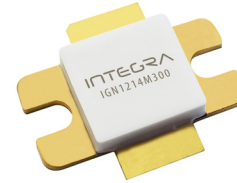


# L-Band, GaN/SiC, RF Power Transistor

1.20 - 1.40 GHz | 380W typ | 72% Efficiency typ | 17dB Gain typ | 50V | 300µs Pulse Length, 10% Duty Cycle

IGN1214M300 and IGN1214M300S 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 300W of peak output power, with typically >17 dB of gain and 72% efficiency. They operate from a 50V supply voltage.



## FEATURES

- GaN on SiC HEMT Technology
- Output Power >380 W
- Pre-matched Input & Output Impedance
- High Efficiency - >72% typical
- Capable of withstanding 5:1 VSWR mismatch
- 100% RF Tested
- RoHS and REACH Compliant
- IGN1214M300 has a bolt-down flange, IGN1214M300S 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	$V_{DS}$	135		25 °C
DC Gate-Source Voltage	$V_{GS}$	-8 to +1	V	25 °C
DC Drain Current	$I_D$	26.4	A	25 °C
DC Gate Current	$I_G$	26.4	mA	25 °C
RF Input Power	$P_{RF,IN}$	20	W	25 °C
Operating Ambient Temperature	$T_J$	-40 to +85	°C	
Storage Temperature	$T_{STG}$	-55 to +150	°C	
Soldering Temperature	$T_{SOLDER}$	250	°C	<50 sec at >200 °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	$V_q$		-2.6		V	$V_{DS} = 50V, I_{DS} = 100mA$

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

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Output Power	$P_{OUT}$	300	380	450	W	$P_{IN} = 7.5W$ $f = 1.2, 1.3, 1.4 \text{ GHz}$ 300 $\mu$ s pulse length, 10% duty cycle $V_{DS} = 50V, I_{DS} = 100mA$
Gain	G	16	17.0	17.8	dB	
Drain Efficiency	$\eta$	60	72	85	%	
Pulse Droop	D	-0.2	0.1	0.4	dB	
Input Return Loss	IRL	8	12	18	dB	
Load Mismatch Stability	VSWR-S	2:1				

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+/-5 °C unless otherwise stated)**

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Peak Thermal Resistance, Junction to underneath side of flange	$R_{TH(JC)}$		0.4	0.45	°C/W	$P_{OUT} = 300W$ Efficiency 72% $f = 1.3 \text{ GHz}$ 300 $\mu$ s pulse length, 10% duty cycle $V_{DS} = 50V, I_{DS} = 100mA$

TYPICAL PERFORMANCE

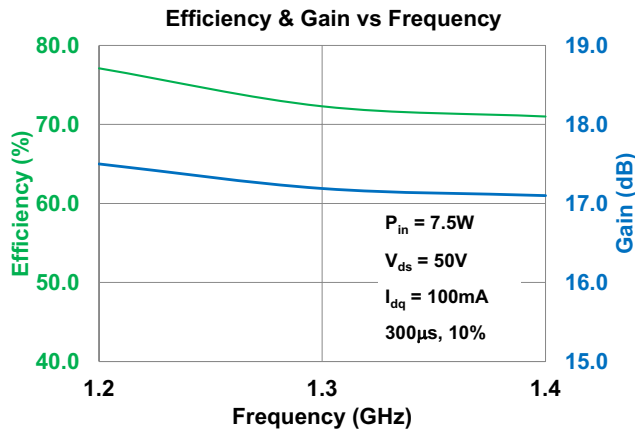


Figure 1

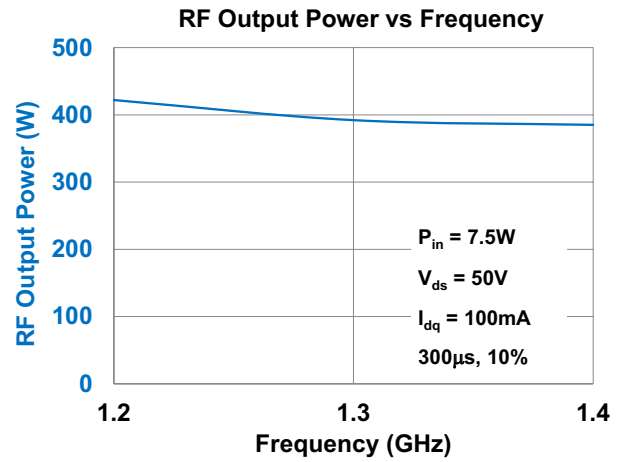


Figure 2

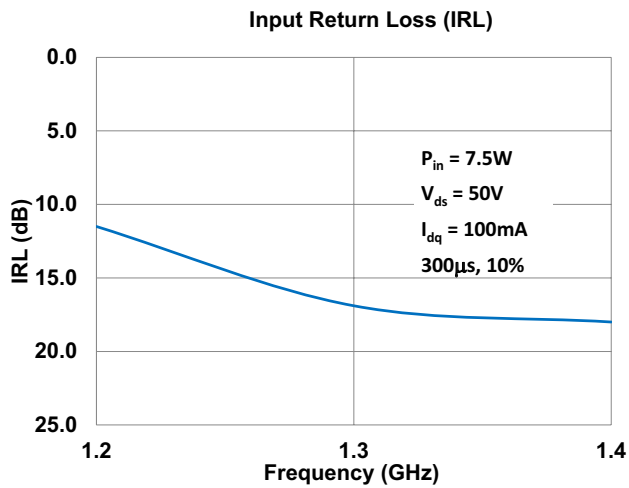


Figure 3

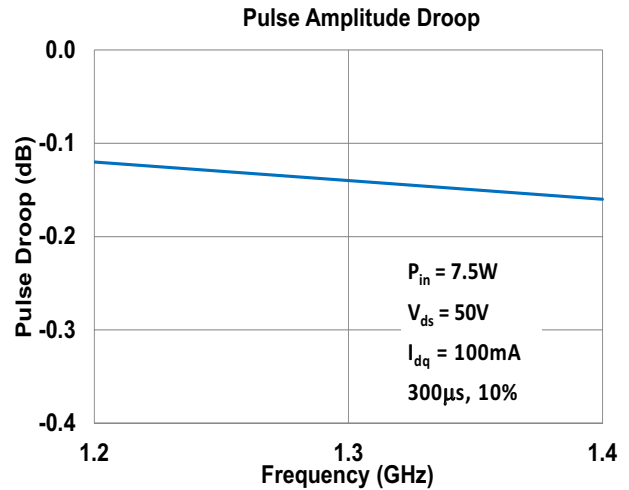
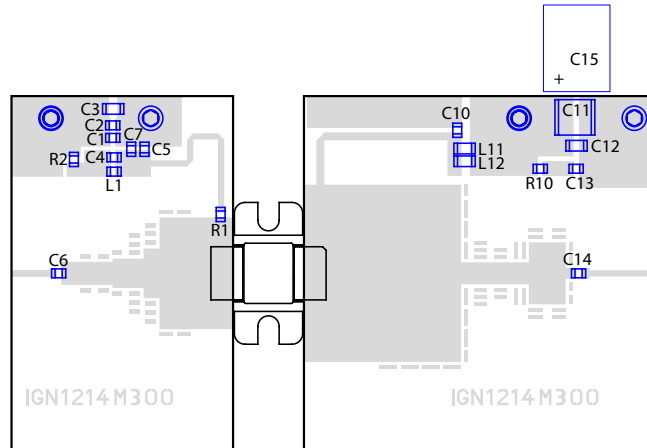


Figure 4

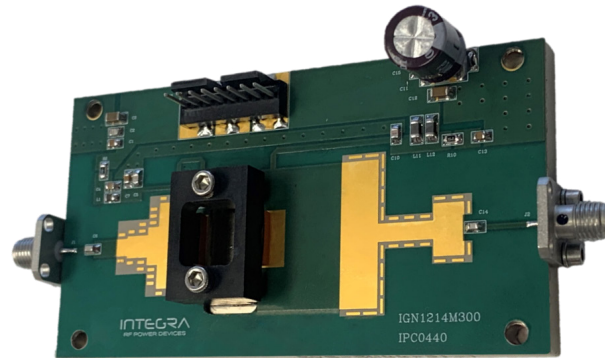
**TEST FIXTURE**



**Bill of Materials for IGN1214M300 Test Fixture**

Designator	Description	Quantity	Part Number
C1, C4, C13	CAP 0.1 $\mu$ F, 0805, 50V	3	08051C104K4T2A
C2, C5, C6, C14	CAP 18pF, 0805	4	ATC600F180
C3, C12	CAP 1 $\mu$ F, 1206	2	12061C105K4T2A
C7	CAP 1000pF, 0805, 50V X7R	1	UPW1J680MPD
C10	CAP 100pF, 0805, 50V, X7R	1	ATC600F102
C11	CAP 10 $\mu$ F, 2220, 50V, X7R	1	22201C106MAT2A
C15	CAP 68 $\mu$ F, 63V, Electrolytic	1	
L1	IND FB, 120 OHM, 0805, 5A	1	ILHB0805ER121V
L11, L12	IND FB, 33 OHM, 1206, 6A	2	BLM31PG330SN1L
R1, R10	RES, 10 OHM, 0805	2	ERJ-6ENF150V
R2	RES, 100 OHM, 0805	1	ERJ-6ENF1000V
PC Board Type	ROGERS RT6006, 25mil, 1/1oz. Copper	2	

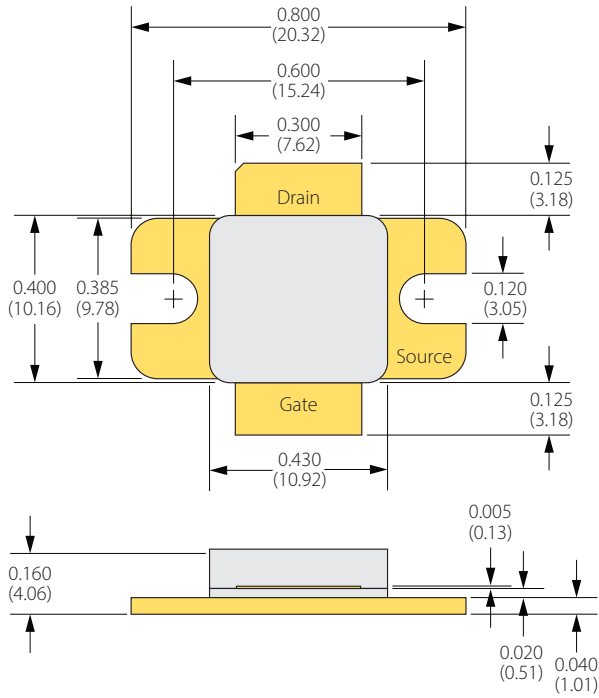
## EVALUATION BOARD



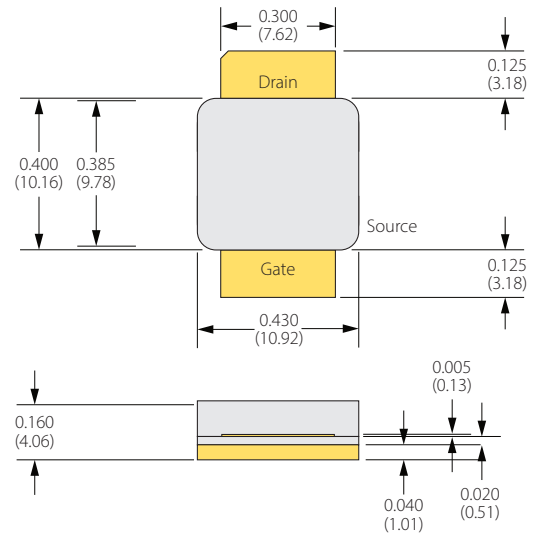
Integra can provide an Evaluation Board (Part number IGN1214M300-EVB) for IGN1214M300.

The Evaluation Board (EVB) is a self-contained test circuit attached directly to a metal base plate that consists of input and output matching networks for the specified RF frequency range and DC bias circuitry. A cavity is channeled into the metal plate to accommodate the RF power transistor, and a clamp is provided to hold the transistor into place. RF input and output connectors are attached to the board and a wiring harness is supplied to apply DC bias to the gate and drain of the transistor. The black, red and blue wires are, respectively, the ground connection, the positive drain bias, and the negative gate bias. It is essential that the user follows the bias sequencing procedure described in Application Note 002 to prevent damage to the transistor. General instructions for the handling of Integra Evaluation Boards are contained in Integra's Application Note 002 which is available for download on Integra's web site [www.integratech.com](http://www.integratech.com), but instructions specific to IGN1214M300-EVB are included with the Evaluation Board.

**PACKAGE PL44C1**



**BOLT-DOWN FLANGE OPTION  
 IGN1214M300**



**EARLESS FLANGE OPTION  
 IGN1214M300S**

**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.

### 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.