HMC435MS8G / 435MS8GE

SPDT NON-REFLECTIVE SWITCH, DC - 4 GHz

Typical Applications

The HMC435MS8G(E) is ideal for:

- Basestations & Repeaters
- Cellular/3G and WiMAX/4G
- Infrastructure and Access Points
- CATV/CMTS
- Test Instrumentation

Features

High Isolation: 60 dB @ 1 GHz
50 dB @ 2 GHz

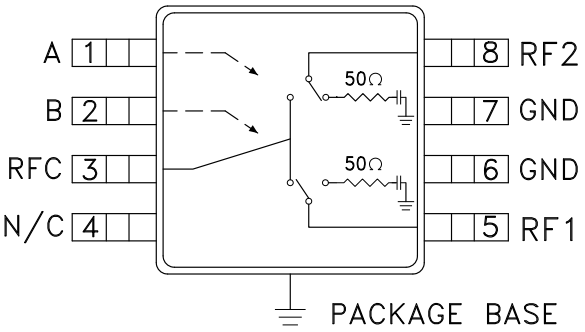
Positive Control: 0/+5V

Input IP3: 51 dBm

Non-Reflective Design

Ultra Small MSOP-86 Package: 14.8 mm^2

Functional Diagram



General Description

The HMC435MS8G(E) is a non-reflective DC to 4 GHz GaAs MESFET SPDT switch in a low cost 8 lead MSOP8G surface mount package with exposed ground paddle. The switch is ideal for cellular/3G and WiMAX/4G applications yielding up to 60 dB isolation, low 0.8 dB insertion loss and +50 dBm input IP3. Power handling is excellent up through the 3.8 GHz WiMAX band with the switch offering a P1dB compression of +31 dBm. On-chip circuitry allows positive voltage control of 0/+5 Volts at very low DC currents.

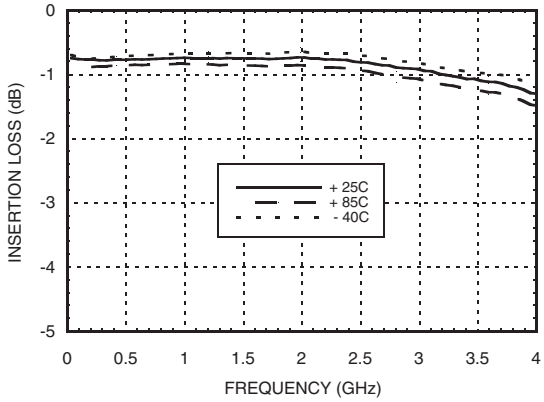
Electrical Specifications, T_A = +25° C, Vctl = 0/+5 Vdc, 50 Ohm System

Parameter	Frequency	Min.	Typ.	Max.	Units
Insertion Loss	DC - 2.5 GHz DC - 3.6 GHz DC - 4.0 GHz		0.8 1.2 1.5	1.0 1.5 1.8	dB dB dB
Isolation (RFC to RF1/RF2)	DC - 1.0 GHz DC - 2.0 GHz DC - 2.5 GHz DC - 3.6 GHz DC - 4.0 GHz	56 46 43 37 30	60 50 47 41 35		dB dB dB dB dB
Return Loss (On State)	DC - 2.5 GHz DC - 3.6 GHz DC - 4.0 GHz	15 13 11	20 17 15		dB dB dB
Return Loss (Off State)	0.5 - 4.0 GHz	16	21		dB
Input Power for 1 dB Compression	0.5 - 4.0 GHz	27	31		dBm
Input Third Order Intercept (Two-Tone Input Power = +7 dBm Each Tone)	0.5 - 1.0 GHz 0.5 - 2.5 GHz 0.5 - 4.0 GHz	48 45 41	51 48 45		dBm
Switching Speed tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF)	DC - 4.0 GHz		 40 60		 ns ns

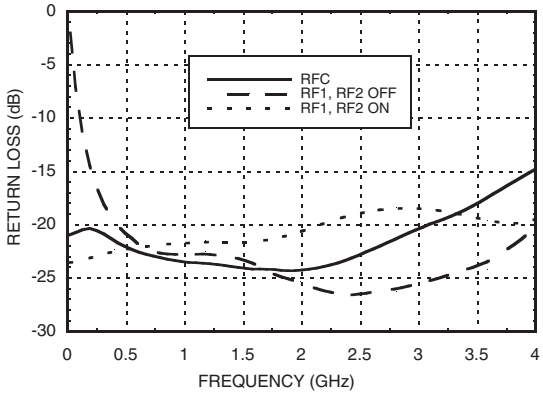
For price, delivery, and to place orders, please contact Hittite Microwave Corporation:
20 Alpha Road, Chelmsford, MA 01824 Phone: 978-250-3343 Fax: 978-250-3373
Order On-line at www.hittite.com

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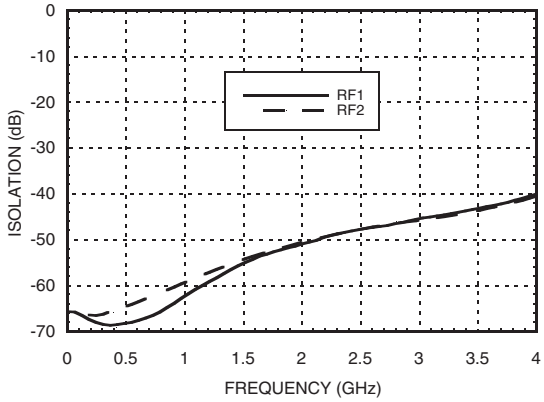
Insertion Loss



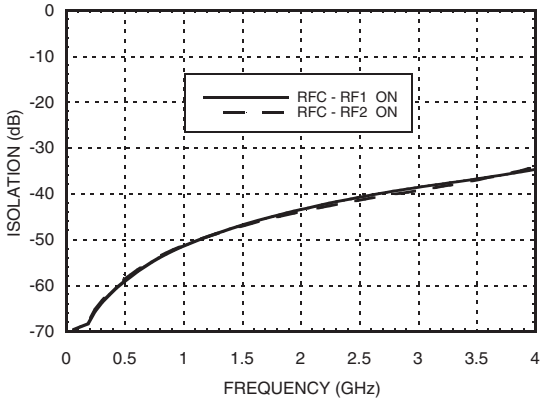
Return Loss



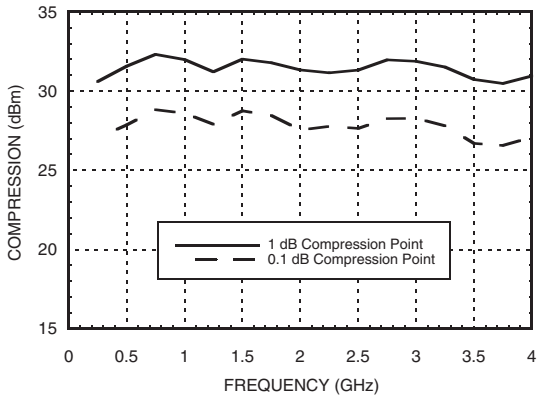
Isolation Between Ports RFC and RF1 / RF2



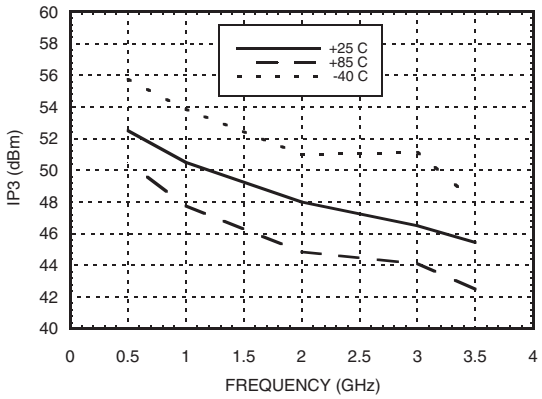
Isolation Between Ports RF1 and RF2



0.1 and 1 dB Input Compression Point



Input Third Order Intercept Point



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Absolute Maximum Ratings

Control Voltage Range	-0.5 to +7.5 Vdc
RF Input Power Vctl = 0/+5V	+31 dBm
RF1, RF2 Termination	+26 dBm
Junction Temperature	150 °C
Continuous Pdiss (derate 8 mW/ °C above 85 °C)	0.52 W
Thermal Resistance - Insertion Loss Path (channel to ground paddle)	118 °C/W
Thermal Resistance - Termination Path (channel to ground paddle)	125 °C/W
Storage Temperature	-65 °C to +150 °C
Operating Temperature	-40 °C to +85 °C
ESD Sensitivity (HBM)	Class 1A

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Control Voltages

**Control Input Tolerances are ± 0.2 Vdc*

State	Bias Condition*
Low	0 Vdc @ 25 µA Typical
High	+5 Vdc @ 25 µA Typical

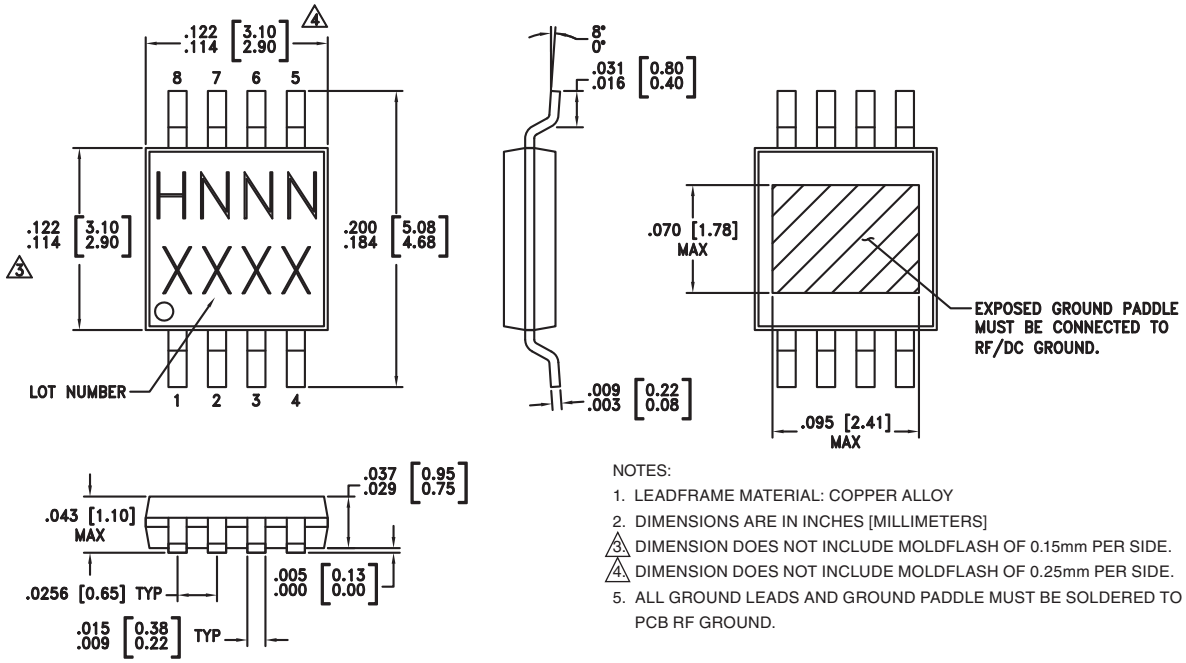
Truth Table

Control Input		Signal Path State
A	B	RFC to:
Low	High	RF1
High	Low	RF2

DC blocks are required at ports RFC, RF1, RF2.

Do not operate continuously at RF power input greater than 1 dB compression and do not ***"Hot Switch"*** power levels greater than +24 dBm (control = 0/+5 Vdc).

Outline Drawing



NOTES:

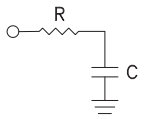
1. LEADFRAME MATERIAL: COPPER ALLOY
2. DIMENSIONS ARE IN INCHES [MILLIMETERS]
3. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
4. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
5. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.

Package Information

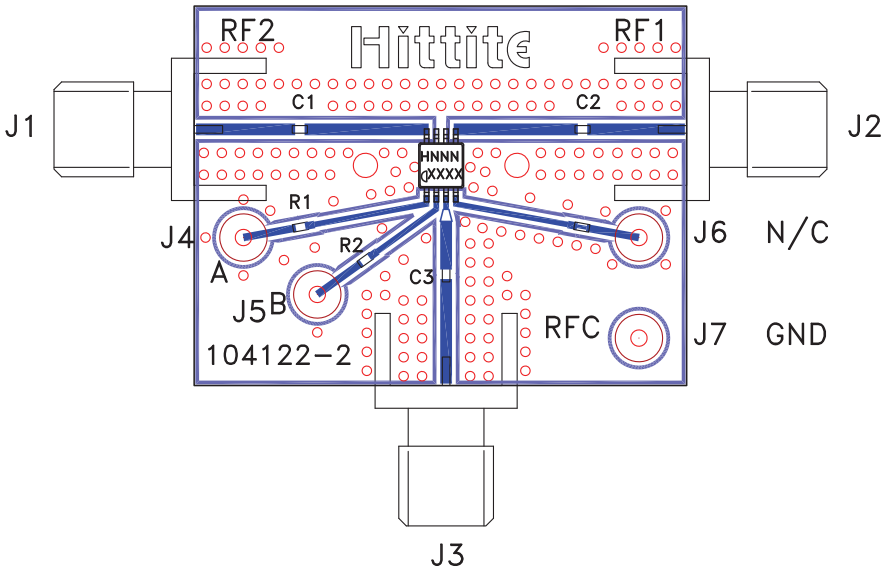
Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking [3]
HMC435MS8G	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL1 [1]	H435 XXXX
HMC435MS8GE	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL1 [2]	H435 XXXX

[1] Max peak reflow temperature of 235 °C
[2] Max peak reflow temperature of 260 °C
[3] 4-Digit lot number XXXX

Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1	A	See truth and control voltage tables.	
2	B	See truth and control voltage tables.	
3, 5, 8	RFC, RF1, RF2	These pins are DC coupled and matched to 50 Ohms. Blocking capacitors are required.	
4	N/C	The pins are not connected internally; however, all data shown herein was measured with these pins connected to RF/DC ground externally.	
6, 7	GND	Package bottom has exposed metal paddle that must be connected to PCB RF ground as well.	

Evaluation PCB



List of Materials for Evaluation PCB 105143 [1]

Item	Description
J1 - J3	PCB Mount SMA RF Connector
J4 - J7	DC Pin
C1 - C3	100 pF Capacitor, 0402 Pkg.
R1 - R2	100 Ohm Resistor, 0402 Pkg.
U1	HMC435MS8G(E) SPDT Switch
PCB [2]	104122 Evaluation PCB

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

The circuit board used in the application should be generated with proper RF circuit design techniques. Signal lines at the RF port should have 50 Ohm impedance and the package ground leads and backside ground slug should be connected directly to the ground plane similar to that shown above. The evaluation circuit board shown above is available from Hittite Microwave Corporation upon request.

Note: Pin J6 is unused and need not be connected.