

Analog Devices Welcomes Hittite Microwave Corporation

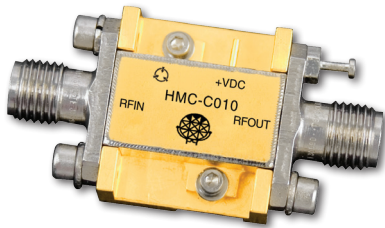
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600° ANALOG PHASE SHIFTER MODULE, 6 - 15 GHz

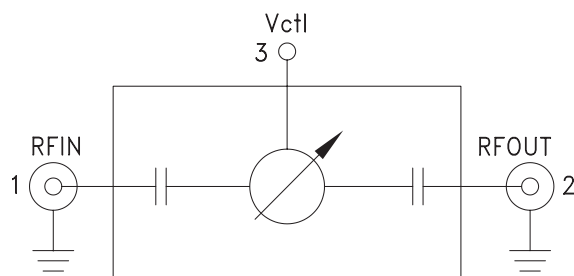


Typical Applications

The HMC-C010 is ideal for:

- Fiber Optics
- Military
- Test Equipment

Functional Diagram



Features

- Wide Bandwidth: 6 - 15 GHz
- >600° Phase Shift
- Single Positive Voltage Control
- Hermetically Sealed Module
- Field Replaceable SMA Connectors
- 55 to +85 °C Operating Temperature

General Description

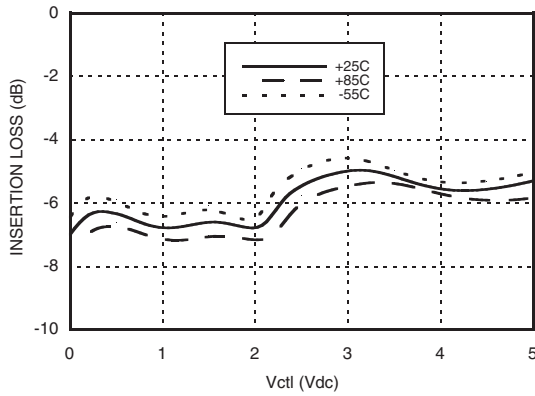
The HMC-C010 is an Analog Phase Shifter which is controlled via an analog control voltage from 0 to +5V. The HMC-C010 provides a continuously variable phase shift of 0 to 800 degrees at 6 GHz, and 0 to 450 degrees at 16 GHz, with consistent insertion loss versus phase shift. The phase shift is monotonic with respect to control voltage. The control port has a modulation bandwidth of 50 MHz. The low insertion loss and extremely robust packaging enable this part to be used in a wide range of applications including the phase adjustment of clocks in fiber optic systems and test equipment. The HMC-C010 is housed in a miniature hermetic module with replaceable SMA connectors.

Electrical Specifications, $T_A = +25^\circ\text{C}$, 50 Ohm System

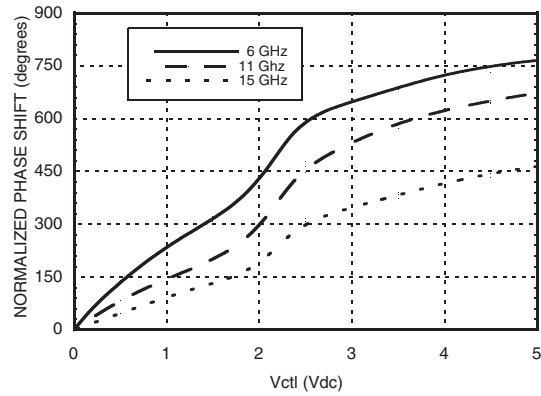
Parameter	Frequency (GHz)	Min.	Typ.	Max.	Units
Phase Shift Range:	6 - 10 GHz 10 - 15 GHz	600 360	800 600		degrees degrees
Insertion Loss	6 - 15 GHz		7	10	dB
Return Loss (Input and Output)	6 - 15 GHz		7		dB
Control Voltage Range	6 - 15 GHz		0 - 5		Volt
Modulation Bandwidth	6 - 15 GHz		50		MHz
Phase Voltage Sensitivity	6 - 15 GHz		120		deg /Volt
Insertion Phase Temperature Sensitivity	6 - 15 GHz		0.5		deg /°C

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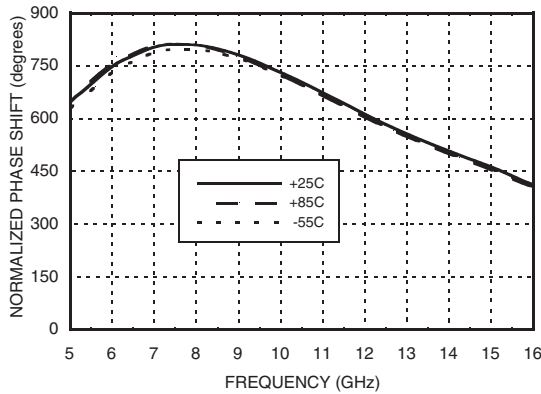
Insertion Loss vs. Control Voltage



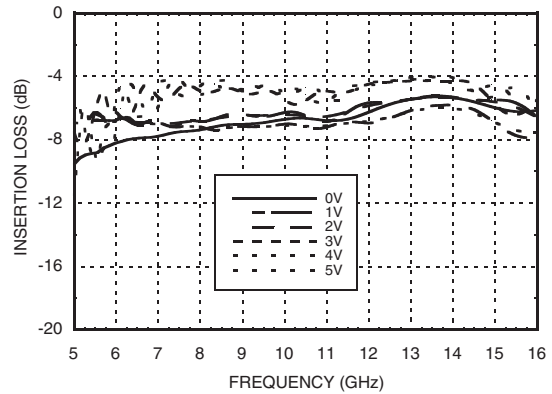
Phase Shift vs. Control Voltage



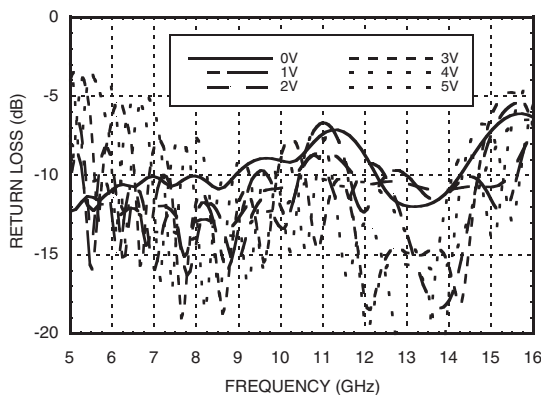
**Phase Shift vs. Frequency @ V_{ctl} = 5V
(Relative to V_{ctl} = 0V)**



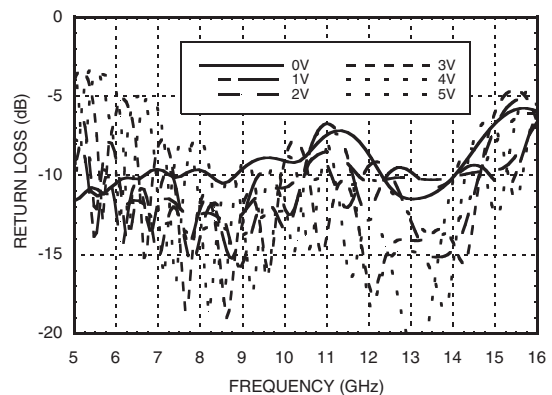
Insertion Loss vs. Frequency



**Input Return Loss vs. Frequency,
V_{ctl} = 0 to +5V**



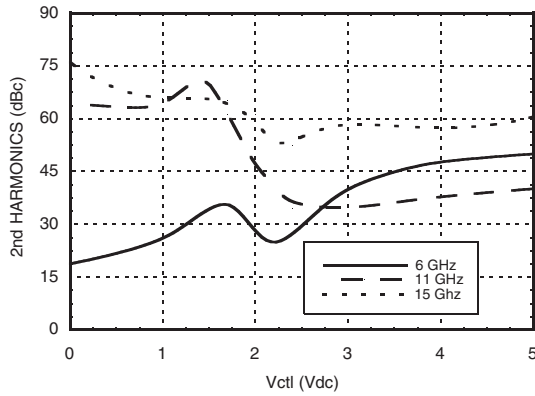
**Output Return Loss vs. Frequency,
V_{ctl} = 0 to +5V**



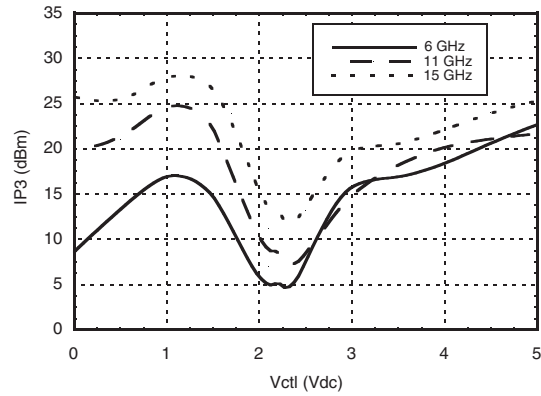


**600° ANALOG PHASE SHIFTER
MODULE, 6 - 15 GHz**

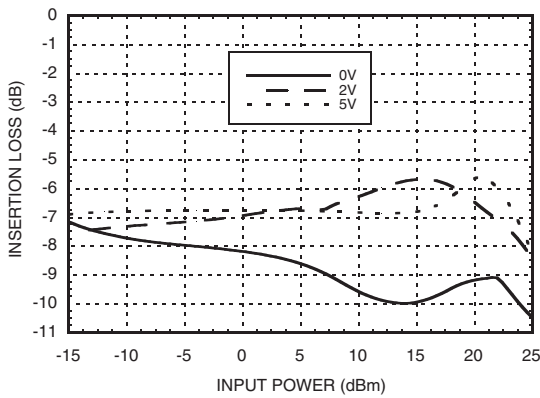
**Second Harmonics vs. Control Voltage,
Pin = -10 dBm**



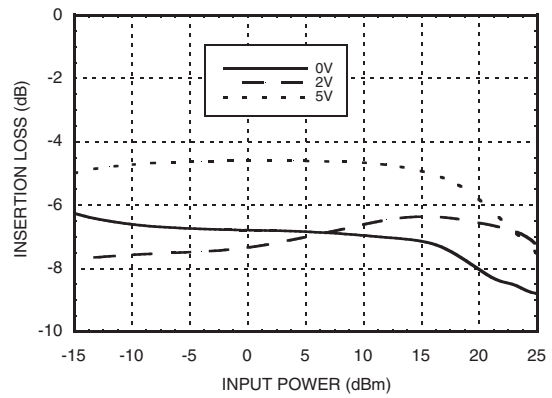
Input IP3 vs. Control Voltage



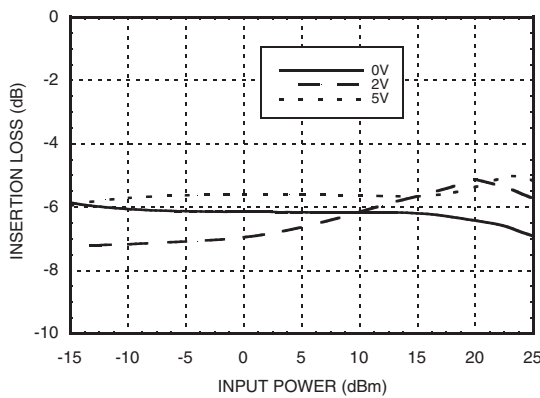
Insertion Loss vs. Pin @ 7 GHz



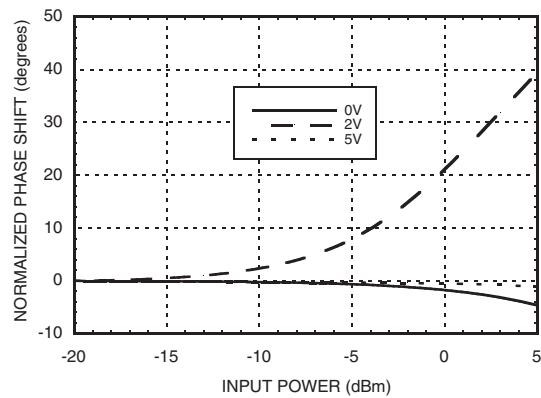
Insertion Loss vs. Pin @ 11 GHz

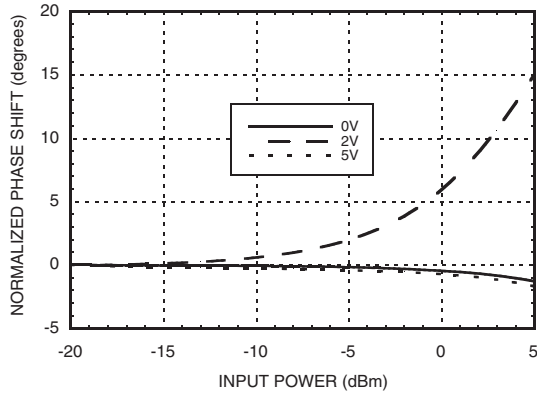
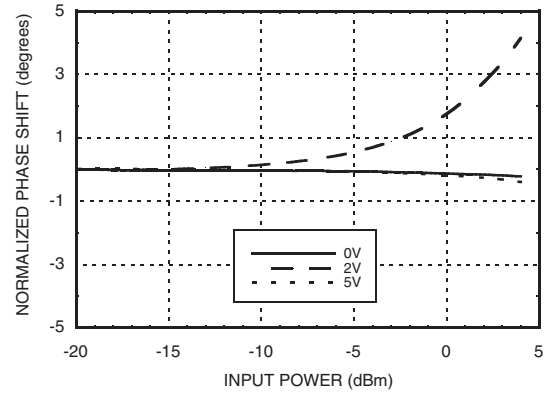


Insertion Loss vs. Pin @ 15 GHz



Phase Shift vs. Pin @ 7 GHz



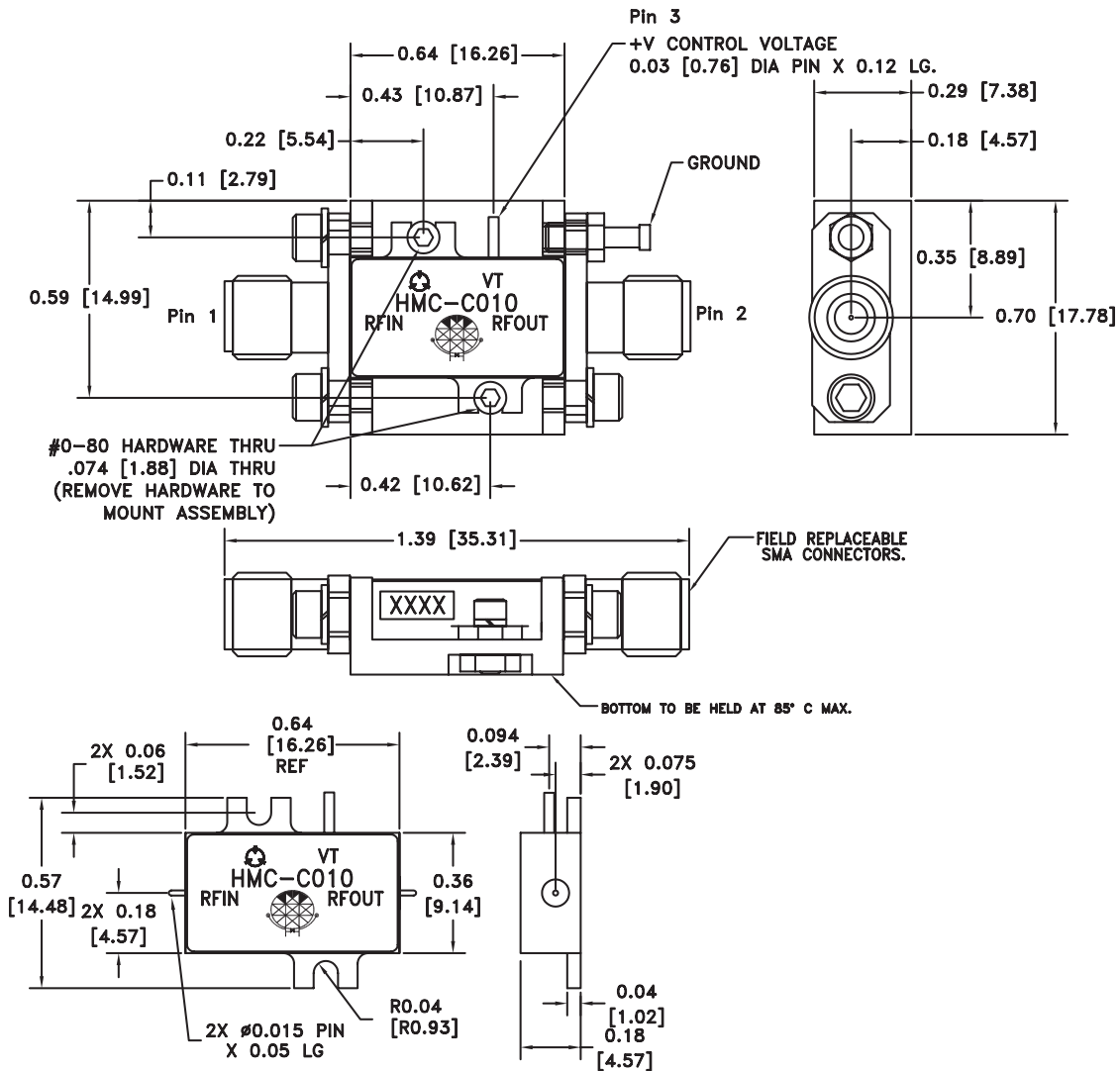
Phase Shift vs. Pin @ 11 GHz

Phase Shift vs. Pin @ 15 GHz

Absolute Maximum Ratings

Control Voltage (Vctl)	-1 Vdc to +8 Vdc
Input Power (RFIN)	+25 dBm
Channel Temperature (Tc)	150 °C
Continuous P _{diss} (T = 85 °C) (derate 21 mW/°C above 85 °C)	1.36 W
Thermal Resistance (junction to ground paddle)	48 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-55 to +85 °C
ESD Sensitivity (HBM)	Class 1B



**600° ANALOG PHASE SHIFTER
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Outline Drawing



Package Information

Package Type	C-1
Package Weight [1]	10.2 gms [2]
Spacer Weight	N/A

[1] Includes the connectors

[2] ±1 gms Tolerance

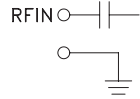
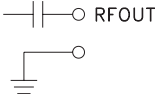
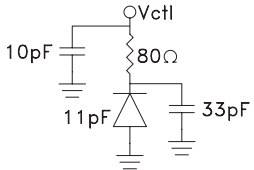
NOTES:

1. PACKAGE, LEADS, COVER MATERIAL: KOVAR™
2. BRACKET MATERIAL: ALUMINUM
3. PLATING: ELECTROLYTIC GOLD 50 MICROINCHES MIN., OVER ELECTROLYTIC NICKEL 75 MICROINCHES MIN.
4. ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. TOLERANCES ±.005 [0.13] UNLESS OTHERWISE SPECIFIED.
6. FIELD REPLACEABLE SMA CONNECTORS.

TENSOLITE 5602 - 5CCSF OR EQUIVALENT.
 ⚠️ TO MOUNT MODULE TO SYSTEM PLATFORM REPLACE 0 -80 HARDWARE WITH DESIRED MOUNTING SCREWS.



Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1	RFIN & RF Ground	RF input connector, SMA female, field replaceable. This pin is DC blocked and matched to 50 Ohms.	
2	RFOUT & RF Ground	RF output connector, SMA female, field replaceable. This pin is DC blocked and matched to 50 Ohms.	
3	Vctl	Phase shift control pin. Application of a voltage between 0 and 5 volts causes the transmission phase to change. The DC equivalent circuit is a series connected diode and resistor.	
	GND	Power supply ground.	