

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

1.2 - 1.4 GHz | 35 W typ | 60% Efficiency typ | 16.4 dB Gain typ | 42 V | 5ms Pulse Length, 30% Duty Cycle

IGN1214L30 is a high power GaN-on-SiC RF power transistor that has been designed to suit the unique needs of modern long-pulse, long-range radar systems. It supplies a minimum of 30 W of peak output power, with typically >16.4 dB of gain and 60% efficiency. It operates from a 42 V supply voltage. For optimal thermal efficiency, the transistor is housed in a metal-based package with an epoxy-sealed ceramic lid.



## FEATURES

- GaN on SiC HEMT Technology
- Output Power >30 W
- Pre-matched Input and Output Impedance
- High Efficiency - up to 60%
- 100% RF Tested Under 5ms, 30% duty cycle pulse conditions
- RoHS and REACH Compliant

## APPLICATIONS

- L-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	$V_{GS}$	-8 to +1.5	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	$P_{RF,IN}$	1	W	25 °C
Operating Junction Temperature	$T_J$	-55 to +200	°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	$V_{DS} = 42V, I_{DS} = 1mA$
Quiescent Gate Voltage	$V_Q$		-2.6		V	$V_{DS} = 42V, I_{DS} = 35mA$

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

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Input Return Loss	IRL	7	12	18	dB	$P_{IN} = 0.8W$ $f = 1.2, 1.3, 1.4 \text{ GHz}$ 5ms pulse length 30% duty cycle pulse conditions $V_{DS} = 42V, I_{DS} = 35mA,$
RF Output Power	$P_{OUT,RF}$	30	35	44	W	
Gain	G	15.7	16.4	17.4	dB	
Drain Efficiency	$\eta$	55	60	75	%	
Pulse Droop	D	-0.5	-0.2	+0.2	dB	
Load Mismatch Stability	VSWR-S	2:1				
VSWR Withstand	VSWR-LMT	3:1				

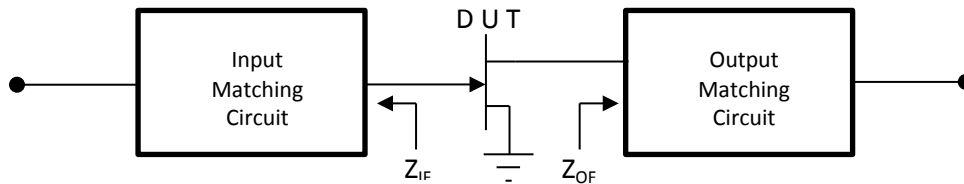
Note: Consult Integra Technologies Application Note 001 for information on how RF output power and pulse droop are measured.

**Table 4. Thermal Resistance (Case temperature = 25 °C unless otherwise stated)**

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Peak Thermal Resistance, Junction to Case	$R_{TH(JC)}$			5.0	°C/W	$P_{OUT} = 30W, 55\% \text{ Efficiency}$ $f = 1.2, 1.3, 1.4 \text{ GHz}$ 5ms pulse length, 30% duty cycle $V_{DS} = 42V, I_{DS} = 35mA$

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

Frequency (GHz)	$Z_{IF}$	$Z_{OF}$	Units	Test Conditions
1.2	1.8 - j 1.1	2.0 - j 1.8	$\Omega$	$P_{OUT} = 30W$ 5ms Pulse length, 30% Duty Cycle $V_{DS} = 42V, I_{DS} = 35mA$
1.3	2.0 - j 0.3	2.0 - j 1.6	$\Omega$	
1.4	2.3 + j 0.4	1.9 - j 1.4	$\Omega$	



TYPICAL PERFORMANCE

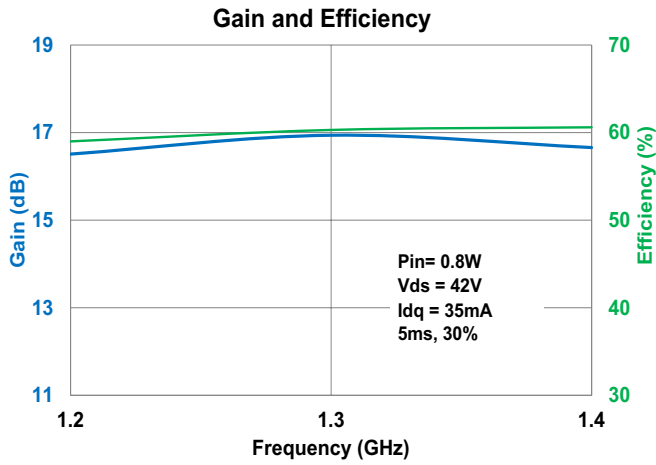


Figure 1

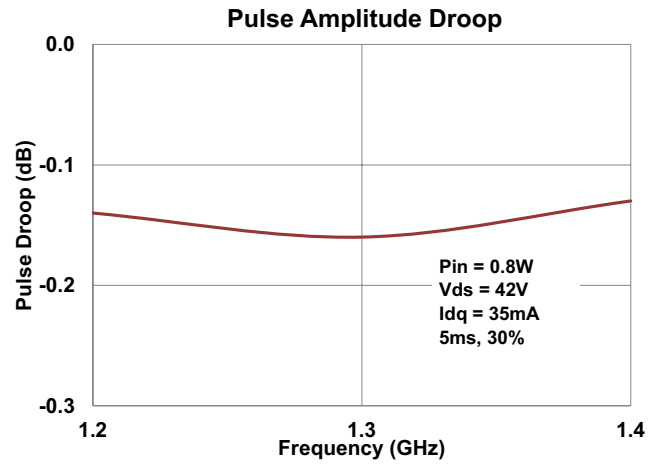


Figure 2

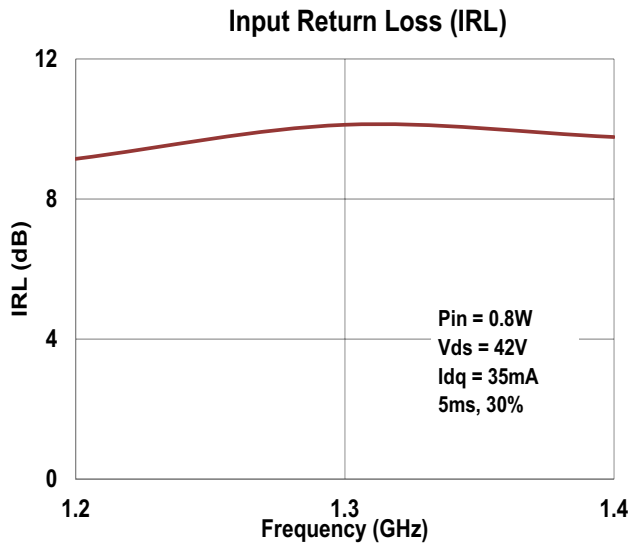


Figure 3

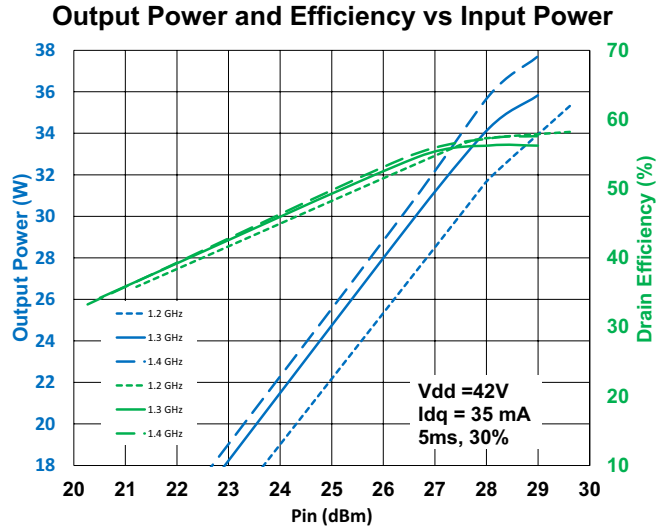
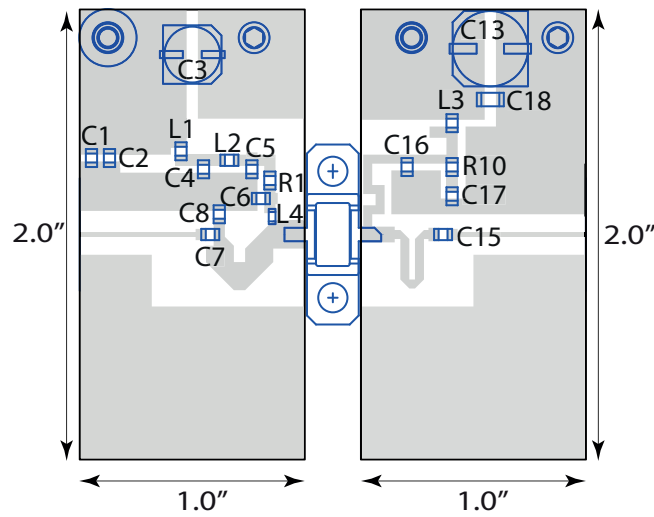


Figure 4

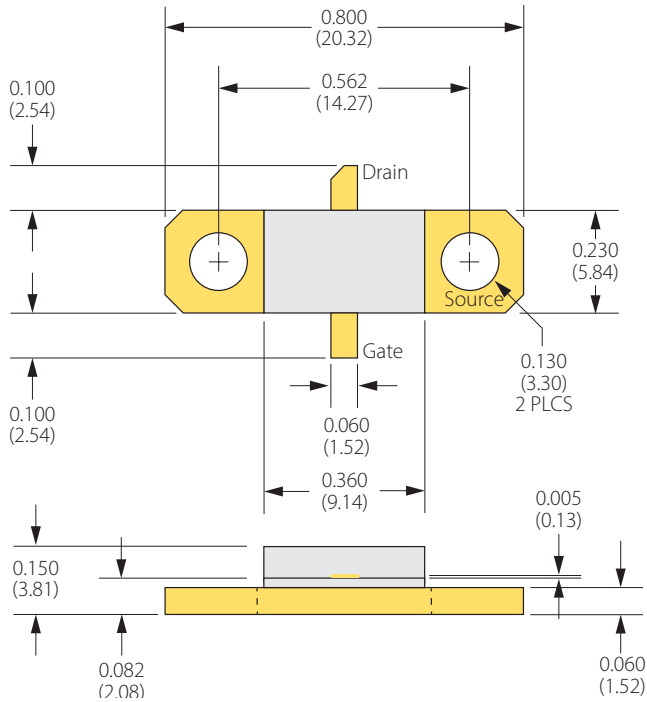
**TEST FIXTURE**



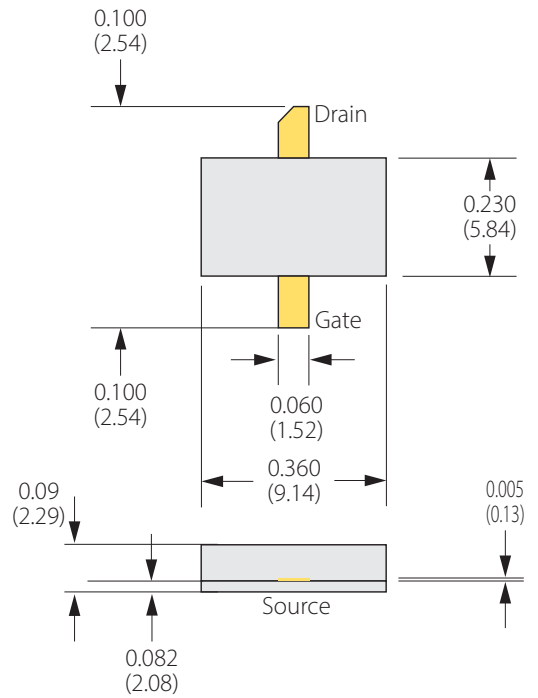
**Bill of Materials for IGN1214L30 Test Fixture**

Designator	Description	Quantity	Part Number
C1, C4, C17	CAP 0.1 $\mu$ F, 0805, 100V	3	08051C104K4T2A
C2, C5	CAP 1000pF, 0805, 100V	2	08051C104K4T2A
C3	CAP 47 $\mu$ F, 25V, Electrolytic	1	PCV1E470MCL2GS
C6, C7, C15, C16	CAP 18pF, 0805, Edge Mount	4	600F180JT250XT
C8	CAP 1pF, 0805	1	600F1R0BT250XT
C13	CAP 68 $\mu$ F, 0810, 63V, Electrolytic	1	EEE-FK1J680P
C18	CAP 1 $\mu$ F, 1206, 100V	1	12061C104KAT2A
L1, L2, L3	IND FB 120 OHM, 0805, 5A	3	ILHB0805ER121V
L4	IND FB, 120nH, 0603	1	0603HP-R12XJB
R1, R10	RES, 5.1 OHM, 0805	2	ERJ-6GEYJ5R1V
PC Board Type	ROGERS RT6010.2, 25mil, 1/1oz. Copper	2	

**PACKAGE PL32A2**



**BOLT-DOWN FLANGE OPTION  
IGN1214L30**



**EARLESS FLANGE OPTION  
IGN1214L30S**

**Dimensions: Inches (mm)**

**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.