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Typical Applications

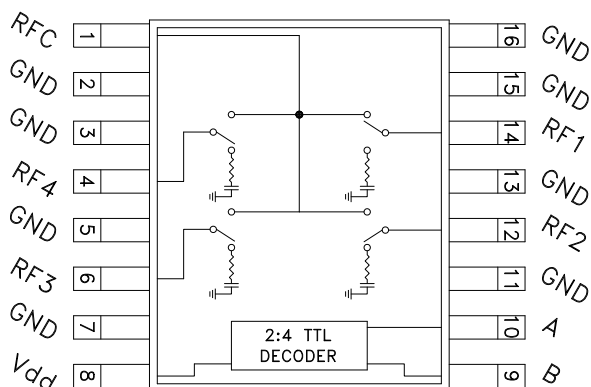
The HMC241QS16 & HMC241QS16E are ideal for:

- Base Stations & Portable Wireless
- CATV / DBS
- Wireless Local Loop
- Test Equipment

Features

- RoHS Compliant Product
- Low Insertion Loss (2 GHz): 0.5 dB
- Single Positive Supply: $V_{dd} = +5V$
- Integrated 2:4 TTL Decoder
- 16 Lead QSOP Package

Functional Diagram



General Description

The HMC241QS16 & HMC241QS16E are general purpose low-cost non-reflective SP4T switches in 16-lead QSOP packages. Covering DC - 3.5 GHz, this switch offers high isolation and has a low insertion loss of 0.5 dB at 2 GHz. The switch offers a single positive bias and true TTL/CMOS compatibility. A 2:4 decoder is integrated on the switch requiring only 2 control lines and a positive bias to select each path, replacing 8 control lines normally required by GaAs SP4T switches.

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SWITCHES - SMT

Electrical Specifications, $T_A = +25^\circ C$, For TTL Control and $V_{dd} = +5V$ in a 50 Ohm System

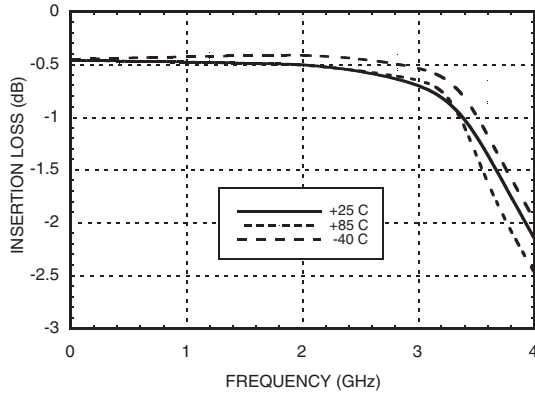
| Parameter | Frequency | Min. | Typ. | Max. | Units |
|--|-------------------|----------------------------------|------|------|-------|
| Insertion Loss | DC - 1.0 GHz | | 0.5 | 0.8 | dB |
| | DC - 2.0 GHz | | 0.5 | 0.8 | dB |
| | DC - 2.5 GHz | | 0.6 | 0.9 | dB |
| | DC - 3.5 GHz | | 1.0 | 1.5 | dB |
| Isolation | DC - 1.0 GHz | 40 | 45 | | dB |
| | DC - 2.0 GHz | 32 | 36 | | dB |
| | DC - 2.5 GHz | 28 | 32 | | dB |
| | DC - 3.5 GHz | 23 | 26 | | dB |
| Return Loss | "On State" | DC - 2.5 GHz | 17 | 21 | dB |
| | | DC - 3.5 GHz | 9 | 12 | dB |
| Return Loss | RF1-4 "Off State" | 0.3 - 3.5 GHz | 8 | 12 | dB |
| | | 0.5 - 2.5 GHz | 12 | 16 | dB |
| Input Power for 1dB Compression | 0.3 - 3.5 GHz | 22 | 25 | | dBm |
| Input Third Order Intercept (Two-Tone Input Power = +7 dBm Each Tone) | 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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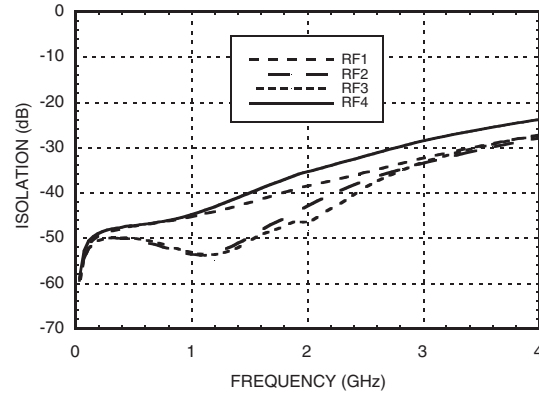
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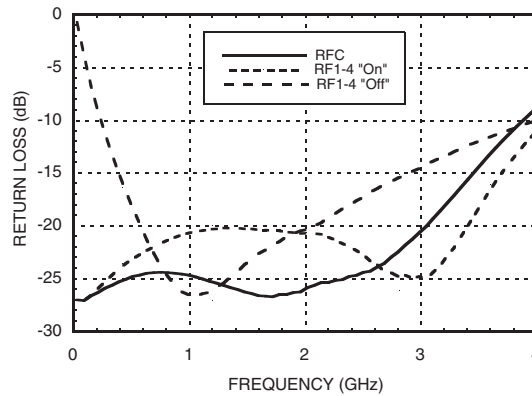
Insertion Loss



Isolation



Return Loss



Bias Voltage & Current

| Vdd Range = +5.0 Vdc ± 10% | | |
|----------------------------|-----------------|-----------------|
| Vdd (Vdc) | Idd (Typ.) (mA) | Idd (Max.) (mA) |
| +5.0 | 4.0 | 7.0 |

Truth Table

| Control Input | | Signal Path State |
|---------------|------|-------------------|
| A | B | RFCOM to: |
| LOW | LOW | RF1 |
| HIGH | LOW | RF2 |
| LOW | HIGH | RF3 |
| HIGH | HIGH | RF4 |

TTL/CMOS Control Voltages

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

NOTE:

DC Blocking capacitors are required at ports RFC and RF1, 2, 3, 4.

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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) |

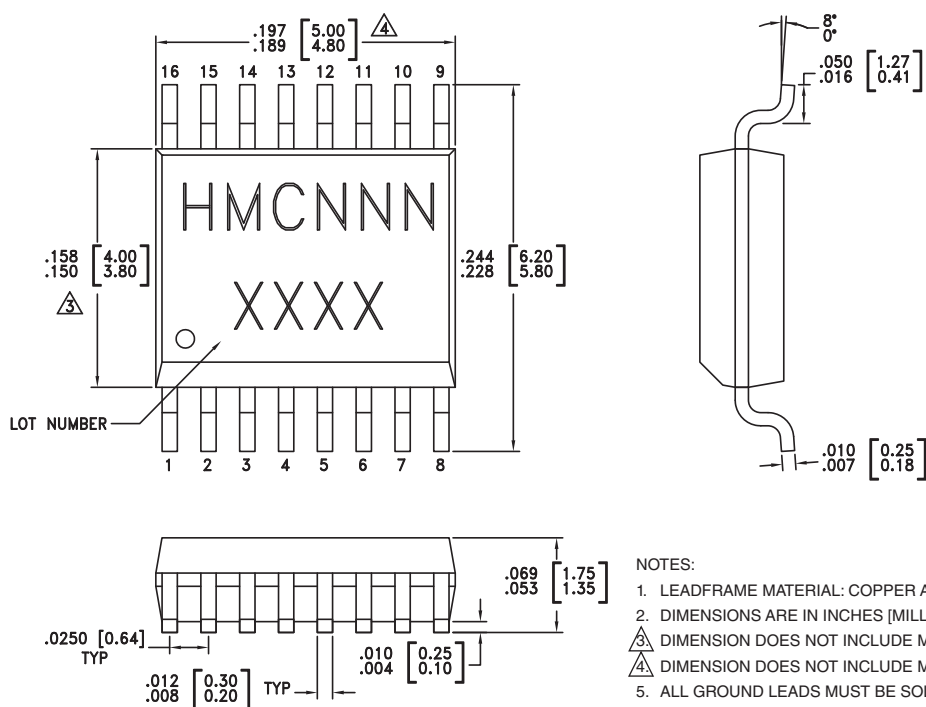


ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

10

SWITCHES - SMT

Outline Drawing



NOTES:

- LEADFRAME MATERIAL: COPPER ALLOY
- DIMENSIONS ARE IN INCHES [MILLIMETERS].
- (triangle symbol) DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
- (triangle symbol) 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] |
|-------------|--|-------------------|---------------------|--------------------------------|
| HMC241QS16 | Low Stress Injection Molding Plastic Silica and Silicon Impregnated | Sn/Pb Solder | MSL1 ^[1] | HMC241 XXXX |
| HMC241QS16E | RoHS-compliant Low Stress Injection Molding Plastic Silica and Silicon Impregnated | 100% Matte Tin | MSL1 ^[2] | HMC241 XXXX |

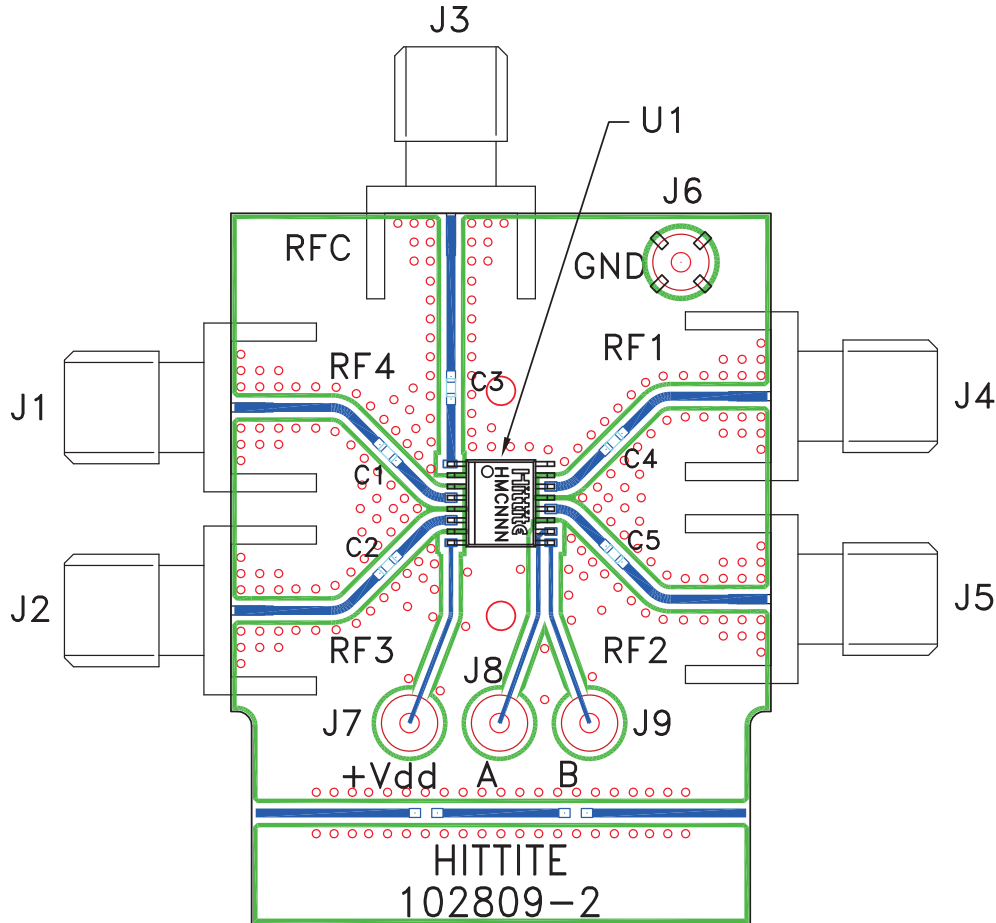
[1] Max peak reflow temperature of 235 °C

[2] Max peak reflow temperature of 260 °C

[3] 4-Digit lot number XXXX



Evaluation PCB



List of Materials for Evaluation PCB 102913 ^[1]

| Item | Description |
|--------------------|--------------------------------------|
| J1 - J5 | PCB Mount SMA RF Connector |
| J6 - J9 | DC Pin |
| C1 - C5 | 330 pF capacitor, 0402 Pkg. |
| U1 | HMC241QS16 / HMC241QS16E SP4T Switch |
| PCB ^[2] | 102809 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.