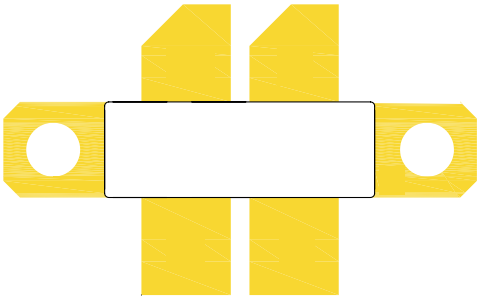
VHF/UHF-Band, GaN/SiC, RF Power Transistor

30 - 512 MHz | 650W typ | 65% Efficiency typ | 17 dB Gain typ | 50 V | 1ms Pulse Length, 10% Duty Cycle

IGN132 is a high power GaN-on-SiC RF power transistor that has been designed to suit the unique needs of VHF/UHF systems. It operates over the full 30 - 512 MHz frequency range. Under 1ms, 10% duty cycle pulse conditions, it supplies typically > 550 W of peak output power. It operates from a 50 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 >550W
- High Efficiency - up to 60%
- 100% RF Tested Under 1ms, 10% duty cycle pulse conditions
- RoHS and REACH Compliant

APPLICATIONS

- VHF/UHF Applications

Table 1. RF Electrical Characteristics in Standard Test Fixture (Case temperature = 30 °C unless otherwise stated)

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Gain	G		17		dB	P_{OUT} = 550W
Drain Efficiency	η		56		%	f = 250 MHz
Pulse Droop	D		-0.3		dB	1ms pulse length, 10% duty cycle
Load Mismatch Stability	VSWR-S		2:1			
VSWR Withstand	VSWR-LMT		5:1			V_{DS} = 50V, I_{DS} = 50mA per side

Note: 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_P	-5.0			V	V_{DS} = 50V, I_{DS} = 1mA per side
Quiescent Gate Voltage	V_Q		-2.8		V	V_{DS} = 50V, I_{DS} = 50mA per side

Table 3. Absolute Maximum Ratings (Not Simultaneous)

Parameter	Symbol	Value	Units	Test Conditions
DC Drain-Source Voltage	V_{DS}	150	V	25 °C
DC Gate-Source Voltage	V_{GS}	-8 to +1.0	V	25 °C
DC Drain Current per side	I_D	39	A	25 °C
DC Gate Current per side	I_G	3.9	mA	25 °C
RF Input Power	$P_{RF,IN}$	37	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

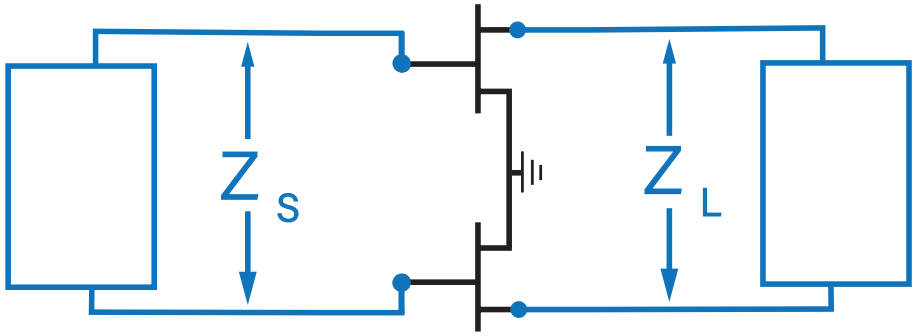
Table 4. Thermal Resistance (Case temperature = 85 °C unless otherwise stated)

Parameter	Symbol	Typ	Test Conditions
Peak Thermal Resistance per side, Channel to Case	R_{TH}	0.45	P_{DISS} = 216W per side 1ms pulse length, 10% duty cycle V_{DS} = 50V
		1.4	P_{DISS} = 118W per side CW V_{DS} = 38V Case temperature 30 °C

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

Frequency (MHz)	Z_S	Z_L	Units	Test Conditions
30	13.0 - j 1.0	12.2 + j 2.5	Ω	$P_{OUT} = P_{sat}$ V_{DS} = 50V, I_{DS} = 50mA per side
70	10.8 - j 3.9	13.0 + j 1.8	Ω	
100	8.9 - j 4.4	13.3 + j 1.5	Ω	
180	5.6 - j 2.8	13.2 + j 1.1	Ω	
250	5.0 - j 0.7	12.5 + j 1.2	Ω	
320	6.1 - j 0.2	11.7 + j 1.8	Ω	
400	4.7 - j 2.1	10.9 + j 3.0	Ω	
450	2.5 - j1.3	10.7 + j 3.8	Ω	
512	1.3 + j 0.8	10.5 + j 5.0	Ω	

Note: Source and load impedances are terminal to terminal.



TYPICAL PERFORMANCE IN A BROADBAND TEST FIXTURE

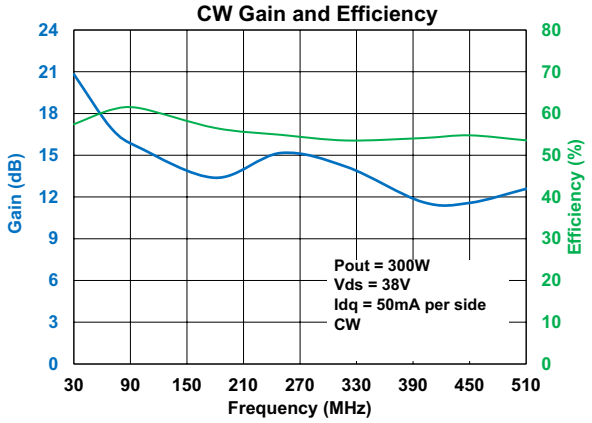


Figure 1

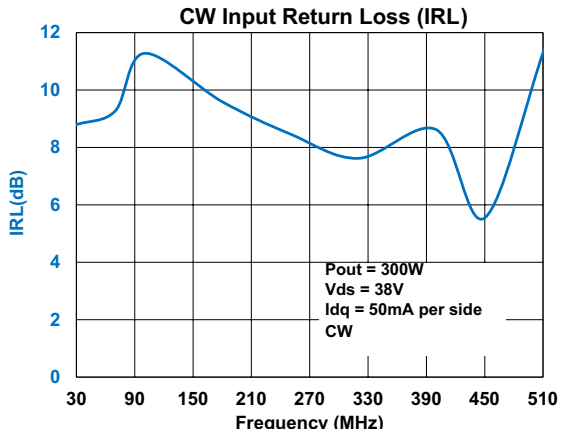


Figure 2

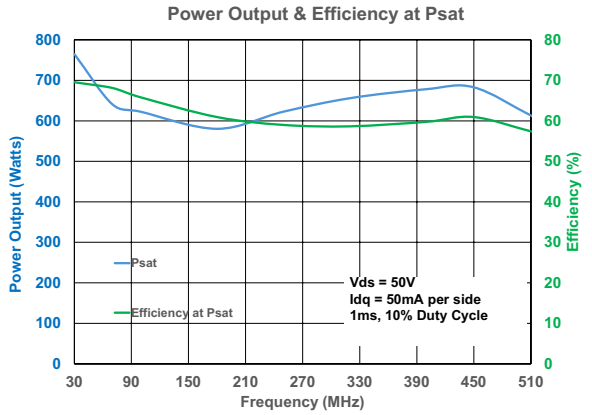


Figure 3

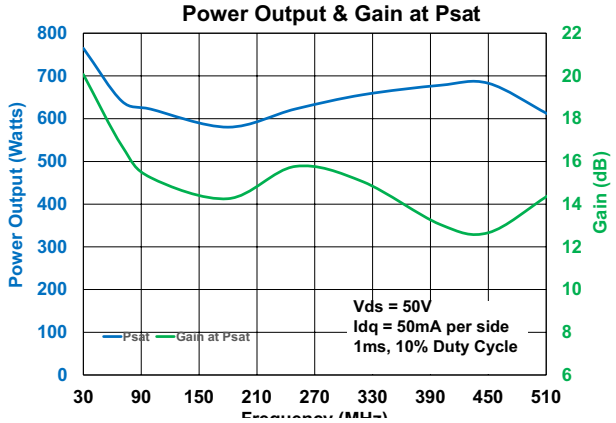


Figure 4

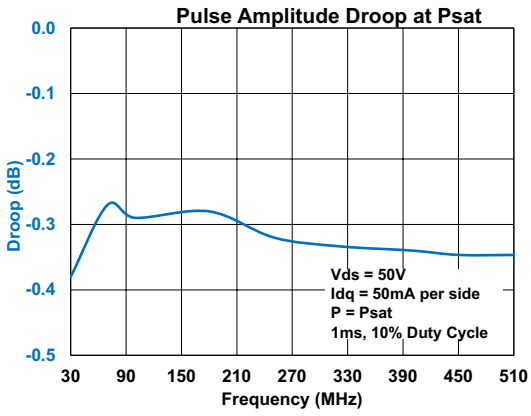


Figure 5

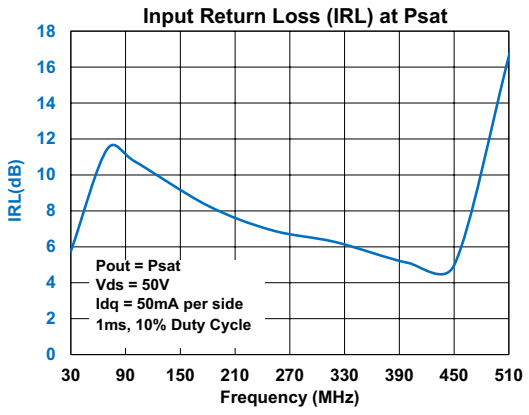


Figure 6

TYPICAL PERFORMANCE IN A BROADBAND TEST FIXTURE

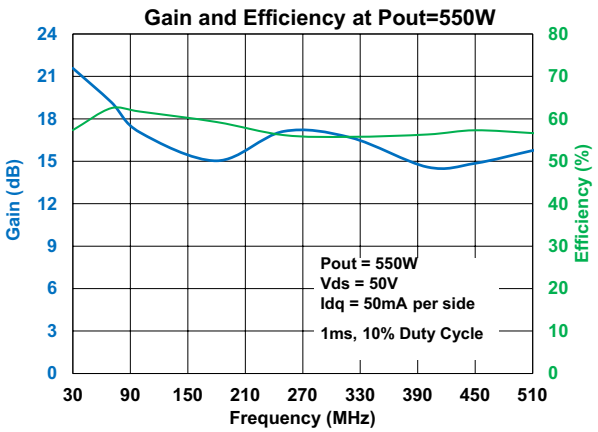


Figure 7

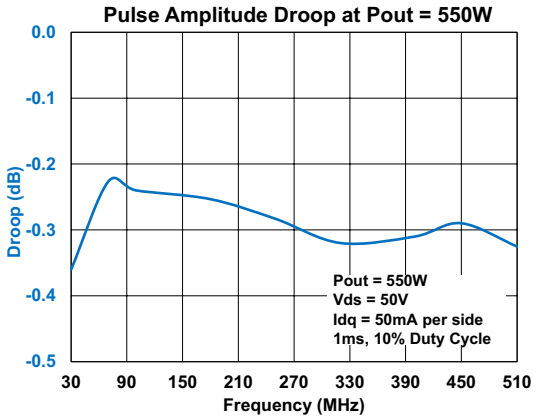


Figure 8

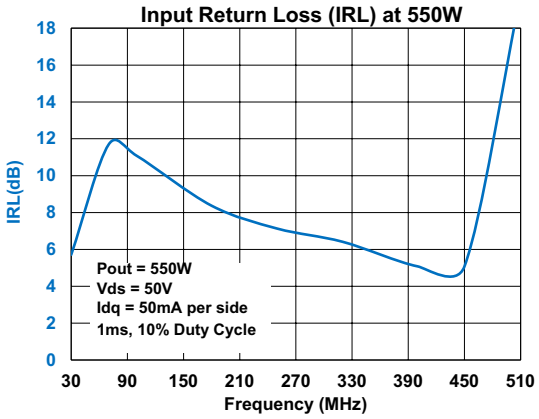
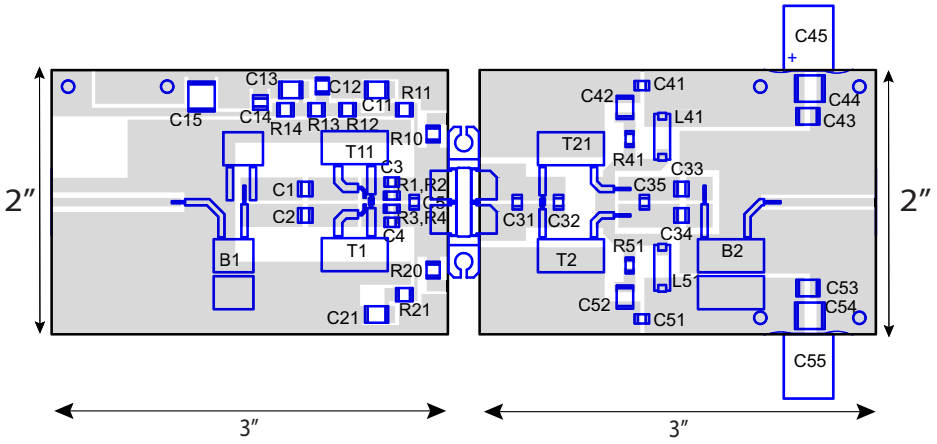
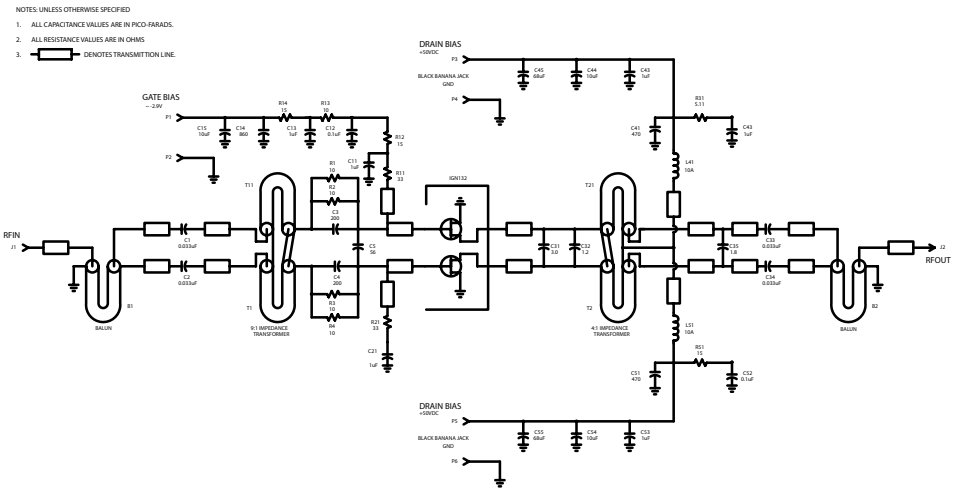


Figure 9

TEST FIXTURE



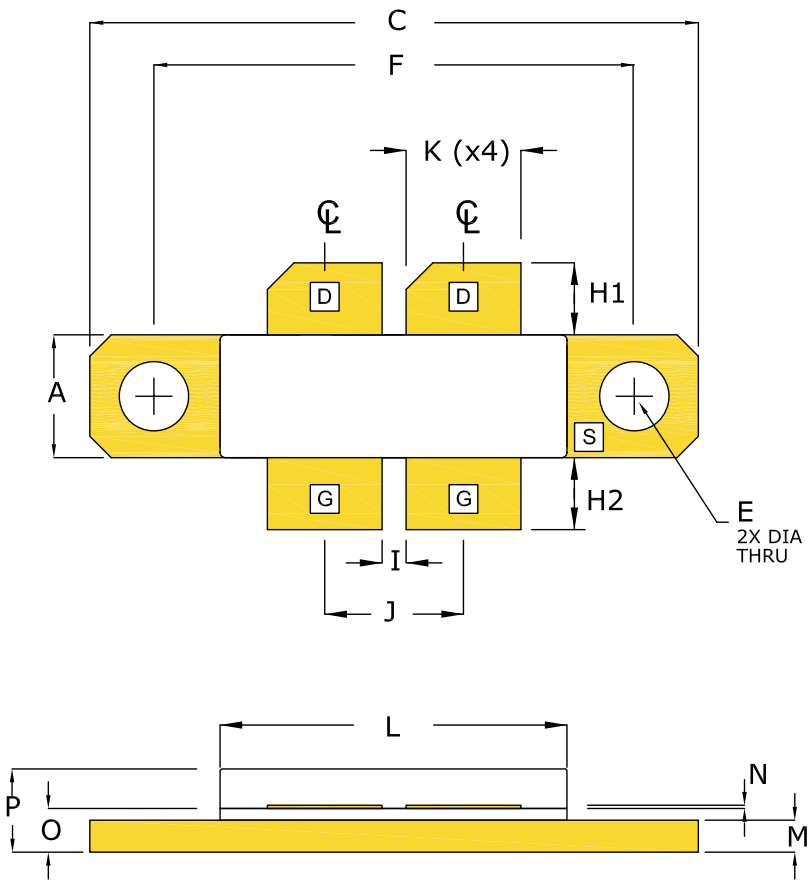
SCHEMATIC



Bill of Materials for IGN132 Test Fixture

C1, C2, C33, C34:	**CAP, C1812C333KCRACTU, 0.033µF, 500V, X7R, 1812**	
C3, C4:	**CAP, ATC800B201CT500X, 200PF, 250V, ATC800B, 1111**	
C5:	**CAP, 800R560GW500XT, 56pF, ATC800R560**	
C11, C13, C21, C43, C53:	**CAP, C1812X105K1RACTU, 1uF, X7R, 100V, 1812**	
C12:	**CAP, C1210C104K1RACTU, 0.1uF, X7R, 100V, 1210**	
C14:	**CAP, ATC800B861JT200X, 860pF, ATC800B**	
C15:	**CAP, C2220X106K5RACTU, 10uF 50V X7R, 2220**	
C31:	**CAP, 100B3R0CT500XT, 3.0pF, ATC100B3R0**	
C32:	**CAP, 100B120JW500XT1K, 12pF, ATC100B120, 1111**	
C35:	**CAP, 100B1R8CW500XT1K, 1.8pF, ATC100B1R8, 1111**	
C41, C51:	**CAP, 800B471JT200XT1K, 470PF, 200V, ATC800B, 1111**	
C42, C52:	**CAP, 08051C104K4T2A, 0.1UF, X7R, 100V, 0805**	
C44, C54:	**CAP, 22201C106MAT2A, 10UF, 100V, X7R, 2220**	
C45, C55:	**CAP, UPJ1J680MPD6, ALUM EL, 68UF, 63V**	
L41, L51:	**FERR, 28F0181-1SR-10, 115 OHM, 10 AMP, SMT, 1LN**	
R1, R2, R3, R4:	**RES, ERJ-6GEYJ100V, 10 OHM, 1/8W, 0805**	
R10, R20:	**RES, CRCW1210422RFKEA, 422 OHM, 1/2W, 1210**	
R11, R21:	**RES, ERJ-6GEYJ330V, 33 OHM, 1/8W, 0805**	
R12, R14:	**RES, CRCW121015R0JNEA, 15 OHM, 1/2W, 1210**	
R13:	**RES, CRCW121010R0FKEA, 10 OHM, 1/2W, 1210**	
R41, R51:	**RES, ERJ-6GEYJ150V, 15 OHM, +/-5%, 1/8W, 0805**	
PC Board	**ROGERS**	**RO4350-03011, 30mil, 1/1oz. Copper**

PACKAGE PL22D1



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.225	0.235	5.72	5.97
B	--	--	--	--
C	1.135	1.145	28.83	29.08
E	0.125	0.135	3.18	3.43
F	0.895	0.905	22.73	22.99
H1	0.115	0.155	2.92	3.94
H2	0.115	0.155	2.92	3.94
I	0.040	0.050	1.02	1.27
J	0.225	0.235	5.72	5.97
K	0.210	0.220	5.33	5.59
L	0.638	0.650	16.21	16.51
M	0.055	0.065	1.40	1.65
N	0.003	0.006	0.10	0.18
O	0.077	0.087	1.96	2.21
P	0.149	0.178	3.78	4.52

PIN SCHEDULE	
D	DRAIN
S	SOURCE
G	GATE

DIMENSIONS

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 Sensitivty 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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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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