SW-456

GaAs SPDT Switch
DC - 3.0 GHz

Rev. V6

Features

- Low Cost Plastic: SC-70 (SOT-363) Package
- Low Insertion Loss: < 0.3 dB @ 900 MHz
- Low Power Consumption: < 15 µA @ -2.3 Volts
- Positive or Negative 2.3 to 8 Volt Control

Description

M/A-COM's SW-456 is a GaAs monolithic switch in a low cost SC-70 (SOT-363) surface mount plastic package. The SW-456 is ideally suited for applications where very low power consumption, low insertion loss, very small size and low cost are required. Typical applications are in dual band systems where switching between small signal components is required, i.e. filter banks, single-band LNA's, converters, etc. The SW-456 can be used in applications up to 0.25 watts in systems such as cellular, PCS, DCS1800, GSM, CDMA, W-CDMA and other analog/digital wireless communication systems.

The SW-456 is fabricated using a mature 0.5 micron PHEMT process. The process features full passivation for performance and reliability.

Ordering Information [1]

Part Number	Package
SW-456 PIN	Bulk Packaging
SW-456TR	1000 piece reel
SW-456TR-3000	3000 piece reel
SW-456SMB	Sample Test Board

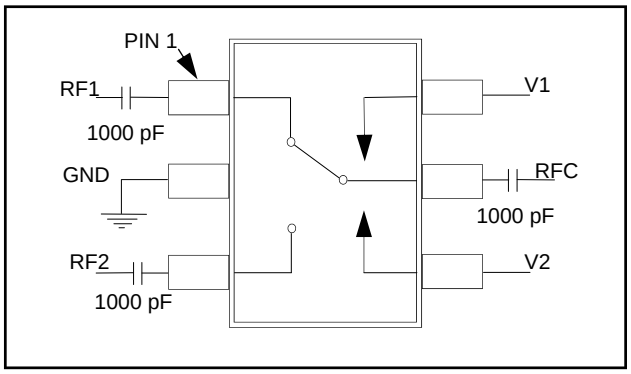
1. Reference Application Note M513 for reel size information.

Absolute Maximum Ratings [2]

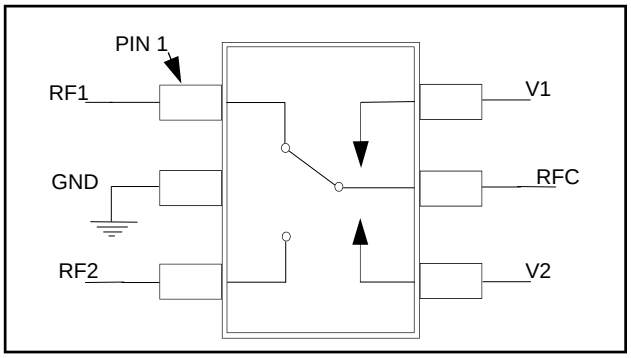
Parameter	Absolute Maximum
Input Power (0.5 - 3.0 GHz) 3 V Control 5 V Control	 +30 dBm +33 dBm
Operating Voltage	+8.5 volts
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

2. Exceeding any one or combination of these limits may cause permanent damage to this device.

Functional Schematic
Positive Control Voltage



Functional Schematic
Negative Control Voltage



Pin Configuration

PIN	Function	Description
1	RF1	RF In/Out
2	GND	RF Ground
3	RF2	RF In/Out
4	V2	V_{CTRL2}
5	RFC	RF Common
6	V1	V_{CTRL1}

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• **India** Tel: +91.80.43537383 • **China** Tel: +86.21.2407.1588
Visit www.macomtech.com for additional data sheets and product information.

Electrical Specifications: T_A = 25°C, V_{CTL} = 0, -2.3 volts (unless otherwise specified)[3]

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss[4]	DC - 1 GHz 1 - 2 GHz 2 - 3 GHz	dB dB dB	— — —	0.35 0.45 0.56	0.5 0.6 0.8
Isolation	DC - 1 GHz 1 - 2 GHz 2 - 3 GHz	dB dB dB	20 15 10	22 17 12	— — —
V_{SWR}	DC - 3 GHz	Ratio	—	1.2:1	1.4:1
P_{1dB} (2.3V supply)	500 MHz - 3 GHz	dBm	—	21	—
P_{1dB} (3V supply)	500 MHz - 3 GHz	dBm	—	27	—
Input IP_2	2-Tone 900 MHz, 5 MHz spacing (3.0 V)	dBm	—	81	—
Input IP_3	2-Tone 900 MHz, 5 MHz spacing (3.0 V)	dBm	—	52	—
Trise, Tfall	10% to 90% RF, 90% to 10% RF	ns	—	25	—
Ton, Toff	50% Control to 90% RF, Control to 10% RF	ns	—	25	—
Transients	In-Band	mV	—	25	—
Control Current	V_{CTL} = -2.3 V	µA	—	4	15

3. External DC blocking capacitors are required on all RF ports when using positive voltage control.
4. Insertion loss can be optimized by varying the DC blocking capacitor value, e.g. 1000 pF for 100 MHz - 1 GHz, 39 pF for 0.5 - 3 GHz.

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.

Truth Table

Mode (Control)	V1	V2	RFC - RF1	RFC - RF2
Positive[5]	0 ± 0.2 V	+2.3 to +8 V	Off	On
	+2.3 to +8 V	0 ± 0.2 V	On	Off
Negative[6]	0 ± 0.2 V	-2.3 V to -8 V	On	Off
	-2.3 V to -8 V	0 ± 0.2 V	Off	On

5. External DC blocking capacitors are required on all RF ports. 1000 pF capacitors used for positive control voltage. For higher frequency operation, smaller value DC blocking capacitors can be substituted.
6. If negative control is used, DC blocking capacitors are not required on RF ports.

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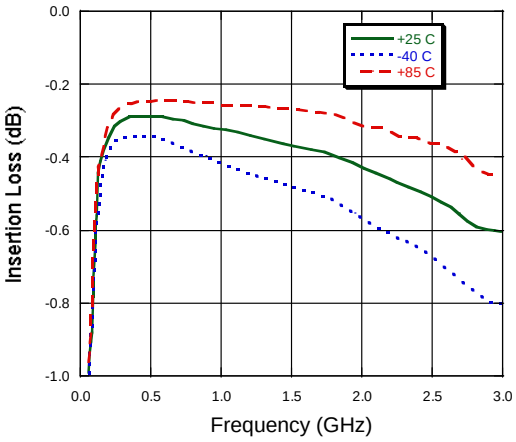
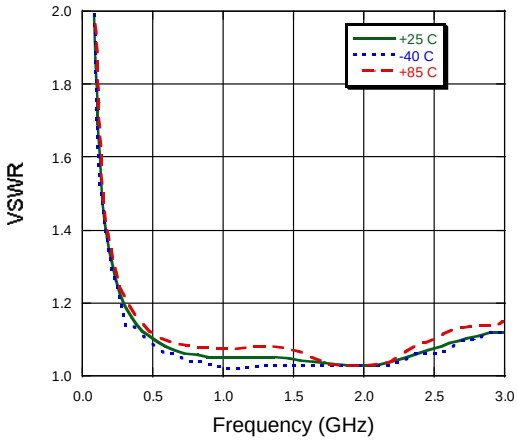
Typical Performance Curves

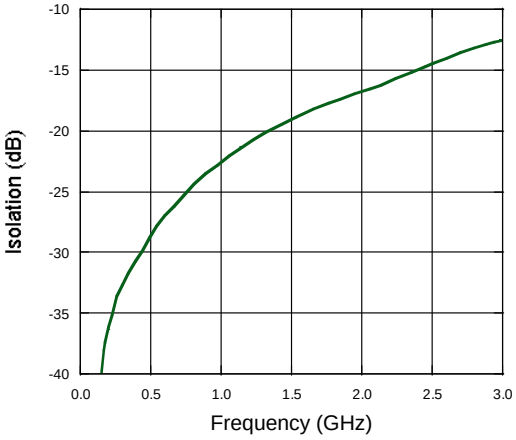
Insertion Loss vs. Frequency Over Temperature



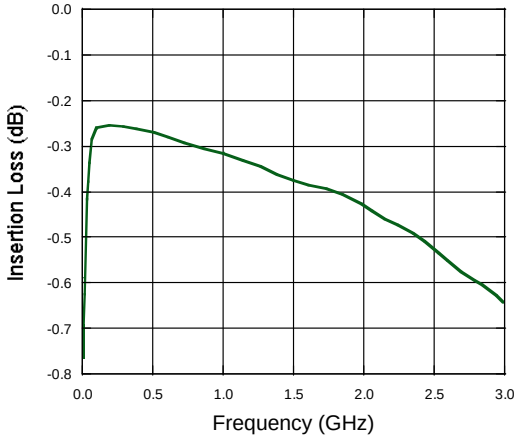
VSWR Over Temperature



Isolation vs. Frequency Over Temperature

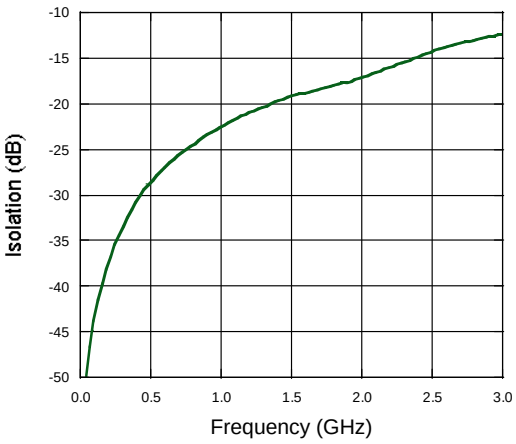


Insertion Loss vs. Frequency (+2.3 V Control, 1000 pF Capacitor on RF Ports)

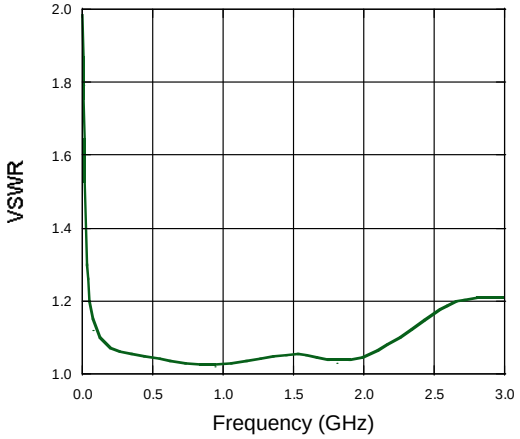


Typical Performance Curves

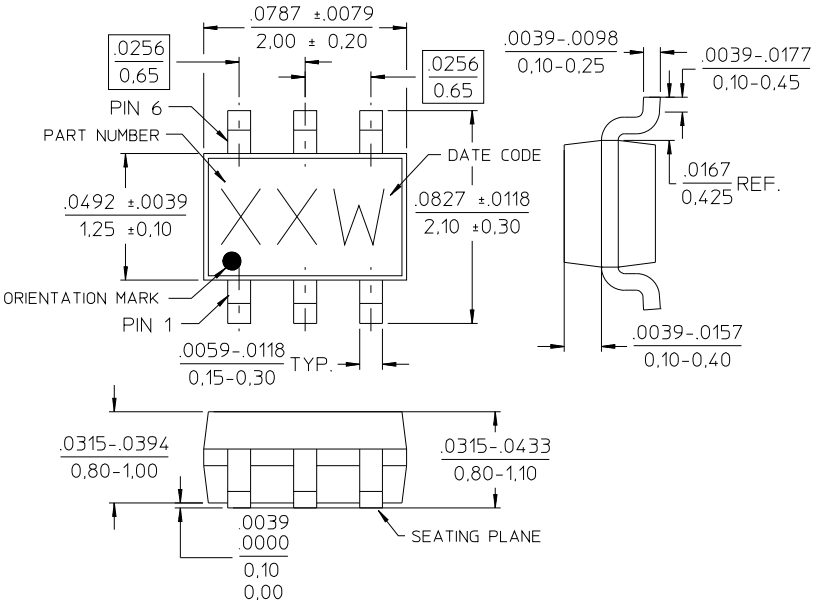
Isolation vs. Frequency
(+2.3 V Control, 1000 pF Capacitor on RF Ports)



VSWR vs. Frequency
(+2.3 V Control, 1000 pF Capacitor on RF Ports)



SC-70 (SOT-363)



NOTES: 1. REFERENCE EIAJ SC-88 FOR ADDITIONAL DIMENSIONAL AND TOLERANCE INFORMATION.
2. REFERENCE M538 APPLICATION NOTE FOR PCB FOOTPRINT INFORMATION.
3. ALL DIMENSIONS SHOWN AS INCHES/MM.

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