



THE DATASHEET OF HMC356LP3





GaAs PHEMT MMIC LOW NOISE AMPLIFIER, 350 - 550 MHz

Typical Applications

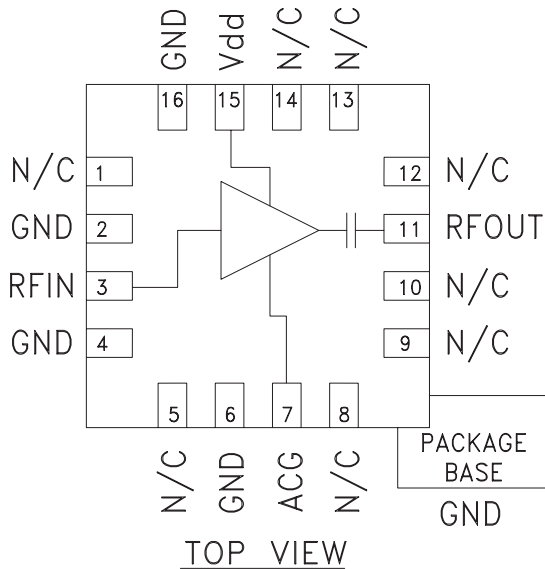
The HMC356LP3 / HMC356LP3E is ideal for basestation receivers:

- GSM 450 & GSM 480
- CDMA 450
- Private Land Mobile Radio

Features

- Noise Figure: ≤ 1.0 dB
- +38 dBm Output IP3
- Gain: 17 dB
- Very Stable Gain vs. Supply & Temperature
- Single Supply: +5V @ 104 mA
- 50 Ohm Matched Output

Functional Diagram



General Description

The HMC356LP3 & HMC356LP3E are high dynamic range GaAs PHEMT MMIC Low Noise Amplifiers is ideal for GSM & CDMA cellular basestation and Mobile Radio front-end receivers operating between 350 and 550 MHz. This LNA has been optimized to provide 1.0 dB noise figure, 17 dB gain and +38 dBm output IP3 from a single supply of +5V @ 104 mA. Input and output return losses are 15 dB typical, with the LNA requiring only four external components to optimize the RF input match, RF ground and DC bias. For applications which require improved noise figure, please see the HMC616LP3(E).

Electrical Specifications, $T_A = +25^\circ C$, $V_s = +5V$

| Parameter | Min. | Typ. | Max. | Units |
|--|-----------|--------|-------|---------|
| Frequency Range | 350 - 550 | | | MHz |
| Gain | 15 | 17 | | dB |
| Gain Variation Over Temperature | | 0.0032 | 0.010 | dB / °C |
| Noise Figure | | 1.0 | 1.4 | dB |
| Input Return Loss | | 17 | | dB |
| Output Return Loss | | 12 | | dB |
| Reverse Isolation | | 24 | | dB |
| Output Power for 1dB Compression (P1dB) | 17 | 21 | | dBm |
| Saturated Output Power (Psat) | | 22.5 | | dBm |
| Output Third Order Intercept (IP3) (-20 dBm Input Power per tone, 1 MHz tone spacing) | 34 | 38 | | dBm |
| Supply Current (Idd) | | 104 | | mA |

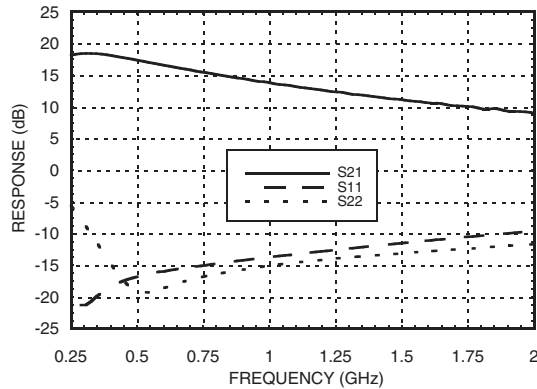
Information furnished by Analog Devices is believed to be accurate and reliable. However, no responsibility is assumed by Analog Devices for its use, nor for any infringements of patents or other rights of third parties that may result from its use. Specifications subject to change without notice. No license is granted by implication or otherwise under any patent or patent rights of Analog Devices. Trademarks and registered trademarks are the property of their respective owners.

For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106
Phone: 781-329-4700 • Order online at www.analog.com
Application Support: Phone: 1-800-ANALOG-D

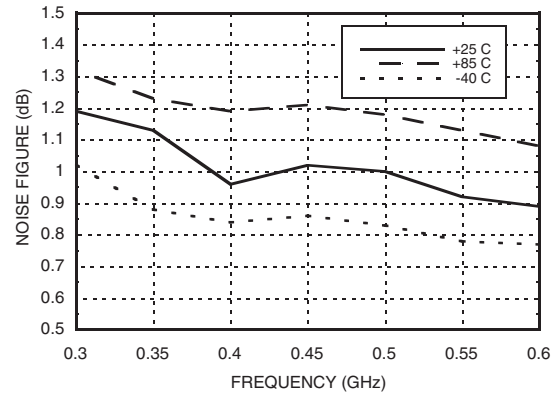


**GaAs PHEMT MMIC LOW NOISE
AMPLIFIER, 350 - 550 MHz**

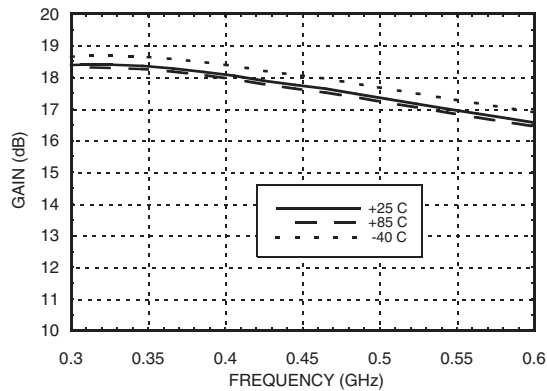
Broadband Gain & Return Loss



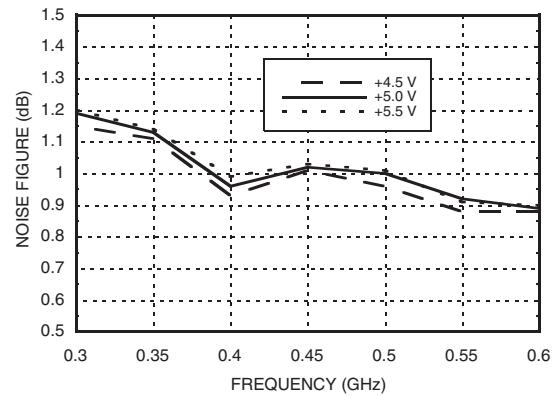
Noise Figure vs. Temperature



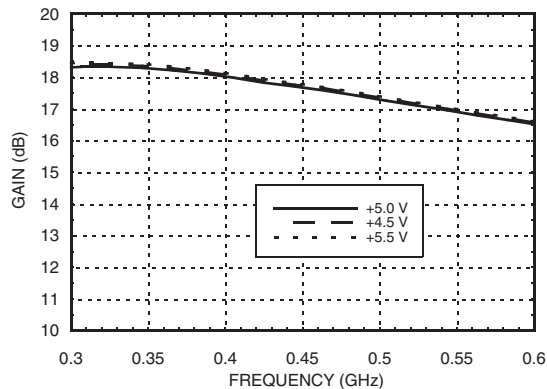
Gain vs. Temperature



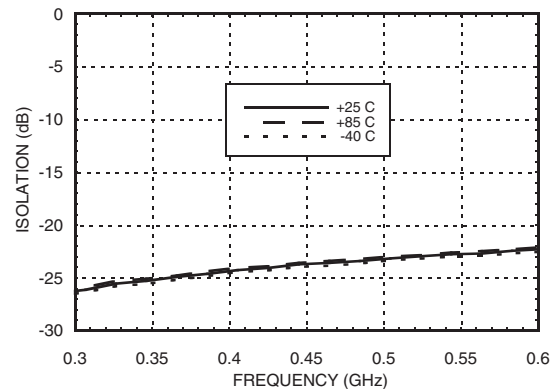
Noise Figure vs. Vdd



Gain vs. Vdd



Reverse Isolation



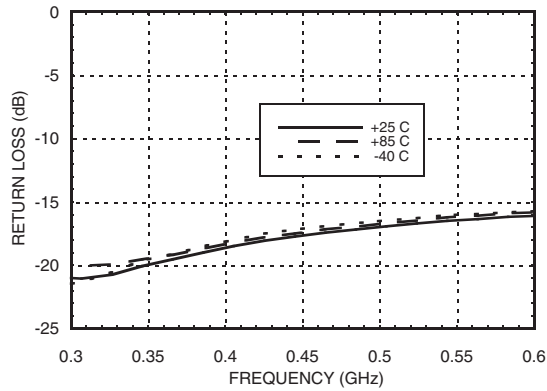
Information furnished by Analog Devices is believed to be accurate and reliable. However, no responsibility is assumed by Analog Devices for its use, nor for any infringements of patents or other rights of third parties that may result from its use. Specifications subject to change without notice. No license is granted by implication or otherwise under any patent or patent rights of Analog Devices. Trademarks and registered trademarks are the property of their respective owners.

For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106 Phone: 781-329-4700 • Order online at www.analog.com Application Support: Phone: 1-800-ANALOG-D

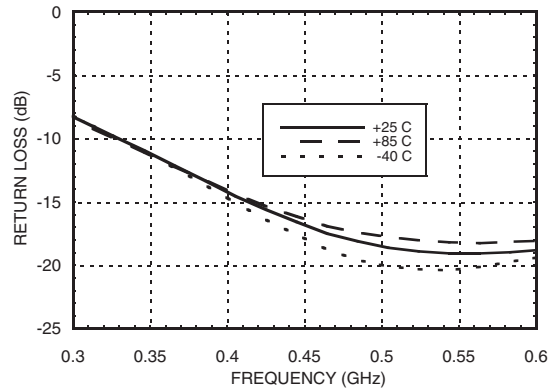


**GaAs PHEMT MMIC LOW NOISE
AMPLIFIER, 350 - 550 MHz**

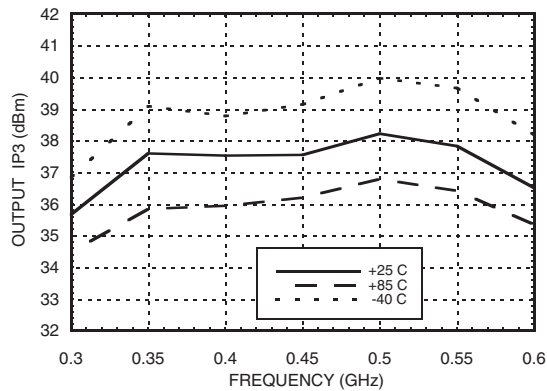
Input Return Loss vs. Temperature



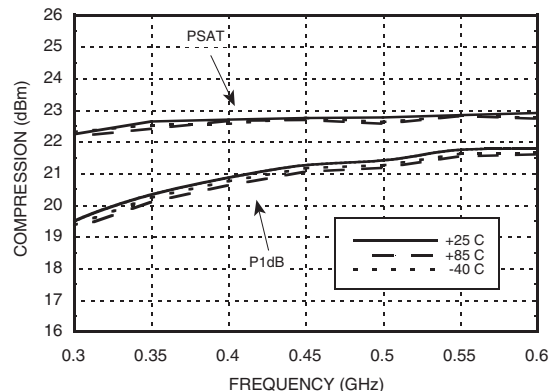
Output Return Loss vs. Temperature



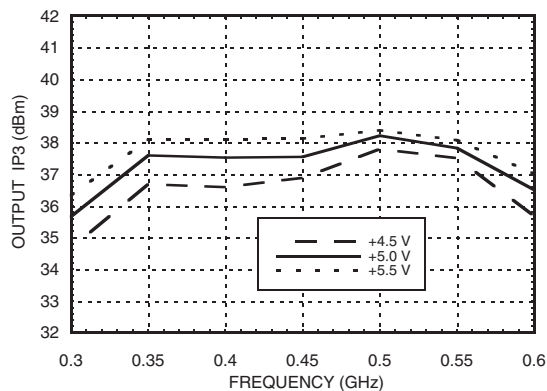
Output IP3 vs. Temperature



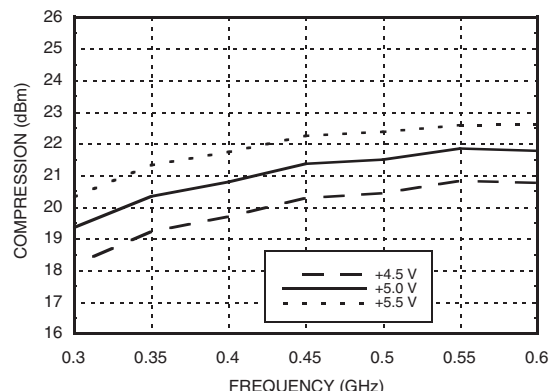
P1dB & Psat vs. Temperature



Output IP3 vs. Vdd



P1dB vs. Vdd



Information furnished by Analog Devices is believed to be accurate and reliable. However, no responsibility is assumed by Analog Devices for its use, nor for any infringements of patents or other rights of third parties that may result from its use. Specifications subject to change without notice. No license is granted by implication or otherwise under any patent or patent rights of Analog Devices. Trademarks and registered trademarks are the property of their respective owners.

For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106 Phone: 781-329-4700 • Order online at www.analog.com Application Support: Phone: 1-800-ANALOG-D

GaAs PHEMT MMIC LOW NOISE AMPLIFIER, 350 - 550 MHz



Absolute Maximum Ratings

| | |
|---|----------------|
| Drain Bias Voltage (Vdd) | +8.0 Vdc |
| RF Input Power (RFIN)(Vdd = +5.0 Vdc) | +15 dBm |
| Channel Temperature | 150 °C |
| Continuous P _{diss} (T = 85 °C) (derate 14 mW/°C above 85 °C) | 0.910 W |
| Thermal Resistance (channel to ground paddle) | 71.4 °C/W |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |

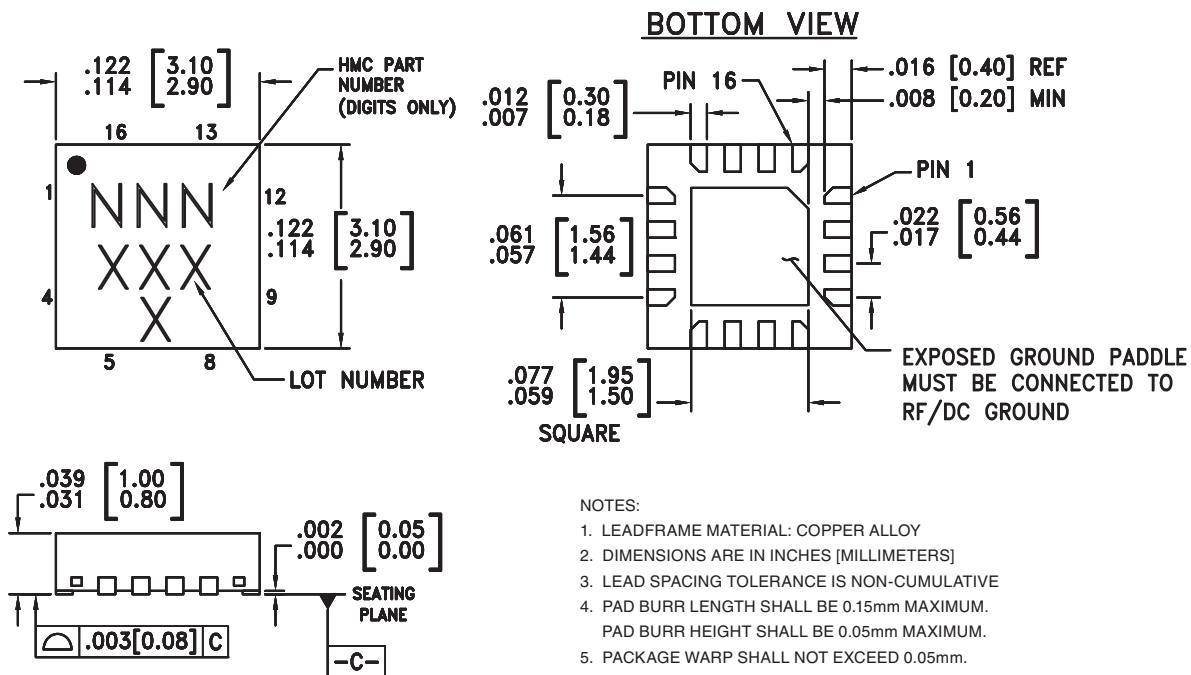
Typical Supply Current vs. Vdd

| Vdd (Vdc) | I _{dd} (mA) |
|-----------|----------------------|
| +4.5 | 103 |
| +5.0 | 104 |
| +5.5 | 105 |



ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



NOTES:

- LEADFRAME MATERIAL: COPPER ALLOY
- DIMENSIONS ARE IN INCHES [MILLIMETERS]
- LEAD SPACING TOLERANCE IS NON-CUMULATIVE
- PAD BURR LENGTH SHALL BE 0.15mm MAXIMUM.
PAD BURR HEIGHT SHALL BE 0.05mm MAXIMUM.
- PACKAGE WARP SHALL NOT EXCEED 0.05mm.
- ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.
- REFER TO HITTITE APPLICATION NOTE FOR SUGGESTED LAND PATTERN.

Package Information

| Part Number | Package Body Material | Lead Finish | MSL Rating | Package Marking ^[3] |
|-------------|--|---------------|---------------------|--------------------------------|
| HMC356LP3 | Low Stress Injection Molded Plastic | Sn/Pb Solder | MSL1 ^[1] | 356 XXXX |
| HMC356LP3E | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 ^[2] | 356 XXXX |

[1] Max peak reflow temperature of 235 °C

[2] Max peak reflow temperature of 260 °C

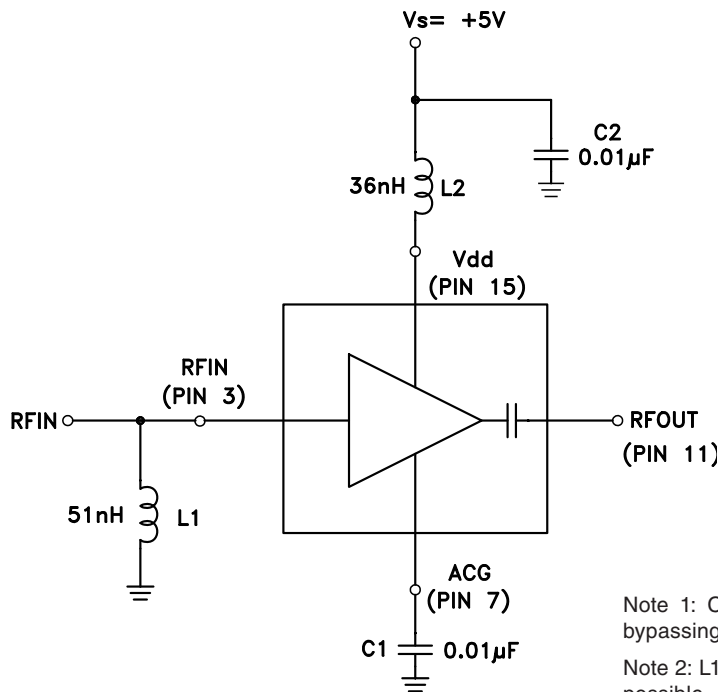
[3] 4-Digit lot number XXXX



Pin Descriptions

| Pin Number | Function | Description | Interface Schematic |
|----------------------------|----------|---|---------------------|
| 1, 5, 8, 9, 10, 12, 13, 14 | N/C | No connection necessary. These pins may be connected to RF/DC ground. | |
| 2, 4, 6, 16 | GND | These pins and package ground paddle must be connected to RF/DC ground. | |
| 3 | RFIN | This pin is matched to 50 Ohms with a 51 nH inductor to ground. See Application Circuit. | |
| 7 | ACG | AC Ground - An external capacitor of 0.01µF to ground is required for low frequency bypassing. See Application Circuit for further details. | |
| 11 | RFOUT | This pin is AC coupled and matched to 50 Ohms. | |
| 15 | Vdd | Power supply voltage. Choke inductor and bypass capacitor are required. See application circuit. | |

Application & Evaluation PCB Circuit



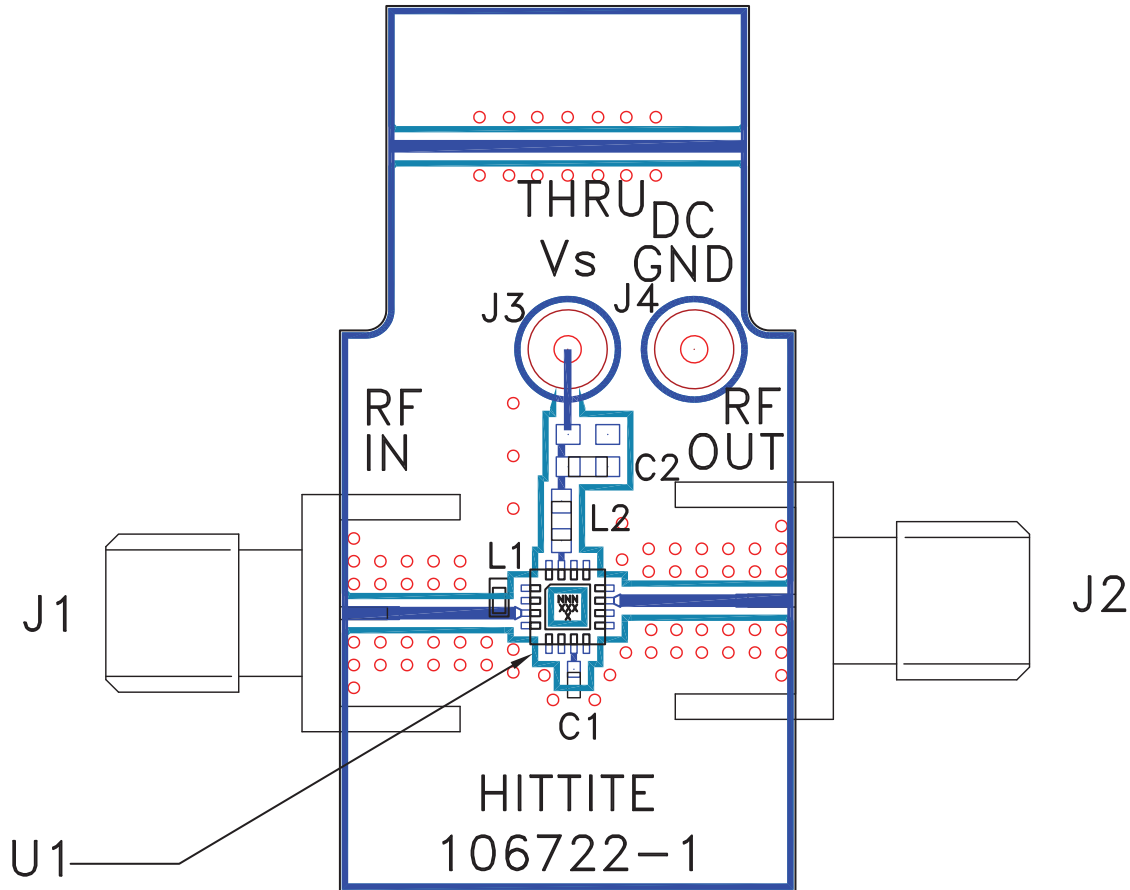
Note 1: Choose value of capacitor C1 for low frequency bypassing. A 0.01 µF ±10% capacitor is recommended.

Note 2: L1, L2 and C1 should be located as close to pins as possible.

Information furnished by Analog Devices is believed to be accurate and reliable. However, no responsibility is assumed by Analog Devices for its use, nor for any infringements of patents or other rights of third parties that may result from its use. Specifications subject to change without notice. No license is granted by implication or otherwise under any patent or patent rights of Analog Devices. Trademarks and registered trademarks are the property of their respective owners.

For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106 Phone: 781-329-4700 • Order online at www.analog.com Application Support: Phone: 1-800-ANALOG-D

Evaluation PCB



List of Materials for Evaluation PCB 107795 [1]

| Item | Description |
|---------|----------------------------------|
| J1 - J2 | PCB Mount SMA RF Connector |
| J3 - J4 | DC Pin |
| C1 | 10,000 pF Capacitor, 0402 Pkg. |
| C2 | 10,000 pF Capacitor, 0603 Pkg. |
| L1 | 51 nH Inductor, 0402 Pkg. |
| L2 | 36 nH Inductor, 0603 Pkg. |
| U1 | HMC356LP3 / HMC356LP3E Amplifier |
| PCB [2] | 106722 Evaluation PCB |

The circuit board used in the 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 circuit board shown is available from Hittite upon request.

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

 [View HMC356LP3 on WIN SOURCE](#)

 [Analog Devices Inc. Information](#)

Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management