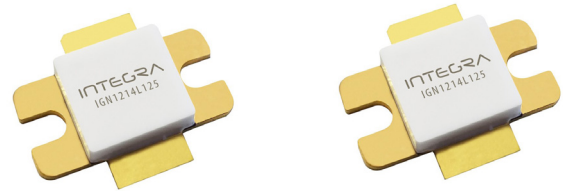


L-Band, GaN/SiC, RF Power Transistor

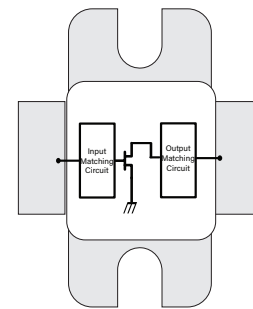
1.20 - 1.40 GHz | 160W typ | 60% Efficiency typ | 18dB Gain typ | 50V | 2ms Pulse Length, 20% Duty Cycle

IGN1214L125 and IGN1214L125S are high power GaN-on-SiC RF power transistors that have been designed specifically for use in L-band radar systems. They operate over the full bandwidth of 1.20 - 1.40 GHz. They supply a minimum of 125W of peak output power, with typically >18 dB of gain and 60% efficiency. They operate from a 50V supply voltage.



FEATURES

- GaN on SiC HEMT Technology
- Output Power 160 W typical
- Pre-matched Input & Output Impedance
- High Efficiency - >60%
- 100% RF Tested
- RoHS and REACH Compliant
- IGN1214L125 has a bolt-down flange, IGN1214L125S is the earless flange option
- Enhanced thermal conductivity flange



APPLICATIONS

- L-band Radar Systems

Table 1. Absolute Maximum Ratings (Not Simultaneous)

Parameter	Symbol	Value	Units	Test Conditions
DC Drain-Source Supply Voltage	V_{DS}	150		25 °C
DC Gate-Source Voltage	V_{GS}	-8 to +1	V	25 °C
DC Drain Current	I_D	12	A	25 °C
DC Gate Current	I_G	12	mA	25 °C
RF Input Power	$P_{RF,IN}$	3	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+/-5 °C unless otherwise stated)

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Gate Pinch-Off Voltage	V_P	-4.0	-3.0	-2.5	V	$V_{DS} = 50V, I_{DS} = 4mA$
Quiescent Gate Voltage	V_Q		-2.8		V	$V_{DS} = 50V, I_{DS} = 25mA$

Table 3. RF Electrical Characteristics (Case temperature = 25+/-5 °C unless otherwise stated)

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Output Power	P_{OUT}	125	160	200	W	$P_{IN} = 2.5W$ $f = 1.2, 1.3, 1.4 \text{ GHz}$ 2ms pulse length, 20% duty cycle $V_{DS} = 50V, I_{DS} = 25mA$
Gain	G	17	18	19	dB	
Drain Efficiency	η	50	60	70	%	
Pulse Droop	D	-0.6	-0.0	+0.2	dB	
Input Return Loss	IRL	7	12	20	dB	
Second Harmonic			-17		dBc	
Third Harmonic			-21		dBc	
Load Mismatch Stability	VSWR-S	2:1				$P_{OUT} = 125W$ $f = 1.2, 1.3, 1.4 \text{ GHz}$ 2ms pulse length, 20% duty cycle $V_{DS} = 50V, I_{DS} = 25mA$
VSWR Withstand	VSWR-LMT	5:1				

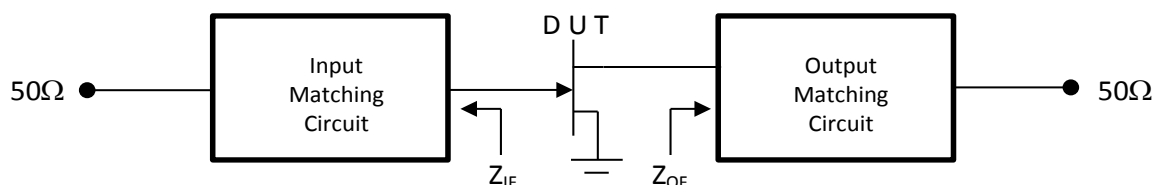
Note: Consult Integra Technologies Application Note 001 for information on how RF output power and pulse droop are measured.

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}		1.5		°C/W	$P_{DISS} = 106.7W$ 2ms pulse length, 20% duty cycle $V_{DS} = 50V$

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

Frequency (GHz)	Z_{IF}	Z_{OF}	Units	Test Conditions
1.2	2.8 - j 2.1	6.7 - j 4.9	Ω	$P_{OUT} = 125W$ 2ms Pulse length, 20% Duty Cycle $V_{DS} = 50V, I_{DS} = 25mA$
1.3	2.8 - j 1.0	6.7 - j 3.6	Ω	
1.4	2.8 + j 0.1	6.8 - j 2.4	Ω	



TYPICAL PERFORMANCE

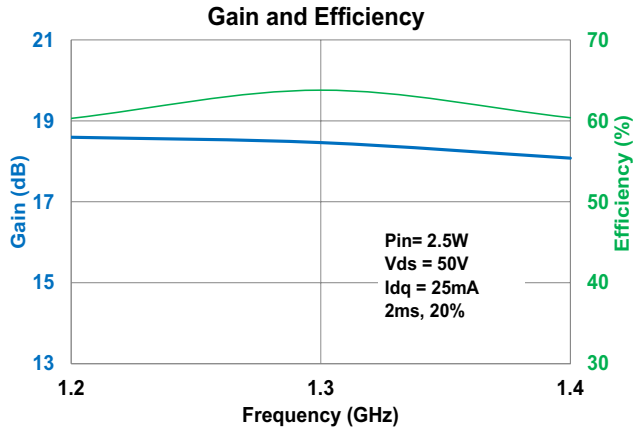


Figure 1

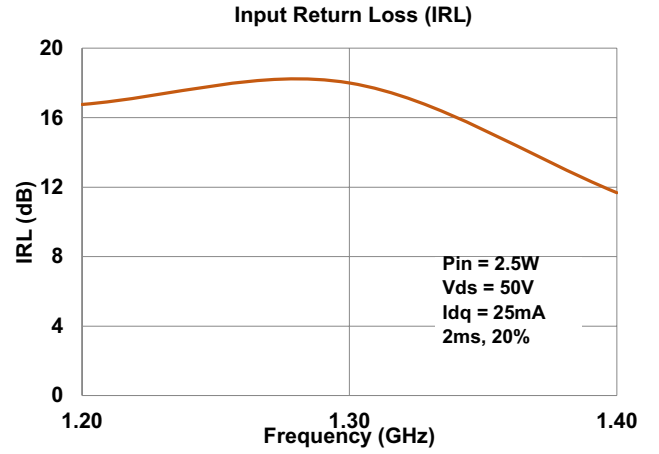


Figure 2

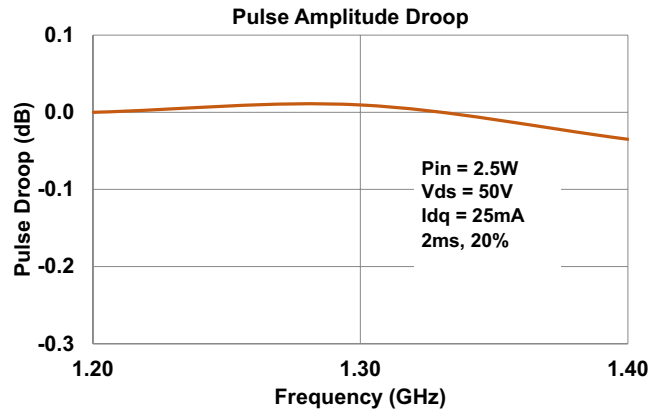
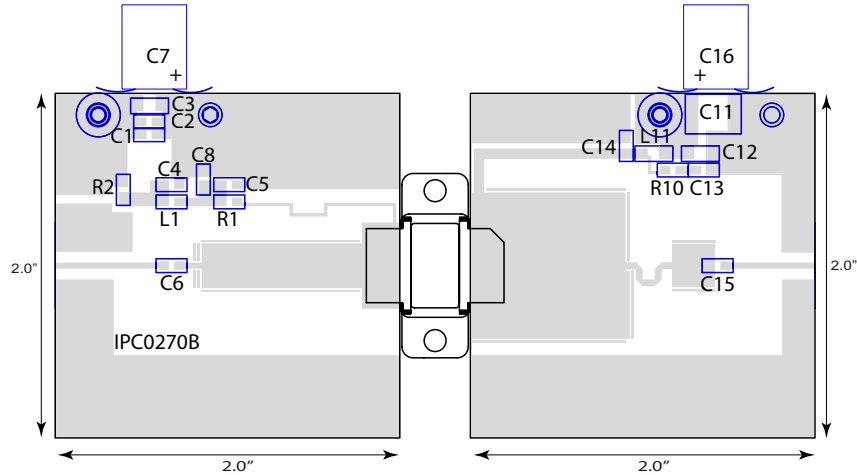


Figure 3

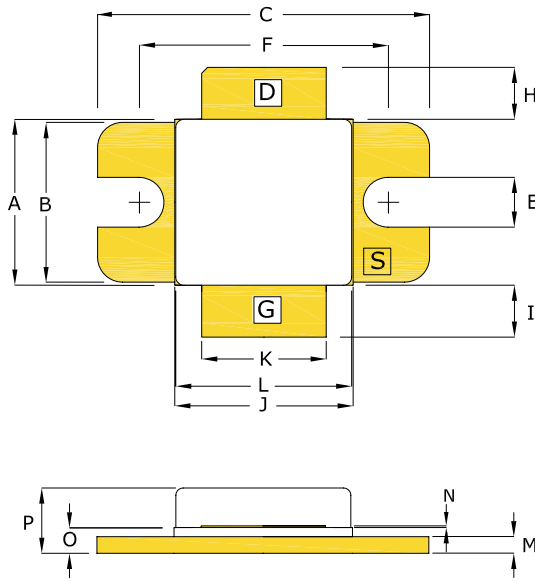
TEST FIXTURE



Bill of Materials for IGN1214L125 Test Fixture

Designator	Description	Quantity	Part Number
C1	CAP 47 μ F, 25V, Electrolytic	1	PCV1E470MCL2GS
C2	CAP 1000pF, 0805, 100V	1	08051A102J4T2A
C3, C11	CAP 0.1 μ F, 0805, 100V, X7R	2	08051C104K4T2A
C4, C5, C10, C13	CAP 18pF, 0805	4	600F180JT250XT
C8	CAP 1pF, 0805	1	600F1R0BT250XT
C12	CAP 68 μ F, 63V, Electrolytic	1	EEE-FK1J680P
C14	CAP 4700 μ F, 63V, Electrolytic	1	UVR1J472MRD6
C19	CAP 1 μ F, 1206, 100V, X7R	1	12061C104KAT2A
L3, L4	IND FB, 33 OHM, 1206, 6A	2	BLM31PG330SH1L
L5	IND 18.5nH, 0908	1	A05TJLB
R1, R10	RES, 10 OHM, 0805	2	ERJ-6ENF10R0V
R3	RES, 390 OHM, 0805	1	ERJ-6GEYJ391V
PC Board Type	ROGERS RT6006, 25mil, 1/1oz. Copper	2	

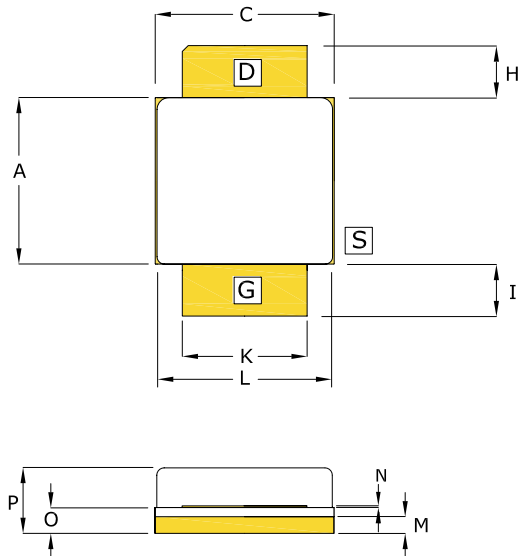
PACKAGE PL44C1



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.395	0.405	10.03	10.29
B	0.380	0.390	9.65	9.91
C	0.795	0.805	20.19	20.45
E	0.115	0.125	2.92	3.18
F	0.595	0.605	15.11	15.37
H	0.110	0.140	2.79	3.56
I	0.110	0.140	2.79	3.56
J	0.425	0.435	10.80	11.05
K	0.295	0.305	7.49	7.75
L	0.420	0.428	10.67	10.87
M	0.035	0.045	0.89	1.14
N	0.004	0.007	0.10	0.18
O	0.053	0.067	1.35	1.70
P	0.143	0.179	3.63	4.55

PIN SCHEDULE	
D	DRAIN
S	SOURCE
G	GATE

**BOLT-DOWN FLANGE OPTION
IGN1214L125**



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.393	0.408	9.97	10.35
B	--	--	--	--
C	0.423	0.438	10.73	11.11
E	--	--	--	--
F	--	--	--	--
H	0.110	0.140	2.79	3.56
I	0.110	0.140	2.79	3.56
J	--	--	--	--
K	0.295	0.305	7.49	7.75
L	0.420	0.428	10.67	10.87
M	0.035	0.045	0.89	1.14
N	0.004	0.007	0.10	0.18
O	0.053	0.067	1.35	1.70
P	0.143	0.179	3.63	4.55

PIN SCHEDULE	
D	DRAIN
S	SOURCE
G	GATE

**EARLESS FLANGE OPTION
IGN1214L125S**

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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