEC MO-220, VAR. VEED-1 (ISSUE C) FOR ADDITIONAL DIMENSIONAL AND TOLERANCE INFORMATION.
2. REFERENCE S2083 APPLICATION NOTE FOR PCB FOOTPRINT INFORMATION.

Handling Procedures

The following precautions should be observed to avoid damage:

Static Sensitivity

Gallium Arsenide Integrated Circuits are ESD sensitive and can be damaged by static electricity. Proper ESD techniques should be used when handling these devices.

Ordering Information

Part Number	Package
SW-489	FQFP-N 12-lead Plastic Package
SW-489TR	1000 piece reel
SW-489SMB	Sample Test Board