

## ULTRA LOW PHASE NOISE DISTRIBUTED AMPLIFIER, 2 - 18 GHz

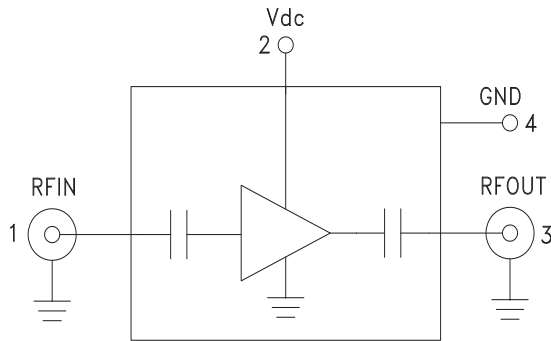


### Typical Applications

The HMC-C050 is ideal for:

- Microwave Radio
- Military & Space
- Test Instrumentation
- VSAT

### Functional Diagram



### Features

- Ultra Low Phase Noise: -160 dBc/Hz @ 10 kHz
- Noise Figure: 5 dB
- Gain: 13.5 dB
- Output IP3: +22.5 dBm
- 50 Ohm Matched Input/Output
- Single Supply Voltage: +5V
- Hermetically Sealed Module
- Field Replaceable SMA Connectors
- 55 to +85°C Operating Temperature

### General Description

The HMC-C050 is a GaAs HBT Ultra Low Noise Amplifier in a miniature, hermetic module designed to operate between 2 and 18 GHz. This high dynamic range amplifier module provides 13.5 dB of gain, 5 dB noise figure and up to +22.5 dBm of OIP3 with a single supply of +5V. The ultra low phase noise contribution of -160 dBc/Hz, enables superior modulation accuracy within transceiver architectures. The wideband distributed amplifier I/O's are internally matched to 50 Ohms and DC blocked for robust performance. The module features removable SMA connectors which can be detached to allow direct connection of the I/O pins to a microstrip or coplanar circuit.

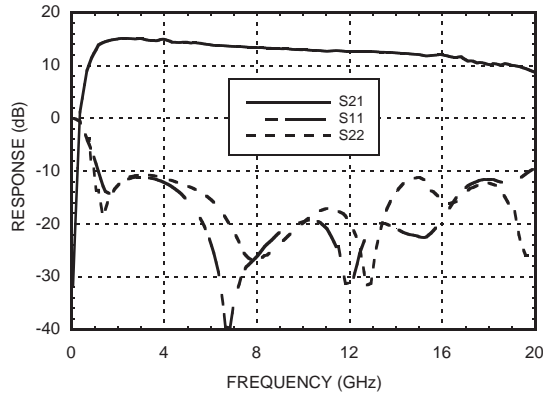
### Electrical Specifications, $T_A = +25^\circ\text{C}$ , $V_{dc} = +5\text{V}$

Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range	8 - 12.5		2 - 18				GHz
Gain	10.5	13.5		9.5	12.5		dB
Gain Flatness		$\pm 1.2$			$\pm 2.2$		dB
Gain Variation Over Temperature		0.021			0.027		dB/°C
Noise Figure		4.5			6.5		dB
Input Return Loss		18			16		dB
Output Return Loss		17			15		dB
Output Power for 1 dB Compression (P1dB)	13	15		8	13		dBm
Saturated Output Power (Psat)		18.5			16		dBm
Output Third Order Intercept (IP3)		22.5			20		dBm
Phase Noise @ 100 Hz		-140			-150		dBc/Hz
Phase Noise @ 1 kHz		-150			-150		dBc/Hz
Phase Noise @ 10 kHz		-160			-150		dBc/Hz
Phase Noise @ 1 MHz		-165			-160		dBc/Hz
Supply Current		80	104		80	104	mA

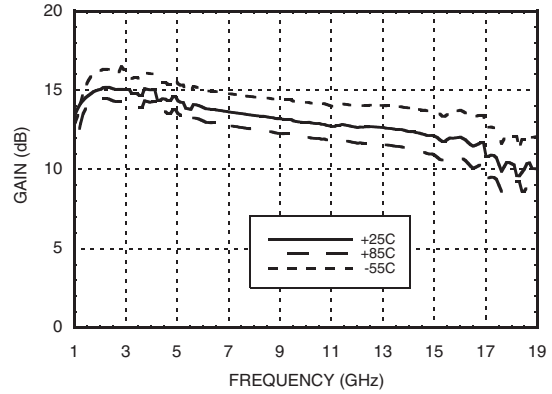
For price, delivery, and to place orders, please contact Hittite Microwave Corporation:  
 20 Alpha Road Chelmsford, MA 01824 Phone: 978-250-3343 Fax: 978-250-3373  
 Order Online at [www.hittite.com](http://www.hittite.com)

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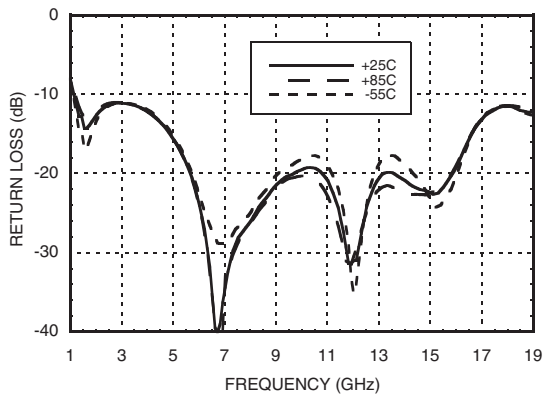
**Gain & Return Loss**



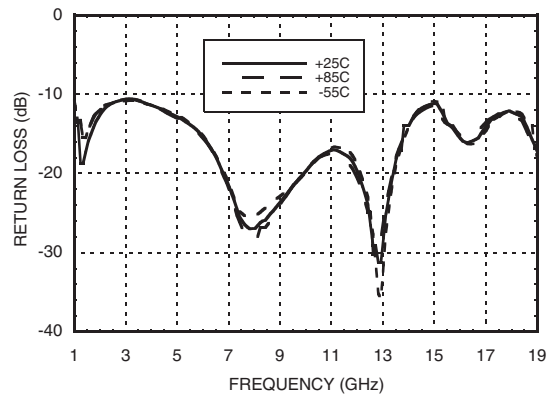
**Gain vs. Temperature**



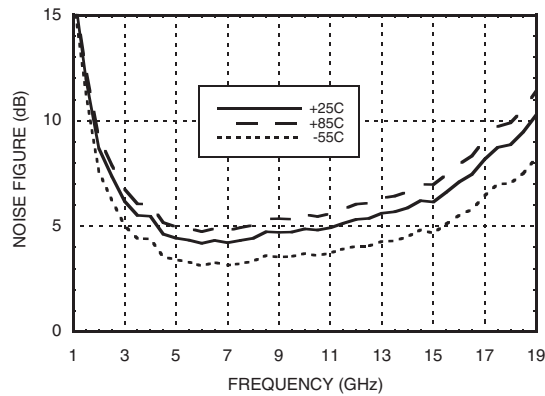
**Input Return Loss vs. Temperature**



**Output Return Loss vs. Temperature**



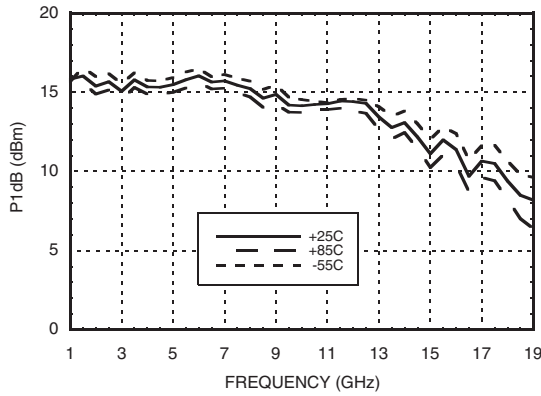
**Noise Figure vs. Temperature**



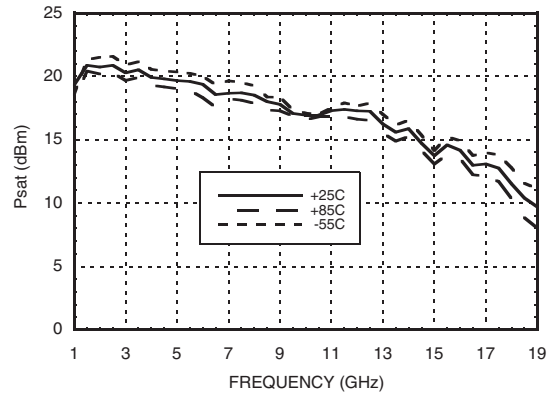


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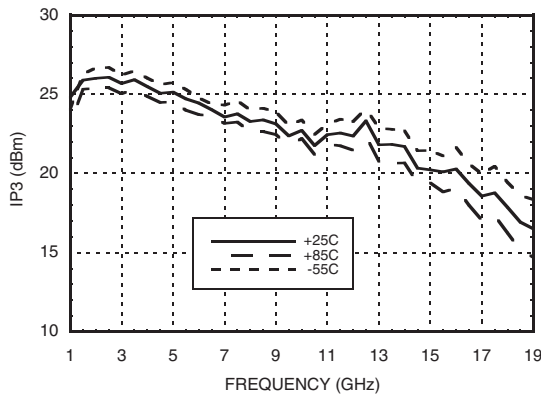
**P1dB vs. Temperature**



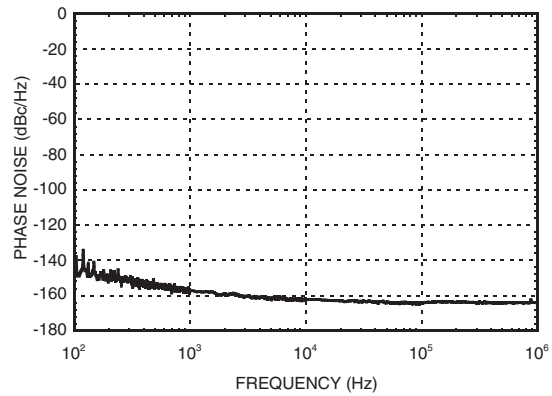
**Psat vs. Temperature**



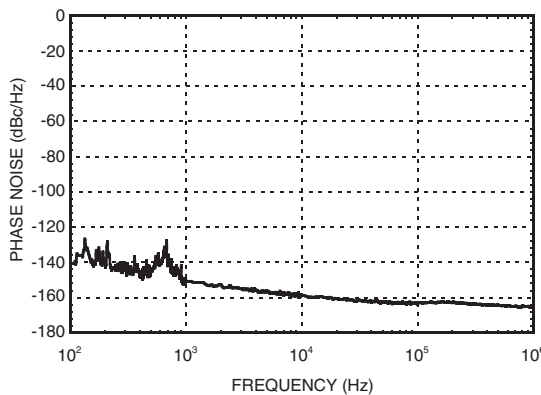
**Output IP3 vs. Temperature**



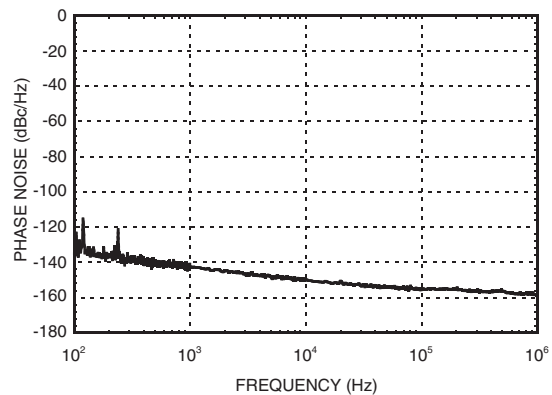
**Phase Noise at Pout = 0 dBm @ 2 GHz**



**Phase Noise at Pout = 0 dBm @ 12 GHz**



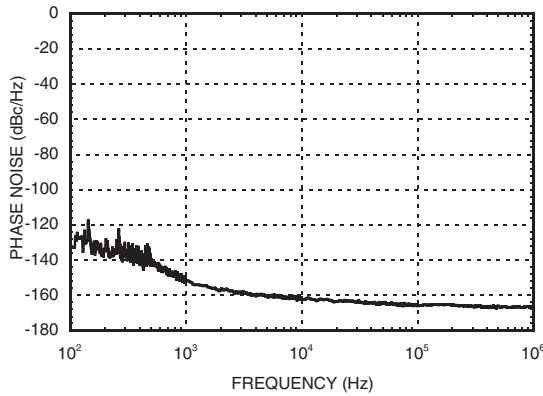
**Phase Noise at Pout = 0 dBm @ 18 GHz**



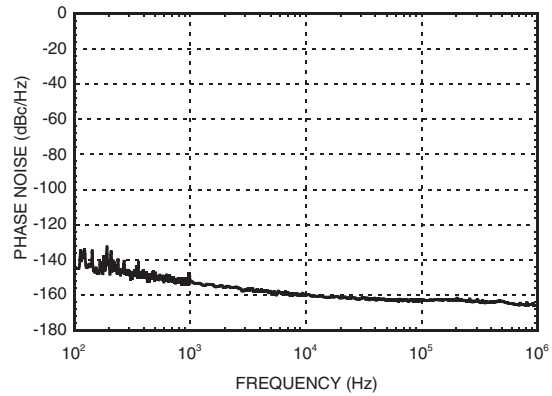


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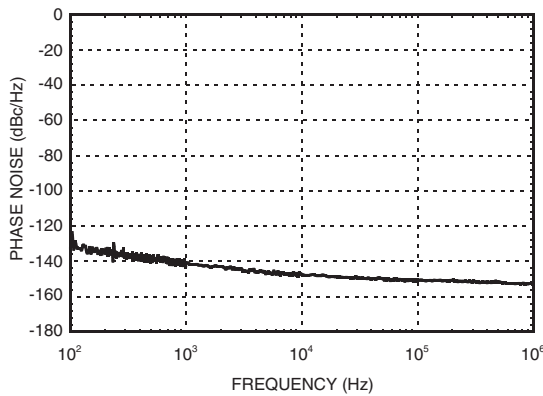
**Phase Noise at Psat @ 2 GHz**



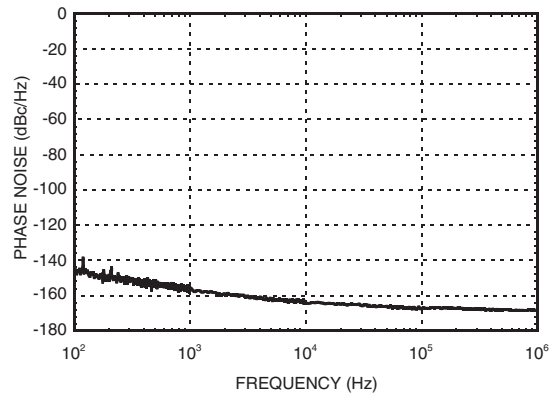
**Phase Noise at Psat @ 12 GHz**



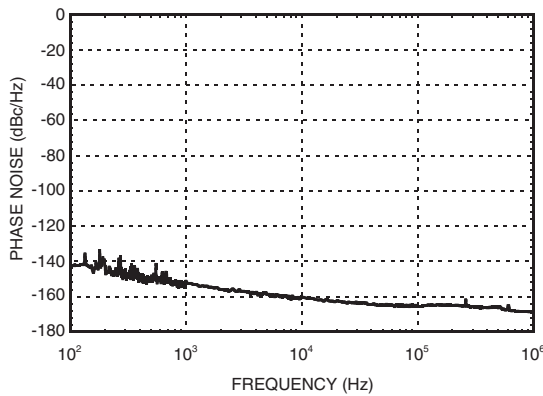
**Phase Noise at Psat @ 18 GHz**



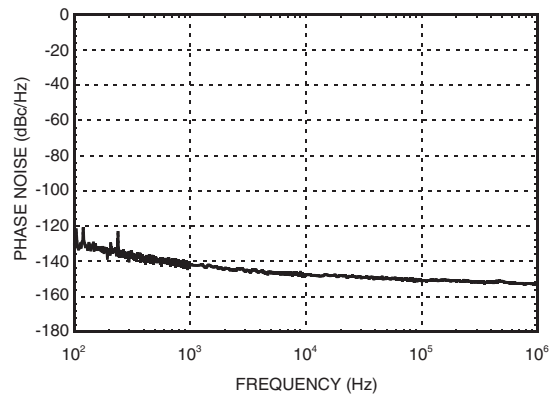
**Phase Noise at P1dB @ 2 GHz**



**Phase Noise at P1dB @ 12 GHz**



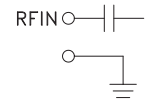
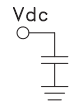
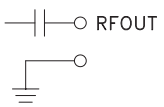

**Phase Noise at P1dB @ 18 GHz**




**ULTRA LOW PHASE NOISE  
DISTRIBUTED AMPLIFIER, 2 - 18 GHz**
**Absolute Maximum Ratings**

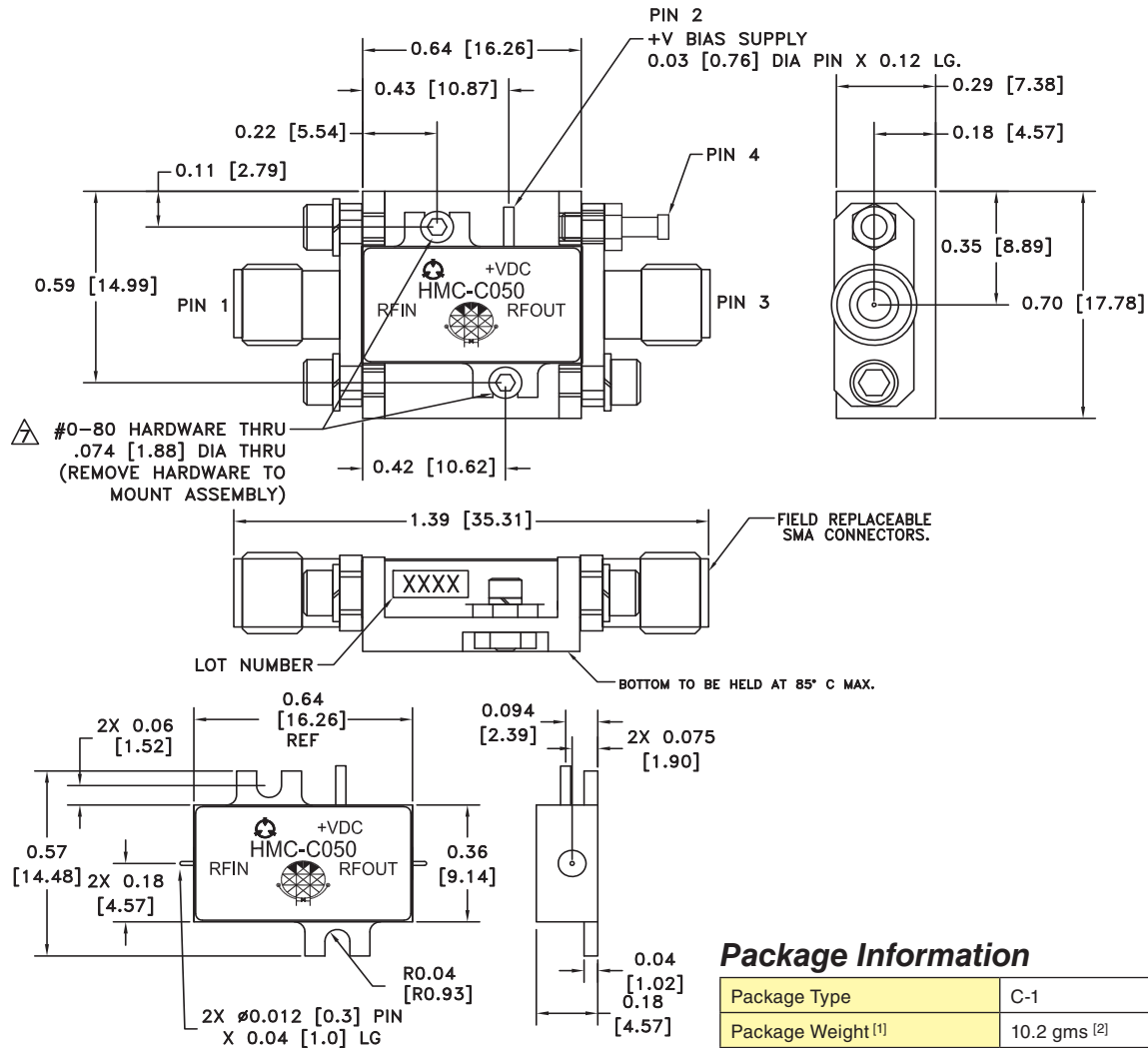
Bias Supply Voltage (Vdc)	+7V
RF Input Power (RFIN)	+15 dBm
Continuous P <sub>diss</sub> (T = 85 °C)	0.65W
Channel Temperature	175 °C
Thermal Resistance	91.5 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-55 to +85 °C


**ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS**
**Pin Descriptions**

Pin Number	Function	Description	Interface Schematic
1	RFIN & RF Ground	RF input connector, coaxial female, field replaceable. This pin is AC coupled and matched to 50 Ohms.	
2	Vdc	Power supply voltage for the amplifier.	
3	RFOUT & RF Ground	RF output connector, coaxial female, field replaceable. This pin is AC coupled and matched to 50 Ohms.	
4	GND	Power supply ground.	

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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:

- PACKAGE, LEADS, COVER MATERIAL: KOVAR™
- SPACER MATERIAL: ALUMINUM
- PLATING: ELECTROLYTIC GOLD 50 MICROINCHES MIN., OVER ELECTROLYTIC NICKEL 75 MICROINCHES MIN.
- ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
- TOLERANCES ±.005 [0.13] UNLESS OTHERWISE SPECIFIED.
- FIELD REPLACEABLE SMA CONNECTORS. TENSOLITE 5602-5CCSF OR EQUIVALENT.
- TO MOUNT MODULE TO SYSTEM PLATFORM REPLACE 0-80 HARDWARE WITH DESIRED MOUNTING SCREWS.