

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

960 - 1220 MHz | 2900 W typ | 70% Efficiency typ | 21dB Gain typ | 75V | 24 x (3.5µs on, 11µs off) Pulse Length, 1.1% LTDC

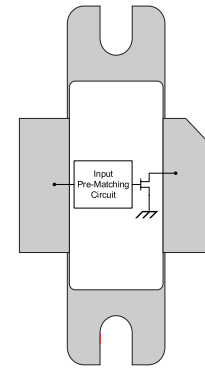
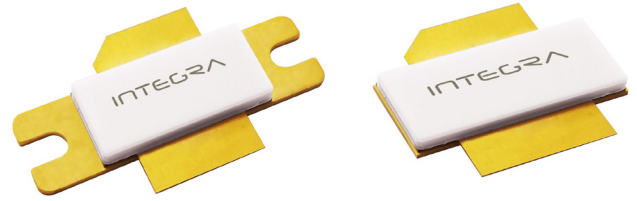
IGN0912M2400 and IGN0912M2400S are high power GaN-on-SiC RF power transistors that have been designed to suit the unique needs of TACAN systems. Under 24 x (3.5µs on, 11µs off), LTDC =1.1% duty cycle pulse conditions, they supply a minimum of 2400 W of peak output power, with typically 20.5dB of associated gain and 65% efficiency. They operate from a 75V 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 >2400 W
- Pre-matched Input Impedance
- 100% RF Tested under 24 x (3.5µs on, 11µs off), LTDC =1.1% pulse conditions
- RoHS and REACH Compliant
- Full non-linear electrothermal model available, please contact the factory

## APPLICATIONS

- TACAN and DME Systems



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

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Gain	G	19	20.5	22	dB	P <sub>OUT</sub> = 2400W f = 960, 1090, 1215 MHz 24 x (3.5µs on, 11µs off), LTDC =1.1% V <sub>ds</sub> = 75V, I <sub>DS</sub> = 100mA
Drain Efficiency	η	62	65	75	%	
Pulse Droop	D	-0.4	-0.2	0.2	dB	
Input Return Loss	IRL	8	20	24	dB	
Load Mismatch Stability	VSWR-S	2:1				
VSWR Withstand	VSWR-LMT	5:1				

Note 1: Consult Integra Technologies Application Note 001 for information on how RF output power and pulse droop are measured.

**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 <sub>p</sub>	-5.0			V	V <sub>DS</sub> = 75V, I <sub>DS</sub> = 1mA
Quiescent Gate Voltage	V <sub>q</sub>		-2.9		V	V <sub>DS</sub> = 75V, I <sub>DS</sub> = 100mA

Table 3. 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 +1.0	V	25 °C
DC Drain Current	$I_D$	98	A	25 °C
DC Gate Current	$I_G$	9.8	mA	25 °C
RF Input Power	$P_{RFIN}$	35	W	25 °C
Operating Channel Temperature	$T_{CH}$	-55 to +225	°C	
Storage Temperature	$T_{STG}$	-62 to +150	°C	
Soldering Temperature	$T_{SOLDER}$	260 for 60s	°C	

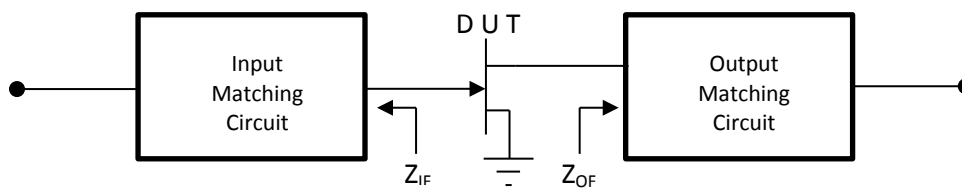
Note: Operation outside the limits given in this table may cause permanent damage to the transistor

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

Parameter	Symbol	Typ	Units	Test Conditions
Peak Thermal Resistance, Channel to Case	$R_{TH}$	0.09	°C/W	$P_{diss} = 1292W$ $V_{DS} = 75V$ 24 x (3.5µs on, 11µs off), LTDC =1.1%

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

Frequency (MHz)	$Z_{IF}$	$Z_{OF}$ Fundamental	$Z_{OF}$ Second Harmonic	Units	Test Conditions
960	0.82 - j 0.72	1.08 - j 1.41	0.10 + j 1.57	$\Omega$	$P_{OUT} = 2400W$ 24 x (3.5µs on, 11µs off), LTDC =1.1% $V_{DS} = 75V, I_{DS} = 100mA$
1090	0.87 - j 0.05	1.13 - j 1.10	0.09 + j 2.71	$\Omega$	
1220	0.93 + j 0.54	0.96 - j 0.97	0.21 + j 4.03	$\Omega$	



TYPICAL PERFORMANCE

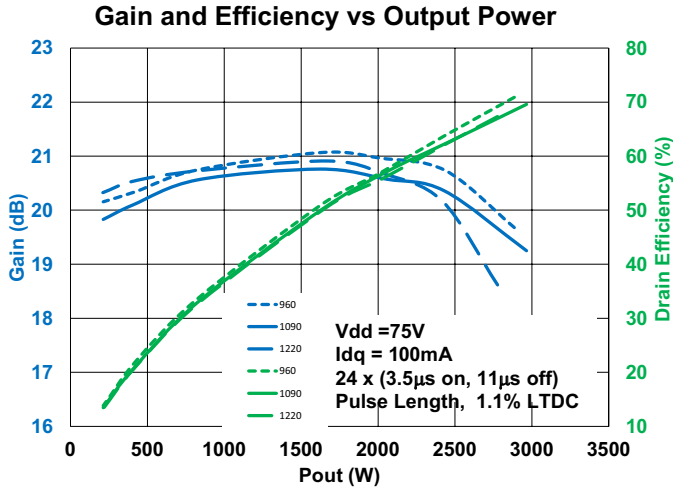


Figure 1

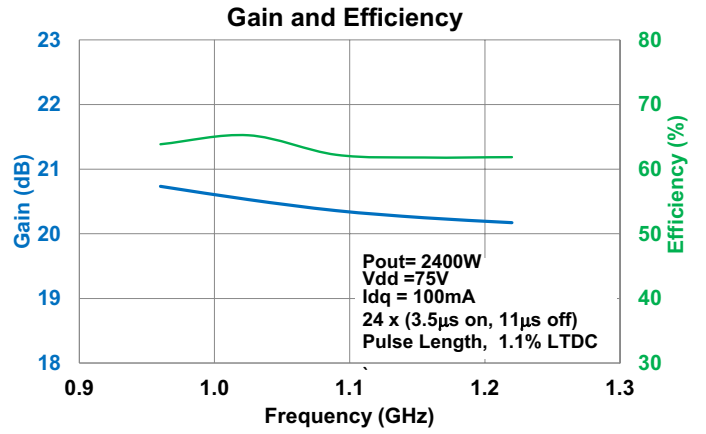


Figure 2

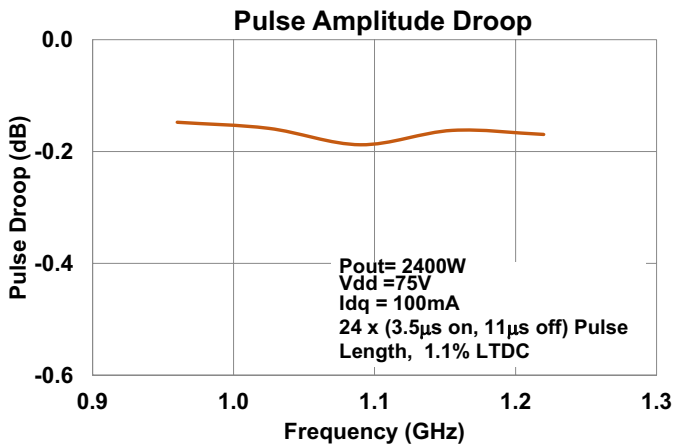


Figure 3

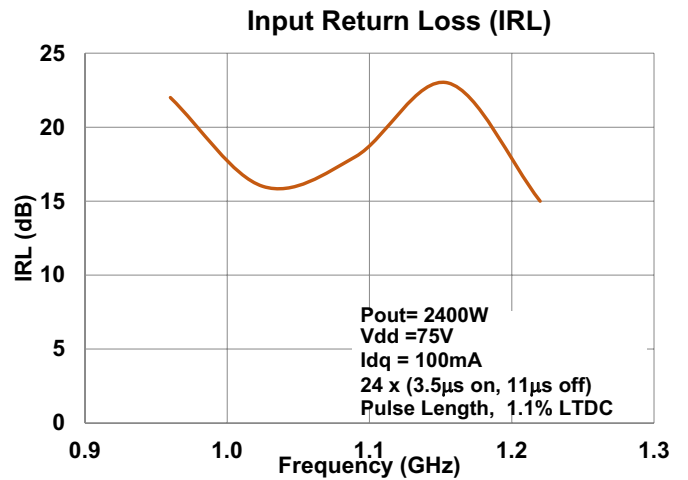
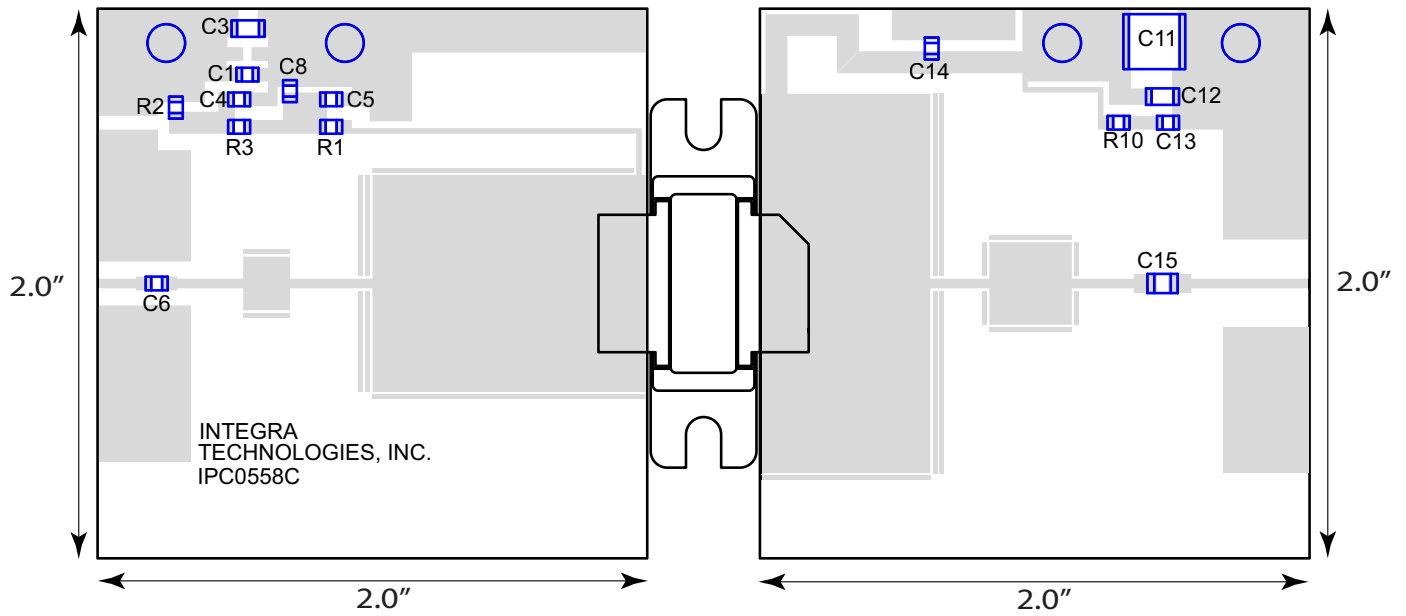


Figure 4

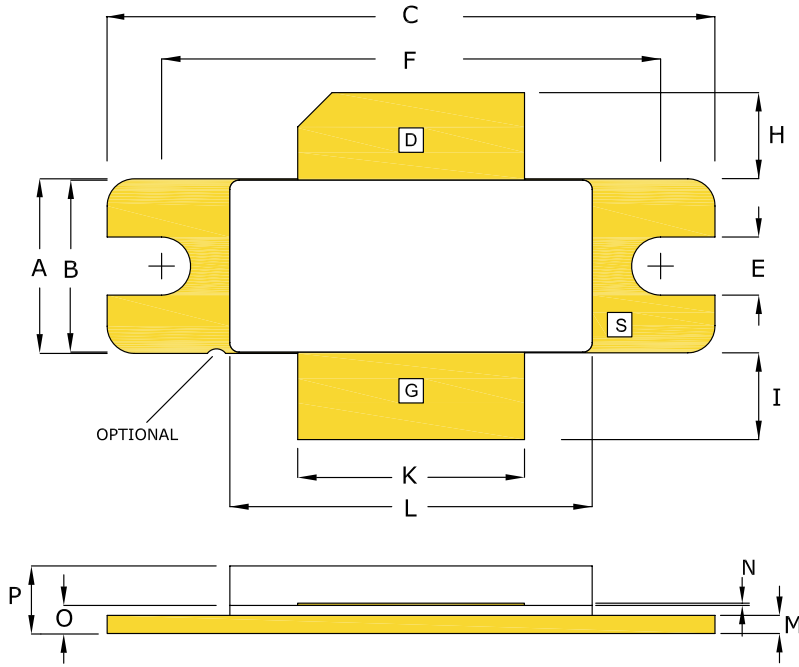
**TEST FIXTURE**



**Bill of Materials for IGN0912M2400 Test Fixture**

Designator	Description	Part Number
C1, C4, C13	CAP 0.1 $\mu$ F, 0755, 100V , X7R	C07551C104K4T2A
C3, C12	CAP 1 $\mu$ F, 1206, 100V, X7R	C12061C105K4T2A
C5, C6, C14	CAP 33pF, 0755	ATC600F330
C8	CAP 1000pF, 0755, 100V	07551A102J4T2A
C11	CAP 10 $\mu$ F, 2220, 100V, X7R	22201C106MAT2A
C15	CAP 150pF, 1111	750B151JT300XT
R1,R10	RES, 15 $\Omega$ , 0755	CRCW075515R0JNEA
R2	RES, 100 $\Omega$ , 0755	CRCW0755100RFKTA
R3	RES, 0 $\Omega$ , 0755	CRCW07550000ZSTA
PC Board	ROGERS RO3006 25mil, 2/2oz. Copper	

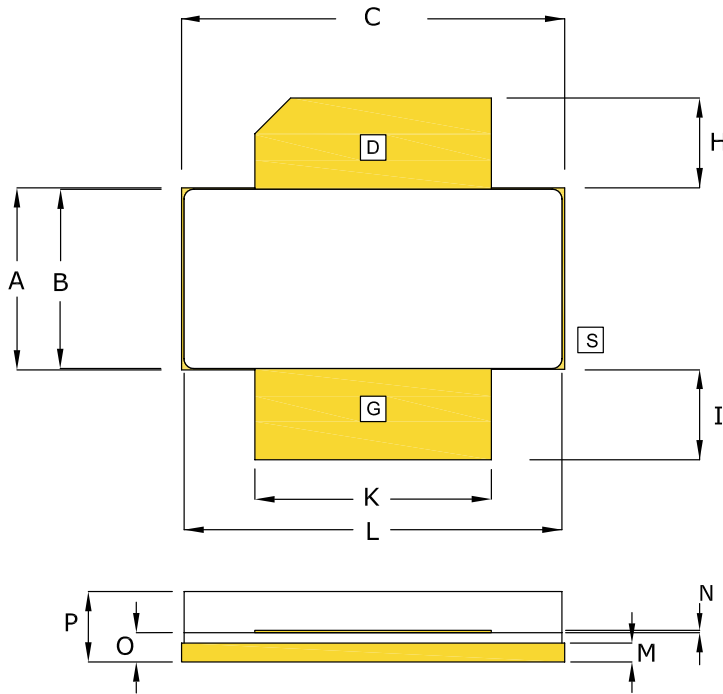
**PACKAGE PL84A1**



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.380	0.390	9.65	9.91
B	0.364	0.374	9.25	9.50
C	1.335	1.345	33.91	34.16
E	0.123	0.133	3.12	3.38
F	1.095	1.105	27.81	28.06
H	0.170	0.210	4.32	5.33
I	0.170	0.210	4.32	5.33
J	--	--	--	--
K	0.495	0.505	12.57	12.83
L	0.772	0.788	19.60	20.01
M	0.035	0.045	0.89	1.14
N	0.003	0.006	0.10	0.18
O	0.057	0.067	1.45	1.70
P	0.132	0.164	3.35	4.17

PIN SCHEDULE	
D	DRAIN
S	SOURCE
G	GATE

**IGN0912M2400**



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.380	0.390	9.65	9.91
B	0.364	0.374	9.25	9.50
C	0.805	0.815	20.45	20.70
E	--	--	--	--
F	--	--	--	--
H	0.170	0.210	4.32	5.33
I	0.170	0.210	4.32	5.33
J	--	--	--	--
K	0.495	0.505	12.57	12.83
L	0.772	0.788	19.60	20.01
M	0.035	0.045	0.89	1.14
N	0.003	0.006	0.10	0.18
O	0.057	0.067	1.45	1.70
P	0.132	0.164	3.35	4.17

PIN SCHEDULE	
D	DRAIN
S	SOURCE
G	GATE

**IGN0912M2400S**

### 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

Integra Technologies Inc. reserves the right to make changes without further notice to any products herein. Integra Technologies Inc. makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Integra Technologies Inc. assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. Integra Technologies Inc. products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Integra Technologies Inc. customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Integra Technologies Inc. for any damages resulting from such improper use or sale.

#### 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.