

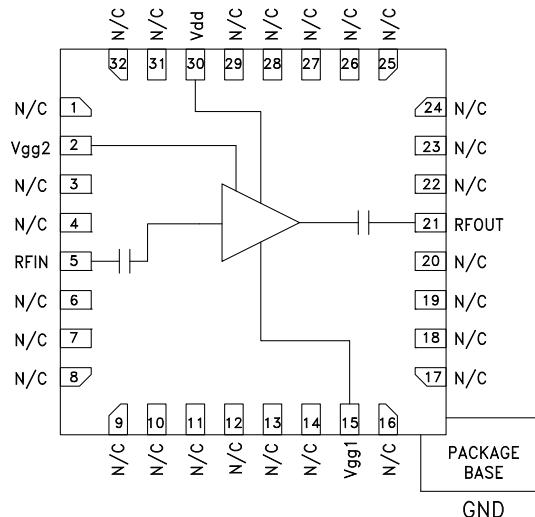


Typical Applications

The HMC463LP5(E) is ideal for:

- Telecom Infrastructure
- Microwave Radio & VSAT
- Military EW, ECM & C³I
- Test Instrumentation
- Fiber Optics

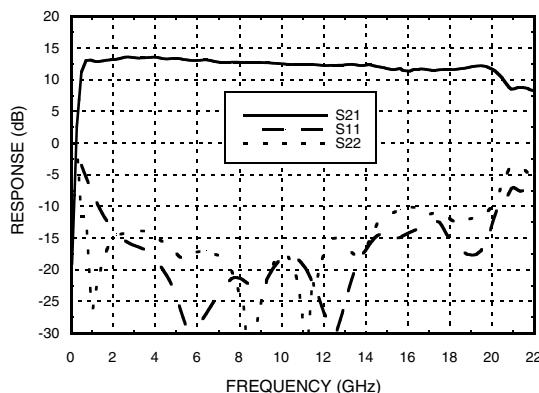
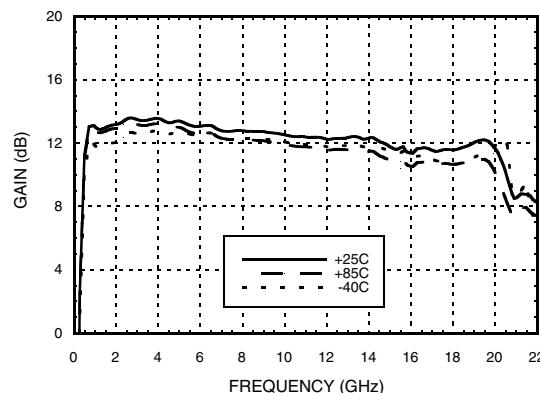
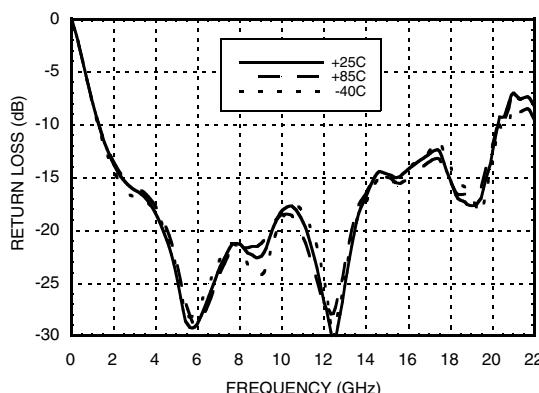
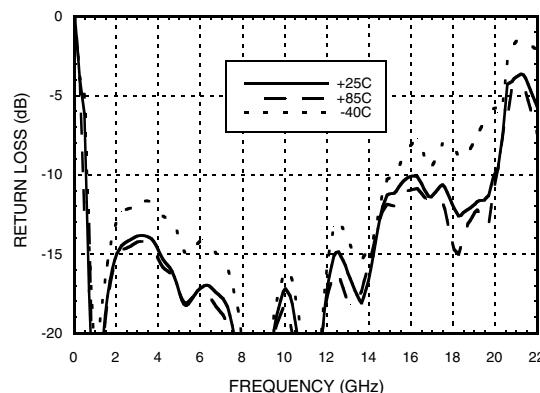
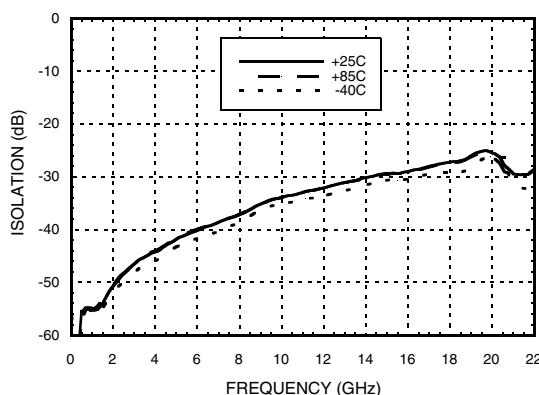
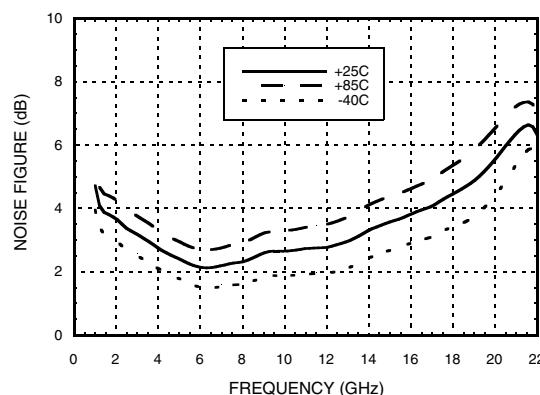
Functional Diagram



Electrical Specifications, $T_A = +25^\circ\text{C}$, $Vdd = 5\text{V}$, $Idd = 60\text{ mA}^*$

Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range	2 - 6			6 - 18			18 - 20			GHz
Gain	10	13		9	12		8	11		dB
Gain Flatness		± 0.5			± 0.5			± 0.5		dB
Gain Variation Over Temperature	0.010	0.015		0.010	0.015		0.010	0.015		dB/ $^\circ\text{C}$
Noise Figure	3	4		3	5		5.5	6.5		dB
Input Return Loss	15			13			12			dB
Output Return Loss		13			10			10		dB
Output Power for 1 dB Compression (P1dB)	16	19		11	16		10	12		dBm
Saturated Output Power (Psat)		21			19			19		dBm
Output Third Order Intercept (IP3)		30			24			22		dBm
Supply Current (Idd) ($Vdd = 5\text{V}$, $Vgg1 = -0.9\text{V}$ Typ.)		60	80		60	80		60	80	mA

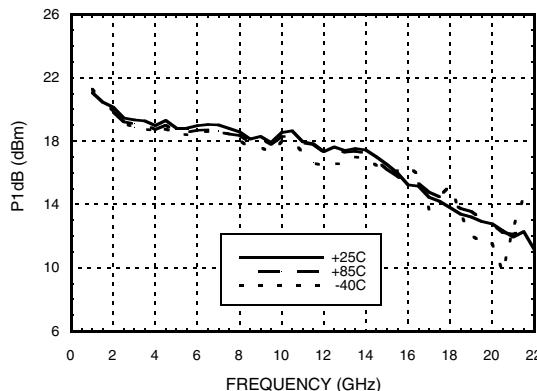
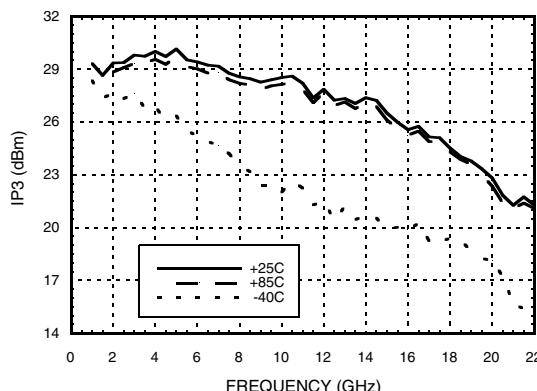
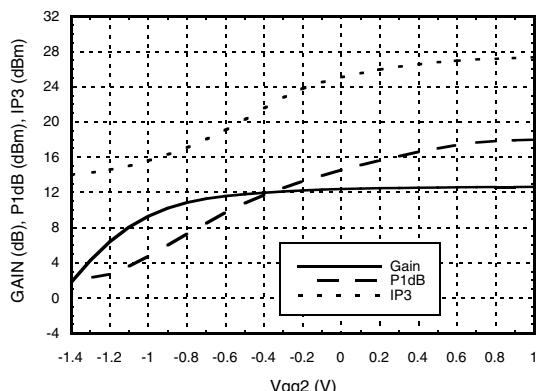
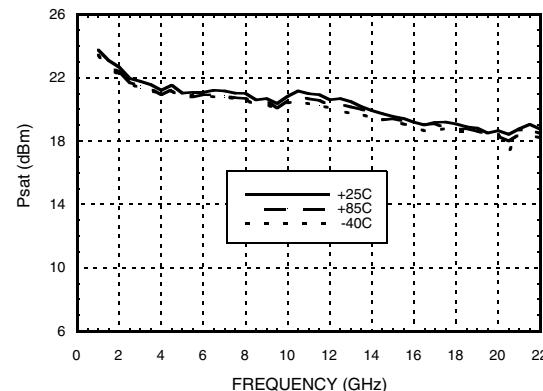
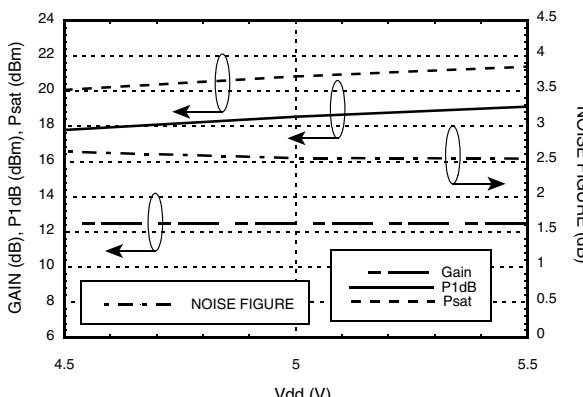
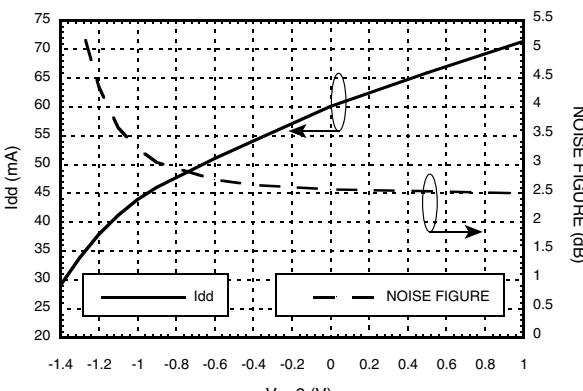
* Adjust Vgg1 between -2 to -0V to achieve $Idd = 60\text{ mA}$ typical.

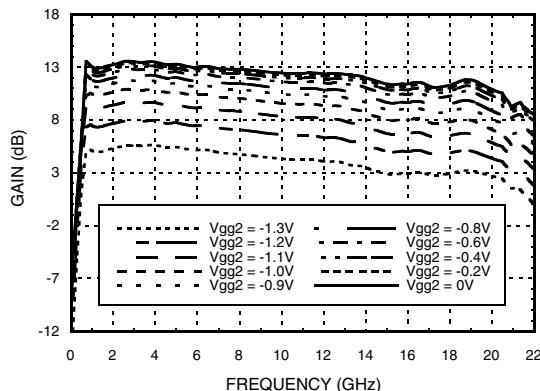

Gain & Return Loss

Gain vs. Temperature

Input Return Loss vs. Temperature

Output Return Loss vs. Temperature

Reverse Isolation vs. Temperature

Noise Figure vs. Temperature




HMC463LP5 / 463LP5E

**GaAs pHEMT MMIC LOW NOISE
AGC AMPLIFIER, 2 - 20 GHz**

P1dB vs. Temperature**Output IP3 vs. Temperature****Gain, P1dB & Output IP3
vs. Control Voltage @ 10 GHz****Psat vs. Temperature****Gain, Power & Noise Figure
vs. Supply Voltage @ 10 GHz, Fixed Vgg1****Noise Figure & Supply Current
vs. Control Voltage @ 10 GHz**


Gain @ Several Control Voltages (Vgg2)

**ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS**
Absolute Maximum Ratings

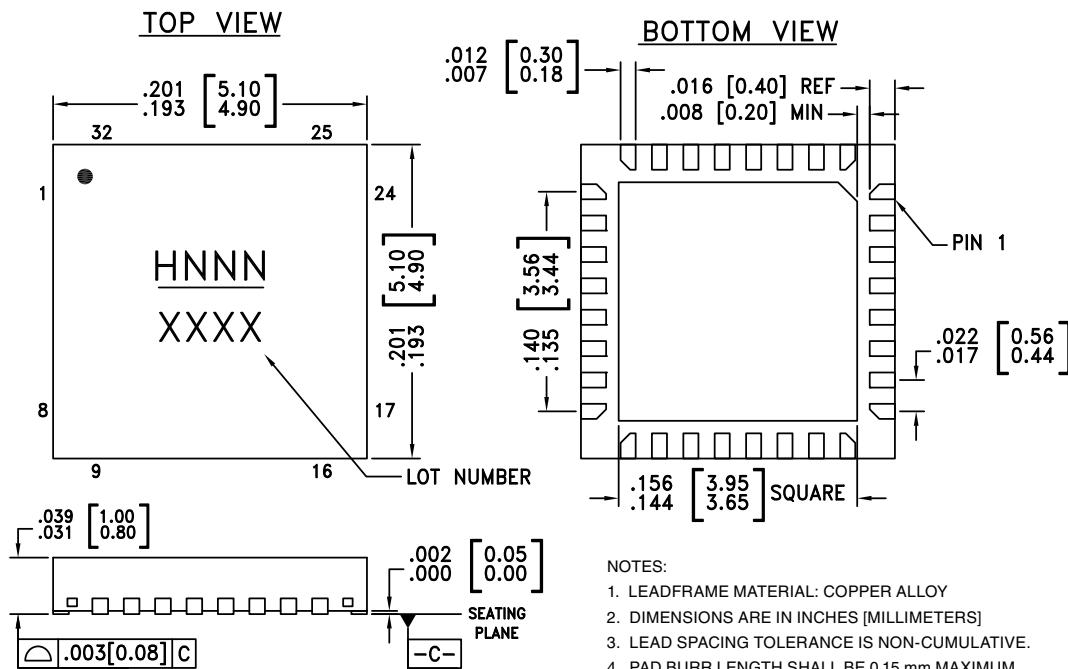
Drain Bias Voltage (Vdd)	+9V
Gate Bias Voltage (Vgg1)	-2 to 0V
Gate Bias Current (Igg1)	2.5 mA
Gate Bias Voltage (Vgg2)(AGC)	(Vdd - 9) Vdc to +2V
RF Input Power (RFIN)(Vdd = +5V)	+18 dBm
Channel Temperature	150 °C
Continuous Pdiss (T= 85 °C) (derate 19.1 mW/°C above 85 °C)	1.24 W
Thermal Resistance (channel to ground paddle)	52.3 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C

Typical Supply Current vs. Vdd

Vdd (V)	Idd (mA)
+4.5	58
+5.0	60
+5.5	62



Outline Drawing



NOTES:

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

Package Information

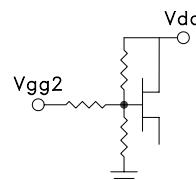
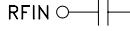
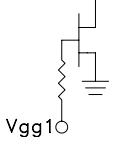
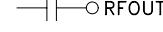
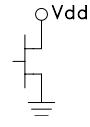
Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking ^[3]
HMC463LP5	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL1 ^[1]	H463 XXXX
HMC463LP5E	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL1 ^[2]	H463 XXXX

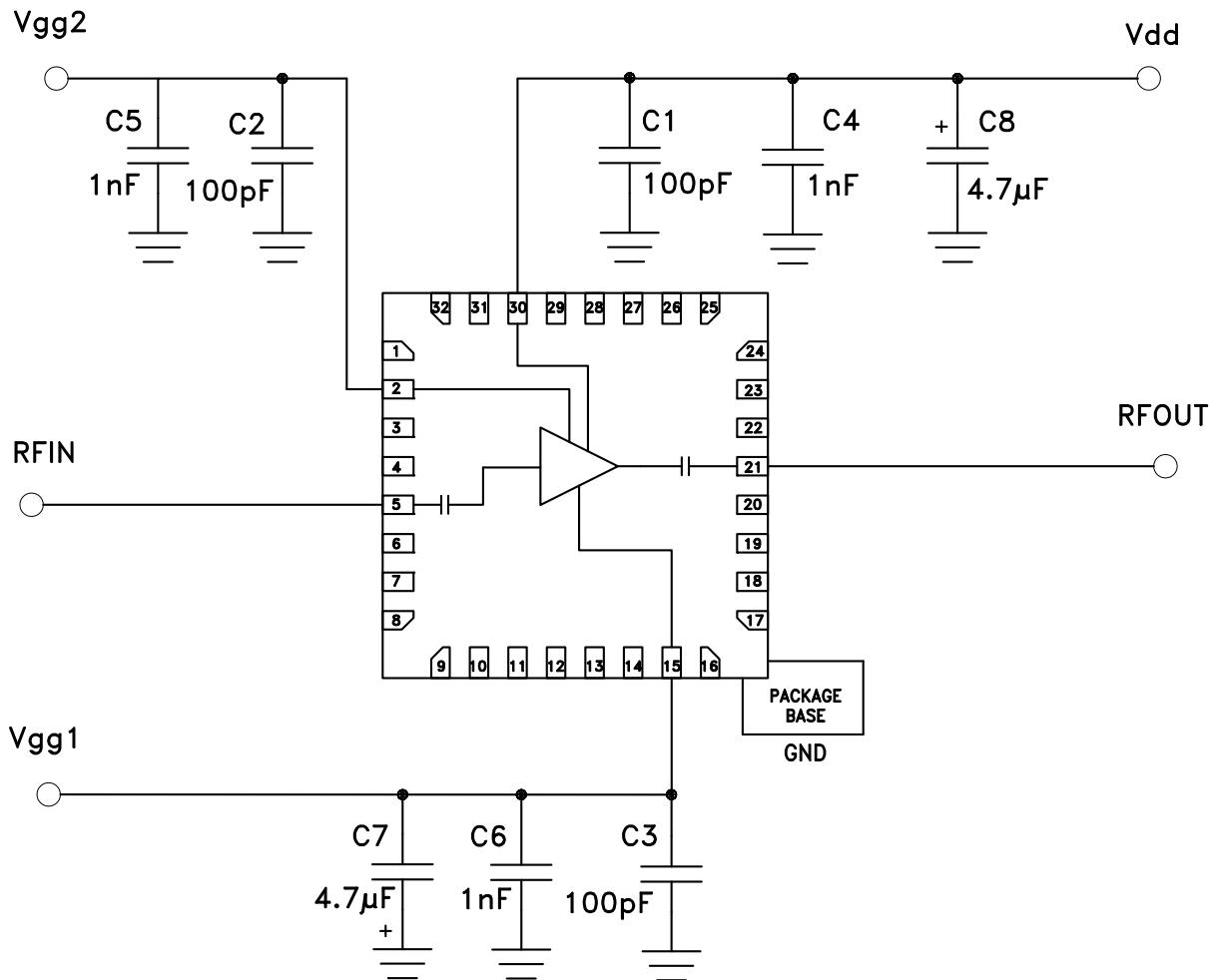
[1] Max peak reflow temperature of 235 °C.

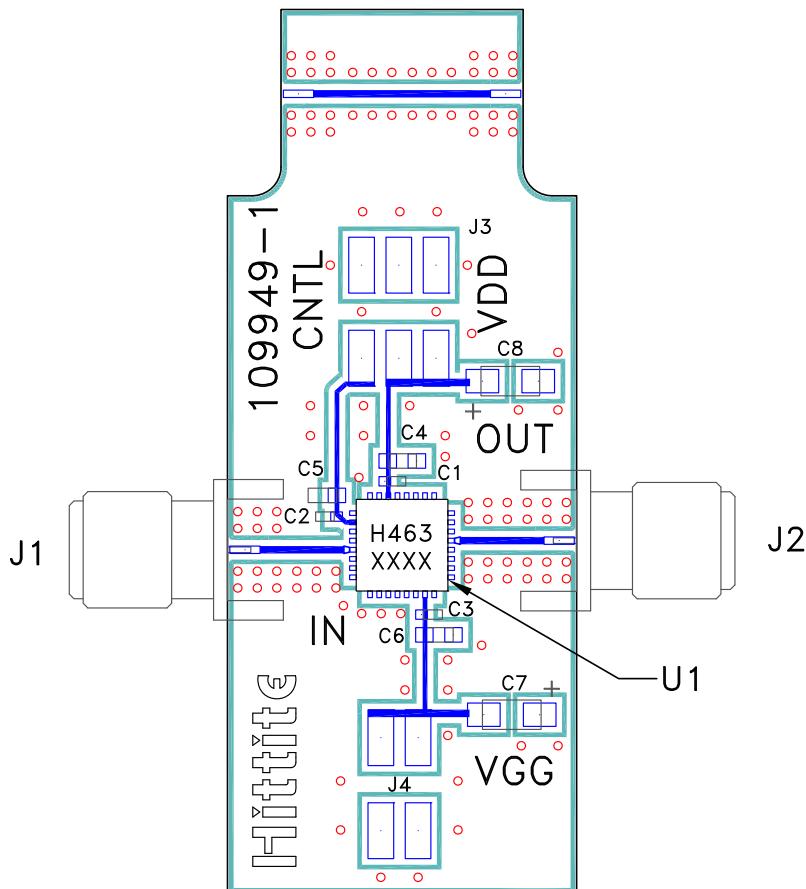
[1] Max peak reflow temperature of 235 °C

[2] Max peak below tempera
[3] 4-Digit lot number XXXX


Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1, 3, 4, 6-14, 16-20, 22-29, 31, 32	N/C	The pins are not connected internally; however, all data shown herein was measured with these pins connected to RF/DC ground externally.	
2	Vgg2	Optional gate control if AGC is required. Leave Vgg2 open circuited if AGC is not required. Typical Vgg2 = -1.5V to 0V	
5	RFIN	This pad is AC coupled and matched to 50 Ohms	
15	Vgg1	Gate control for amplifier. Adjust to achieve Idd = 60 mA.	
21	RFOUT	This pad is AC coupled and matched to 50 Ohms	
30	Vdd	Power supply voltage for the amplifier. External bypass capacitors are required	
Ground Paddle	GND	Ground paddle must be connected to RF/DC ground.	


Application Circuit


Evaluation PCB**List of Materials for Evaluation PCB 108341^[1]**

Item	Description
J1 - J2	SRI K Connector
J3 - J4	2 mm Molex Header
C1 - C3	100 pF Capacitor, 0402 Pkg.
C4 - C6	1000 pF Capacitor, 0603 Pkg.
C7 - C8	4.7 µF Capacitor, Tantalum
U1	HMC463LP5(E) Amplifier
PCB ^[2]	109949 Evaluation PCB

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350 or Arlon 25FR

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 package bottom 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 board should be mounted to an appropriate heat sink. The evaluation circuit board shown is available from Hittite upon request.