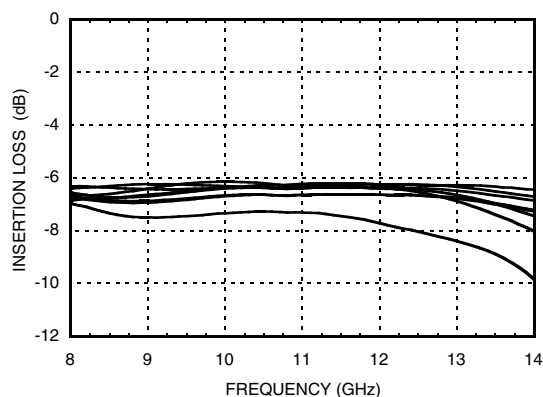
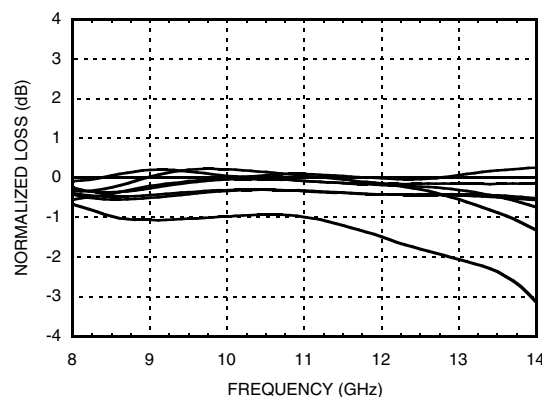
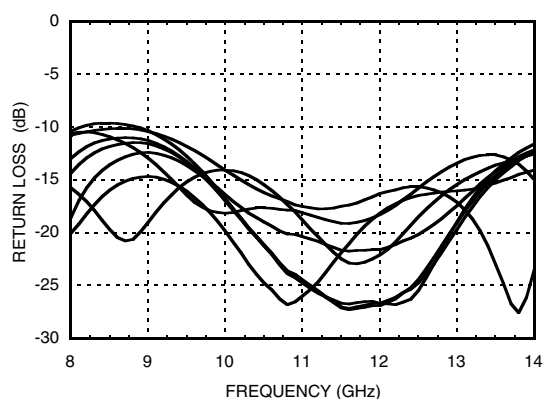
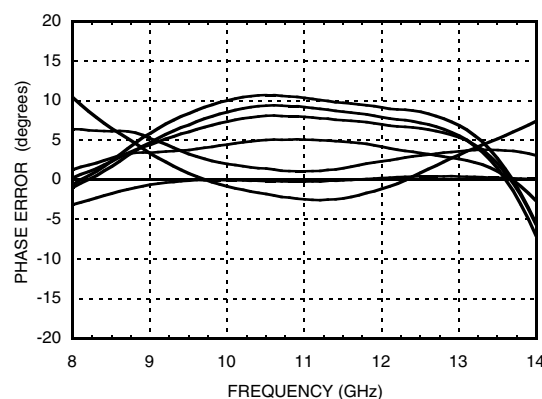
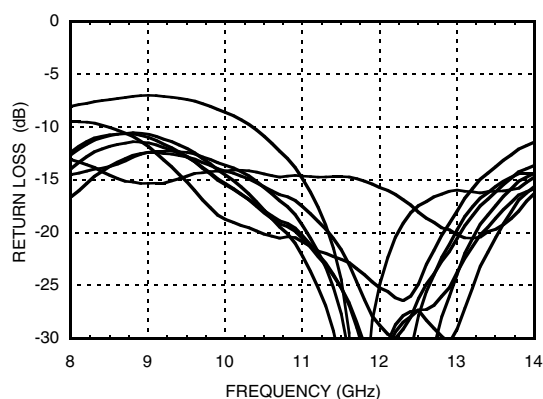
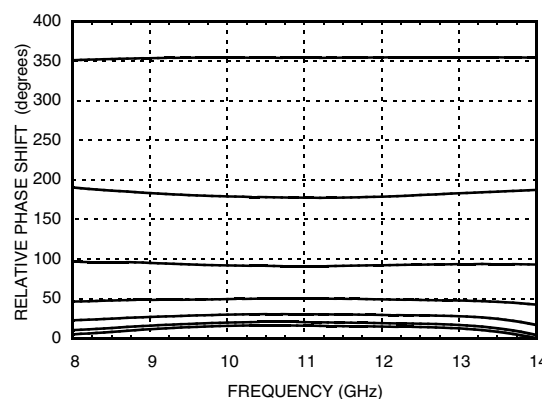
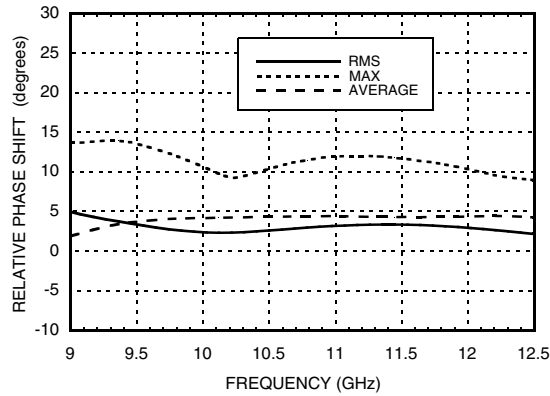



**GaAs MMIC 6-BIT DIGITAL
PHASE SHIFTER, 9 - 12.5 GHz**
Insertion Loss, Major States Only

Normalized Loss, Major States Only

Input Return Loss, Major States Only

Phase Error, Major States Only

Output Return Loss, Major States Only

**Relative Phase Shift
Major States Including All Bits**


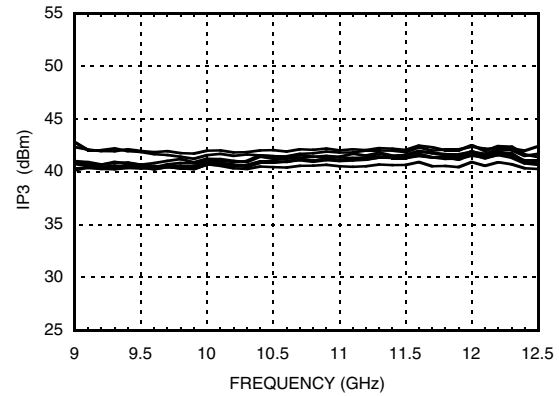


**GaAs MMIC 6-BIT DIGITAL
PHASE SHIFTER, 9 - 12.5 GHz**

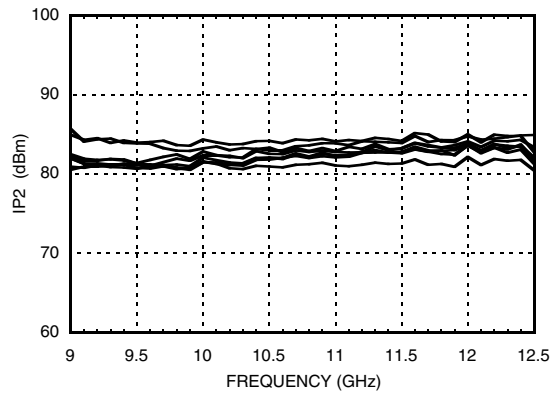
**Relative Phase Shift,
RMS, Average, Max, All States**



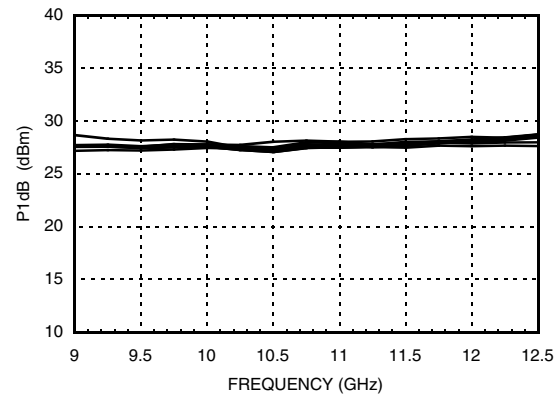
Input IP3, Major States Only



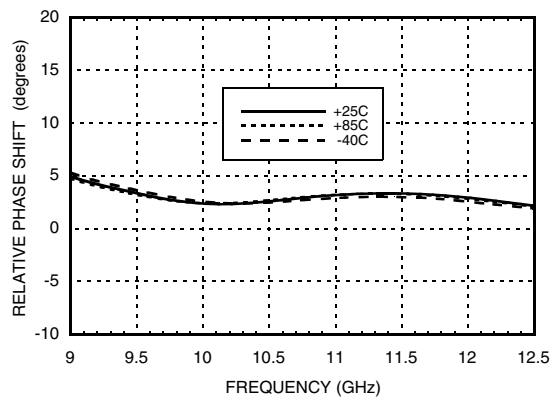
Input IP2, Major States Only



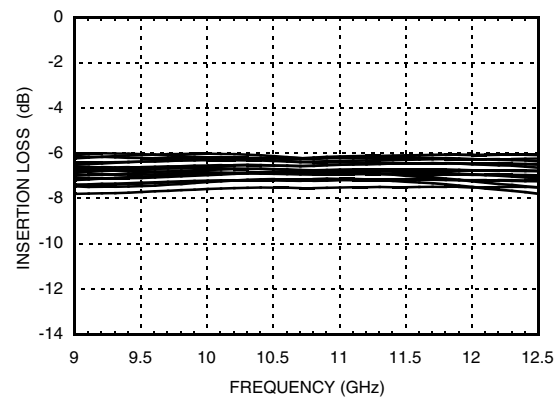
Input P1dB, Major States Only



RMS Phase Error vs. Temperature



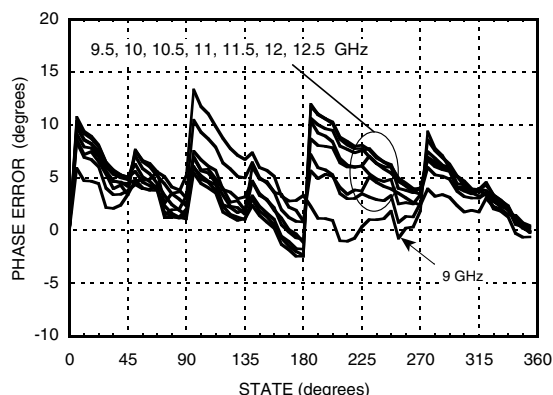
**Insertion Loss vs. Temperature,
Major States Only**





GaAs MMIC 6-BIT DIGITAL PHASE SHIFTER, 9 - 12.5 GHz

Phase Error vs. State



Bias Voltage & Current

Vdd	Idd
5.0	5.6mA
Vss	Iss
-5.0	5.6mA

Control Voltage

State	Bias Condition
Low (0)	0 to 0.2 Vdc
High (1)	Vdd ±0.2 Vdc @ 35 µA Typ.

Absolute Maximum Ratings

Input Power (RFIN)	29 dBm (T= +85 °C)
Bias Voltage Range (Vdd)	-0.2 to +12V
Bias Voltage Range (Vss)	+0.2 to -12V
Channel Temperature (Tc)	150 °C
Thermal Resistance (channel to ground paddle)	80 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C



**ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS**

Truth Table

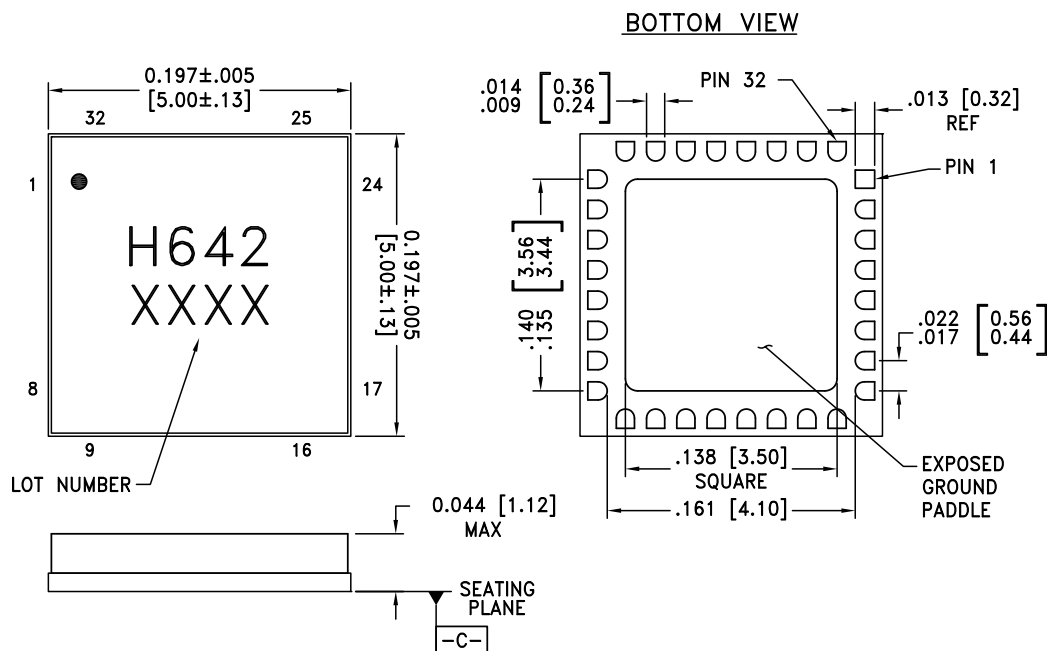
Control Voltage Input						Phase Shift (Degrees) RFIN - RFOUT
Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	
0	0	0	0	0	0	Reference*
1	0	0	0	0	0	5.625
0	1	0	0	0	0	11.25
0	0	1	0	0	0	22.5
0	0	0	1	0	0	45.0
0	0	0	0	1	0	90.0
0	0	0	0	0	1	180.0
1	1	1	1	1	1	354.375

Any combination of the above states will provide a phase shift approximately equal to the sum of the bits selected.
*Reference corresponds to monotonic setting



**GaAs MMIC 6-BIT DIGITAL
PHASE SHIFTER, 9 - 12.5 GHz**

Outline Drawing



NOTES:

1. PACKAGE BODY MATERIAL: ALUMINA
2. LEAD AND GROUND PADDLE PLATING: 30-80 MICROINCHES GOLD OVER 50 MICROINCHES MINIMUM NICKEL.
3. DIMENSIONS ARE IN INCHES [MILLIMETERS].
4. LEAD SPACING TOLERANCE IS NON-CUMULATIVE
5. PACKAGE WARP SHALL NOT EXCEED 0.05mm DATUM **-C-**
6. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.

Package Information

Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking ^[2]
HMC642LC5	Alumina, White	Gold over Nickel	MSL3 ^[1]	H642 XXXX





[1] Max peak reflow temperature of 260 °C

[2] 4-Digit lot number XXXX

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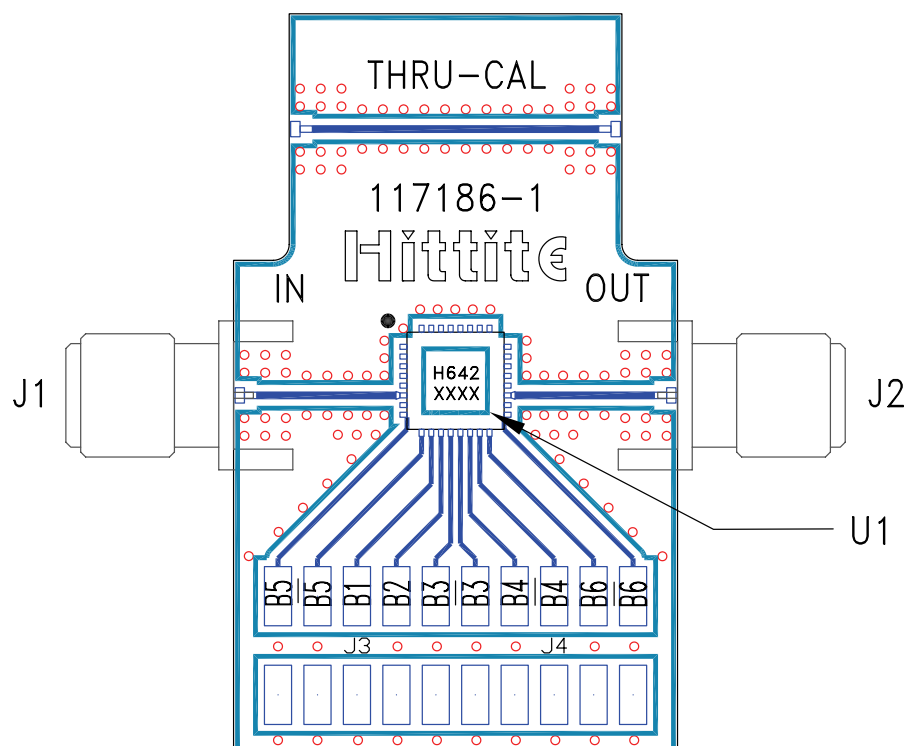

**GaAs MMIC 6-BIT DIGITAL
PHASE SHIFTER, 9 - 12.5 GHz**
Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1 - 4, 8, 17 21 - 32	N/C	No connection required. These pins may be connected to RF/DC ground without affecting performance.	
5, 7, 18, 20	GND	These pins and exposed ground paddle must be connected to RF/DC ground.	
6	RFIN	This port is DC coupled and matched to 50 Ohms.	
9 - 11, 13 - 15	BIT6, BIT5, BIT4, BIT3, BIT2, BIT1	Control Input. See truth table and control voltage tables.	
12	Vss	Voltage supply.	
16	Vdd	Voltage supply.	
19	RFOUT	This port is DC coupled and matched to 50 Ohms.	



**GaAs MMIC 6-BIT DIGITAL
PHASE SHIFTER, 9 - 12.5 GHz**

Evaluation PCB



List of Materials for Evaluation PCB 117252 ^{[1][3]}

Item	Description
J1 - J2	PCB Mount SMA RF Connector
J3 - J4	Molex Header 2mm
U1	HMC642LC5 6-Bit Digital Phase Shifter
PCB [2]	117186 Evaluation PCB

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

[3] Please refer to part's pin description and functional diagram for pin out assignments on evaluation board.

The circuit board used in the final application should use RF circuit design techniques. Signal lines should have 50 ohm impedance while the package ground leads and exposed paddle should be connected directly to the ground plane similar to that shown. A sufficient number of via holes should be used to connect the top and bottom ground planes. The evaluation board should be mounted to an appropriate heat sink. The evaluation circuit board shown is available from Hittite upon request.

**GaAs MMIC 6-BIT DIGITAL
PHASE SHIFTER, 9 - 12.5 GHz**