



# HMC182S14 / 182S14E

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

## **Typical Applications**

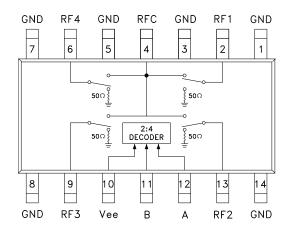
The HMC182S14 / HMC182S14E is ideal for:

• 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,**

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

Parameter		Frequency	Min.	Тур.	Max.	Units
Insertion Loss		DC - 1.0 GHz DC - 2.0 GHz		0.7 0.8	1.1 1.2	dB dB
Isolation		DC - 0.5 GHz DC - 1.0 GHz DC - 2.0 GHz	41 36 28	45 40 32		dB dB dB
Return Loss	"On State" "On State" "Off State" "Off State"	DC - 1.0 GHz DC - 2.0 GHz DC - 1.0 GHz DC - 2.0 GHz	21 16 17 13	25 20 21 17		dB dB dB dB
Input Power for 1 dB Compression		50 MHz 0.5 - 2.0 GHz		22 24		dBm dBm
Input Third Order Intercept (Two-Tone Input Power = 7 dBm Each Tone).		50 MHz 0.5 - 1.0 GHz 0.5 - 2.0 GHz	25 41 37	30 45 41		dBm dBm dBm
Switching Characteristics		DC - 2.0 GHz				
tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF)				25 50		ns ns

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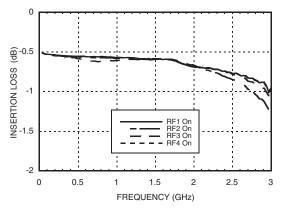


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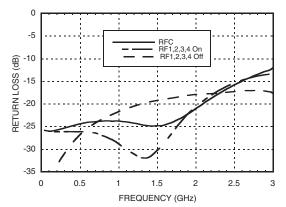
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## **Insertion Loss**



## **Return Loss**

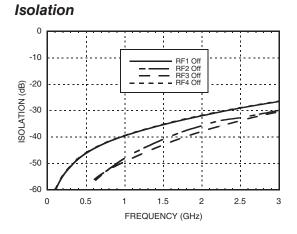


## **Bias Voltage & Current**

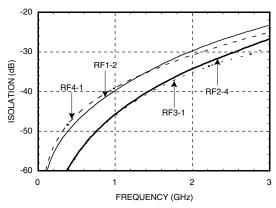
Vee Range = -5.0 Vdc ± 10%		
Vee (Vdc)	lee (Typ.) (mA)	lee (Max.) (mA)
-5.0	4.0	7.0

## **Control Voltages**

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



## Isolation Between Several RF I/Os



## Truth Table

Control Input		Signal Path State	
A	В	RFCOM to:	
High	High	RF1	
Low	High	RF2	
High	Low	RF3	
Low	Low	RF4	

SWITCHES - SMT

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# HMC182S14 / 182S14E



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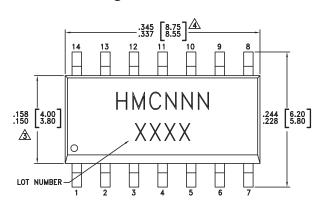
## Absolute Maximum Ratings

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)	

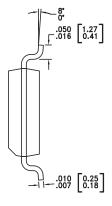


ELECTROSTATIC SENSITIVE DEVICE OBSERVE HANDLING PRECAUTIONS

## **10** Outline Drawing







NOTES:

1. LEADFRAME MATERIAL: COPPER ALLOY

2. DIMENSIONS ARE IN INCHES [MILLIMETERS].

A DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.

A DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.

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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	B2S14 Low Stress Injection Molded Plastic Silica and Silicon Impregnated Sn/Pb Solder MSL1		MSL1 <sup>[1]</sup>	HMC182 XXXX
HMC182S14E	MC182S14E RoHS-compliant Low Stress Injection Molde Plastic Silica and Silicon Impregnated		MSL1 <sup>[2]</sup>	HMC182 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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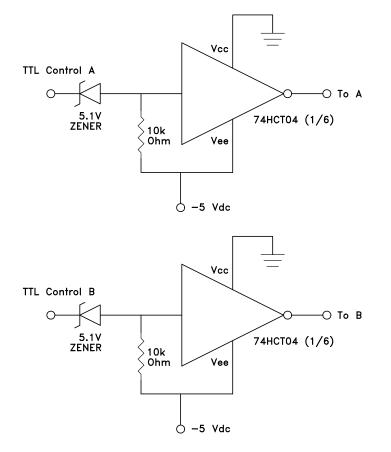


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## GaAs MMIC SP4T NON-REFLECTIVE SWITCH, DC - 2 GHz

## **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.

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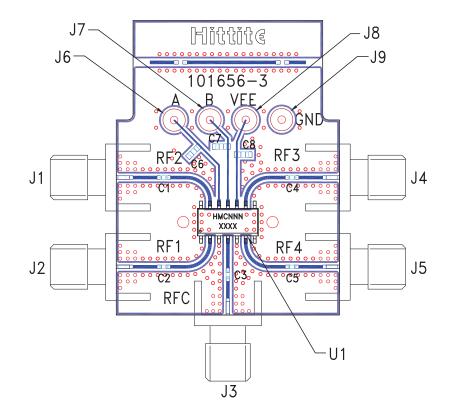


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## **Evaluation PCB**



## List of Materials for Evaluation PCB 101672<sup>[1]</sup>

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

Reference this number when ordering complete evaluation PCB
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.

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# SWITCHES - SMT

10 - 12





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