

L-Band, GaN/SiC, RF Power Transistor

960-1220 MHz | 45 W | 60% Efficiency typ | 20.5 dB Gain typ | 50 V | Link 16

IGN0912L45 and IGN0912L45S are high power GaN-on-SiC RF power transistors that have been designed to suit the needs of IFF/SSR avionics systems, military tactical data links, and TACAN/DME systems. They operate over the full instantaneous bandwidth of 960-1220MHz. Under Link 16 [444x (7μs on, 6μs off), 22.7% Long Term Duty Cycle] pulse conditions they supply a minimum of 45 W of peak output power, with typically 20.5 dB of gain and 60% efficiency. They operate from a 50 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 >45 W
- Pre-matched Input and Output Impedance
- High Efficiency - 60% typical
- 100% RF Tested Under Link 16 pulse conditions
- RoHS and REACH Compliant

APPLICATIONS

- Link 16 applications
- TACAN/DME Systems

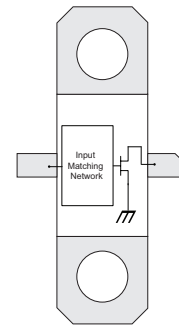


Table 1. Absolute Maximum Ratings (Not Simultaneous)

Parameter	Symbol	Value	Units	Test Conditions
DC Drain-Source Voltage	V_{DS}	160	V	25 °C
DC Gate-Source Voltage	V_{GS}	-8 to +1	V	25 °C
DC Drain Current	I_D	3.6	A	25 °C
DC Gate Current	I_G	3.6	mA	25 °C
RF Input Power	$P_{RF,IN}$	0.5	W	25 °C
Operating Channel Temperature	T_J	-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			V	$V_{DS} = 50V, I_{DS} = 1mA$
Quiescent Gate Voltage	V_Q		-2.5		V	$V_{DS} = 50V, I_{DS} = 20mA$

Table 3. RF Electrical Characteristics (Case temperature = 30 °C unless otherwise stated)

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
RF Output Power	$P_{OUT,RF}$	35.5	55	80	W	$P_{IN} = 0.5W$ $f = 960, 1090, 1220 \text{ MHz}$ $V_{DS} = 50V, I_{DS} = 20mA$ Link 16 pulse conditions (444 x [7µs on, 6µs off], LTDC = 22.7%)
Gain	G	18.5	20.5	22	dB	
Drain Efficiency	η	50	60	70	%	
Input Return Loss	IRL	7	12	20	dB	
Pulse Droop	D	-0.5	-0.2	+0.2	dB	
Load Mismatch Stability	VSWR-S	2:1				
VSWR Withstand	VSWR-LMT	3:1				

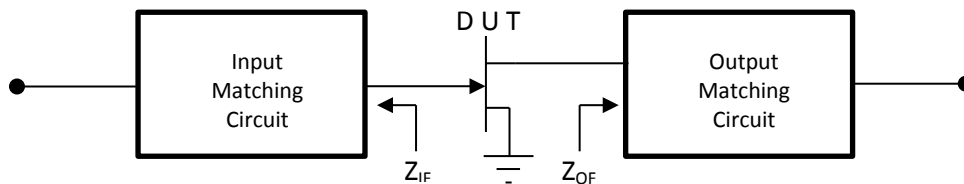
Note: Consult Integra Technologies Application Note 001 for information on how RF output power and pulse droop are measured for the ELM and Link 16 pulse trains.

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}	3.8	°C/W	$P_{DISS} = 36.7W$ Link 16 pulse conditions (444 x [7µs on, 6µs off], LTDC = 22.7%) $V_{DS} = 50V$

Table 5. Test Fixture Source & Load Impedances (Case temperature = 25 °C unless otherwise stated)

Frequency (MHz)	Z_{IF}	Z_{OF}	Units	Test Conditions
960	3.4 - j 3.1	12.1 + j 5.4	Ω	$P_{OUT} = 45W$ Link 16 pulse conditions (444 x [7µs on, 6µs off], LTDC = 22.7%) $V_{DS} = 50V, I_{DS} = 20mA$
1090	3.3 - j 1.3	12.1 + j 3.6	Ω	
1215	3.4 + j 0.4	11.4 + j 2.9	Ω	



TYPICAL PERFORMANCE

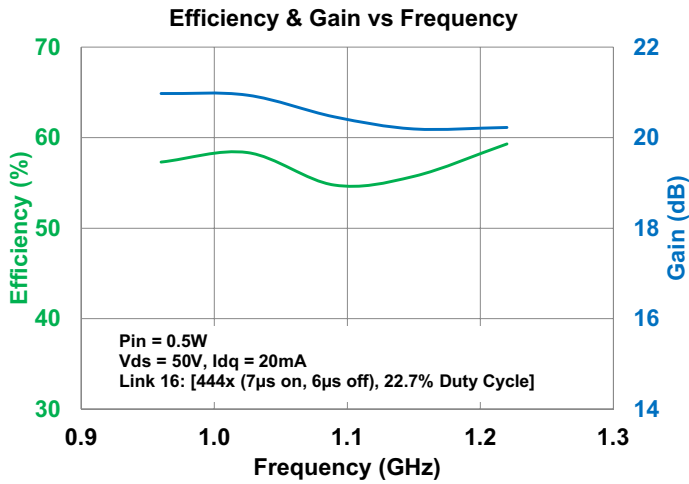


Figure1

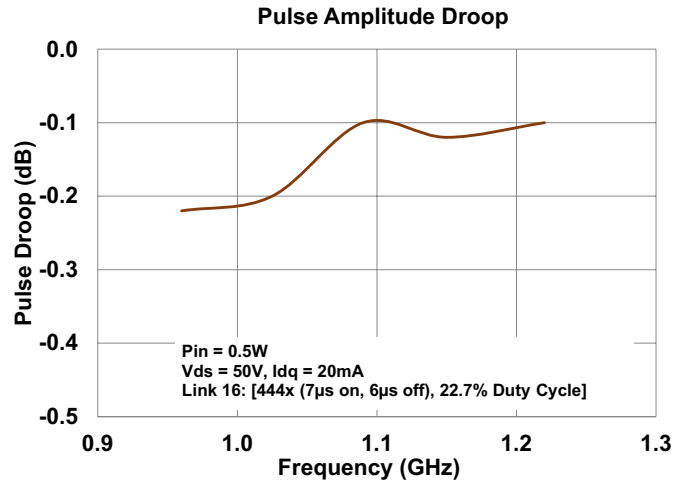


Figure 2

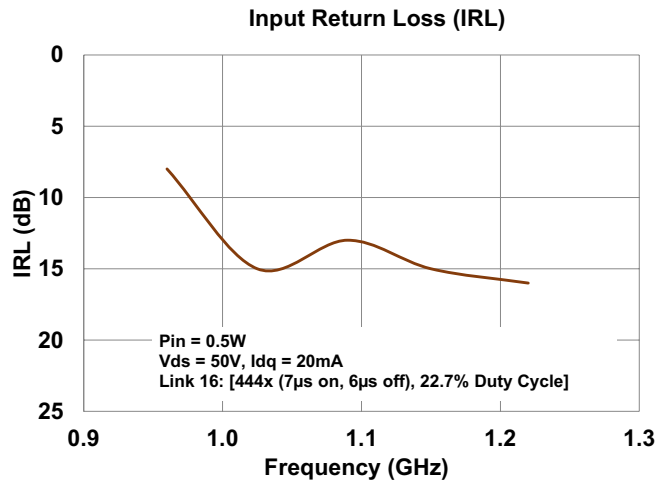
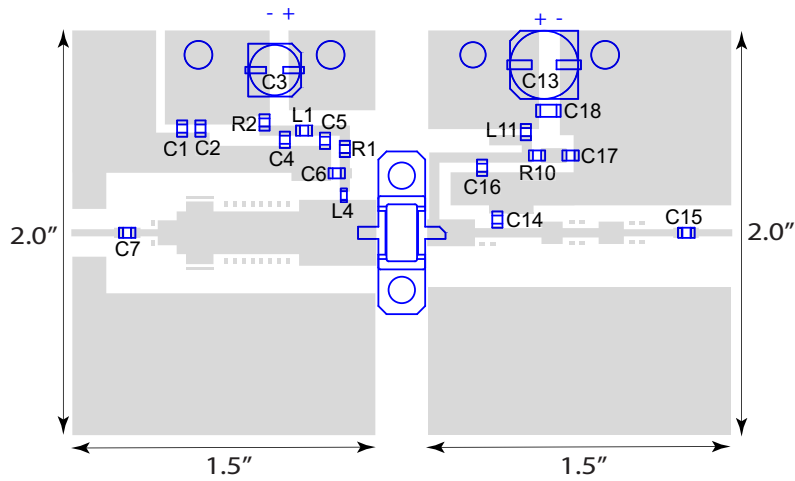


Figure 3

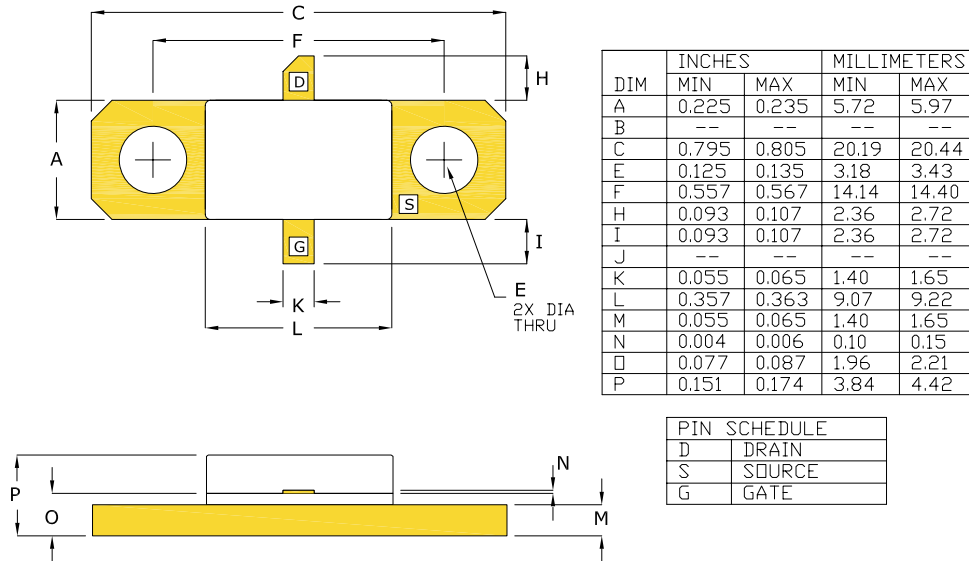
TEST FIXTURE



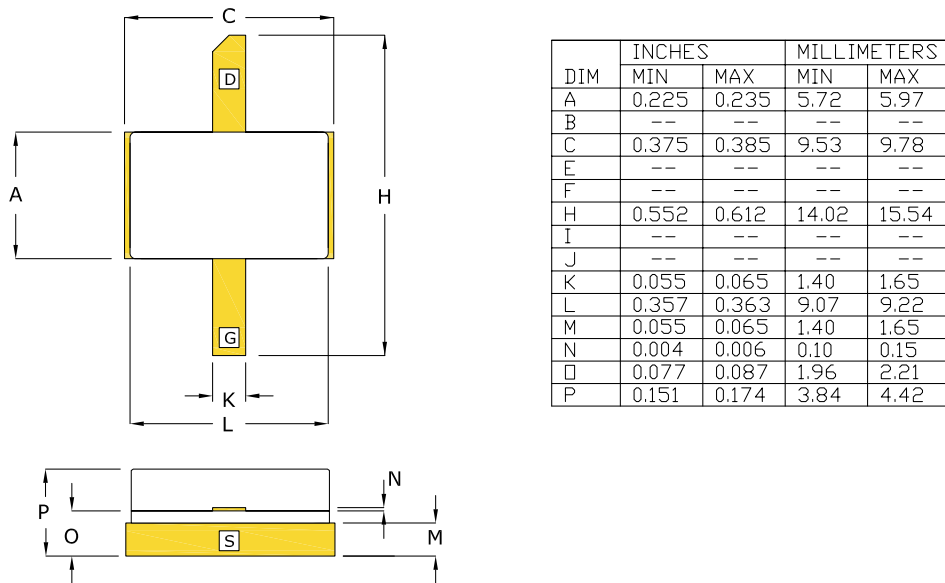
Bill of Materials for IGN0912L45 Test Fixture

Designator	Description	Part Number
C1, C4, C17	CAP 0.1 μ F, 0805, 100V, X7R	08051C104K4T2A
C2, C5	CAP 1000pF, 100V, 0805	08051A102J4T2A
C3	CAP Electrolytic 47 μ F, 25V	PCV1E470MCL2GS
C6, C7, C15, C16	CAP 18pF, 0805	600F180JT250XT
C13	CAP Electrolytic 68 μ F, 63V	EEE-FK1J680P
C14	CAP 3.3pF, 0805	600F3R3BT250XT
C18	CAP 1 μ F, 100V, 1206, X7R	12061C105K4T2A
L1	Zero Ohm Resistor, 0805	6GEY0R00V
L4	IND 120nH, 0603	0603HP-R12XJE
L11	IND FB 120 OHM, 5A, 0805	ILHB0805ER121V
R1, R10	RES 5.1 OHM, 0805	ERJ-6GEYJ5R1V
R2	RES 200 OHM, 0805	ERJ-6ENF2000V
PC Board Type	ROGERS RT6006, 25mil, 1/1oz. Copper	

PACKAGE PL32A2



**BOLT-DOWN FLANGE OPTION
IGN0912L45**



**EARLESS FLANGE OPTION
IGN0912L45S**

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.

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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.

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