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SPDT NON-REFLECTIVE SWITCH, DC - 4 GHz

Typical Applications

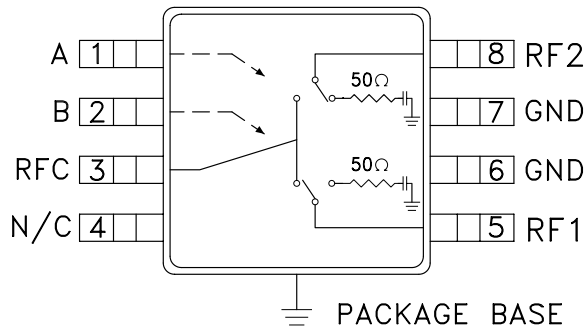
The HMC435AMS8G(E) is ideal for:

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

Features

- High Isolation: 62 dB @ 1 GHz
52 dB @ 2 GHz
- Single Positive Control: 0/+5V
- Input IP3: 54 dBm
- Non-Reflective Design
- Ultra Small MSOP-86 Package: 14.8 mm²

Functional Diagram



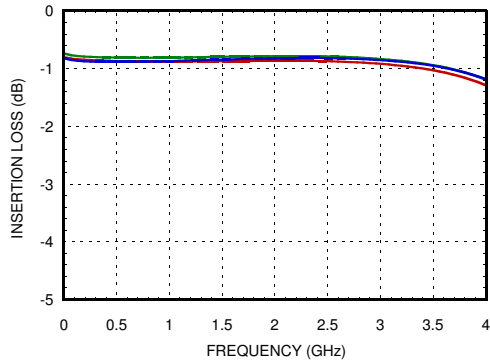
General Description

The HMC435AMS8G(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 +30 dBm. On-chip circuitry allows positive voltage control of 0/+5 Volts at very low DC currents.

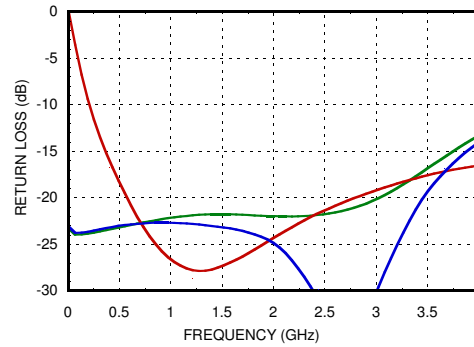
Electrical Specifications, $T_A = +25^\circ \text{C}$, $V_{ctl} = 0/+5 \text{Vdc}$, 50 Ohm System

| Parameter | Frequency | Min. | Typ. | Max. | Units |
|--|---------------|--|------|----------|----------|
| Insertion Loss | DC - 2.5 GHz | | 0.8 | 1.0 | dB |
| | DC - 3.6 GHz | | 1.0 | 1.5 | dB |
| | DC - 4.0 GHz | | 1.2 | 1.8 | dB |
| Isolation (RFC to RF1/RF2) | DC - 1.0 GHz | 56 | 62 | | dB |
| | DC - 2.0 GHz | 46 | 52 | | dB |
| | DC - 2.5 GHz | 43 | 48 | | dB |
| | DC - 3.6 GHz | 37 | 42 | | dB |
| | DC - 4.0 GHz | 30 | 40 | | dB |
| Return Loss (On State) | DC - 2.5 GHz | 15 | 23 | | dB |
| | DC - 3.6 GHz | 13 | 17 | | dB |
| | DC - 4.0 GHz | 11 | 14 | | 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 | 30 | | dBm |
| Input Third Order Intercept (Two-Tone Input Power = +7 dBm Each Tone) | 0.5 - 1.0 GHz | 48 | 54 | | dBm |
| | 0.5 - 2.5 GHz | 45 | 53 | | dBm |
| | 0.5 - 4.0 GHz | 41 | 51 | | dBm |
| Switching Speed | DC - 4.0 GHz | | | | |
| | | tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF) | | 40 60 | ns ns |

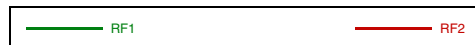
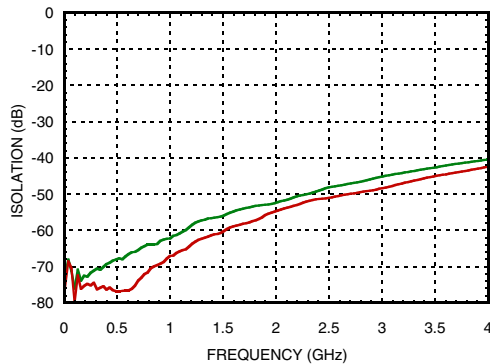
Insertion Loss



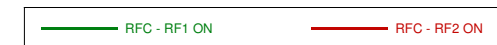
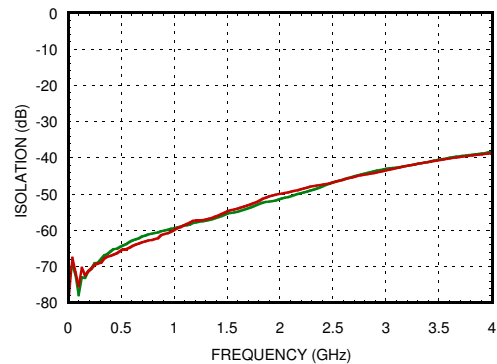
Return Loss



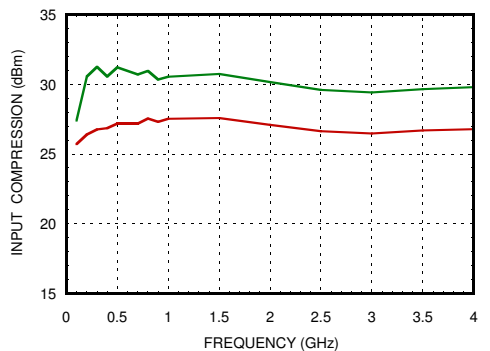
Isolation Between Ports RFC and RF1 / RF2



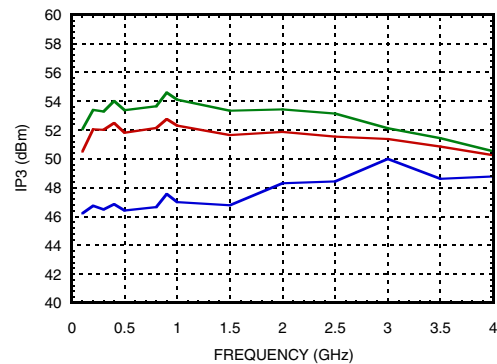
Isolation Between Ports RF1 and RF2



0.1 and 1 dB Input Compression Point



Input Third Order Intercept Point



Absolute Maximum Ratings

| | |
|---|------------------|
| Control Voltage Range | -0.5 to +7.5 Vdc |
| RF Input Power $V_{ctl} = 0/+5V$ | +31 dBm |
| RF1, RF2 Termination | +26 dBm |
| Junction Temperature | 150 °C |
| Insertion Loss Path - (channel to ground) Continuous P_{diss} (T = 85 °C) (derate 13 mW/°C above 85 °C) | 0.86 W |
| Thermal Resistance | 75 °C/W |
| Termination Path - (channel to ground) Continuous P_{diss} (T = 85 °C) (derate 6.5 mW/°C above 85 °C) | 0.42 W |
| Thermal Resistance | 153 °C/W |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |
| ESD Sensitivity (HBM) | Class 1A |

Control Voltages

 *Control Input Tolerances are ± 0.2 Vdc

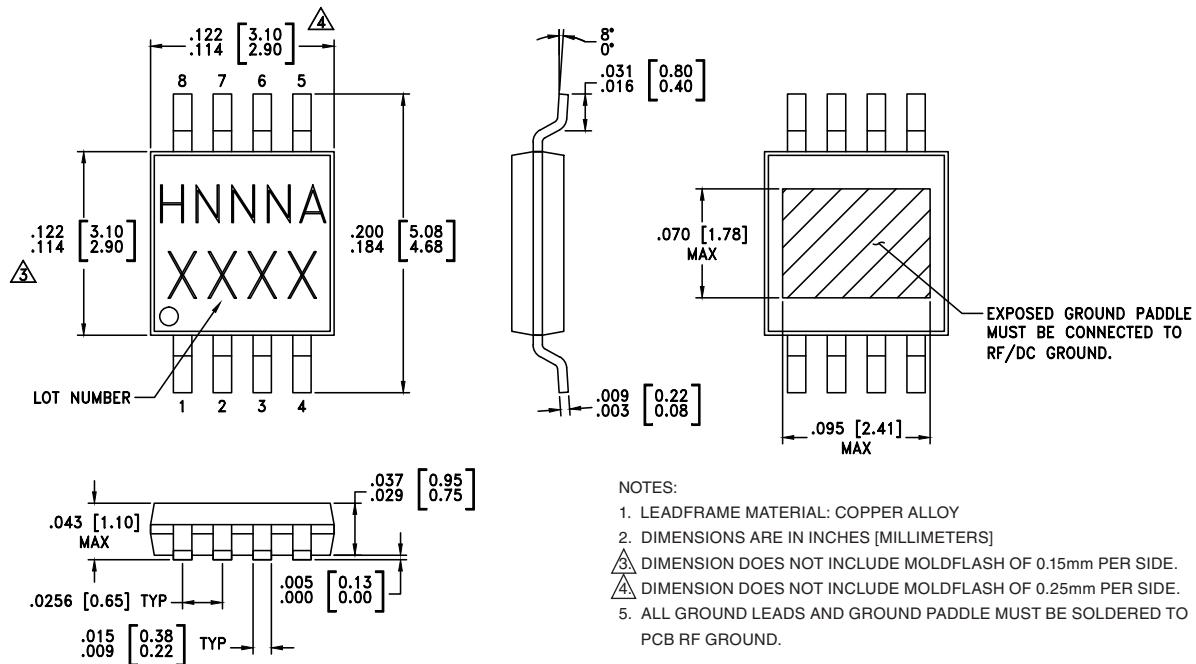
| State | Bias Condition* |
|-------|------------------------------|
| Low | 0 Vdc @ 5 μ A Typical |
| High | +5.0 Vdc @ 5 μ A Typical |

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).

**ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS**
Outline Drawing




Package Information

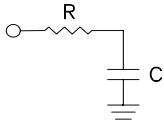

| Part Number | Package Body Material | Lead Finish | MSL Rating | Package Marking ^[3] |
|--------------|--|---------------|---------------------|--------------------------------|
| HMC435AMS8G | Low Stress Injection Molded Plastic | Sn/Pb Solder | MSL1 ^[1] | H435A XXXX |
| HMC435AMS8GE | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 ^[2] | H435A XXXX |

[1] Max peak reflow temperature of 235 °C

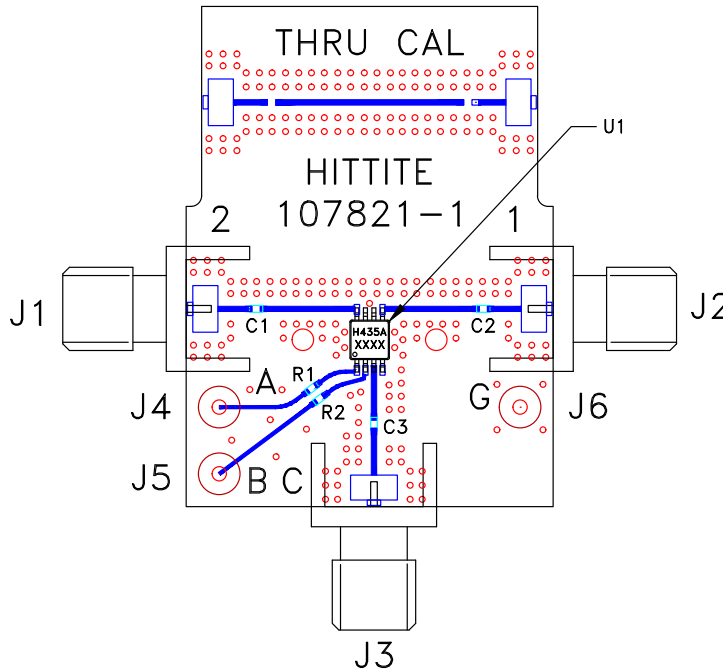
[2] Max peak reflow temperature of 260 °C

[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 | This pin is not connected internally; however, all data shown herein was measured with this pin 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 EVAL 105143-HMC435AMS8G^[1]

| Item | Description |
|--------------------|-----------------------------|
| J1 - J3 | PCB Mount SMA RF Connector |
| J4 - J6 | DC Pin |
| C1 - C3 | 100 pF Capacitor, 0402 Pkg. |
| R1 - R2 | 100 Ohm Resistor, 0402 Pkg. |
| U1 | HMC435AMS8G(E) SPDT Switch |
| PCB ^[2] | 107821 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.



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