



Typical Applications

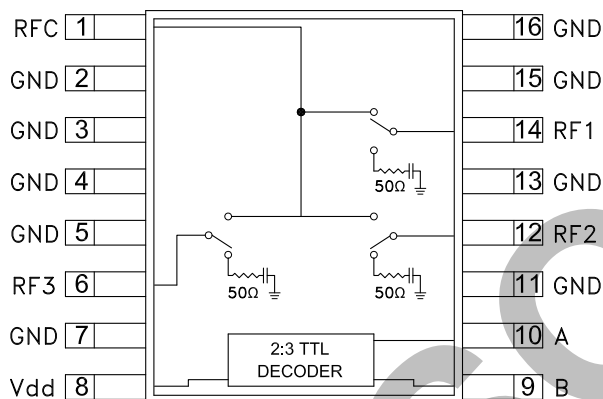
The HMC245QS16 / HMC245QS16E is ideal for:

- Basestation Infrastructure
- CATV / DBS
- Wireless Local Loop
- Test Equipment

Features

- Low Insertion Loss: 0.5 dB @ 2.0 GHz
- Non-Reflective Design
- Integrated 2:3 TTL Decoder
- “All Off” Isolation State
- Single Positive Supply: Vdd = +5V
- 16 Lead QSOP SMT Package

Functional Diagram



General Description

The HMC245QS16 & HMC245QS16E are low cost non-reflective SP3T switches in 16-lead QSOP surface mount packages. Covering DC to 3.5 GHz, the switch offers 30 to 40 dB isolation and a low insertion loss of 0.5 dB. A 2:3 TTL/CMOS compatible decoder is integrated on the switch requiring only 2 control lines and a single +5V bias to select each path, replacing 6 control lines normally required by GaAs SP3T switches.

Electrical Specifications,

$T_A = +25^\circ \text{C}$, For TTL Control and Vdd = +5V in a 50 Ohm System

| Parameter | Frequency | Min. | Typ. | Max. | Units |
|--|---------------|----------------------------------|------|------|-------|
| Insertion Loss | DC - 2.0 GHz | | 0.5 | 0.8 | dB |
| | DC - 3.0 GHz | | 0.6 | 0.9 | dB |
| | DC - 3.5 GHz | | 0.7 | 1.0 | dB |
| Isolation | DC - 1.0 GHz | 40 | 44 | | dB |
| | DC - 2.0 GHz | 35 | 39 | | dB |
| | DC - 2.5 GHz | 31 | 35 | | dB |
| | DC - 3.5 GHz | 26 | 30 | | dB |
| Return Loss | “On State” | DC - 1.5 GHz | 20 | | dB |
| | | DC - 3.5 GHz | 17 | | dB |
| Return Loss RF1 - 3 | “Off State” | 0.3 - 3.5 GHz | 12 | | dB |
| | | 0.5 - 3.5 GHz | 15 | | dB |
| Input Power for 1 dB Compression | 0.3 - 2.5 GHz | 23 | 26 | | dBm |
| | 0.3 - 3.5 GHz | 22 | 25 | | dBm |
| Input Third Order Intercept (Two-tone Input Power = +7 dBm each tone) | 0.3 - 2.5 GHz | 44 | 48 | | dBm |
| | 0.3 - 3.5 GHz | 40 | 44 | | dBm |
| Switching Characteristics | 0.3 - 3.5 GHz | tRISE, tFALL (10/90% RF) | 40 | | ns |
| | | tON, tOFF (50% CTL to 10/90% RF) | 150 | | ns |
| | | | | | |

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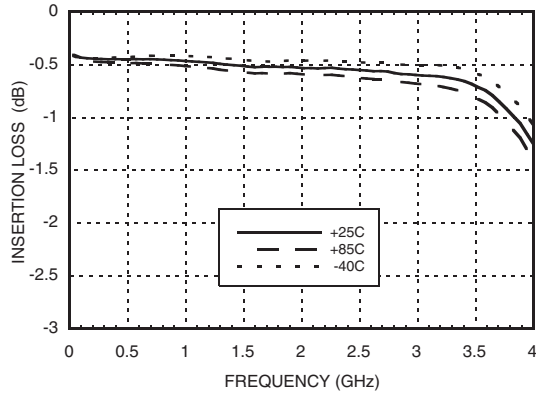
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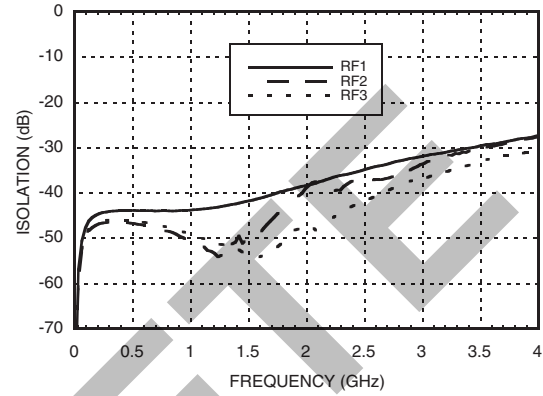
HMC245QS16 / 245QS16E

GaAs MMIC SP3T NON-REFLECTIVE SWITCH, DC - 3.5 GHz

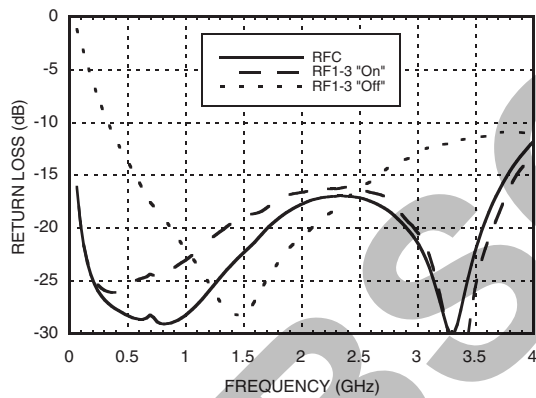
Insertion Loss vs. Temperature



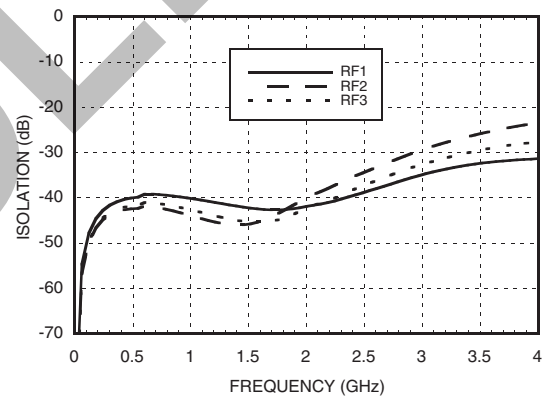
Isolation



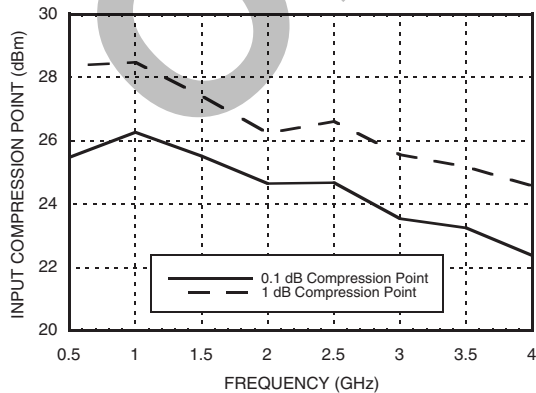
Return Loss



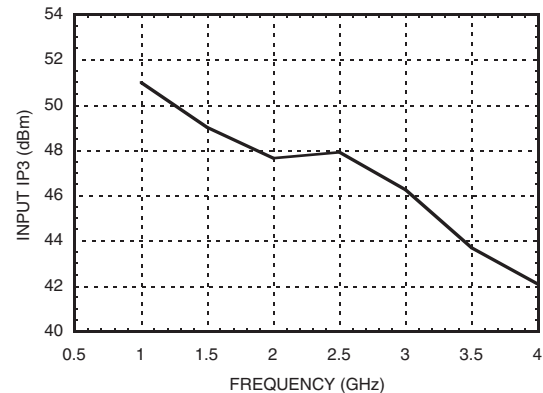
Off State Isolation



0.1 and 1 dB Input Compression Point



Input Third Order Intercept Point



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HMC245QS16 / 245QS16E

GaAs MMIC SP3T NON-REFLECTIVE SWITCH, DC - 3.5 GHz

Bias Voltage & Current

| Vdd Range= +5.0 Vdc ±10% | | |
|--------------------------|----------------|----------------|
| Vdd (Vdc) | Idd (Typ) (mA) | Idd (Max) (mA) |
| +5.0 | 3.0 | 6.0 |

TTL/CMOS Control Voltages

| State | Bias Condition |
|-------|-------------------------------|
| Low | 0 to +0.8 Vdc @ 5 uA Typ. |
| High | +2.0 to +5.0 Vdc @ 70 uA Typ. |

Truth Table

| Control Input | | Signal Path State |
|---------------|------|-------------------|
| A | B | RF COM to: |
| Low | Low | RF1 |
| High | Low | RF2 |
| Low | High | RF3 |
| High | High | All Off |

OBSOLETE



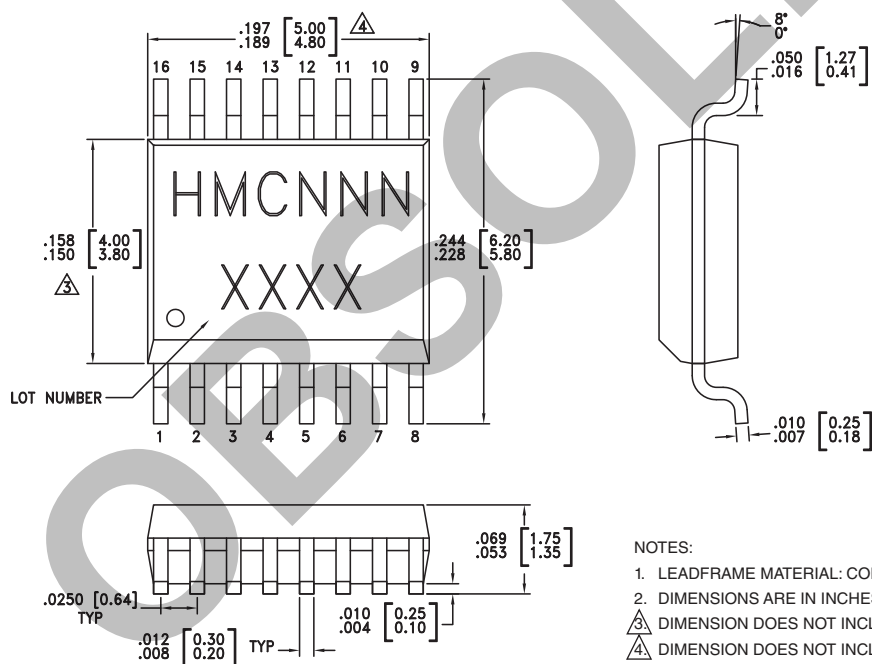
Absolute Maximum Ratings

| | |
|--|---|
| Bias Voltage Range (Port Vdd) | +7.0 Vdc |
| Control Voltage Range (A & B) | -0.5V to Vdd +1 Vdc |
| Channel Temperature | 150 °C |
| Thermal Resistance (Insertion Loss Path) | 210 °C/W |
| Thermal Resistance (Terminated Path) | 250 °C/W |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |
| Maximum Input Power Vdd = +5 Vdc | +20 dBm (0.05 - 0.5 GHz) +27 dBm (0.5 - 3.5 GHz) |
| ESD Sensitivity (HBM) | Class 1A |



ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



NOTES:

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

Package Information


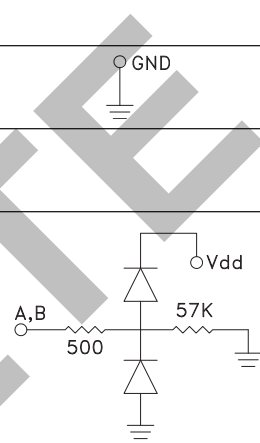
| Part Number | Package Body Material | Leadframe Plating | MSL Rating | Package Marking ^[3] |
|-------------|--|-------------------|---------------------|--------------------------------|
| HMC245QS16 | Low Stress Injection Molding Plastic Silica and Silicon Impregnated | Sn/Pb Solder | MSL1 ^[1] | HMC245 XXXX |
| HMC245QS16E | RoHS-compliant Low Stress Injection Molding Plastic Silica and Silicon Impregnated | 100% Matte Tin | MSL1 ^[2] | HMC245 XXXX |

[1] Max peak reflow temperature of 235 °C

[2] Max peak reflow temperature of 260 °C

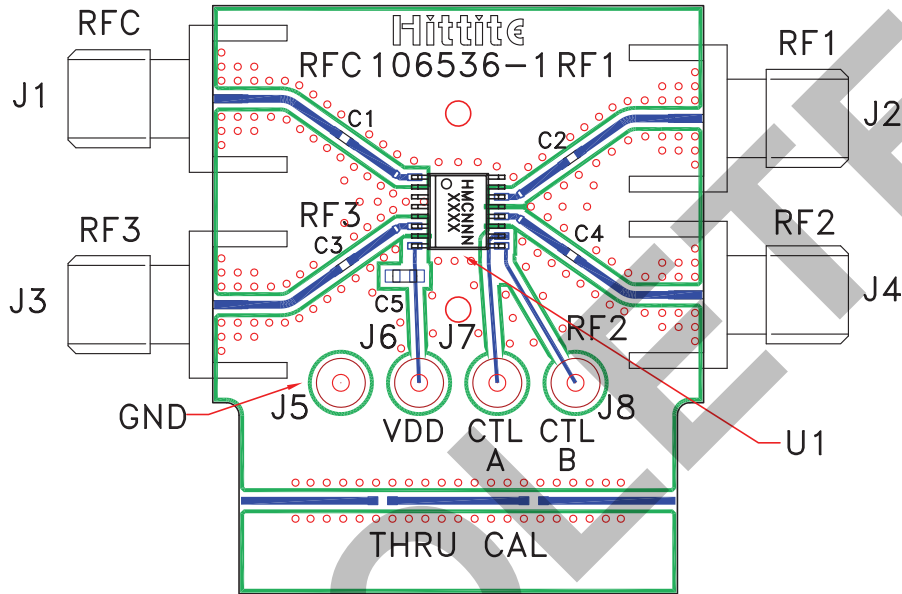
[3] 4-Digit lot number XXXX


Pin Descriptions

| Pin Number | Function | Description | Interface Schematic |
|--------------------------|--------------------|--|---|
| 1, 6, 12, 14 | RF3, RF2, RF1, RFC | This pin is DC coupled and matched to 50 Ohms. Blocking capacitors are required. | |
| 2 - 5, 7, 11, 13, 15, 16 | GND | This pin must be connected to PCB RF ground to maximize isolation. |  |
| 8 | Vdd | Supply Voltage +5.0 Vdc ±10% | |
| 9 | B | See truth table and control voltage table. |  |
| 10 | A | See truth table and control voltage table. | |



Evaluation PCB



List of Materials for Evaluation PCB 106687 [1]

| Item | Description |
|---------|--------------------------------------|
| J1 - J4 | PCB Mount SMA RF Connector |
| J5 - J8 | DC Pin |
| C1 - C4 | 100 pF Capacitor, 0402 Pkg. |
| C5 | 10k pF Capacitor, 0603 Pkg. |
| U1 | HMC245QS16 / HMC245QS16E SP3T Switch |
| PCB [2] | 106536 Evaluation PCB |

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

The circuit board used in the final 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 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.