



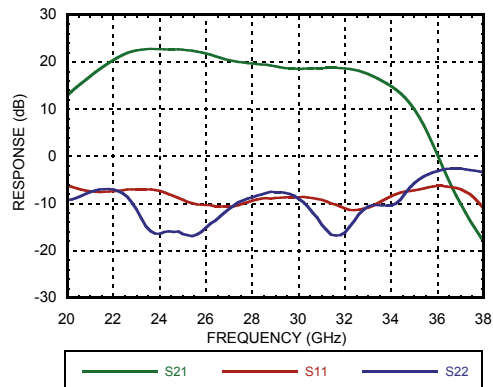
NO CONTENT ON THE ATTACHED DOCUMENT HAS CHANGED



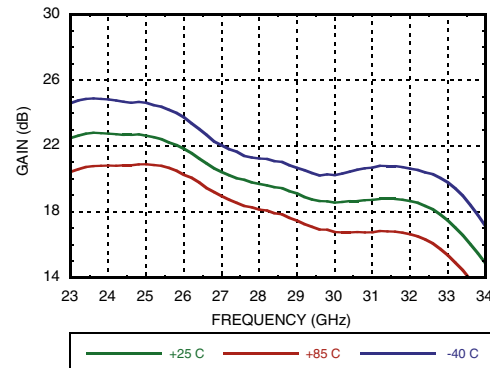
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GAAS PHEMT MMIC 1.5 WATT POWER AMPLIFIER, 24 - 31.5 GHz

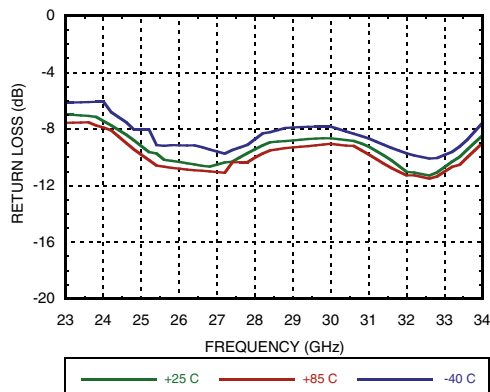
Broadband Gain & Return Loss vs. Frequency



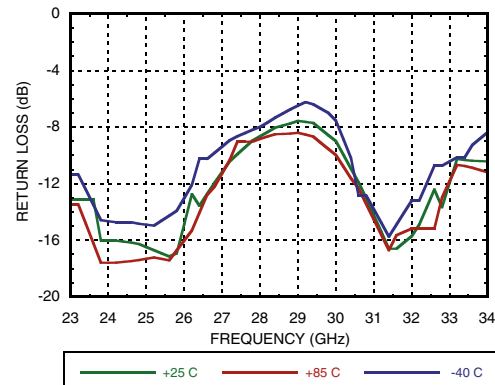
Gain vs. Temperature



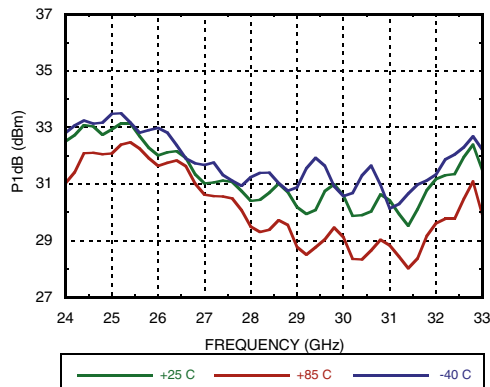
Input Return Loss vs. Temperature



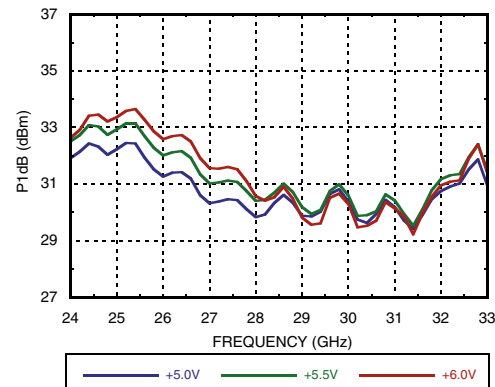
Output Return Loss vs. Temperature



P1dB vs. Temperature

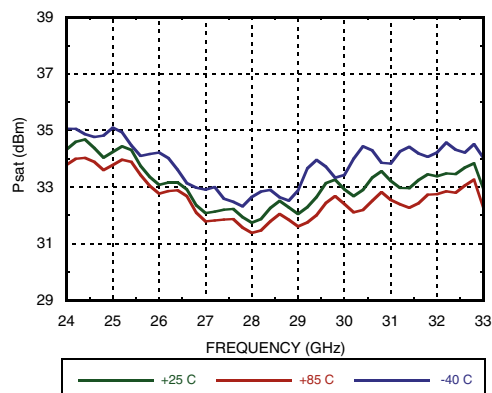
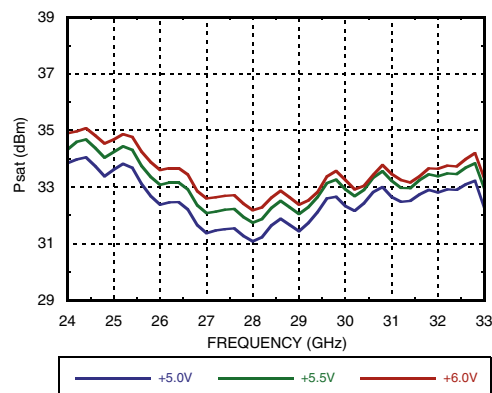
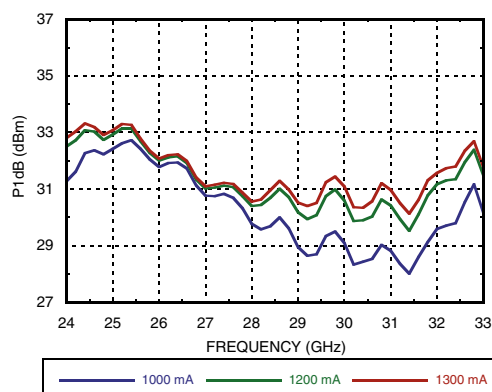
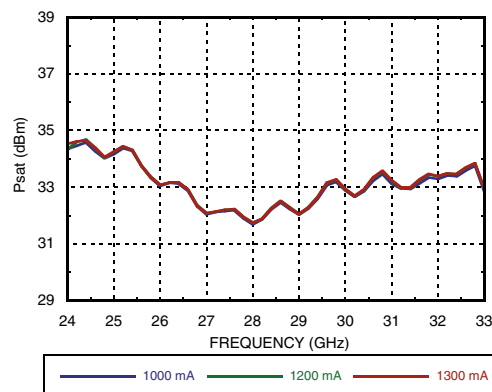
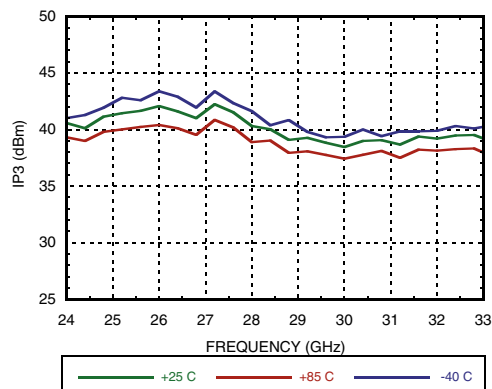
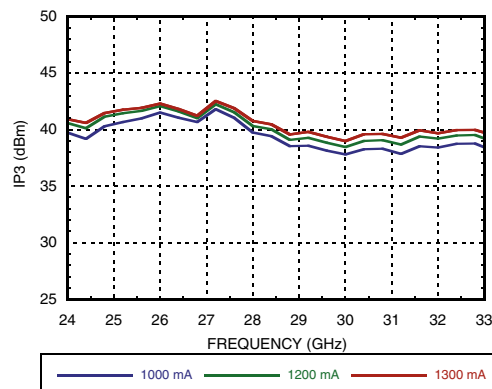


P1dB vs. Supply Voltage



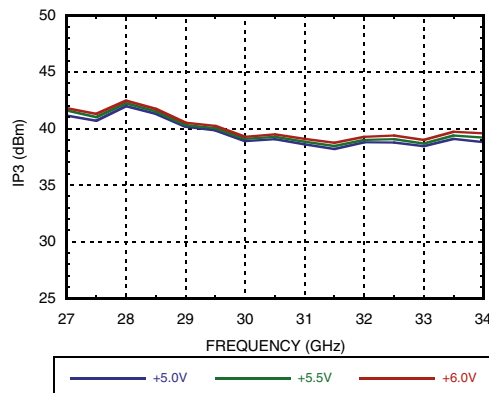


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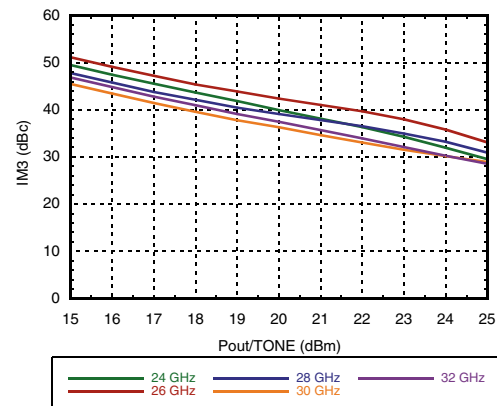
**HMC943LP5E****GAAS PHEMT MMIC 1.5 WATT
POWER AMPLIFIER, 24 - 31.5 GHz****Psat vs. Temperature****Psat vs. Supply Voltage****P1dB vs. Supply Current (Idd)****Psat vs. Supply Current (Idd)****Output IP3 vs.
Temperature, Pout/Tone = +22 dBm****Output IP3 vs.
Supply Current, Pout/Tone = +22 dBm**

GAAS PHEMT MMIC 1.5 WATT POWER AMPLIFIER, 24 - 31.5 GHz

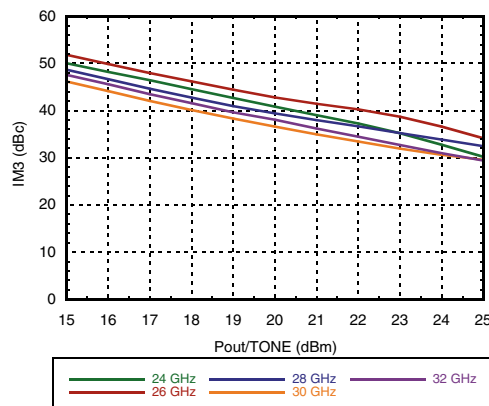
**Output IP3 vs.
Supply Voltage, Pout/Tone = +22 dBm**



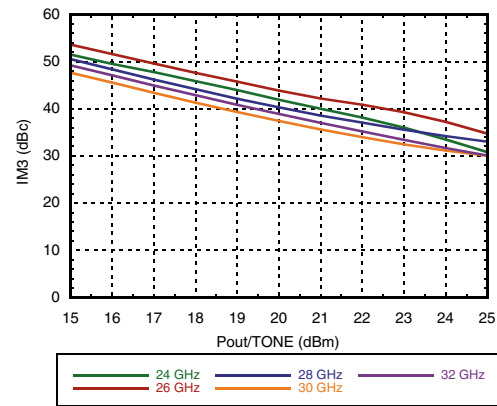
Output IM3 @ Vdd = +5V



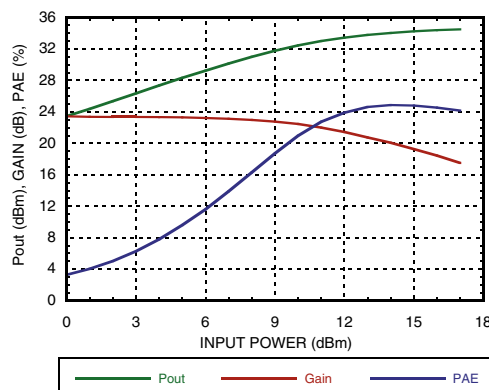
Output IM3 @ Vdd = +5.5V



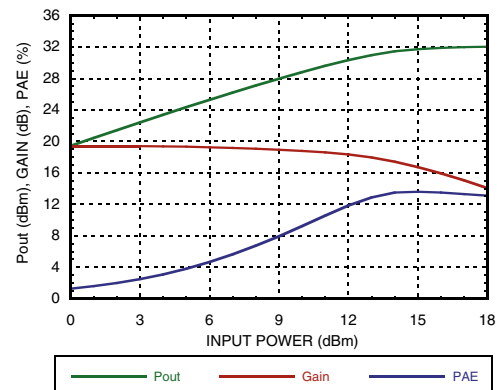
Output IM3 @ Vdd = +6V



Power Compression @ 24 GHz



Power Compression @ 29 GHz





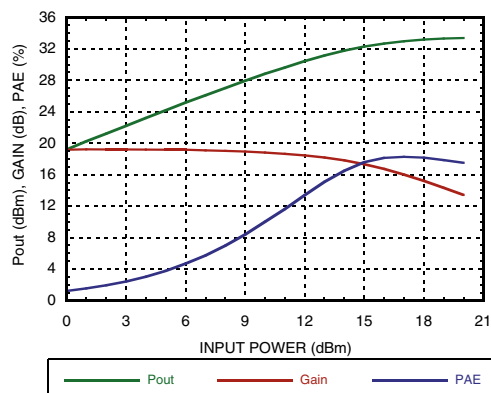
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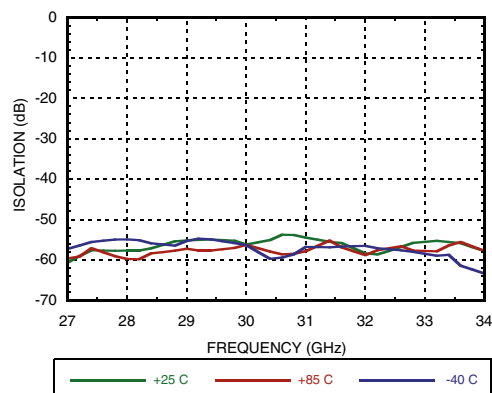
HMC943LP5E

GAAS PHEMT MMIC 1.5 WATT POWER AMPLIFIER, 24 - 31.5 GHz

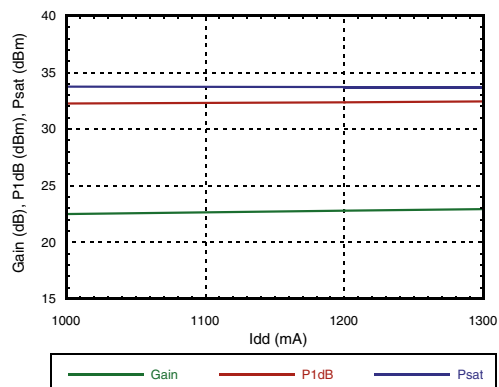
Power Compression @ 32 GHz



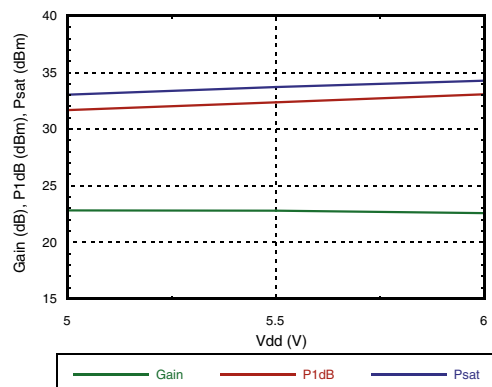
Reverse Isolation



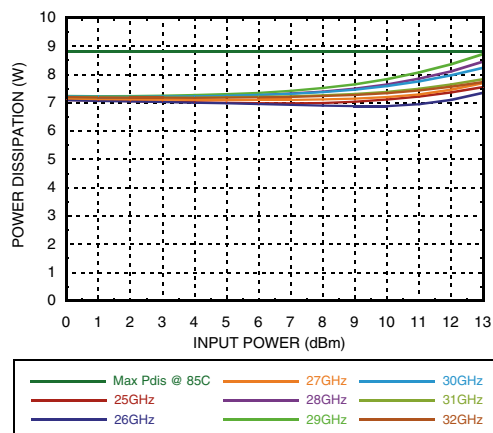
Gain & Power vs. Supply Current @ 26 GHz



Gain & Power vs. Supply Voltage @ 26 GHz



Power Dissipation @ 6V, 1200 mA





**GAAS PHEMT MMIC 1.5 WATT
POWER AMPLIFIER, 24 - 31.5 GHz**

Typical Supply Current vs. Vdd

Drain Bias Voltage (Vd)	+7V
RF Input Power (RFIN)	+20 dBm
Channel Temperature	150 °C
Continuous P _{DISS} (T= 85 °C) (derate 135 mW/°C above 85 °C)	8.8 W
Thermal Resistance (channel to package bottom)	7.4 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-55 to +85 °C
ESD Sensitivity (HBM)	Class 0, 150V

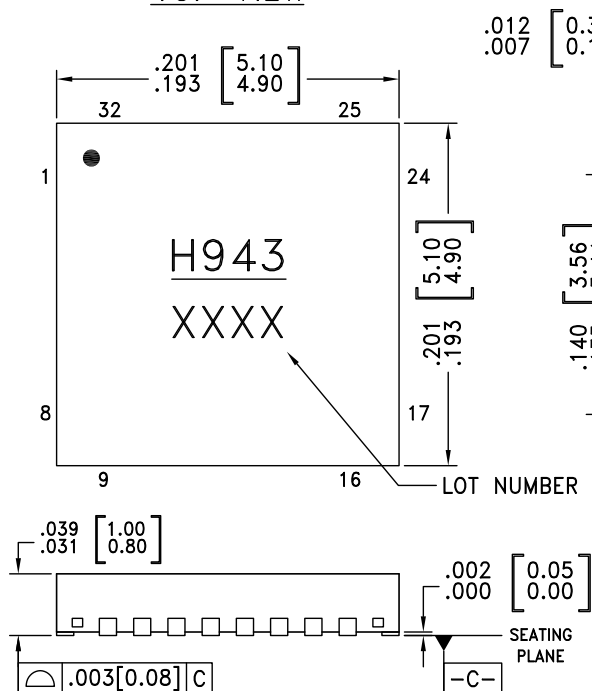
Vdd (V)	Idd (mA)
+5.0	1200
+5.5	1200
+6.0	1200

Note: Amplifier will operate over full voltage ranges shown above V_{GG} adjusted to achieve $I_{DD} = 1200\text{ mA}$

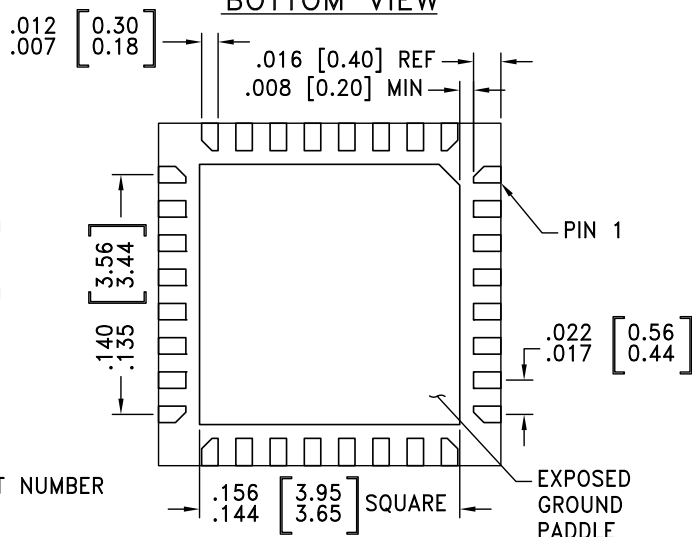


ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

TOP VIEW



BOTTOM VIEW



NOTES:

1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEAD AND GROUND PADDLE MATERIAL: COPPER ALLOY.
3. LEAD AND GROUND PADDLE PLATING: 100% MATTE TIN.
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. LEAD SPACING TOLERANCE IS NON-CUMULATIVE.
6. PAD BURR LENGTH SHALL BE 0.15mm MAX. PAD BURR HEIGHT SHALL BE 0.25mm MAX.
7. PACKAGE WARP SHALL NOT EXCEED 0.05mm.
8. 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 ^[1]
HMC943LP5E	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL1 ^[2]	H943 XXXX

[1] 4-Digit lot number XXXX

[2] Max peak reflow temperature of 260 °C



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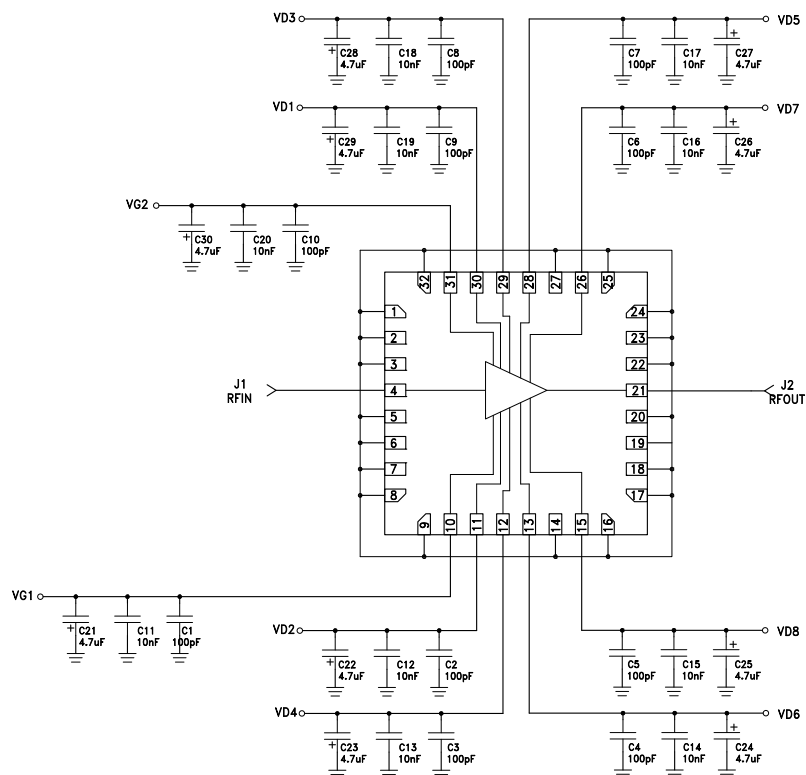
HMC943LP5E

GAAS PHEMT MMIC 1.5 WATT POWER AMPLIFIER, 24 - 31.5 GHz

Pin Descriptions

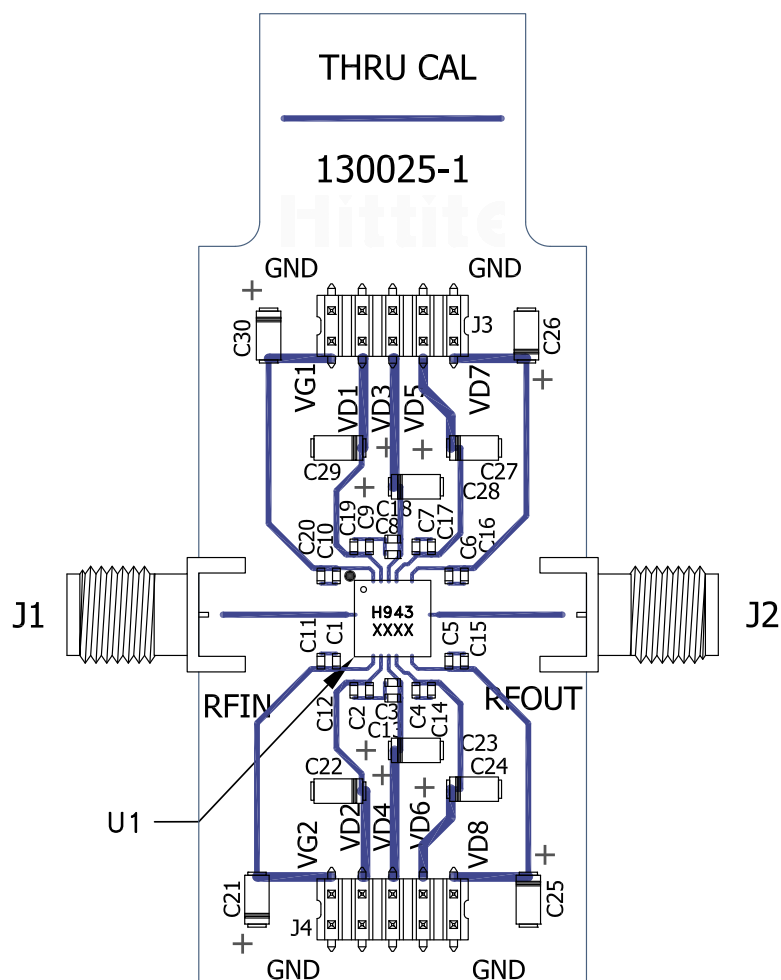
Pin Number	Function	Description	Interface Schematic
1, 3, 5, 8, 9, 16, 17, 20, 22, 24, 25, 32	GND	These pins and package bottom must be connected to RF/DC ground.	
2, 6, 7, 14, 18, 19, 23, 27	N/C	These pins are not connected internally; however, all data shown herein was measured with these pins connected to RF/DC ground externally.	
4	RFIN	RF signal input. This pad is AC coupled and matched to 50 Ohms over the operating frequency range.	
10, 31	VG1, VG2	Gate control for amplifier. External bypass capacitors of 100 pF, 0.01 μ F, and 4.7 μ F are required on each.	
11 - 13, 15, 26, 28 - 30	VD2, VD4, VD6, VD8, VD7, VD5, VD3, VD1	Drain bias for the amplifier. External bypass capacitors of 100 pF, 0.01 μ F, and 4.7 μ F are required on each.	
21	RFOUT	RF signal output. This pad is AC coupled and matched to 50 ohms over the operating frequency range.	

Application Circuit



For price, delivery and to place orders: Hittite Microwave Corporation, 2 Elizabeth Drive, Chelmsford, MA 01824
 Phone: 978-250-3343 Fax: 978-250-3373 Order On-line at www.hittite.com
 Application Support: Phone: 978-250-3343 or apps@hittite.com

Evaluation PCB



List of Materials for Evaluation PCB 130027 ^[1]

Item	Description
J1, J2	SRI, K Connectors
J3, J4	DC Pins
C1 - C10	100 pF Capacitors, 0402 Pkg.
C11 - C20	10000 pF Capacitors, 0402 Pkg.
C21 - C30	4.7 µF Capacitors, Case A Pkg.
U1	HMC943LP5E Power Amplifier
PCB ^[2]	130025 Evaluation PCB

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350 or Arlon FR4

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