



## GaAs HEMT MMIC LOW NOISE AMPLIFIER, 2 - 12 GHz

### Typical Applications

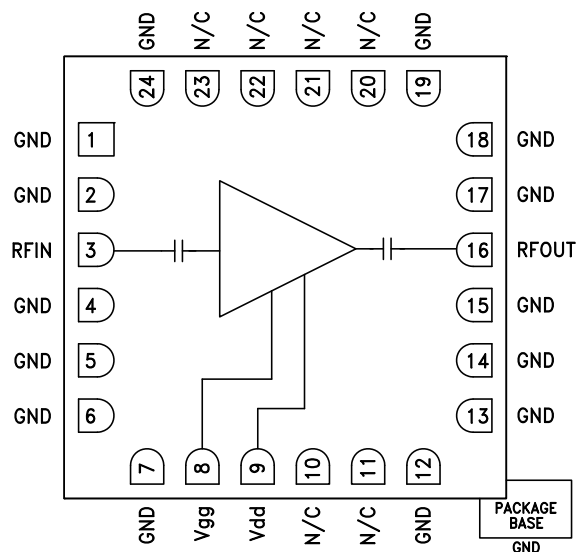
This HMC772LC4 is ideal for:

- Wideband Communication Systems
- Surveillance Systems
- Point-to-Point Radios
- Point-to-Multi-Point Radios
- Military & Space
- Test Instrumentation

### Features

- Noise Figure: 1.8 dB
- Gain: 15 dB
- Output IP3: +25 dBm
- P1dB Output Power: +13 dBm
- 50 Ohm Matched Input/Output
- Supply Voltage: +4V @ 45 mA
- 24 Lead Ceramic 4x4mm SMT Package: 16mm<sup>2</sup>

### Functional Diagram



### General Description

The HMC772LC4 is a GaAs MMIC HEMT Low Noise Wideband Amplifier which operates between 2 and 12 GHz. The amplifier provides 15 dB of gain, 1.8 dB noise figure up to 12 GHz and output IP3 of +25 dBm, while requiring only 45 mA from a +4V supply voltage. The Psat output power of up to +15 dBm enables the LNA to function as a LO driver for many of Hittite's balanced, I/Q or image reject mixers. The HMC772LC4 also features I/Os that are DC blocked and internally matched to 50 Ohms, making it ideal for SMT based high capacity microwave radio applications. The HMC772LC4 is housed in a RoHS compliant 4x4 mm QFN leadless ceramic package.

### Electrical Specifications, $T_A = +25^\circ C$ , $V_{dd} = +4V$ , $I_{dd} = 45 mA^*$

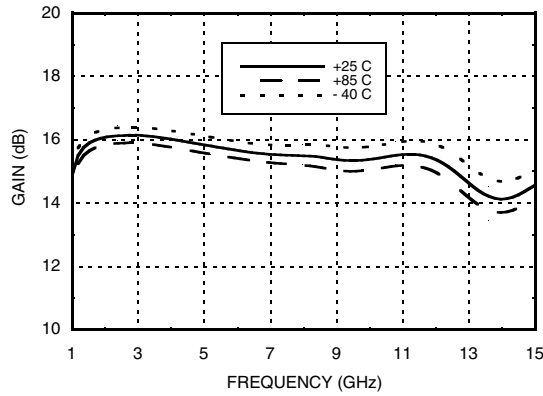
Parameter	Min.	Typ.	Max.	Units
Frequency Range	2 - 12			GHz
Gain	14	15		dB
Gain Variation over Temperature		0.01		dB / °C
Noise Figure		1.8	2.5	dB
Input Return Loss		15		dB
Output Return Loss		15		dB
Output Power for 1 dB Compression		13		dBm
Output Third Order Intercept (IP3)		25		dBm
Supply Current (I <sub>dd</sub> ) (V <sub>dd</sub> = 4V, V <sub>gg</sub> = -0.2V Typ.)*		45		mA

\* Adjust V<sub>gg</sub> between -1 to 0.3V to achieve I<sub>dd</sub> = 45mA typical.

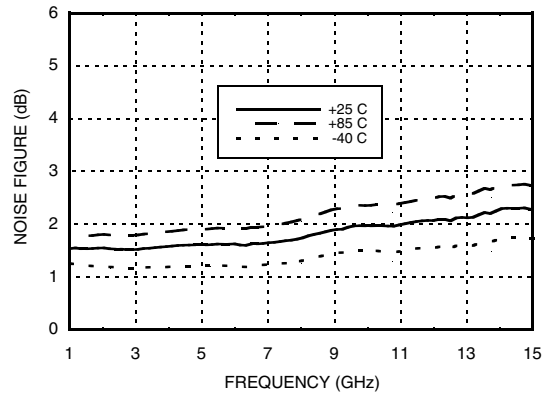


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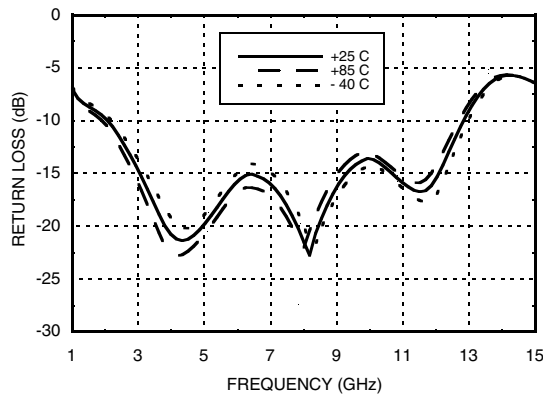
**Gain vs. Temperature**



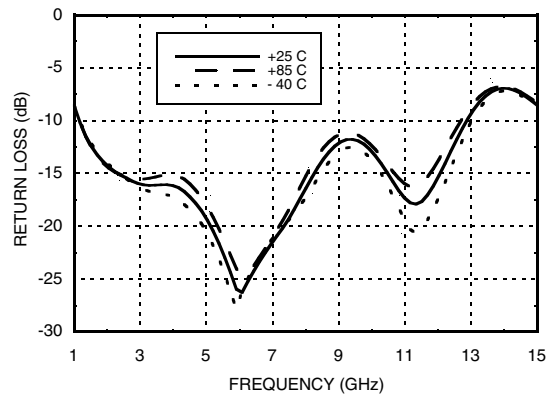
**Noise Figure vs. Temperature**



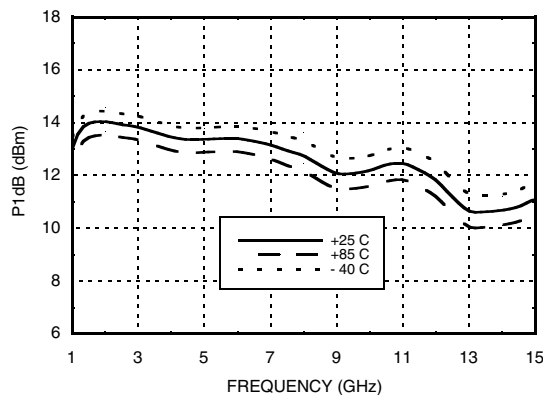
**Output Return Loss vs. Temperature**



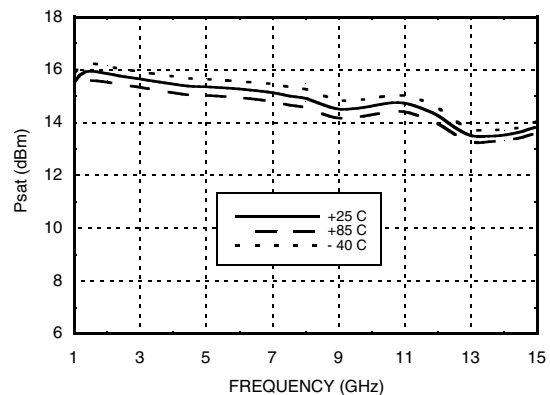
**Input Return Loss vs. Temperature**



**Output P1dB vs. Temperature**



**Output Psat vs. Temperature**



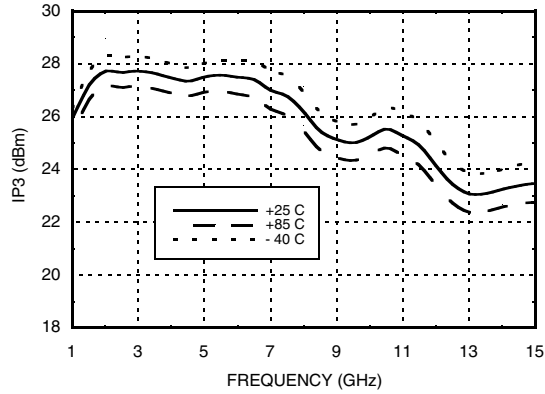
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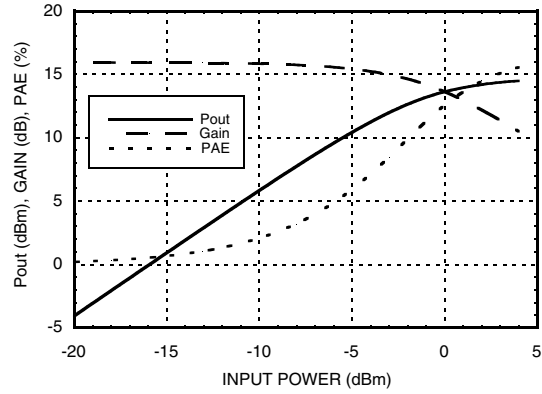


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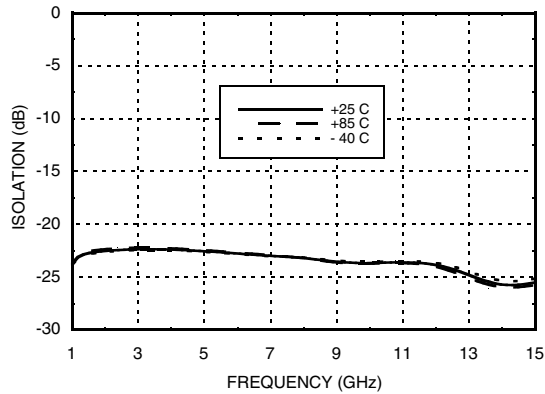
**Output IP3 vs. Temperature**



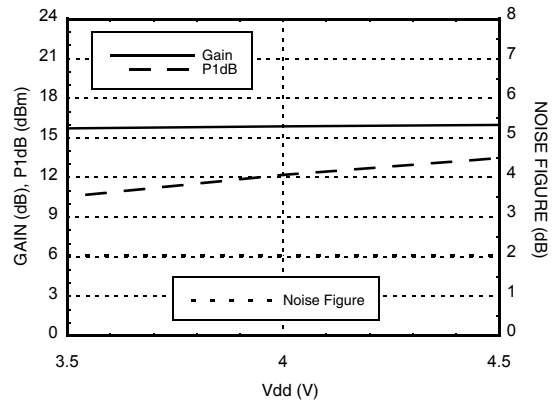
**Power Compression @ 12 GHz**



**Reverse Isolation vs. Temperature**



**Gain, Noise Figure & Power vs.  
Supply Voltage @ 12 GHz**

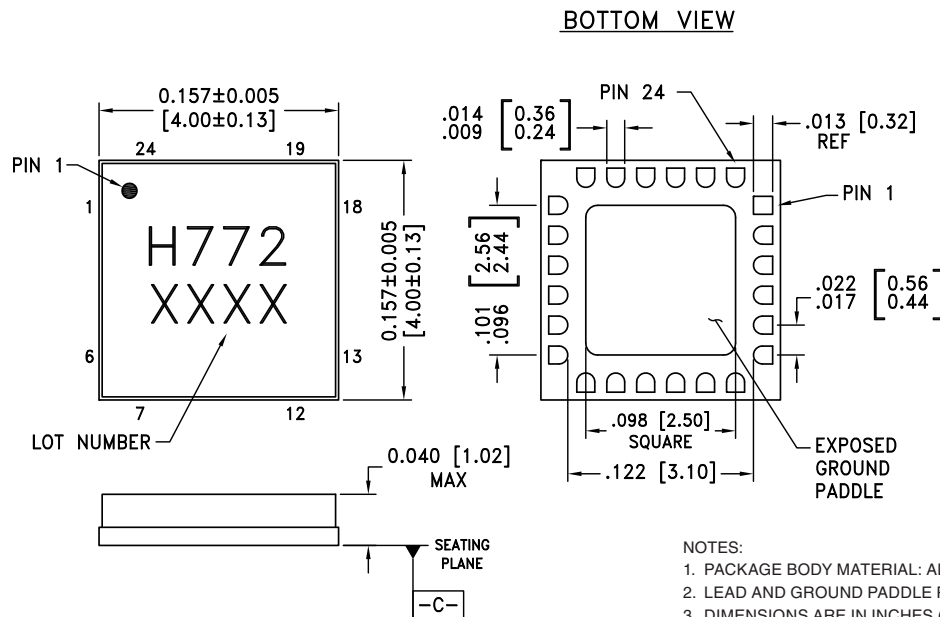


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**GaAs HEMT MMIC LOW NOISE  
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**Absolute Maximum Ratings**

Drain Bias Voltage	+5V
Drain Bias Current	60 mA
RF Input Power	5 dBm
Gate Bias Voltage	-1 to 0.3 V
Continuous P <sub>diss</sub> (T = 85 °C) (derate 5.8 mW/°C above 85 °C)	0.55 W
Thermal Resistance (Channel to ground paddle)	172 °C/W
Channel Temperature	180 °C
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C


**ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS**
**Outline Drawing**

**NOTES:**

1. PACKAGE BODY MATERIAL: ALUMINA.
2. LEAD AND GROUND PADDLE PLATING: GOLD FLASH OVER 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 <sup>[2]</sup>
HMC772LC4	Alumina, White	Gold over Nickel	MSL3 <sup>[1]</sup>	H772 XXXX

[1] Max peak reflow temperature of 260 °C

[2] 4-Digit lot number XXXX

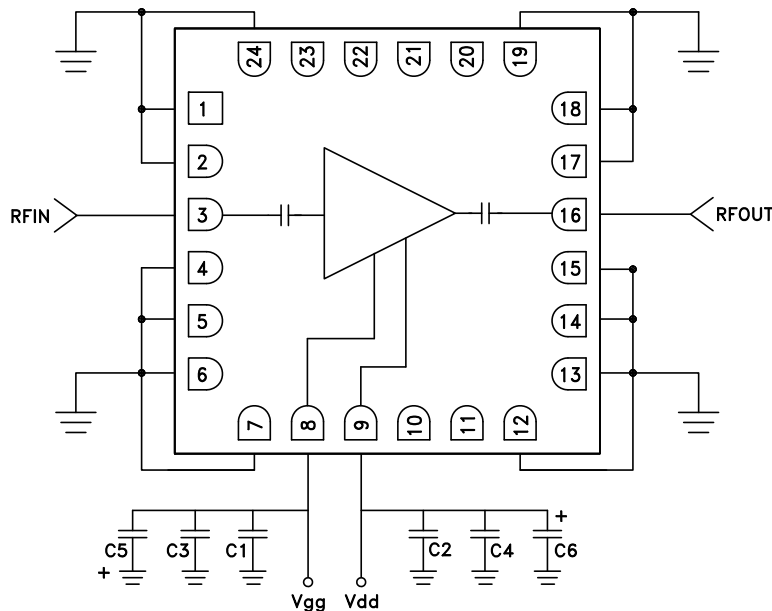


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**Pin Descriptions**

Pin Number	Function	Description	Interface Schematic
1, 2, 4 - 7, 12 - 15, 17 - 19, 24	GND	These pins and ground paddle must be connected to RF/DC ground.	
3	RFIN	This pin is AC coupled and matched to 50 Ohms.	
8	Vgg	Gate control for amplifier. Please follow "MMIC Amplifier Biasing Procedure" application note. See application circuit for required external components.	
9	Vdd	Power Supply Voltage for the amplifier. See application circuit for required external components.	
10, 11, 20 - 23	N/C	The pins are not connected internally; however, all data shown herein was measured with these pins connected to RF/DC ground externally.	
16	RFOUT	This pin is AC coupled and matched to 50 Ohms.	

**Application Circuit**



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