



GaAs MMIC SP8T NON-REFLECTIVE SWITCH, DC - 2.5 GHz

Typical Applications

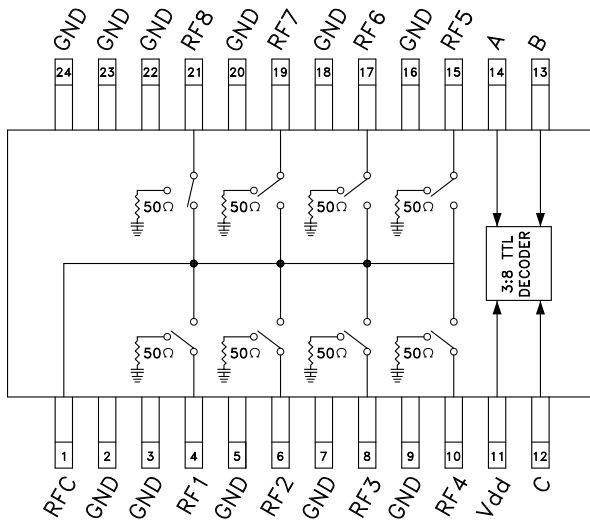
The HMC253QS24 / HMC253QS24E is ideal for DC - 2.5 GHz applications:

- CATV/DBS
- CDMA
- Cellular/PCS

Features

- Low Insertion Loss (2 GHz): 1.3dB
- Single Positive Supply: $V_{dd} = +5V$
- Integrated 3:8 TTL Decoder
- 24 Lead QSOP Package

Functional Diagram



General Description

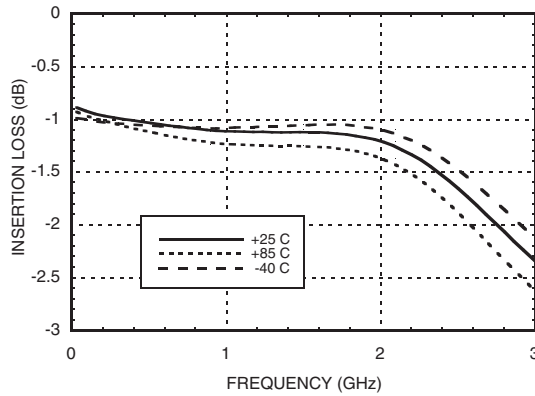
The HMC253QS24 & HMC253QS24E are low-cost non-reflective SP8T switches in 24-lead QSOP packages featuring wideband operation from DC to 2.5 GHz. The switch offers a single positive bias and true TTL/CMOS compatibility. A 3:8 decoder is integrated on the switch requiring only 3 control lines and a positive bias to select each path. The HMC253QS24 & HMC253QS24E SP8T will replace multiple configurations of SP4T and SPDT MMIC switches.

Electrical Specifications,

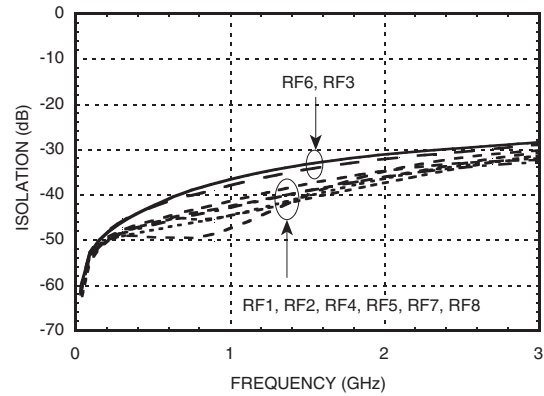
$T_A = +25^\circ C$, For TTL Control and $V_{dd} = +5V$ in a 50 Ohm system

| Parameter | Frequency | Min. | Typ. | Max. | Units |
|--|---------------|------|------|------|-------|
| Insertion Loss | DC - 1.0 GHz | | 1.1 | 1.5 | dB |
| | DC - 2.0 GHz | | 1.3 | 1.7 | dB |
| | DC - 2.5 GHz | | 1.8 | 2.4 | dB |
| Isolation | DC - 1.0 GHz | 32 | 36 | | dB |
| | DC - 2.0 GHz | 26 | 30 | | dB |
| | DC - 2.5 GHz | 24 | 28 | | dB |
| Return Loss | DC - 1.0 GHz | 14 | 18 | | dB |
| | DC - 2.0 GHz | 9 | 12 | | dB |
| | DC - 2.5 GHz | 6 | 8 | | dB |
| Return Loss (RF1-8) | 0.3 - 2.5 GHz | 7 | 10 | | dB |
| | 0.5 - 2.5 GHz | 10 | 13 | | dB |
| Input Power for 1 dB Compression | 0.3 - 2.5 GHz | 20 | 23 | | dBm |
| Input Third Order Intercept (Two-Tone Input Power = +7 dBm Each Tone) | 0.3 - 2.5 GHz | 40 | 43 | | dBm |
| Switching Characteristics | 0.3 - 2.5 GHz | | | | |
| | | | 30 | | ns |
| | | | 100 | | ns |

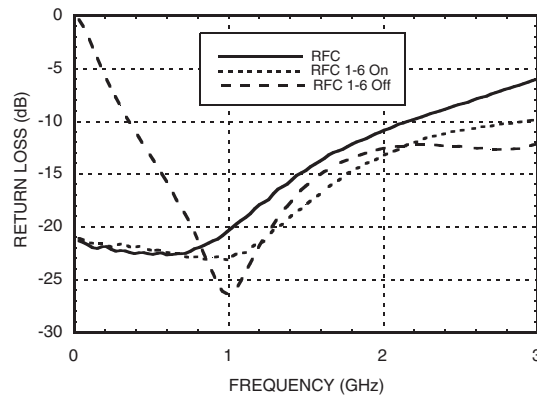
Insertion Loss



Isolation



Return Loss



Bias Voltage & Current

| Vdd Range = +5.0 Vdc \pm 10% | | |
|--------------------------------|--------------------|--------------------|
| Vdd (Vdc) | Idd (Typ.) (mA) | Idd (Max.) (mA) |
| +5.0 | 6.0 | 9.0 |

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 | C | RFCOM to: |
| Low | Low | Low | RF1 |
| High | Low | Low | RF2 |
| Low | High | Low | RF3 |
| High | High | Low | RF4 |
| Low | Low | High | RF5 |
| High | Low | High | RF6 |
| Low | High | High | RF7 |
| High | High | High | RF8 |

NOTE:

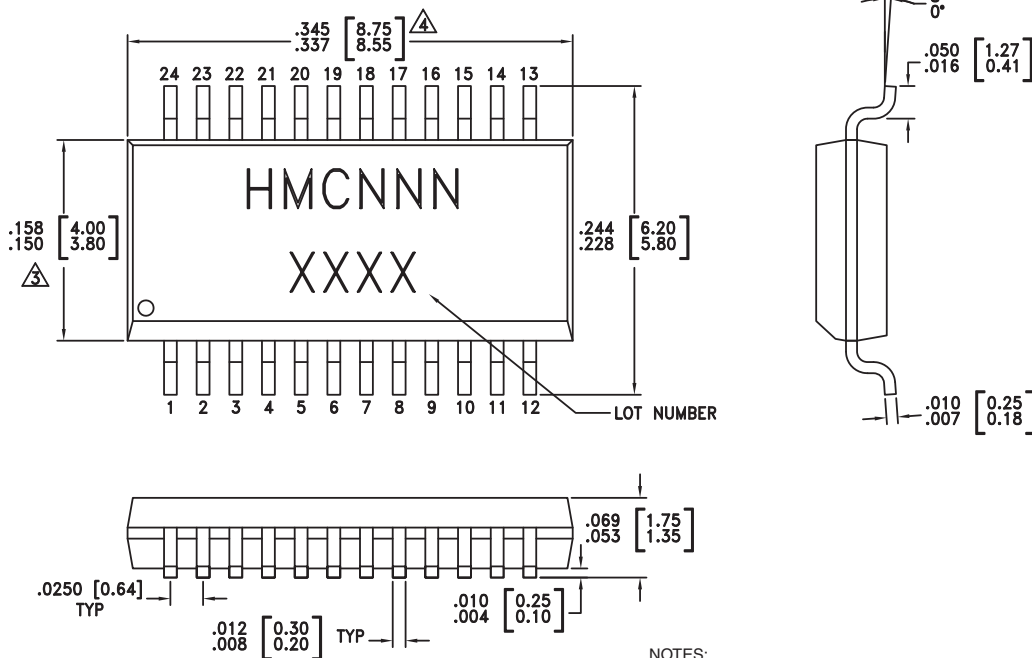
DC Blocking capacitors are required at ports RFC and RF1, 2, 3, 4, 5, 6, 7, 8.

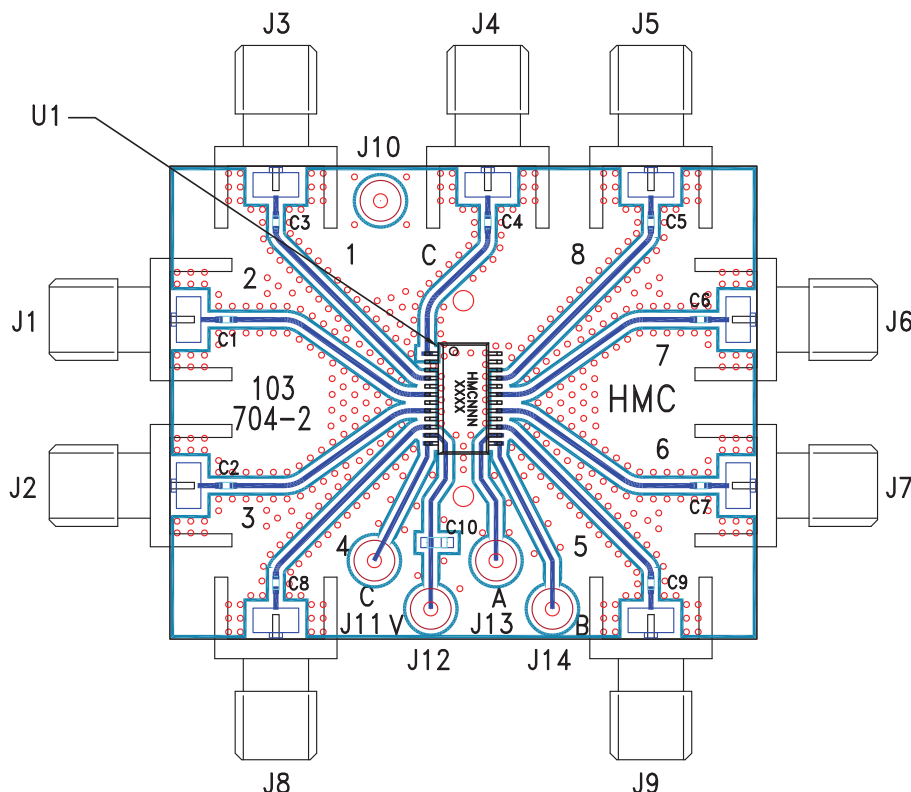

**GaAs MMIC SP8T NON-REFLECTIVE
SWITCH, DC - 2.5 GHz**
Absolute Maximum Ratings

| | |
|----------------------------------|---|
| Bias Voltage Range (Port Vdd) | +7.0 Vdc |
| Control Voltage Range (A, B, C) | -0.5V to Vdd +1Vdc |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |
| Maximum Input Power Vdd = +5V | +20 dBm (0.05 - 0.5 GHz) +24 dBm (0.5 - 2.5 GHz) |



**ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS**

Outline Drawing


Evaluation Circuit Board

List of Materials for Evaluation PCB 103706 [1]

| Item | Description |
|-----------|---|
| J1 - J9 | PCB Mount SMA Connector |
| J10 - J14 | DC Pin |
| C1 - C9 | 100 pF Capacitor, 0402 Pkg. |
| C10 | 0.01 uF Capacitor, 0603 Pkg. |
| U1 | HMC253QS24 / HMC253QS24E SP8T Switch |
| PCB [2] | 103704 Eval Board |

[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 ports should have 50 ohm impedance while the package ground leads should be connected directly to the ground plane similar to that shown above. A sufficient number of via holes should be used to connect the top and bottom ground planes. The evaluation circuit board shown above is available from Hittite Microwave Corporation upon request.