



HMC182S14 / 182S14E

GaAs MMIC SP4T NON-REFLECTIVE SWITCH, DC - 2 GHz

Typical Applications

The HMC182S14 / HMC182S14E is ideal for:

- 800 - 1000 MHz Basestation

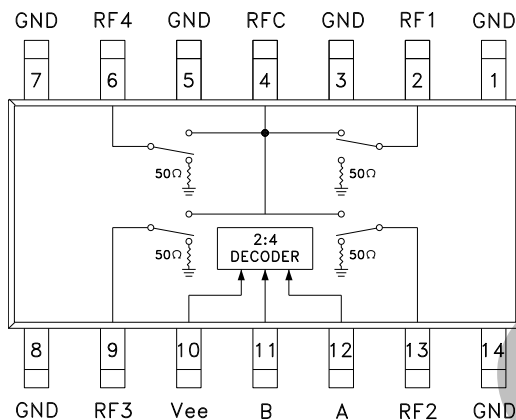
Features

Low Insertion Loss: 0.8dB

Integrated 2:4 Decoder

14 Lead SOIC Package

Functional Diagram



General Description

The HMC182S14 & HMC182S14E are low-cost terminated SP4T switches in 14-lead SOIC packages for use in antenna diversity, switched filter banks, gain/attenuation selection, and general channel multiplexing applications. The switch can control signals up to 2 GHz. A 2:4 decoder is integrated on the switch, requiring only 2 control lines and a negative bias to select each RF path. The 2:4 decoder replaces 4 to 8 control lines normally required by GaAs SP4T switches. The HMC182S14(E) are drop-in replacements for the HMC165S14 in applications requiring low "off state" VSWR. See positive bias / TTL SP4T HMC241QS16.

Electrical Specifications,

$T_A = +25^\circ \text{C}$, For 0/-5V Control and Vee = -5V in a 50 Ohm System

| Parameter | | Frequency | Min. | Typ. | Max. | Units |
|--|-------------|---------------|------|------|------|-------|
| Insertion Loss | | DC - 1.0 GHz | | 0.7 | 1.1 | dB |
| | | DC - 2.0 GHz | | 0.8 | 1.2 | dB |
| Isolation | | DC - 0.5 GHz | 41 | 45 | | dB |
| | | DC - 1.0 GHz | 36 | 40 | | dB |
| | | DC - 2.0 GHz | 28 | 32 | | dB |
| Return Loss | "On State" | DC - 1.0 GHz | 21 | 25 | | dB |
| | "On State" | DC - 2.0 GHz | 16 | 20 | | dB |
| | "Off State" | DC - 1.0 GHz | 17 | 21 | | dB |
| | "Off State" | DC - 2.0 GHz | 13 | 17 | | dB |
| Input Power for 1 dB Compression | | 50 MHz | | 22 | | dBm |
| | | 0.5 - 2.0 GHz | | 24 | | dBm |
| Input Third Order Intercept (Two-Tone Input Power = 7 dBm Each Tone). | | 50 MHz | 25 | 30 | | dBm |
| | | 0.5 - 1.0 GHz | 41 | 45 | | dBm |
| | | 0.5 - 2.0 GHz | 37 | 41 | | dBm |
| Switching Characteristics | | DC - 2.0 GHz | | 25 | | ns |
| | | | | 50 | | ns |

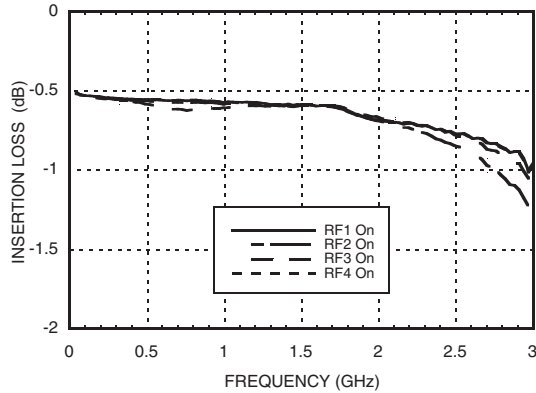
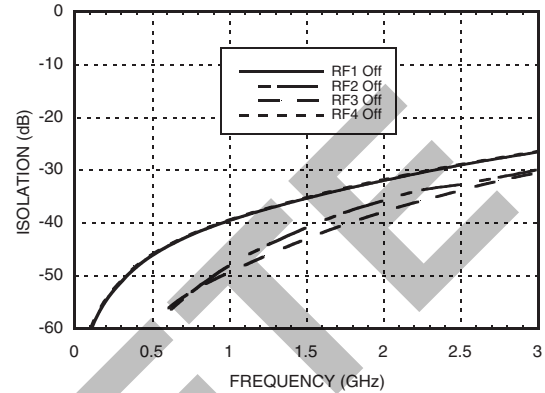
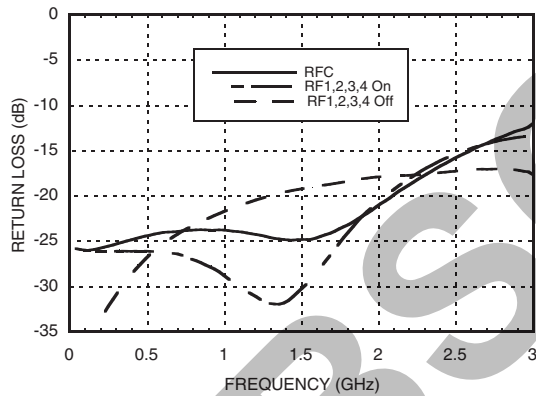
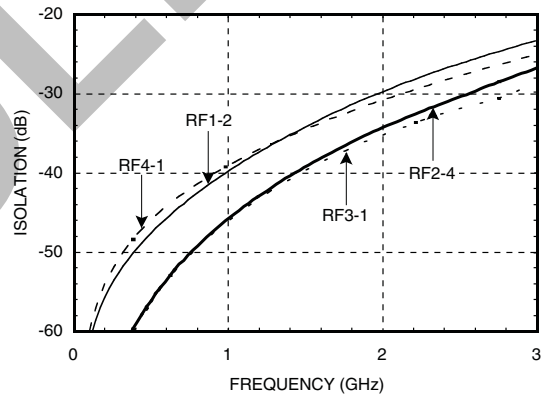
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GaAs MMIC SP4T NON-REFLECTIVE SWITCH, DC - 2 GHz

Insertion Loss

Isolation

Return Loss

Isolation Between Several RF I/Os

Bias Voltage & Current

| Vee Range = -5.0 Vdc \pm 10% | | |
|--------------------------------|-----------------|-----------------|
| Vee (Vdc) | Iee (Typ.) (mA) | Iee (Max.) (mA) |
| -5.0 | 4.0 | 7.0 |

Control Voltages

| State | Bias Condition |
|-------|---------------------------------|
| Low | 0 to -3 VDC @ 70 μ A Typ. |
| High | -5 to -4.2 VDC @ 5 μ A Typ. |

Truth Table

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

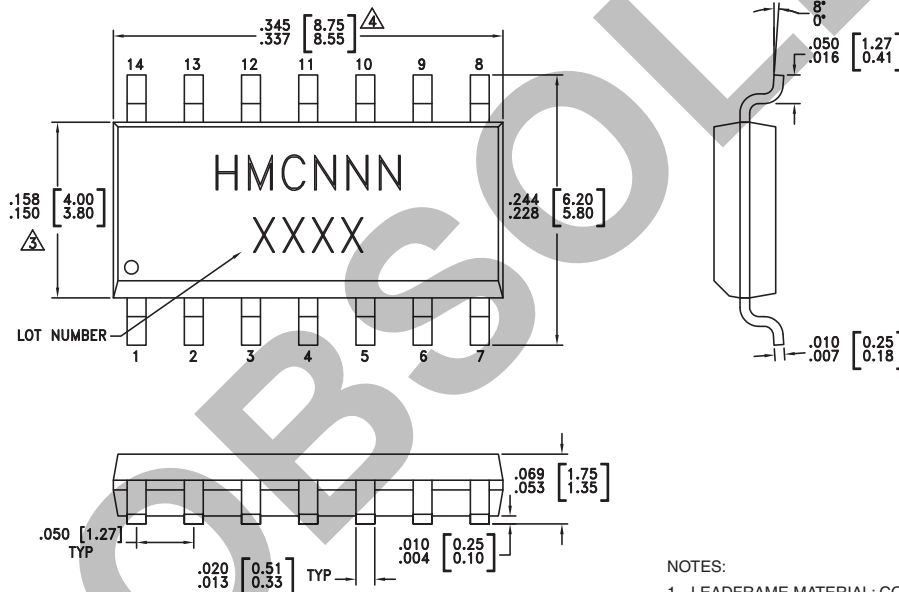
Absolute Maximum Ratings

| | |
|--|--|
| Bias Voltage Range (Port Vee) | -7 Vdc |
| Control Voltage Range (A & B) | Vee -0.5V to +1.0 Vdc |
| Channel Temperature | 150 °C |
| Thermal Resistance (Insertion Loss Path) | 123 °C/W |
| Thermal Resistance (Terminated Path) | 260 °C/W |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |
| Maximum Input Power | +27 dBm (<500 MHz) +30 dBm (>500 MHz) |



**ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS**

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 MUST BE SOLDERED TO PCB RF GROUND.

Package Information

| Part Number | Package Body Material | Leadframe Plating | MSL Rating | Package Marking ^[3] |
|-------------|---|-------------------|---------------------|--------------------------------|
| HMC182S14 | Low Stress Injection Molded Plastic Silica and Silicon Impregnated | Sn/Pb Solder | MSL1 ^[1] | HMC182 XXXX |
| HMC182S14E | RoHS-compliant Low Stress Injection Molded Plastic Silica and Silicon Impregnated | 100% Matte Tin | MSL1 ^[2] | <u>HMC182</u> XXXX |

[1] Max peak reflow temperature of 235 °C

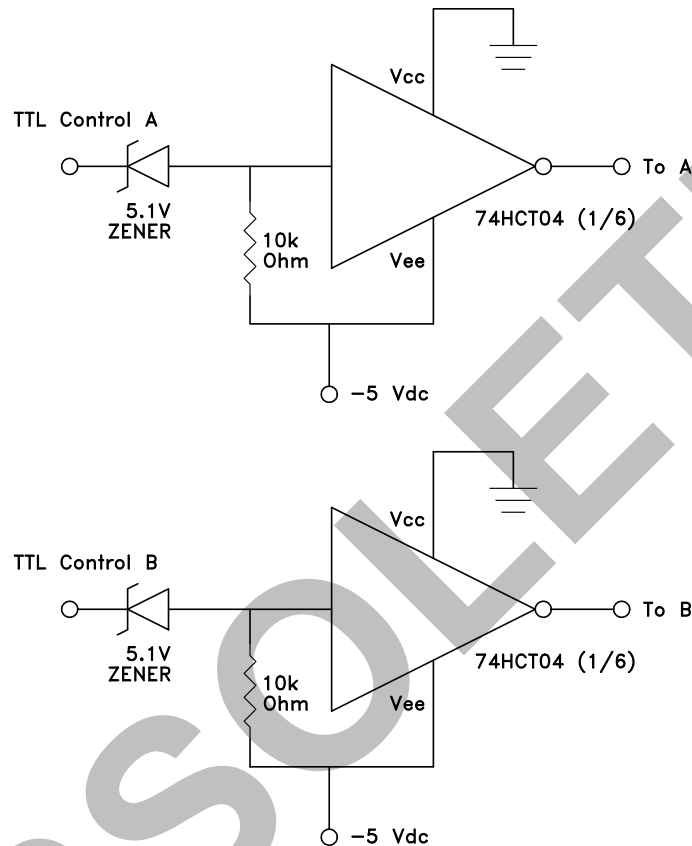
[2] Max peak reflow temperature of 260 °C

[3] 4-Digit lot number XXXX

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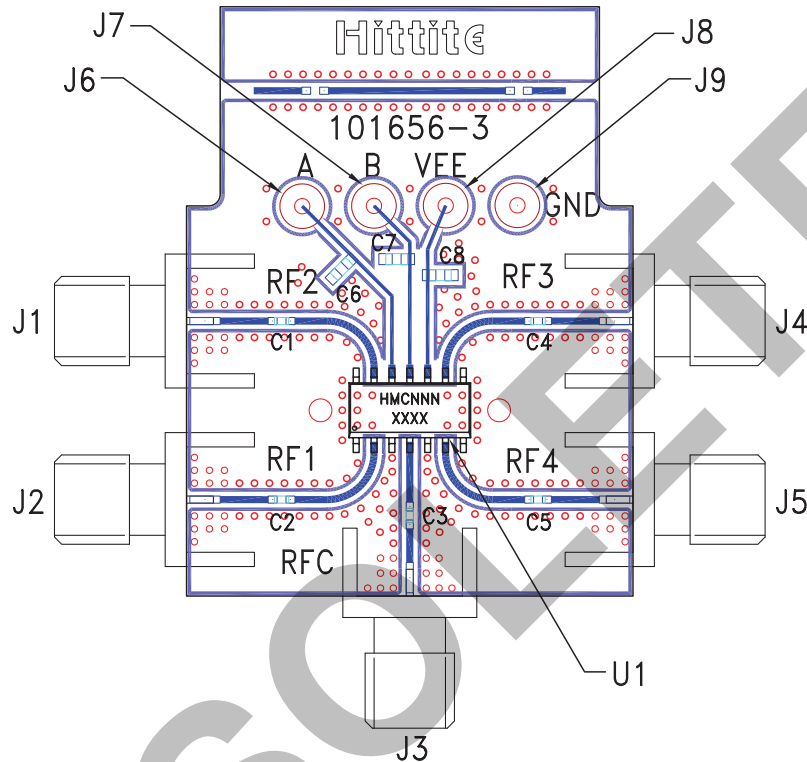
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TTL Interface Circuit



Note:
Control inputs A and B can be driven directly with TTL logic with -5 Volts applied to theHCT logic gate Vee pin and to Vee (pin 10) of the RF switch.

Evaluation PCB



List of Materials for Evaluation PCB 101672 ^[1]

| Item | Description |
|---------|---------------------------------------|
| J1 - J5 | PCB Mount SMA RF Connector |
| J6 - J9 | DC Pin |
| C1 - C5 | 330 pF capacitor, 0402 Pkg. |
| C6 - C8 | 10,000 pF capacitor, 0603 Pkg. |
| U1 | HMC182S14 / HMC182S14E SP4T Switch |
| PCB [2] | 101656 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.



v03.0805

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SWITCH, DC - 2 GHz**

Notes:

OBSOLETE

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SWITCHES - SMT

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