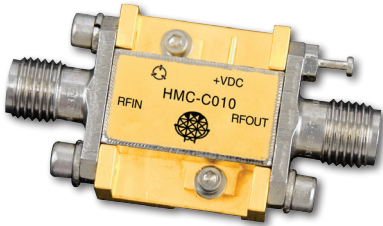


**600° ANALOG PHASE SHIFTER  
MODULE, 6 - 15 GHz**

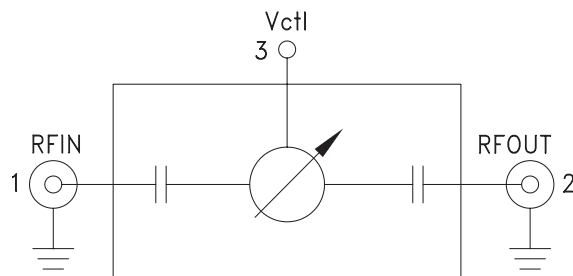


**Typical Applications**

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,  $T_A = +25^\circ C$ , 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

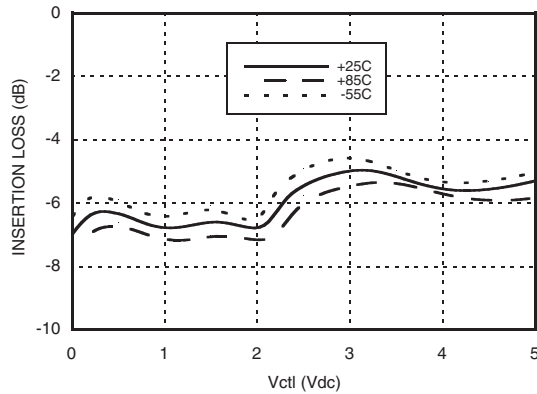
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Phone: 781-329-4700 • Order online at [www.analog.com](http://www.analog.com)  
Application Support: Phone: 1-800-ANALOG-D

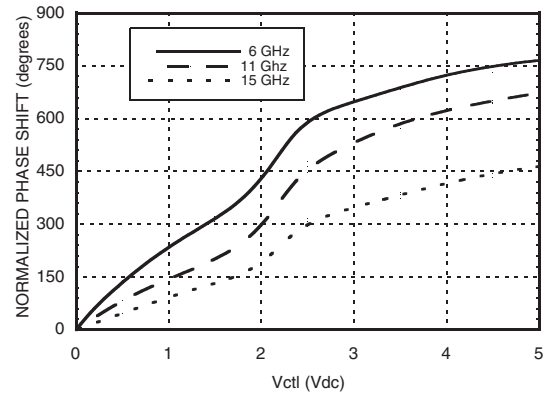


**600° ANALOG PHASE SHIFTER  
MODULE, 6 - 15 GHz**

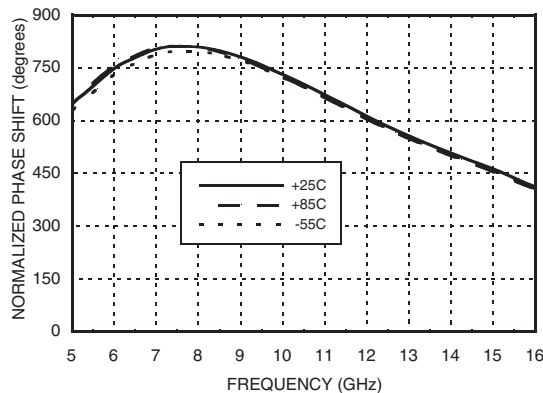
**Insertion Loss vs. Control Voltage**



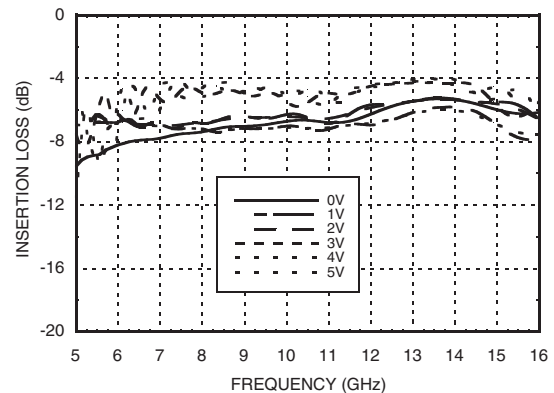
**Phase Shift vs. Control Voltage**



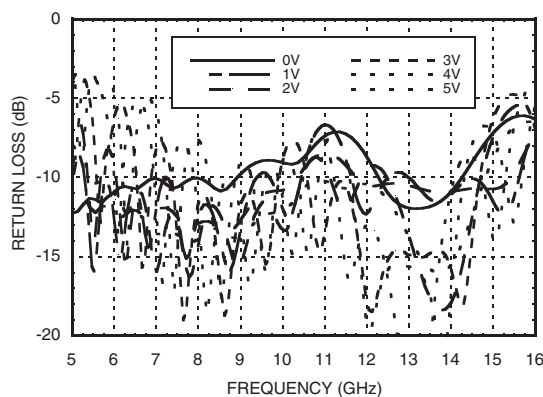
**Phase Shift vs. Frequency @ Vctl = 5V  
(Relative to Vctl = 0V)**



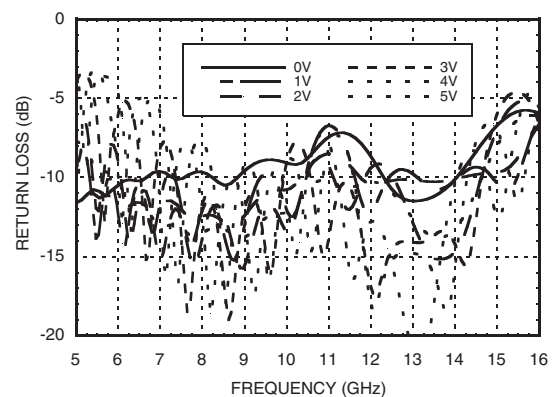
**Insertion Loss vs. Frequency**



**Input Return Loss vs. Frequency,  
Vctl = 0 to +5V**



**Output Return Loss vs. Frequency,  
Vctl = 0 to +5V**



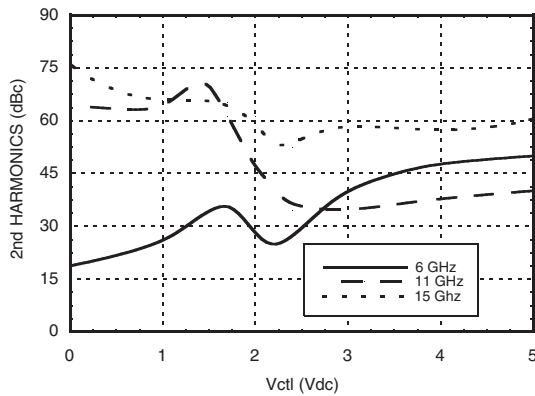
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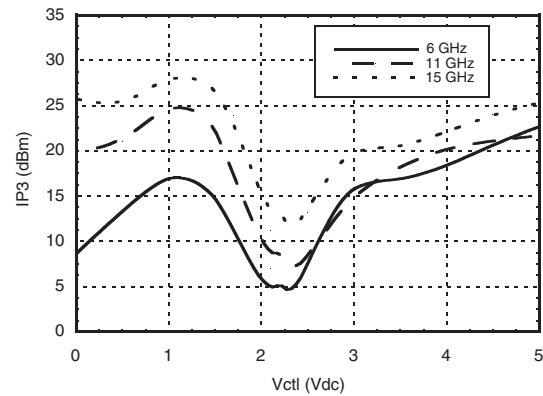


**600° ANALOG PHASE SHIFTER  
MODULE, 6 - 15 GHz**

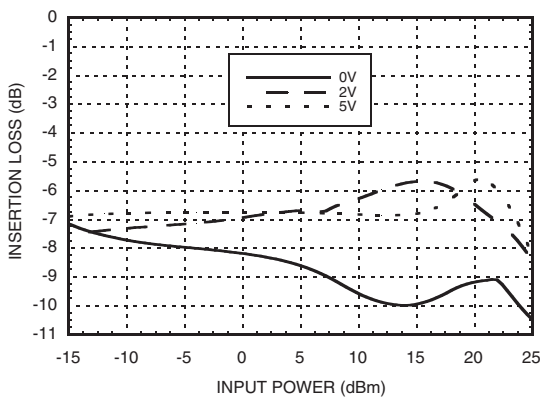
**Second Harmonics vs. Control Voltage,  
Pin = -10 dBm**



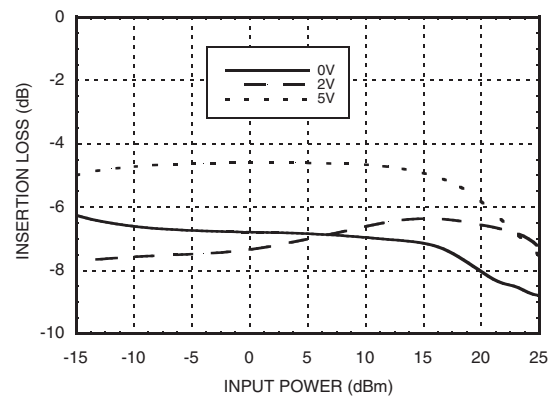
**Input IP3 vs. Control Voltage**



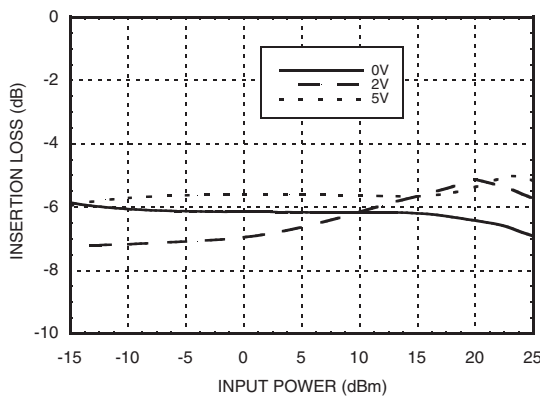
**Insertion Loss vs. Pin @ 7 GHz**



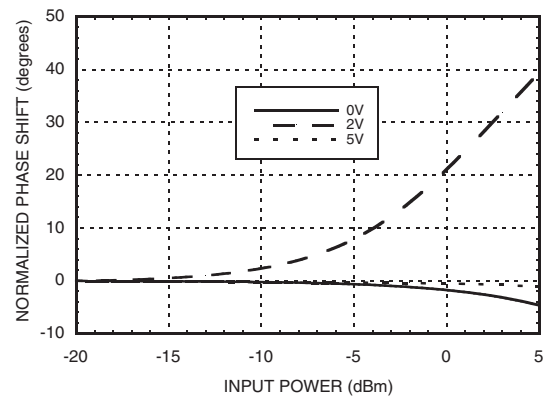
**Insertion Loss vs. Pin @ 11 GHz**



**Insertion Loss vs. Pin @ 15 GHz**



**Phase Shift vs. Pin @ 7 GHz**



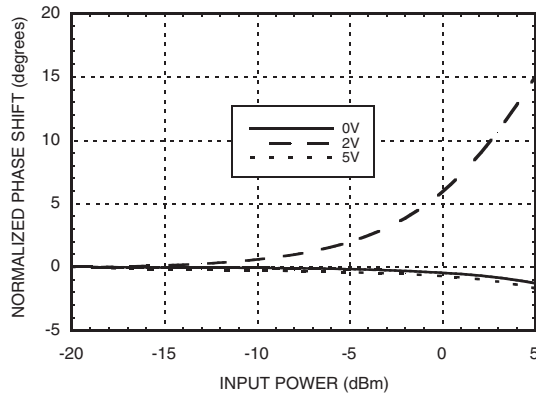
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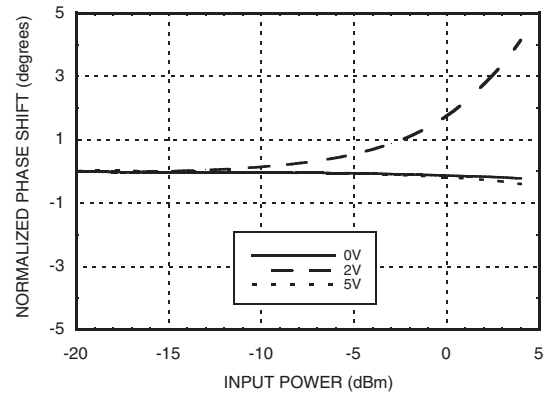
## 600° ANALOG PHASE SHIFTER MODULE, 6 - 15 GHz



**Phase Shift vs. Pin @ 11 GHz**



**Phase Shift vs. Pin @ 15 GHz**



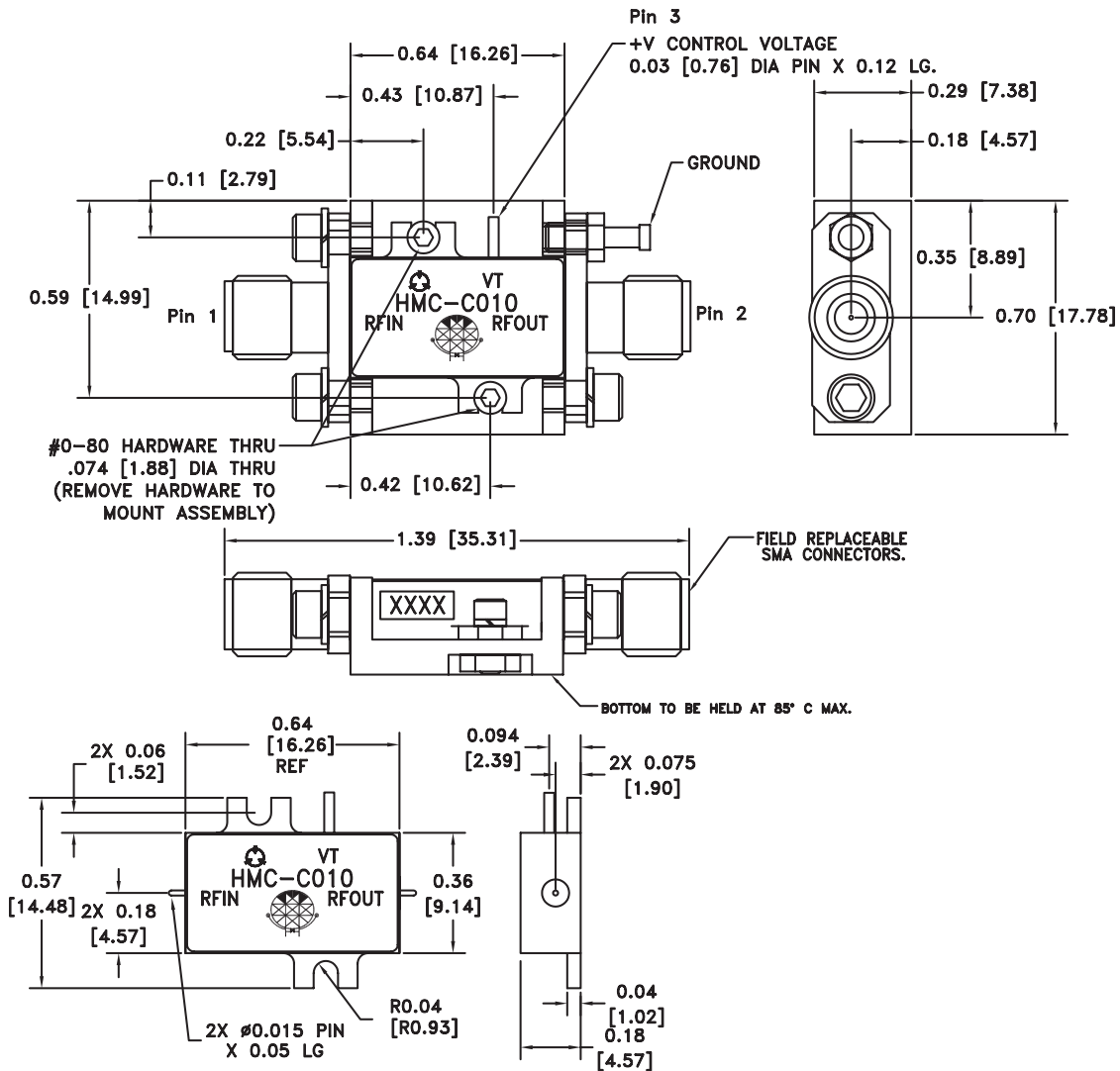
### Absolute Maximum Ratings

Control Voltage (Vctl)	-1 Vdc to +8 Vdc
Input Power (RFIN)	+25 dBm
Channel Temperature (Tc)	150 °C
Continuous Pdiss (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  
MODULE, 6 - 15 GHz**



**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:**

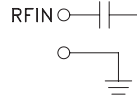
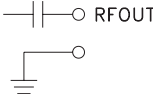
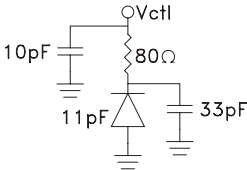
1. PACKAGE, LEADS, COVER MATERIAL: KOVAR™
2. BRACKET MATERIAL: ALUMINUM
3. PLATING: ELECTROLYTIC GOLD 50 MICROINCHES MIN., OVER ELECTROLYTIC NICKEL 75 MICROINCHES MIN.
4. ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. TOLERANCES ±.005 [0.13] UNLESS OTHERWISE SPECIFIED.
6. FIELD REPLACEABLE SMA CONNECTORS.

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

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



### 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.	