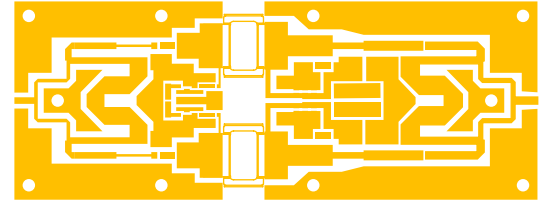


# S-Band GaN/SiC, RF Power Amplifier Pallet

2.9-3.1 GHz | 4 kW | 63% Efficiency typ | 14 dB Gain typ | 100 V | 60µs Pulse Length, 4% Duty Cycle

IGNP2931M4000 is a high power GaN-on-SiC RF power amplifier pallet that has been designed to suit the unique needs of S-Band Radar systems. It operates over the full 2.9-3.1 GHz frequency range. Under 60µs, 4% duty cycle pulse conditions it supplies 4kW of peak output power, with typically 14dB of associated gain and 63% efficiency. It operates from a 100 V supply voltage.



## FEATURES

- GaN on SiC HEMT Technology
- Output Power >4kW
- Fully matched to 50Ω
- High Efficiency
- 100% RF Tested Under 60µs, 4% duty cycle pulse conditions
- System Power in a component pallet form factor
- Unparalleled System Power Density
- Enables Disruptive Radar System Re-architecture
- SWaP-C<sup>2</sup>
  - Size = Reduce radar system size by a 66% over competing systems
  - Weight = Reduce radar system weight a factor of 55%
  - System Power Density = 408W / in<sup>2</sup>
  - Cost = Reduce system cost by >40%
  - Complexity = Eliminate multiple combining layers

## APPLICATIONS

- S-Band Radar Systems

**Table 1. RF Electrical Characteristics (Case temperature = 30 °C unless otherwise stated)**

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Gain	G	10	14	16	dB	P <sub>out</sub> = 4kW f = 2.9, 3.0, 3.1 GHz 60µs pulse length, 4% duty cycle V <sub>DS</sub> = 100V, I <sub>DS</sub> = 300 mA
Drain Efficiency	η	50	63	70	%	
Pulse Droop	D	0	-0.25	-0.6	dB	
Load Mismatch Stability	VSWR-S	3:1				
Input Return Loss	IRL	5	20	30	dB	

Note: Consult Integra Technologies Application Note 001 for information on how RF output power and pulse droop are measured.

**Table 2. Absolute Maximum Ratings (Not Simultaneous)**

Parameter	Symbol	Value	Units	Test Conditions
DC Drain-Source Voltage	$V_{DS}$	300	V	25 °C
DC Gate-Source Voltage	$V_{GS}$	-8 to +1	V	25 °C
DC Drain Current	$I_D$	144	A	25 °C
DC Gate Current	$I_G$	10	mA	25 °C
RF Input Power	$P_{RFIN}$	400	W	25 °C
Operating Channel Temperature	$T_{CH}$	-55 to +225	°C	
Storage Temperature	$T_{STG}$	-55 to +150	°C	
Soldering Temperature	$T_{SOLDER}$	260 for 60s	°C	

Note: Operation outside the limits given in this table may cause permanent damage to the transistor

**Table 3. DC Electrical Characteristics (Case temperature = 25 °C unless otherwise stated)**

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Gate Pinch-Off Voltage	$V_p$	-5.0			V	$V_{DS} = 100V, I_{DS} = 1mA$
Quiescent Gate Voltage	$V_q$		-4		V	$V_{DS} = 100V, I_{DS} = 300mA$

**Table 4. Transistor Thermal Resistance (Case temperature = 85 °C unless otherwise stated)**

Parameter	Symbol	Typ	Units	Test Conditions
Peak Thermal Resistance, Channel to Case	$R_{TH}$	0.055	°C/W	$P_{DISS} = 2349W$ 60µs pulse length, 4% duty cycle $V_{DS} = 100V$

TYPICAL PERFORMANCE

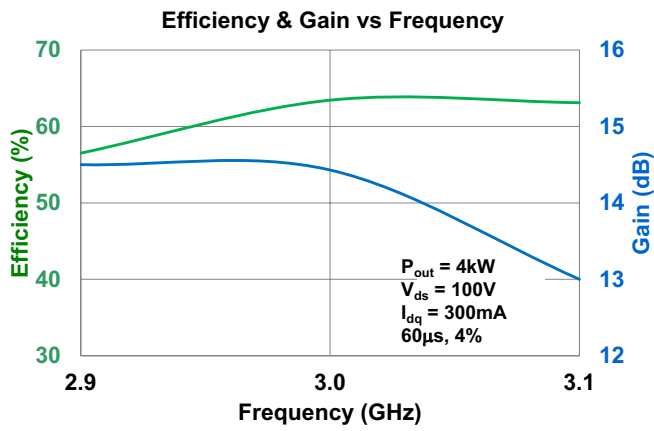


Figure 1.

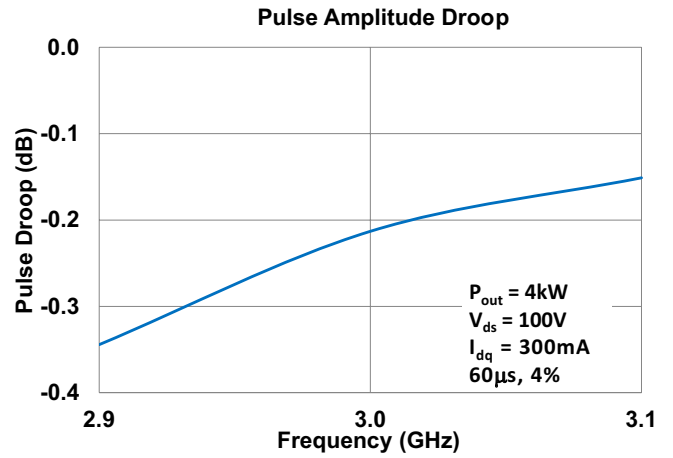


Figure 2.

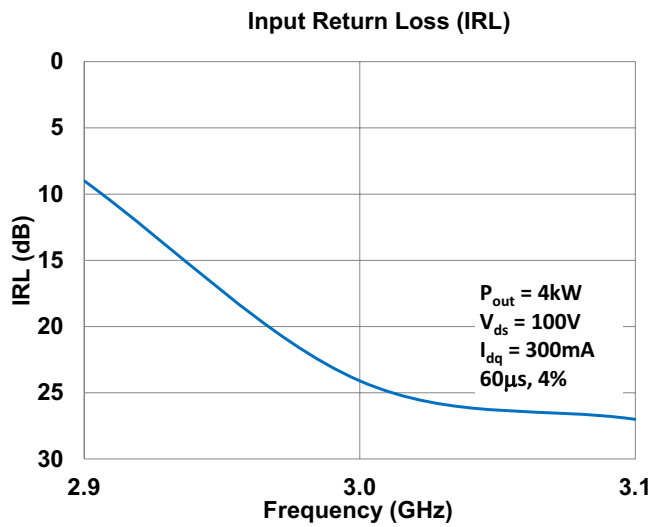
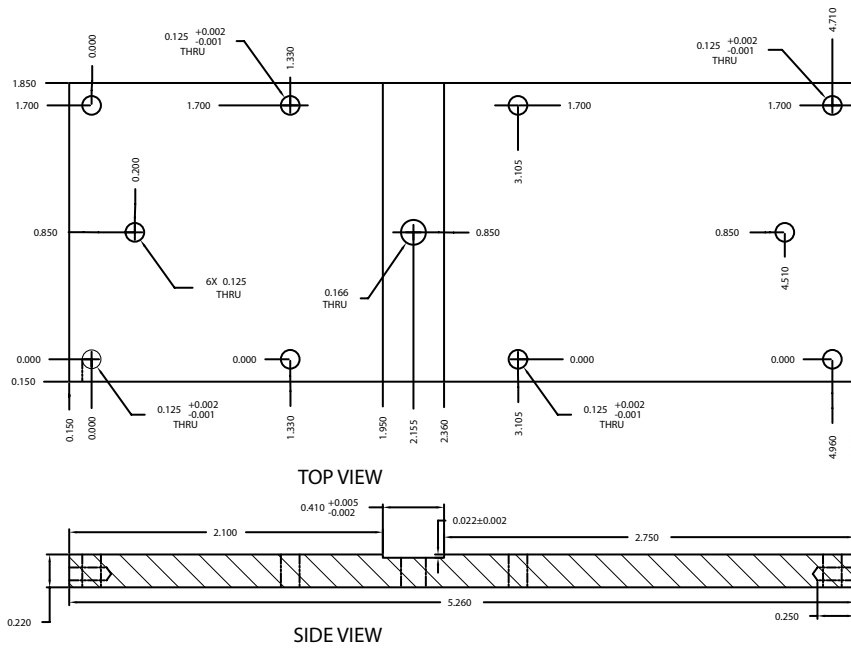


Figure 3.

### DIMENSIONS



### ESD & MSL Rating

Parameter	Rating	Standard
ESD Human Body Model (HBM)	TBD	ESDA/JEDEC JS-001-2012
ESD Charged Device Model (CDM)	TBD	JEDEC JESD22-C101F
Moisture Sensitivity Level (MSL)	Unlimited Shelf Life	IPC/JEDEC J-STD-020

### REACH Compliance

Integra Technologies supports EU Regulation number 1907/2006 concerning the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) as these apply to Integra semiconductor products, development tools, and shipping packaging.

In support of the REACH regulation, Integra will:

- Inform customers and recipients of Integra product if they contain any substances that are of very high concern (SVHC) per the European Chemical Agency (ECHA) website.
- Notify ECHA if any Integra product that contains any SVHCs which exceed guidelines for REACH chemicals by weight per part number and for total content weight per year for all products produced in or imported to the European market.
- Cease shipments of product containing REACH Annex XIV substances until authorization has been obtained.
- Cease shipment of product containing REACH Annex XVII chemicals when restrictions apply.

Integra has evaluated its materials, BOMs, and product specifications and product and has determined that this transistor conforms to all REACH and SVHC regulations and guidelines. Integra has implemented actions and control programs that will assure continued compliance.

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**DEFINITIONS:**

**DATA SHEET STATUS**

Advanced Specification - This data sheet contains Advanced specifications.

Preliminary Specification - This data sheet contains specifications based on preliminary measurements and data.

Final Specification - This data sheet contains final product specifications.

**MAXIMUM RATINGS** Stress above one or more of the maximum ratings may cause permanent damage to the device. These are maximum ratings only operation of the device at these or at any other conditions above those given in the characteristics sections of the specification is not implied. Exposure to maximum values for extended periods of time may affect device reliability.