

# S-Band, GaN/SiC, RF Power Transistor

2.4 - 2.9 GHz | 500 W typ | 50% Efficiency typ | 13dB Gain typ | 48 V | 300µs Pulse Length, 10% Duty Cycle

IGN2429M400 and IGN2429M400S are high power GaN-on-SiC RF power transistors that have been designed to suit the unique needs of modern radar systems. They supply a minimum of 400W of peak output power, with typically >13 dB of gain and 50% efficiency. They operate from a 48 V supply voltage. For optimal thermal efficiency, the transistors are housed in a metal-based package with an epoxy-sealed ceramic lid.

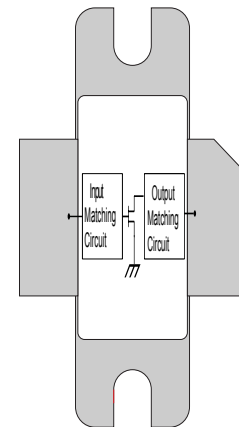


## FEATURES

- GaN on SiC HEMT Technology
- Output Power >400W
- Pre-matched Input and Output Impedances
- High Efficiency - 50% typical
- 100% RF Tested Under 300µs, 10% duty cycle pulse conditions
- RoHS and REACH Compliant

## APPLICATIONS

- S-band Radar Systems



**Table 1. Absolute Maximum Ratings (Not Simultaneous)**

Parameter	Symbol	Value	Units	Test Conditions
DC Drain-Source Voltage	$V_{DS}$	120	V	25 °C
DC Gate-Source Voltage	$V_{GS}$	-5 to +1.0	V	25 °C
DC Drain Current	$I_D$	48	A	25 °C
DC Gate Current	$I_G$	48	mA	25 °C
RF Input Power	$P_{RF,IN}$	25	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 2. 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	$V_{DS} = 48V, I_{DS} = 1mA$
Quiescent Gate Voltage	$V_Q$		-2.6		V	$V_{DS} = 48V, I_{DS} = 200mA$

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

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
RF Output Power	$P_{OUT\ RF}$	400	500	630	W	$P_{IN} = 25W$ $f = 2.4, 2.65, 2.9\ GHz$ $300\mu s$ pulse length, 10% duty cycle $V_{DS} = 48V, I_{DS} = 200mA$
Gain	G	12	13	14	dB	
Drain Efficiency	$\eta$	45	50	75	%	
Pulse Droop	D	-0.5	-0.25	+0.3	dB	
Input Return Loss	IRL	7	12	20	dB	
Load Mismatch Stability	VSWR-S	2:1				
VSWR Withstand	VSWR-LMT	3:1				

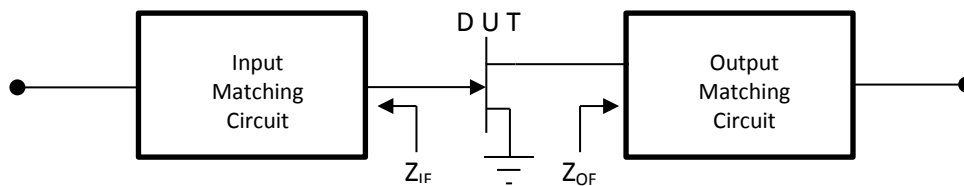
Note: Consult Integra Technologies Application Note 001 for information on how RF output power and pulse droop are measured.

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

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Peak Thermal Resistance, Channel to Case	$R_{TH}$		0.31		°C/W	$P_{DISS} = 400W$ $300\mu s$ pulse length, 10% duty cycle $V_{DS} = 48V$

**Table 5. Matching Circuit Impedances (Case temperature = 25 °C unless otherwise stated)**

Frequency (GHz)	$Z_{IF}$	$Z_{OF}$	Units	Test Conditions
2.4	1.7 - j 1.8	1.6 - j 2.7	$\Omega$	$P_{OUT} = 400W$ $300\mu s$ Pulse length, 10% Duty Cycle $V_{DS} = 48V, I_{DS} = 200mA$
2.65	1.7 - j 1.2	1.9 - j 2.3	$\Omega$	
2.9	1.6 - j 0.4	1.8 - j 1.9	$\Omega$	



TYPICAL PERFORMANCE

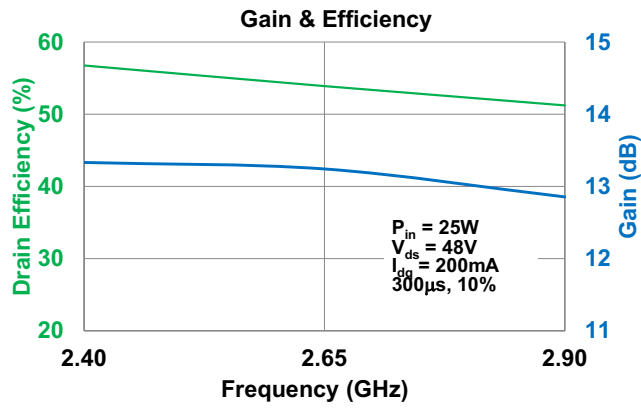


Figure 1

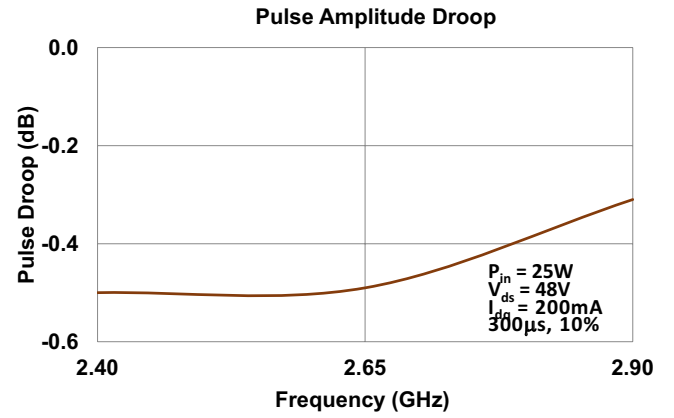


Figure 2

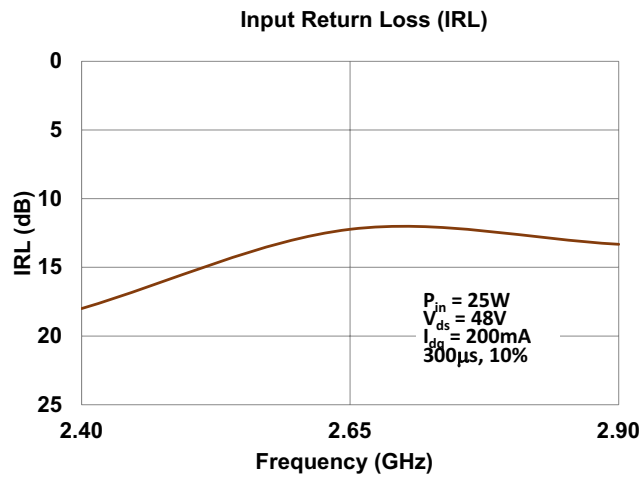
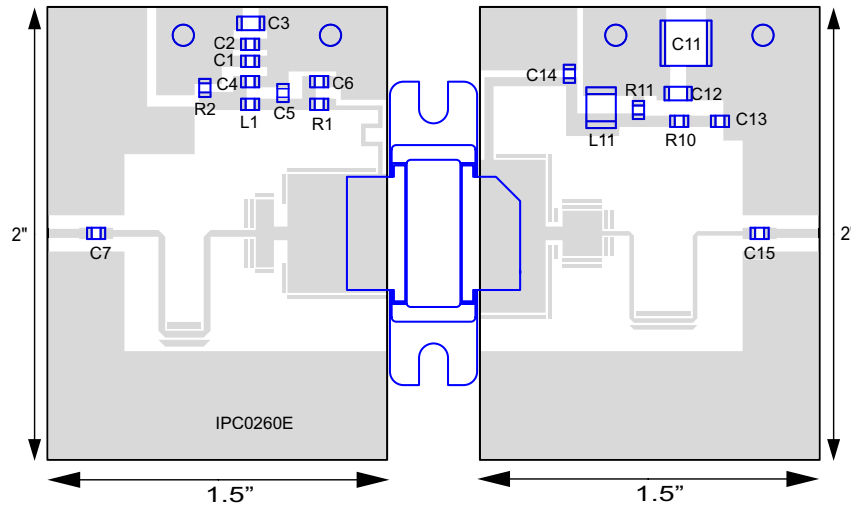


Figure 3

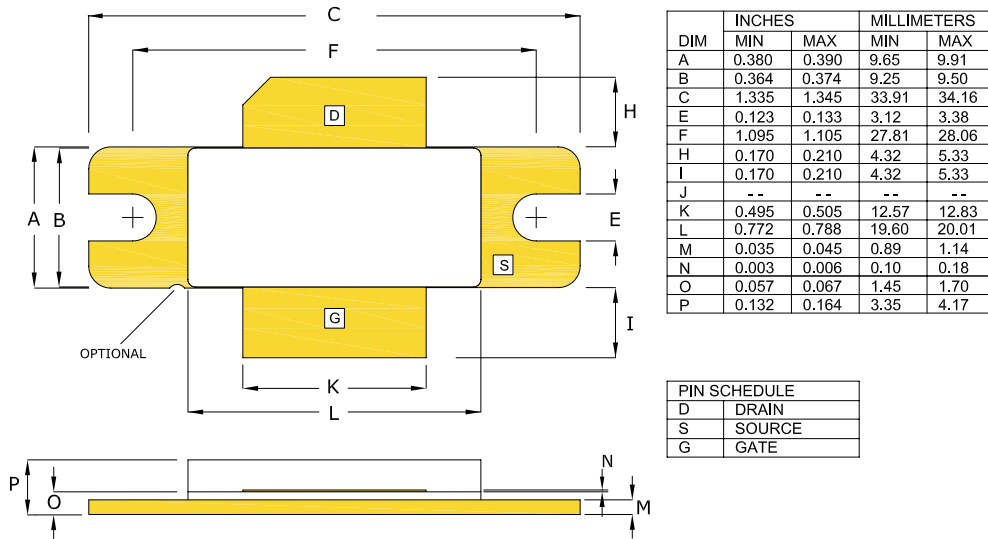
**TEST FIXTURE**



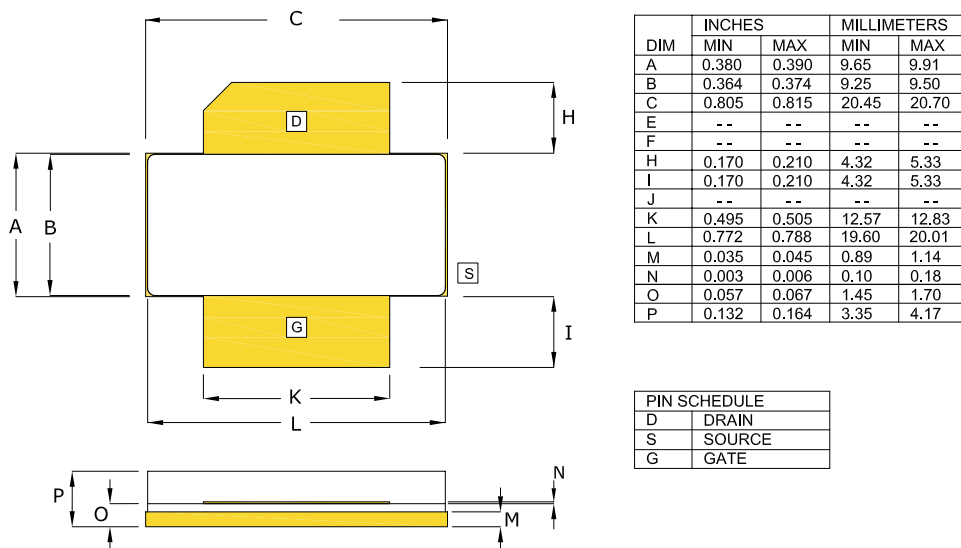
**Bill of Materials for IGN2429M400 Test Fixture**

Designator	Description	Quantity	Part Number
C1, C4, C13	CAP 0.1 $\mu$ F, 0805, 100V	3	08051C104K4T2A
C2, C6, C7, C14, C15	CAP 10pF, 0805	5	ATC600F100
C3, C12	CAP 1 $\mu$ F, 1206, 100V, X7R	2	12061C105K4T2A
C5	CAP 1000pF, 0805, 100V	1	08051A102J4T2A
C11	CAP 10 $\mu$ F, 2220, 100V, X7R	1	22201C106MAT2A
L1	IND FB 120 OHM, 0805, 5A	1	ILHB0805ER121V
L11	IND 5.5nH, 1508	1	1508-5N5JLB
R1, R10, R11	RES 10 OHM, 0805	3	ERJ-6ENF10R0V
R2	RES 200 OHM, 0805	2	ERJ-6ENF2000V
PC Board Type	ROGERS RO4350B-03011, 30mil, 1/1oz. Copper	2	

PACKAGE PL84A1



BOLT-DOWN FLANGE OPTION  
IGN2429M400



EARLESS FLANGE OPTION  
IGN2429M400S

### 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

### RoHS Compliance

Integra Technologies, Inc declares that its GaN and LDMOS Transistor Products comply with EU Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS2), as adopted by EU member states on January 2, 2013 and amended on March 31, 2015 by EU Directive 2015/863/EU.

### 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.

### Disclaimer

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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.