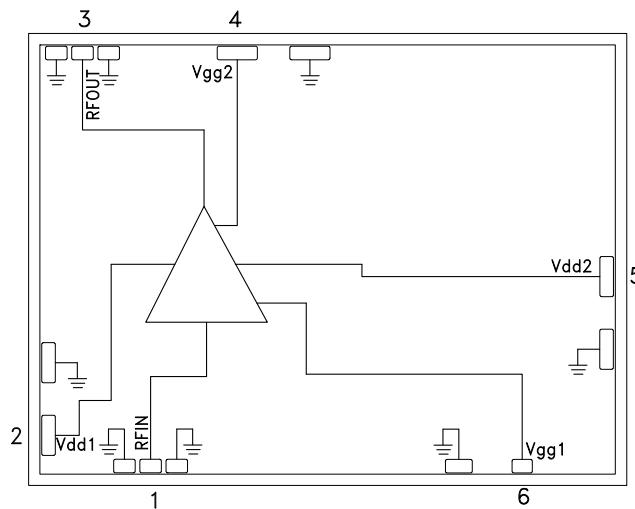



**10 WATT GaN MMIC POWER AMPLIFIER,
6 - 18 GHz**
Typical Applications

The HMC7149 is ideal for:

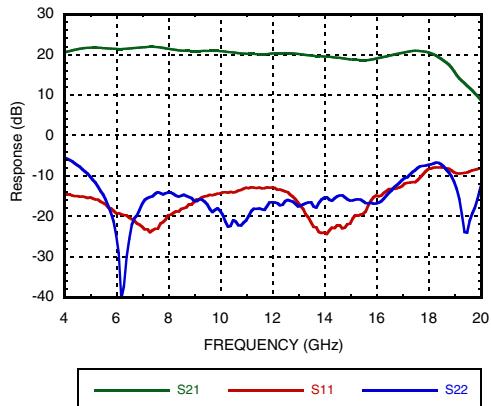
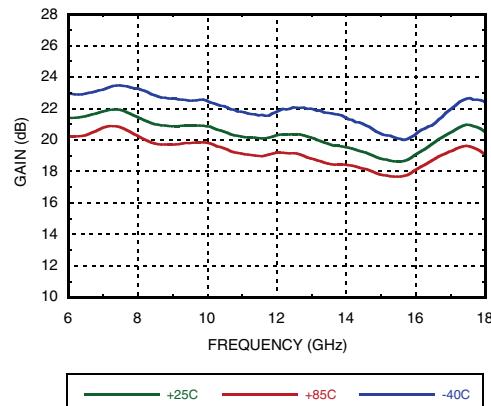
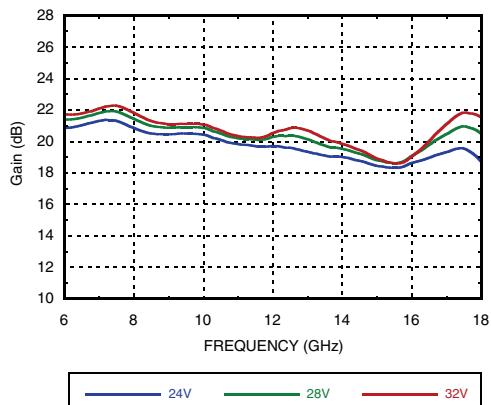
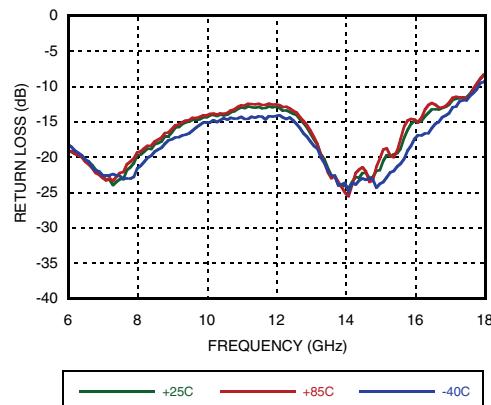
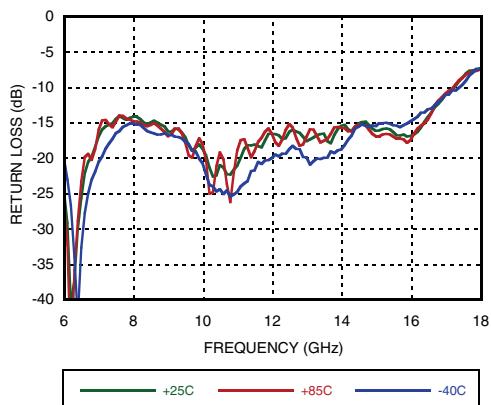
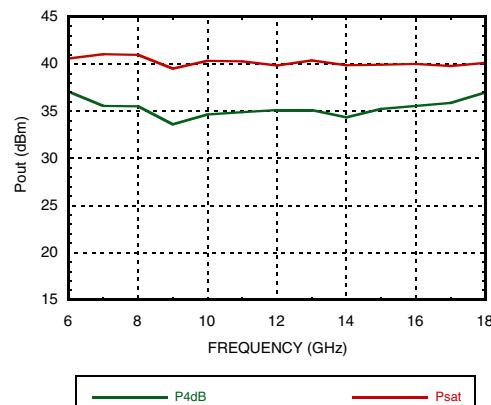
- Test Instrumentation
- General Communications
- Radar

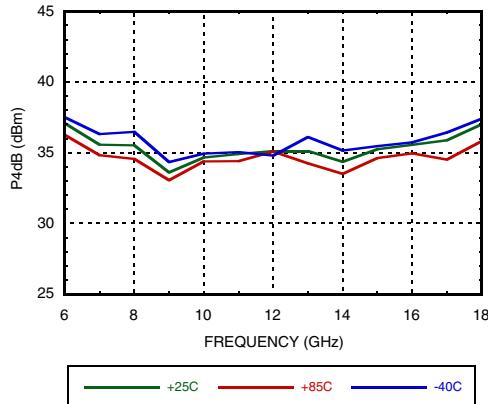
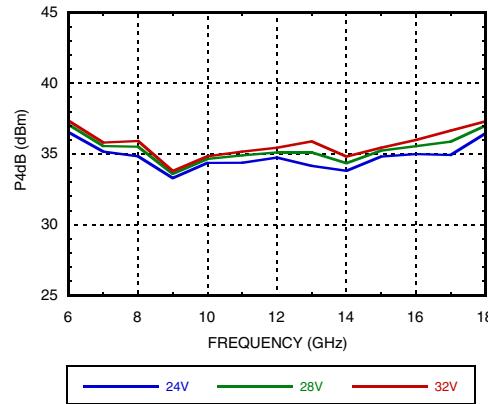
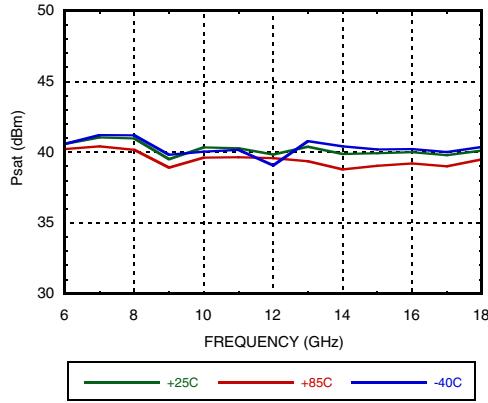
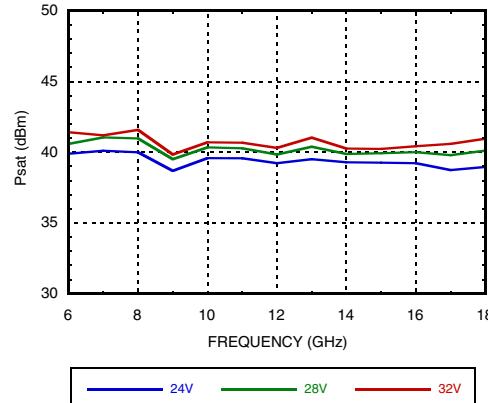
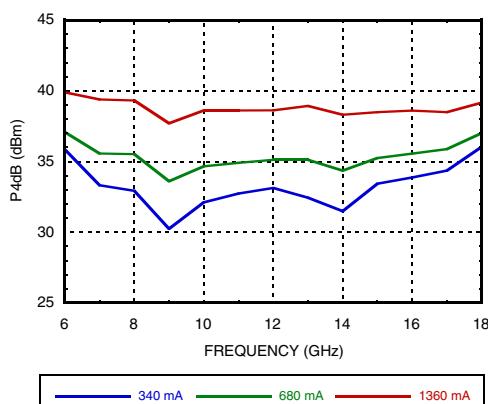
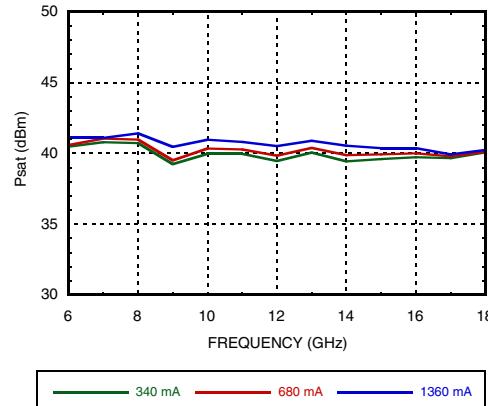
Functional Diagram

Electrical Specifications, $T_c = +25^\circ\text{C}$, $Vdd = Vdd1 = Vdd2 = +28\text{ V}$, $Idd = 680\text{ mA}$ [1]

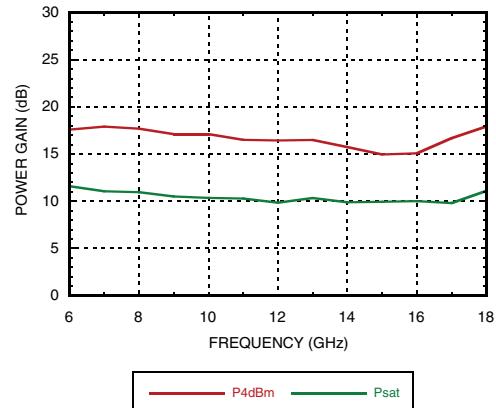
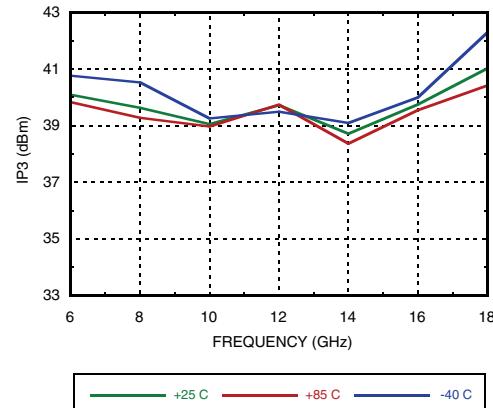
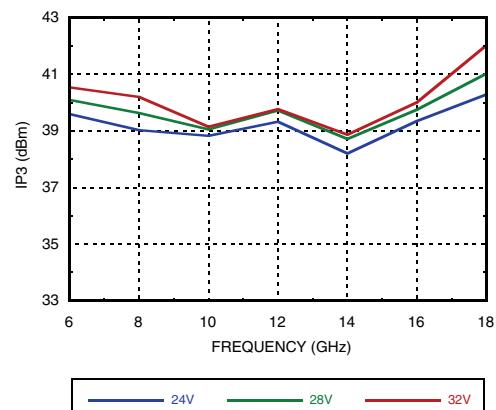
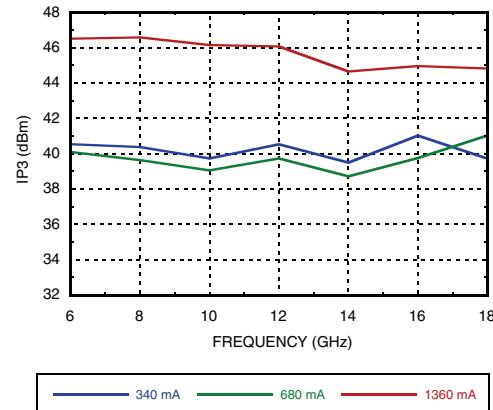
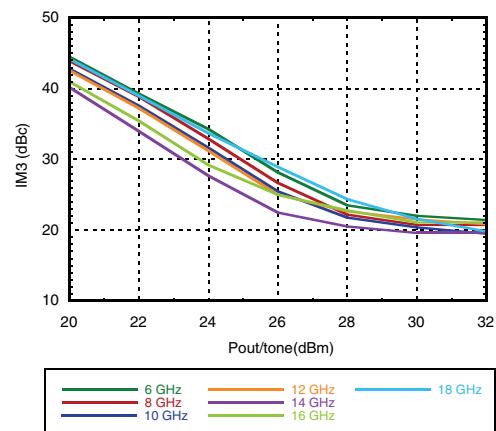
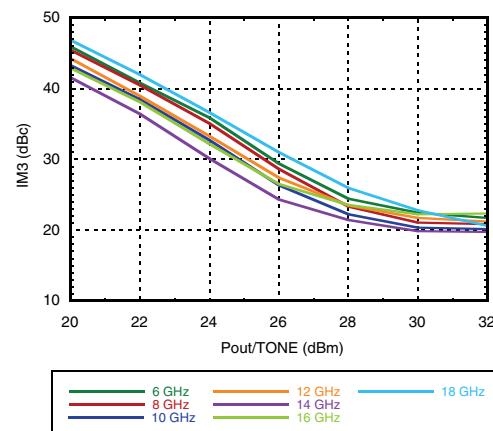
Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range	6 - 10			10 - 14			14 - 16			16 - 18			GHz
Small Signal Gain	19	21		18	20		17	19		18	20		dB
Gain Flatness		± 0.5			± 0.6			± 0.5			± 0.7		dB
Gain Variation Over Temperature	0.023			0.02			0.02			0.018			dB/ $^\circ\text{C}$
Input Return Loss		17			17			16			11		dB
Output Return Loss		17			17			18			12		dB
Output Power for 4 dB Compression (P4dB)		35			35			35			36		dBm
Power Gain for 4 dB compression (P4dB)		17			16			15			17		dB
Saturated Output Power (Psat)		40			40			40			40		dBm
Output Third Order Intercept (IP3) [2]		39.5			39			39.5			40.5		dBm
Power Added Efficiency		22			20			20			20		%
Supply Current (Idd @ Vdd = 28V)		680			680			680			680		mA

[1] Adjust Vgg between -3V and 0V to achieve $Idd = 680\text{ mA}$ typical.

[2] Measurement taken at 28V@ 680 mA, $P_{out/tone} = +28\text{ dBm}$.


**10 WATT GaN MMIC POWER AMPLIFIER,
6 - 18 GHz**
Gain and Return Loss

Gain vs. Temperature

Gain vs. Vdd

Input Return Loss vs. Temperature

Output Return Loss vs. Temperature

Pout vs. Frequency


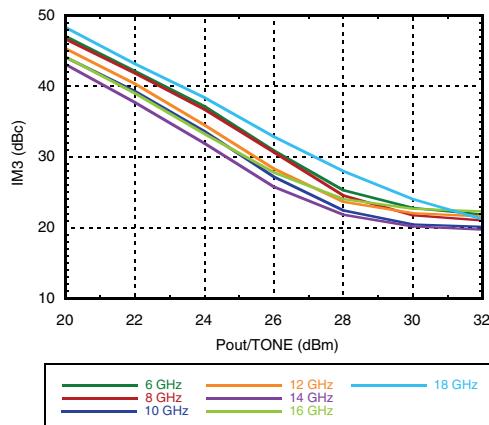

**10 WATT GaN MMIC POWER AMPLIFIER,
6 - 18 GHz**
P4dB vs. Temperature**P4dB vs. Supply Voltage****Psat vs. Temperature****Psat vs. Supply Voltage****P4dB vs. Supply Current****Psat vs. Supply Current**


**10 WATT GaN MMIC POWER AMPLIFIER,
6 - 18 GHz**
Power Gain vs. Frequency

Output IP3 vs. Temperature
Pout/tone = +28 dBm

Output IP3 vs. Supply Voltage
Pout/tone = +28 dBm

Output IP3 vs. Supply Current
Pout/tone = +28 dBm

Output IM3 @ Vdd= +24V

Output IM3 @ Vdd= +28V


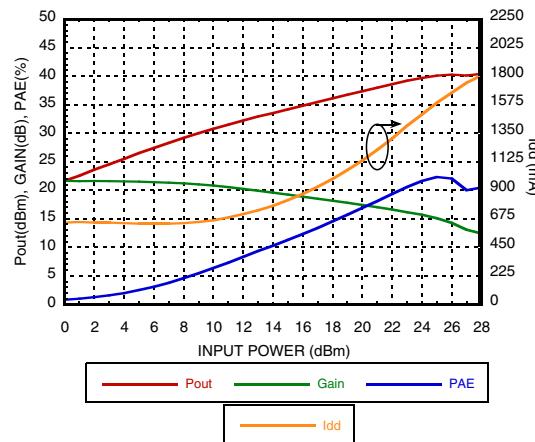


10 WATT GaN MMIC POWER AMPLIFIER, 6 - 18 GHz

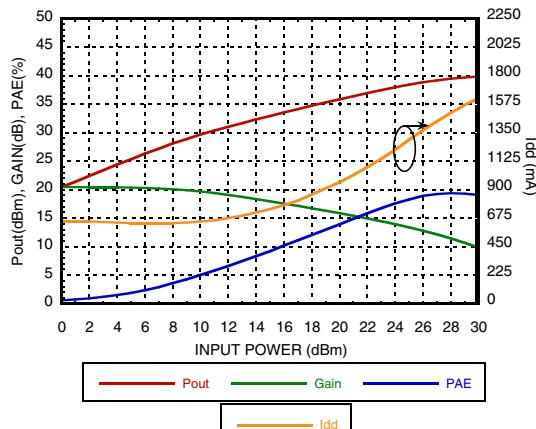
Output IM3 @ Vdd= +32V



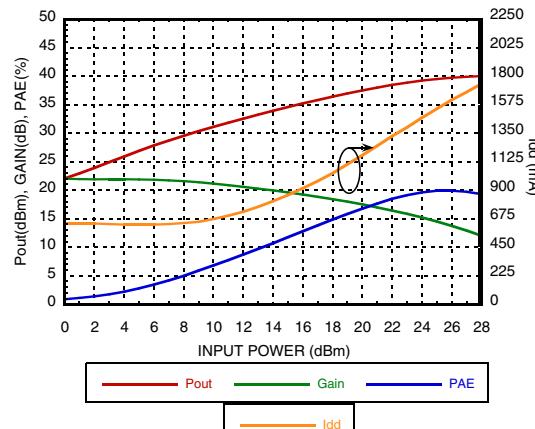
Power Compression @ 6 GHz



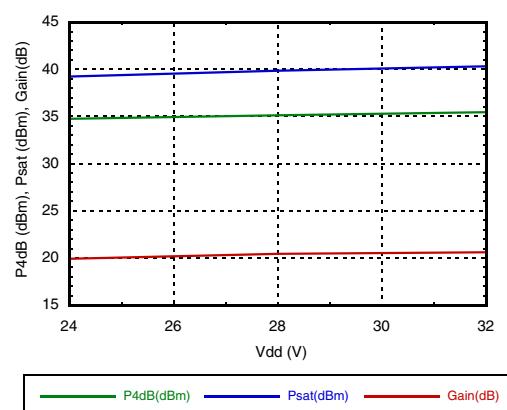
Power Compression @ 12 GHz



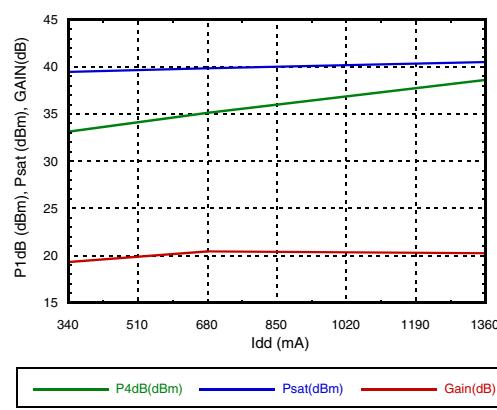
Power Compression @ 18 GHz

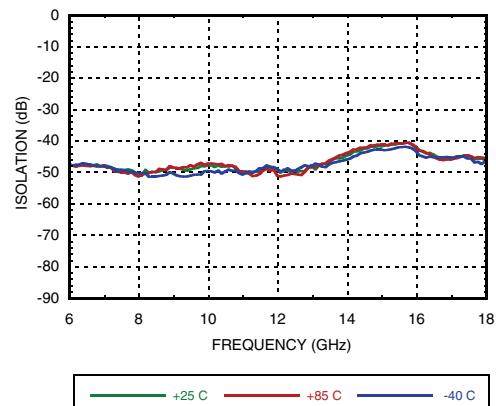
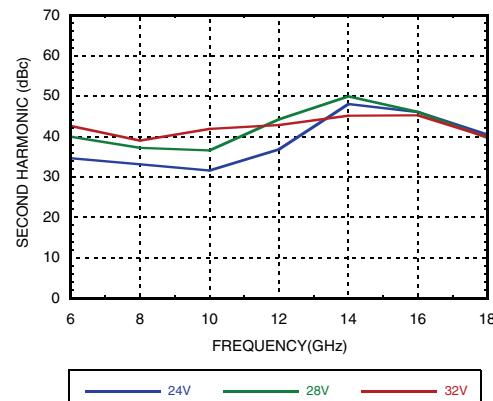
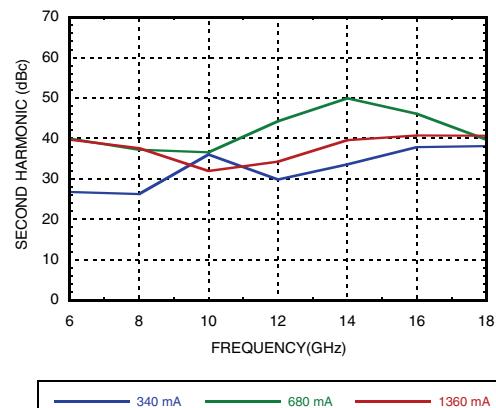
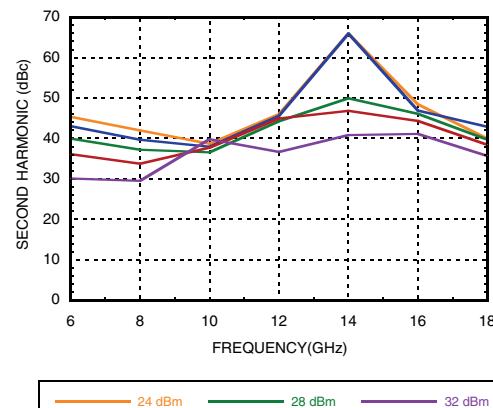
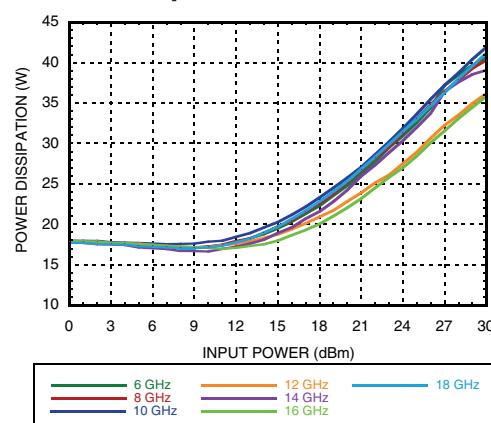


Gain and Power vs. Supply Voltage @ 12 GHz



Gain and Power vs. Supply Current @ 12 GHz




**10 WATT GaN MMIC POWER AMPLIFIER,
6 - 18 GHz**
Reverse Isolation vs. Temperature

Second Harmonics vs. Supply Voltage

Second Harmonics vs. Supply Current

Second Harmonics vs. Pout

Power Dissipation



**10 WATT GaN MMIC POWER AMPLIFIER,
6 - 18 GHz**
Absolute Maximum Ratings^[1]

Drain Bias Voltage (Vdd)	+32V
Gate Bias Voltage (Vgg)	-8V to +0V
Maximum Forward Gate Current	6 mA
Maximum RF Input Power (RFIN)	30 dBm
Maximum Junction Temperature (Tj)	225 °C
Maximum Pdiss (T=85°C) (Derate 357 mW/°C above 85°C)	50 W
Thermal Resistance ^[2]	2.8 °C/W
Maximum VSWR ^[3]	6:1
Storage Temperature	-55 to +150 °C
Operating Temperature	-40 to +85 °C

Typical Supply Current vs. Vdd

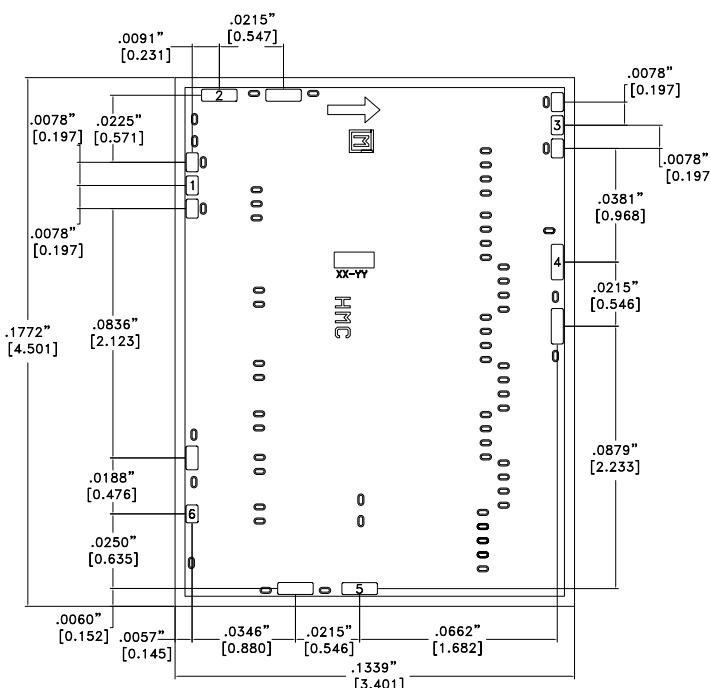
Vdd (V)	Idd (mA)
+28.0	680


**ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS**

[1] Operation outside parameter ranges above can cause permanent damage to the device. These are maximum stress ratings only. Continuous operation of the device at these conditions is not implied.

[2] Assumes 1mil AuSn die attach to a 40mil CuMo Carrier with 85°C at the back of the carrier.

[3] Restricted by maximum power dissipation

Outline Drawing

Die Packaging Information^[1]

Standard	Alternate
GP-1 (Gel Pack)	[2]

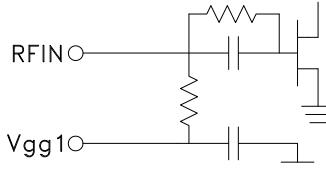
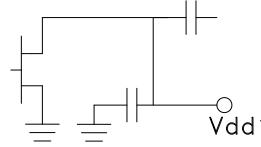
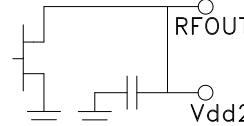
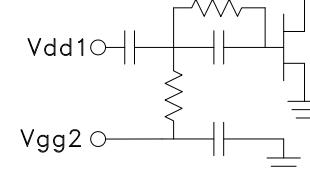
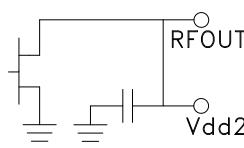
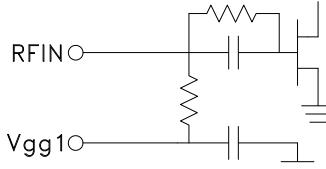
[1] Refer to the "Packaging Information" section for die packaging dimensions.

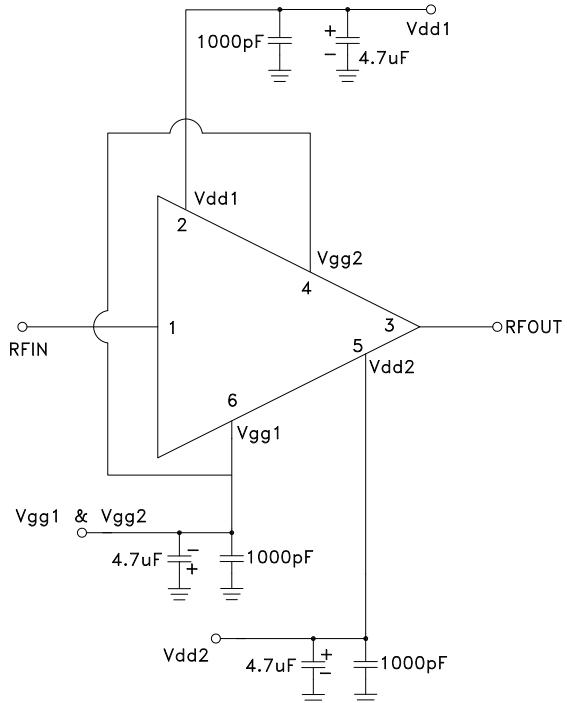
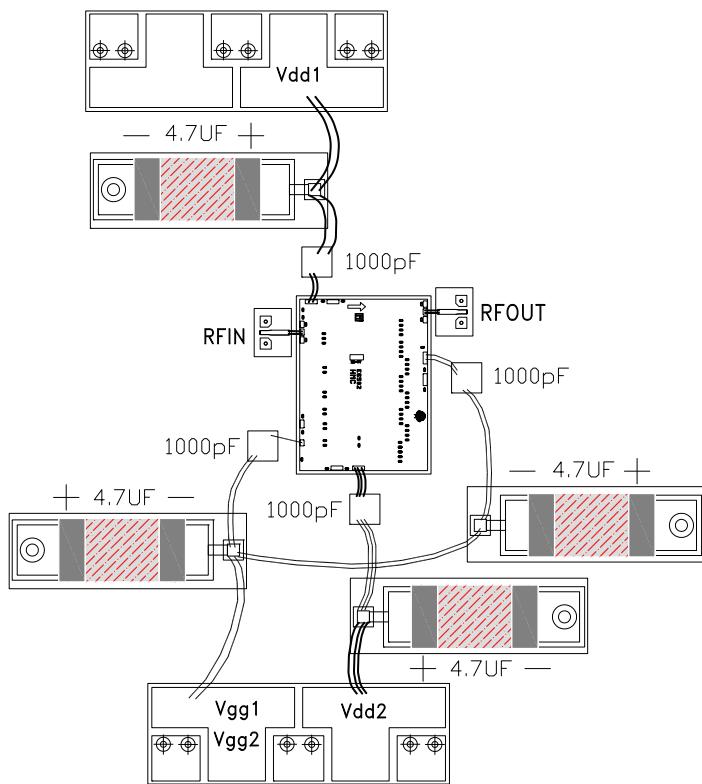
[2] For alternate packaging information contact Hittite Microwave Corporation.

NOTES:

1. ALL DIMENSIONS ARE IN INCHES [MM]
2. DIE THICKNESS IS .004"
3. TYPICAL BOND PAD IS .004" SQUARE
4. BACKSIDE METALLIZATION: GOLD
5. BOND PAD METALLIZATION: GOLD
6. BACKSIDE METAL IS GROUND.
7. CONNECTION NOT REQUIRED FOR UNLABELED BOND PADS.
8. OVERALL DIE SIZE \pm .002


**10 WATT GaN MMIC POWER AMPLIFIER,
6 - 18 GHz**
Pad Descriptions

Pad Number	Function	Description	Interface Schematic
1	RFIN	This pad is AC coupled and is matched to 50 Ohms. External blocking capacitor is required.	
2	Vdd1	Drain Bias	
3	RFOUT	This pad is DC coupled and is matched to 50 Ohms. External blocking capacitor is required.	
4	Vgg2	Gate Bias	
5	Vdd2	Drain Bias	
6	Vgg1	Gate Bias	
Die Bottom	GND	Die bottom must be connected to RF/DC ground.	


**10 WATT GaN MMIC POWER AMPLIFIER,
6 - 18 GHz**
Application Circuit

Assembly Diagram




10 WATT GaN MMIC POWER AMPLIFIER, 6 - 18 GHz

Mounting & Bonding Techniques for GaN MMICs

The die should be eutectically attached directly to the ground plane (see HMC general Handling, Mounting, Bonding Note).

50 Ohm Microstrip transmission lines on 0.127mm (5 mil) thick alumina thin film substrates are recommended for bringing RF to and from the chip (Figure 1). If 0.254mm (10 mil) thick alumina thin film substrates must be used, the die should be raised 0.150mm (6 mils) so that the surface of the die is coplanar with the surface of the substrate. One way to accomplish this is to attach the 0.102mm (4 mil) thick die to a copper tungsten or CuMo heat spreader which is then attached to the thermally conductive ground plane (Figure 2).

Microstrip substrates should be placed as close to the die as possible in order to minimize bond wire length. Typical die-to-substrate spacing is 0.076mm to 0.152 mm (3 to 6 mils).

Handling Precautions

Follow these precautions to avoid permanent damage.

Storage: All bare die are placed in either Waffle or Gel based ESD protective containers, and then sealed in an ESD protective bag for shipment. Once the sealed ESD protective bag has been opened, all die should be stored in a dry nitrogen environment.

Cleanliness: Handle the chips in a clean environment. DO NOT attempt to clean the chip using liquid cleaning systems.

Static Sensitivity: Follow ESD precautions to protect against ESD strikes.

Transients: Suppress instrument and bias supply transients while bias is applied. Use shielded signal and bias cables to minimize inductive pick-up.

Die placement: A heated vacuum collet (180°C) is the preferred method of pick up. Ensure that the area of vacuum contact on the die is minimized to prevent cracking under differential pressure. All air bridges (if applicable) must be avoided during placement. Minimize impact forces applied to the die during auto-placement.

Mounting

The chip is back-metallized with a minimum of 5 microns of gold and is the RF ground and thermal interface. It is recommended that the chip be die mounted with AuSn eutectic preforms. The mounting surface should be clean and flat.

Eutectic Reflow Process: An 80/20 gold tin 0.5mil (13um) thick preform is recommended with a work surface temperature of 280°C. Limit exposure to temperatures above 300°C to 30 seconds maximum. A die bonder or furnace with 95% N₂ / 5% H₂ reducing atmosphere should be used. No organic flux should be used. Coefficient of thermal expansion matching is critical for long term reliability.

Die Attach Inspection: X-ray or acoustic scan is recommended.

Wire Bonding

Thermosonic ball or wedge bonding is the preferred interconnect technique. Gold wire must be used in a diameter appropriate for the pad size and number of bonds applied. Force, time and ultrasonics are critical parameters: optimize for a repeatable, high bond pull strength. Limit the die bond pad surface temperature to 200°C maximum.

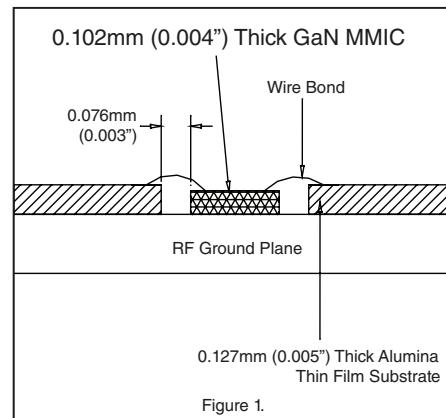


Figure 1.

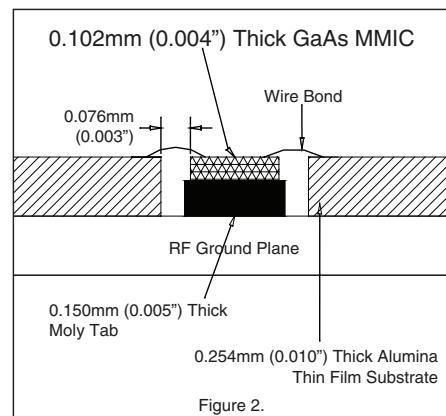


Figure 2.

Данный компонент на территории Российской Федерации**Вы можете приобрести в компании MosChip.**

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибуторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ Р В 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

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Факс: +7 495 668-12-70 (доб.304)

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