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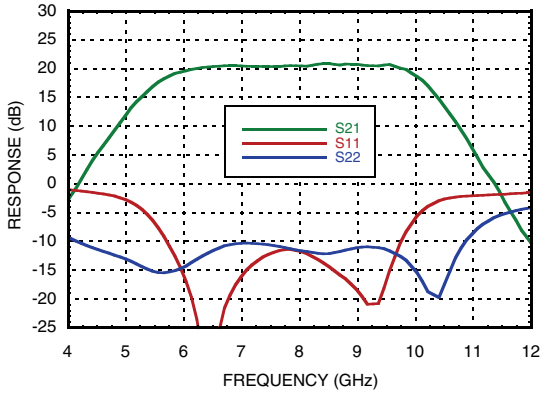
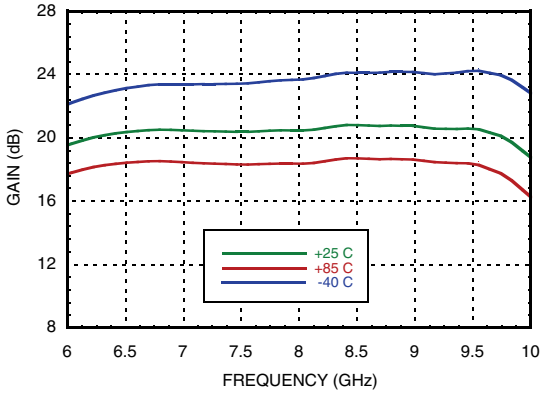
# GaAs pHEMT MMIC 1 WATT POWER AMPLIFIER, 6.0 - 9.5 GHz



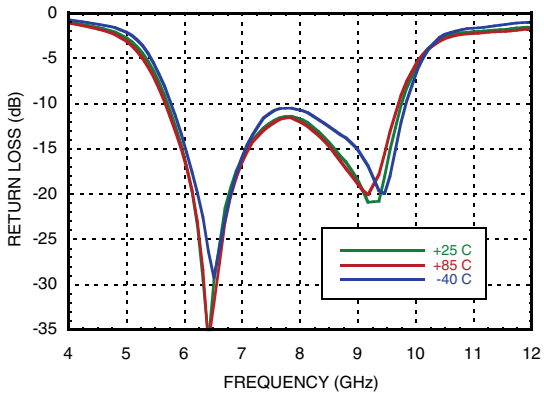
### Broadband Gain & Return Loss



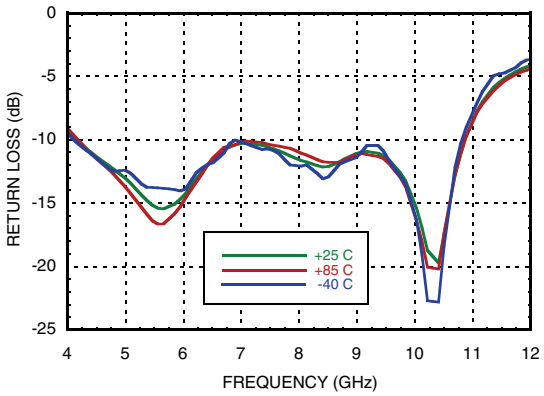

### Gain vs. Temperature



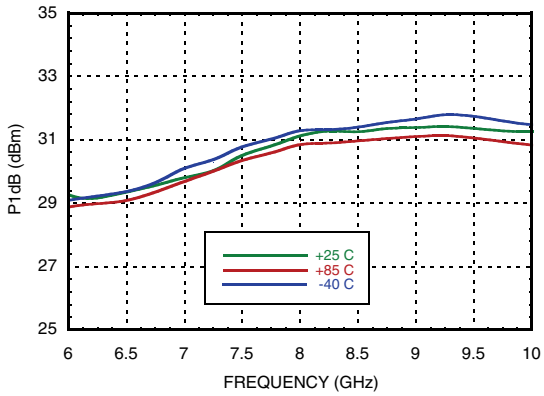

### Input Return Loss vs. Temperature



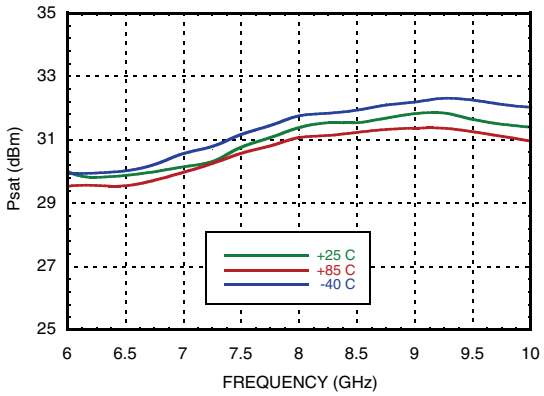

### Output Return Loss vs. Temperature



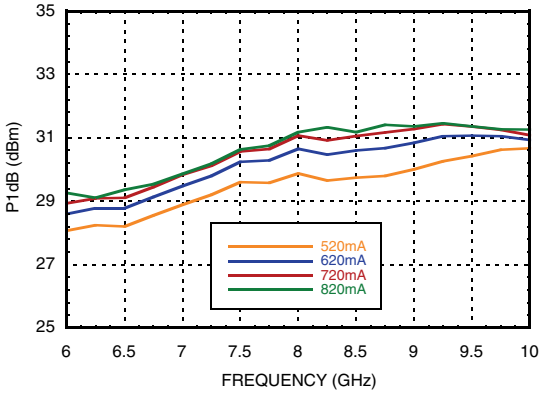

### P1dB vs. Temperature



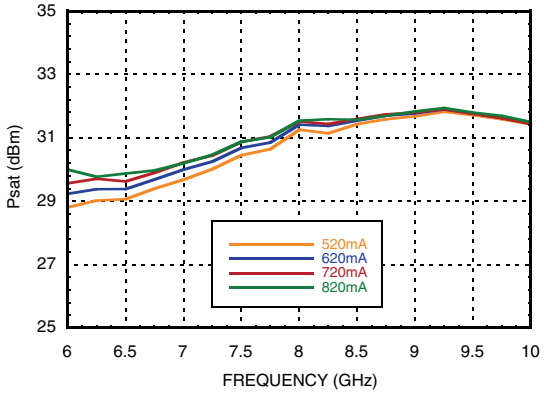

### Psat vs. Temperature



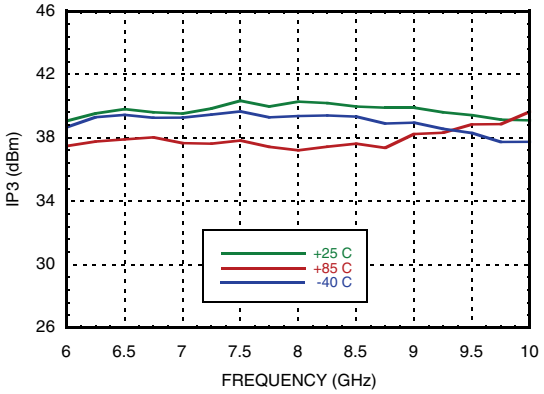
### P1dB vs. Current



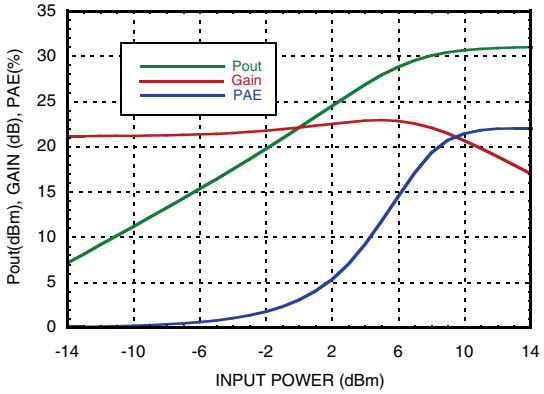

### Psat vs. Current



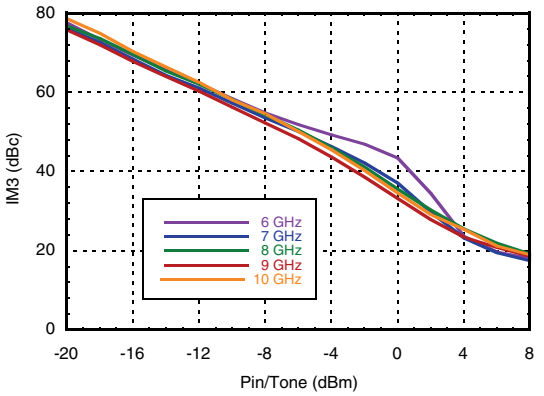

### Output IP3 vs. Temperature 7V @ 520 mA, Pin/Tone = -15 dBm



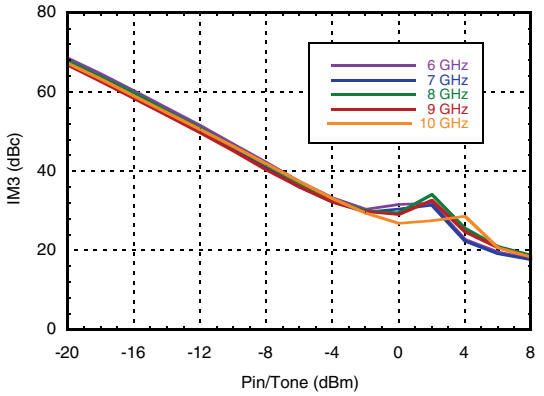

### Power Compression @ 8 GHz, 7V @ 820 mA




### Output IM3, 7V @ 520 mA




### Output IM3, 7V @ 820 mA



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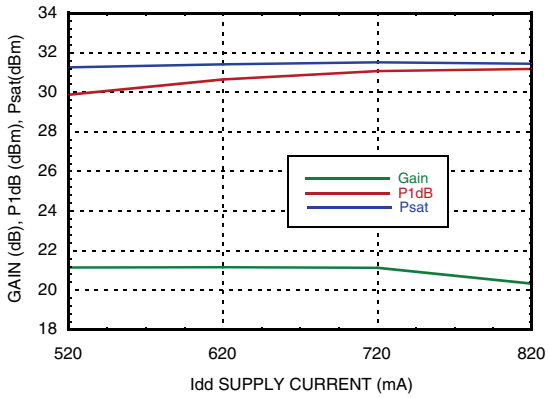
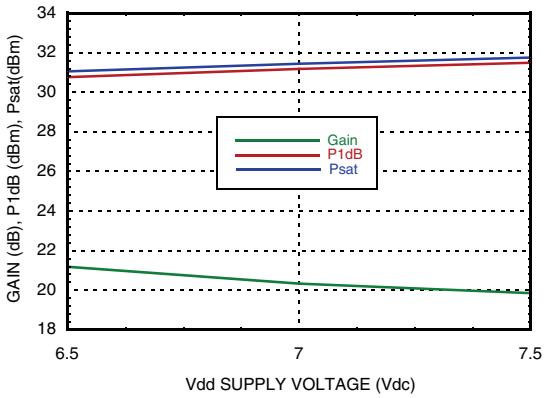
# GaAs pHEMT MMIC 1 WATT POWER AMPLIFIER, 6.0 - 9.5 GHz



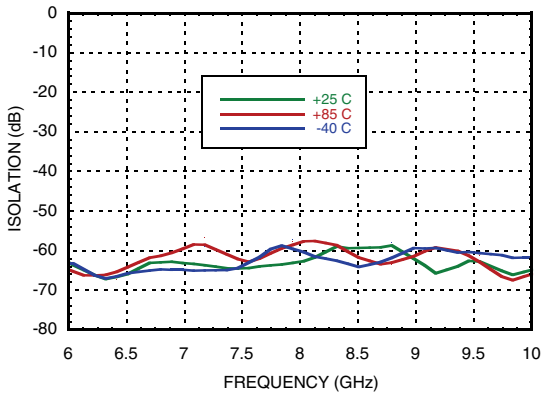
### Gain & Power vs. Supply Current @ 8 GHz



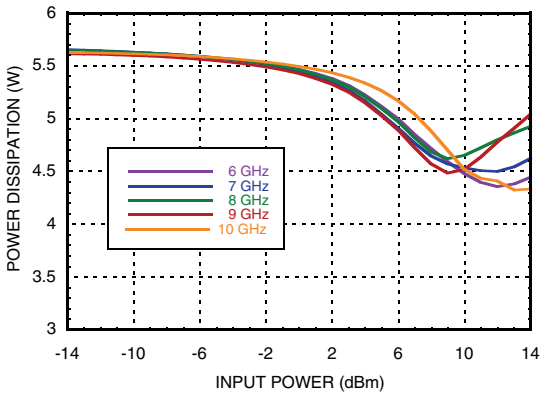

### Gain & Power vs. Supply Voltage @ 8 GHz




### Reverse Isolation vs. Temperature, 7V @ 820 mA




### Power Dissipation




### Absolute Maximum Ratings

| | |
|---|---|
| Drain Bias Voltage (Vdd) | +8 Vdc |
| Gate Bias Voltage (Vgg) | -2.0 to 0 Vdc |
| RF Input Power (RFIN)(Vdd = +7.0 Vdc) | +12 dBm |
| Channel Temperature | 175 °C |
| Continuous Pdiss (T= 75 °C) (derate 59.8 mW/°C above 75 °C) | 5.98 W |
| Thermal Resistance (channel to package bottom) | 16.72 °C/W |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -55 to +85 °C |
| ESD Sensitivity (HBM) | Class 0B. Passed 200V |

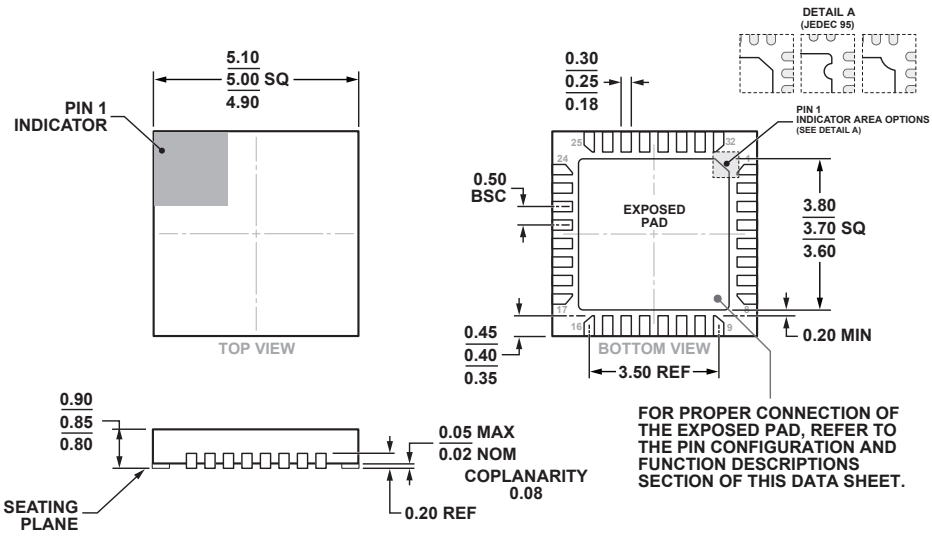
### Typical Supply Current vs. Vdd

| Vdd (V) | Idd (mA) |
|---|---|
| +6.5 | 824 |
| +7.0 | 820 |
| +7.5 | 815 |

*Note: Amplifier will operate over full voltage ranges shown above Vgg adjusted to achieve Idd = 820 mA at +7.0V*

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

## Outline Drawing




**COMPLIANT TO JEDEC STANDARDS MO-220-VHHD-4.**

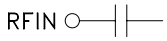
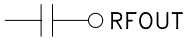
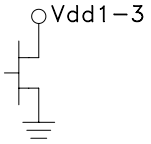
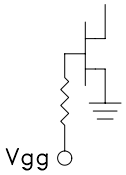
32-Lead Lead Frame Chip Scale Package [LFCSP]
5 mm × 5 mm and 0.90 mm Package Height
(HCP-32-3)
Dimensions shown in millimeters

## Package Information

| Part Number | Package Body Material | Lead Finish | MSL Rating | Package Marking [2] |
|---|---|---|---|---|
| HMC590LP5E | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL3 [1] | H590<br>XXXX |
| HMC590LP5ETR | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL3 [1] | H590<br>XXXX |

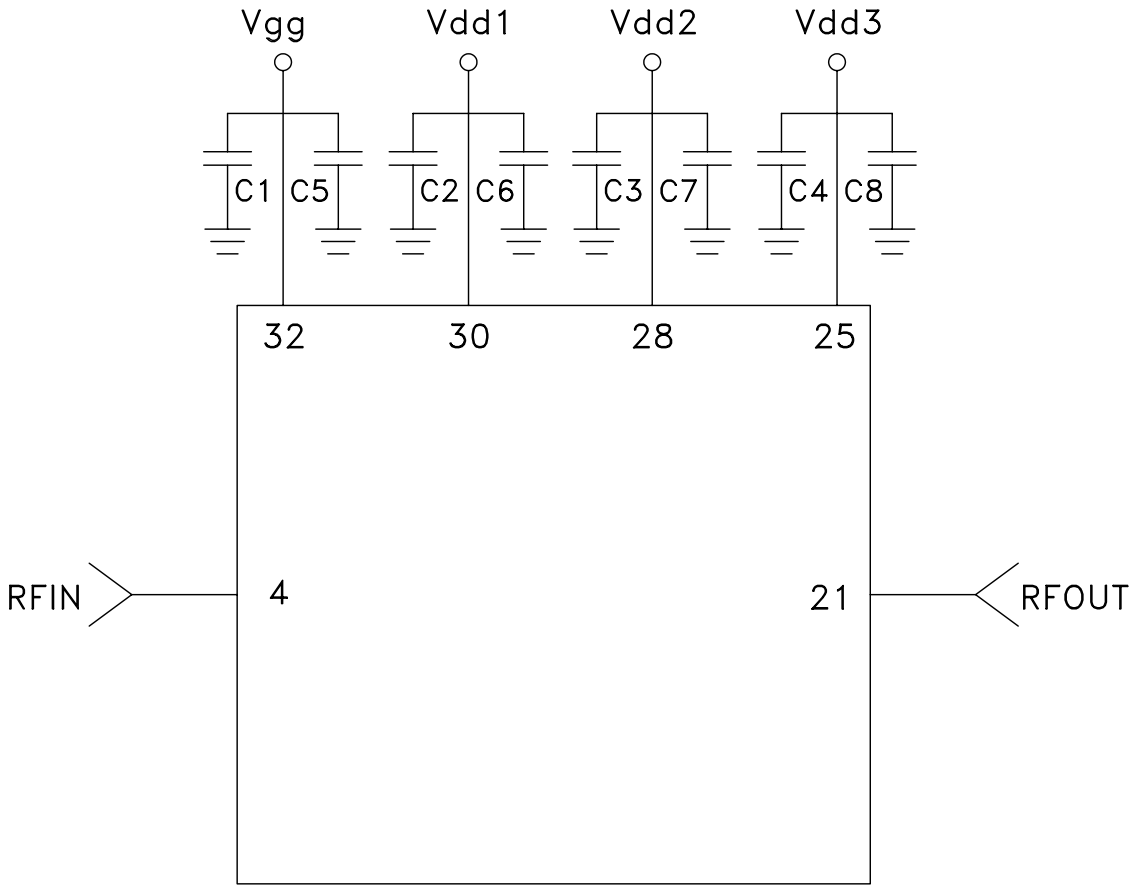
[1] Max peak reflow temperature of 260 °C
[2] 4-Digit lot number XXXX

## Pin Descriptions

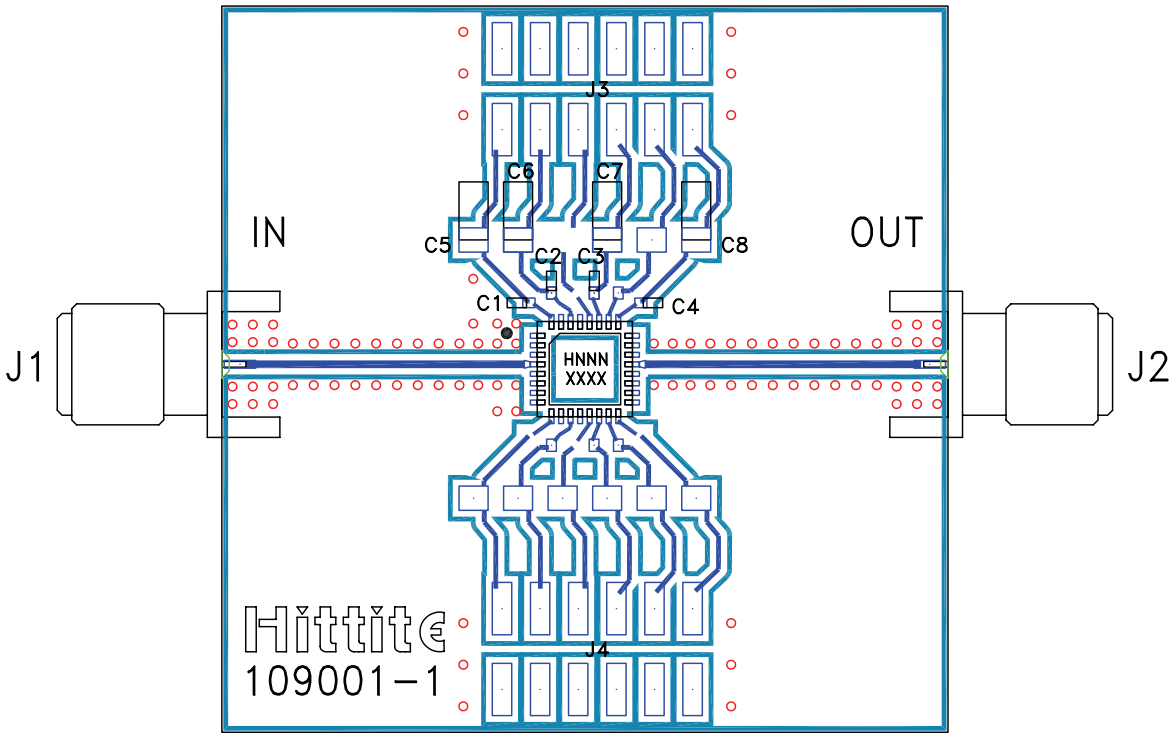
| Pin Number | Function | Description | Interface Schematic |
|---|---|---|---|
| 1, 2, 6 - 19, 23, 24, 26, 27, 29, 31 | N/C | Not connected. | |
| 3, 5, 20, 22 | GND | These pins and package bottom must be connected to RF/DC ground. |   |
| 4 | RFIN | This pad is AC coupled and matched to 50 Ohms. |   |
| 21 | RFOUT | This pad is AC coupled and matched to 50 Ohms. |   |
| 25, 28, 30 | Vdd 1-3 | Power Supply Voltage for the amplifier. External bypass capacitors of 100 pF and 2.2 µF are required. |   |
| 32 | Vgg | Gate control for amplifier. Adjust to achieve Idd of 820 mA. Please follow “MMIC Amplifier Biasing Procedure” Application Note. External bypass capacitors of 100 pF and 2.2 µF are required. |   |

## Application Circuit

| Component | Value |
|---|---|
| C1 - C4 | 100pF |
| C5 - C8 | 2.2µF |



## Evaluation PCB




## List of Materials for Evaluation PCB 115927-HMC590LP5 [1]

| Item | Description |
|---|---|
| J1 - J2 | PCB Mount SMA Connector |
| J3 | DC Pin |
| C1 - C4 | 100 pF Capacitor, 0402 Pkg |
| C5 - C8 | 2.2 µF Capacitor, 1206 Pkg |
| U1 | HMC590LP5E |
| PCB [2] | 109001 Evaluation PCB |

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

The circuit board used in the final 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 Analog Devices , Inc. upon request.