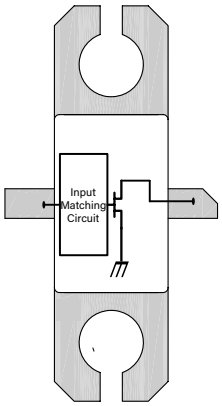
P-Band, GaN/SiC, RF Power Transistor

100-460 MHz | 135W | 55% Efficiency typ | 20.5 dB Gain typ | 100 V | 100µs Pulse Length, 10% Duty Cycle

IGN0105M135 is a high power GaN-on-SiC push-pull RF power transistor that has been designed to suit the unique needs of P band radar systems. It operates over the full 100-460 MHz frequency range. Under 100µs, 10% duty cycle pulse conditions, it supplies a minimum of 135 W of peak output power, with typically 20.5 dB of gain and 55% efficiency. It operates from a 100 V supply voltage. For optimal thermal efficiency, the transistor is housed in a metal-based package with thermal enhancement and uses an epoxy-sealed ceramic lid.

FEATURES

- GaN on SiC HEMT Technology
- Output Power >135W
- Pre-matched Input Impedance
- Incorporates RC feedback within the package between gate and drain
- High Efficiency - up to 60%
- 100% RF Tested Under 100µs, 10% duty cycle pulse conditions
- RoHS and REACH Compliant
- Full non-linear electrothermal model available, please contact the factory



APPLICATIONS

- P-band Radar Systems

Table 1. RF Electrical Characteristics (Case temperature = 35 °C unless otherwise stated)

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Gain	G	18	20.5	23	dB	P_{OUT} = 135W f = 100, 280, 460 MHz 100µs pulse length, 10% duty cycle V_{DS} = 100V, I_{DS} = 150mA
Drain Efficiency	η	45	55	65	%	
Pulse Droop	D	-0.5	-0.2	+0.1	dB	
Input Return Loss	IRL	4	7.5	12	dB	
Load Mismatch Stability	VSWR-S					
VSWR Withstand	VSWR-LMT					

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

Table 2. Absolute Maximum Ratings (Not Simultaneous)

Parameter	Symbol	Value	Units	Test Conditions
DC Drain-Source Voltage	V_{DS}	300	V	25 °C
DC Gate-Source Voltage	V_{GS}	-8 to +1.0	V	25 °C
DC Drain Current	I_D	7.2	A	25 °C
DC Gate Current	I_G	7.2	mA	25 °C
RF Input Power	$P_{RF,IN}$	1.4	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 3. DC Electrical Characteristics (Case temperature = 25 °C unless otherwise stated)

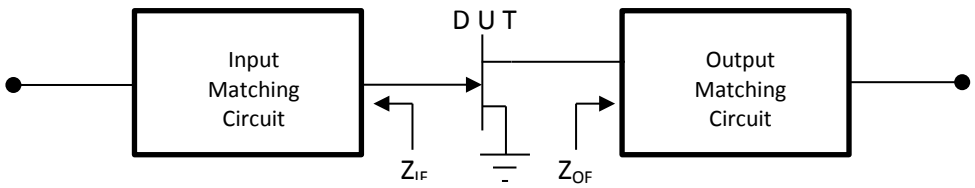
Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Gate Pinch-Off Voltage	V_P	-5.0			V	V_{DS} = 100V, I_{DS} = 1mA
Quiescent Gate Voltage	V_Q		-2.8		V	V_{DS} = 100V, I_{DS} = 150mA

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

Parameter	Symbol	Typ	Test Conditions
Peak Thermal Resistance, Channel to Case	R_{TH}	1.05	P_{diss} = 135W 100µs pulse length, 10% duty cycle V_{DS} = 100V, I_{DS} = 150mA

Table 5. Test Fixture Source & Load Impedances (Case temperature = 35 °C unless otherwise stated)

Frequency (MHz)	Z_{IF}	Z_{OF}	Units	Test Conditions
100	50.2 - j 2.5	38.6 - j 0.9	Ω	P_{OUT} = 135W 100µs pulse length, 10% duty cycle V_{DS} = 100V, I_{DS} = 150mA
280	36.9 - j 5.6	29.4 + J 9.6	Ω	
460	26.7 + j 5.5	24.0 + j 9.3	Ω	



TYPICAL PERFORMANCE

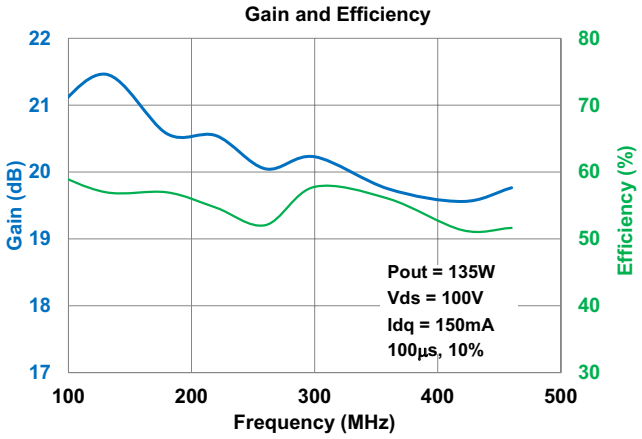


Figure 1.

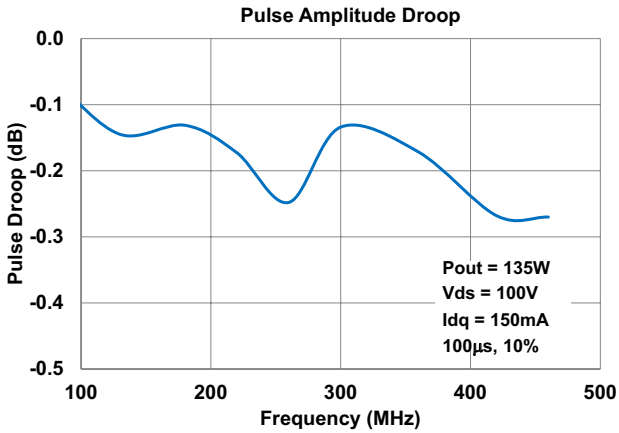


Figure 2.

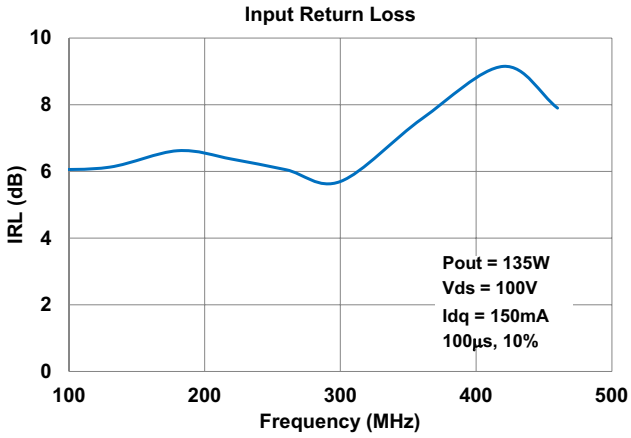
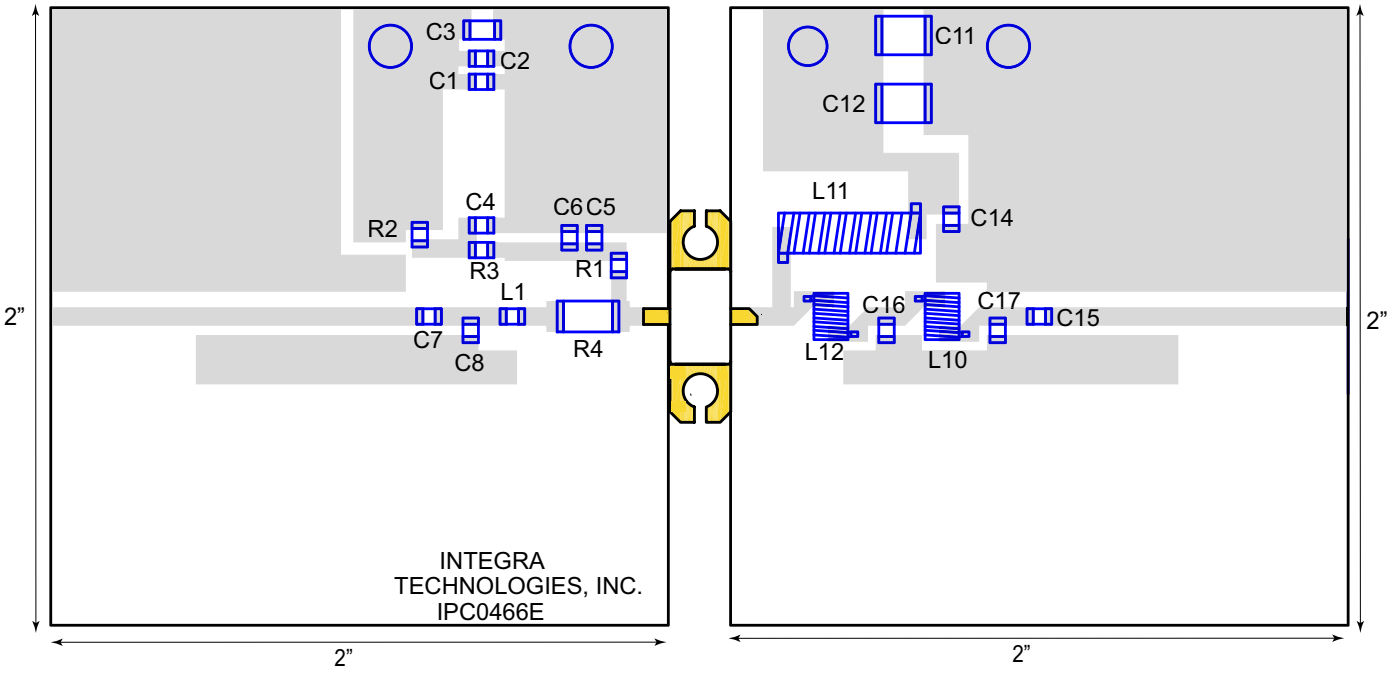


Figure 3.

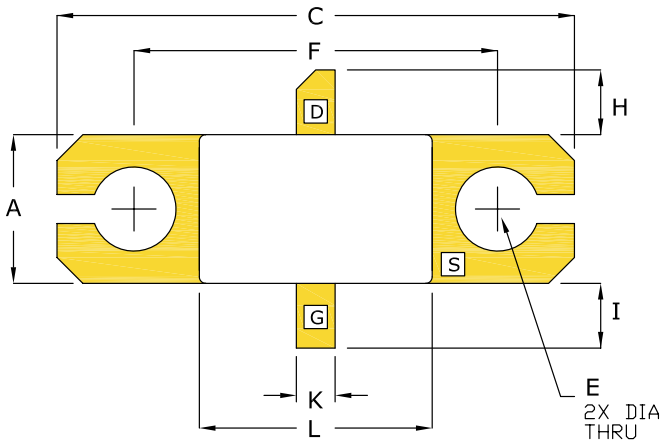
TEST FIXTURE



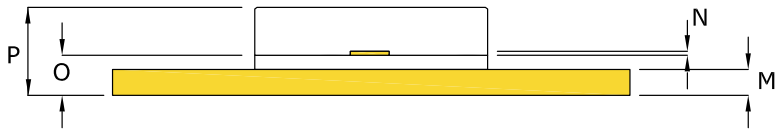
Bill of Materials for IGN0105M135 Test Fixture

Designator	Description	Part Number
C1, C4	CAP 0.1μF, 0805, 100V , X7R	C08051C104K4T2A
C2, C5	CAP 1000pF, 0805, 100V	08051A102J4T2A
C3	CAP 1μF, 1206, 100V, X7R	C12061C105K4T2A
C6, C7, C14, C15	CAP 240pF, 0805, 250V	600F241JT250XT
C8	CAP 7.5pF, 0805, 250V	600F7R5BT250XT
C11, C12	CAP 1μF, 1812, 200V, X7R	18122C105KAT2A
C16	CAP 12PF, 0805, 250V	600F120FT250XT
C17	CAP 6.8PF, 0805, 250V	600F6R8BT250XT
L1	IND 8.2nH, 0805	0805CS-080XGEC
L10	IND 18.5nH	A05TJLB
L11	IND 300nH	2222Q-301JEC
L12	IND 12.5nH	A04TJGLC
R1	RES 51Ω, 0805	6GEYJ510V
R2	RES 200Ω, 0805	ERJ-6ENF1000V
R3	RES 0Ω, 0805	6GEY0R00V
R4	RES 4.99Ω, 2010	CRCW20104R99FKEFHP
PC Board	ROGERS RO4350B 30mil, 1/1oz. Copper	

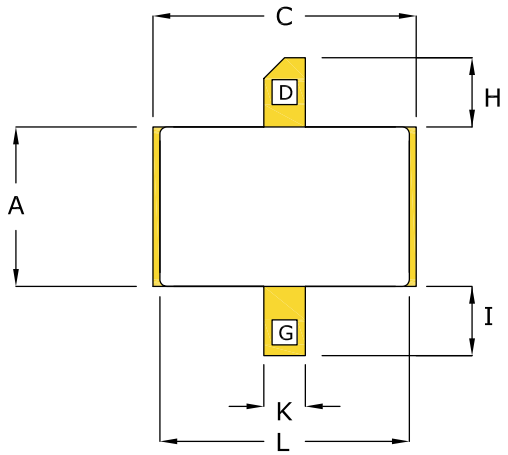
PACKAGE PL32C2 FLANGED AND EARLESS VERSIONS



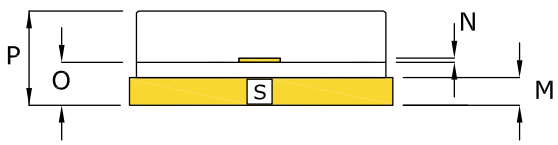
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.225	0.235	5.72	5.97
B	--	--	--	--
C	0.795	0.805	20.19	20.44
E	0.125	0.135	3.18	3.43
F	0.557	0.567	14.14	14.40
H	0.090	0.110	2.29	2.79
I	0.090	0.110	2.29	2.79
J	--	--	--	--
K	0.055	0.065	1.40	1.65
L	0.357	0.363	9.07	9.22
M	0.035	0.045	0.89	1.14
N	0.004	0.006	0.10	0.15
□	0.057	0.067	1.45	1.70
P	0.131	0.154	3.33	3.91



PIN SCHEDULE	
D	DRAIN
S	SOURCE
G	GATE



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.225	0.235	5.72	5.97
B	--	--	--	--
C	0.375	0.385	9.53	9.78
E	--	--	--	--
F	--	--	--	--
H	0.090	0.110	2.29	2.79
I	0.090	0.110	2.29	2.79
J	--	--	--	--
K	0.055	0.065	1.40	1.65
L	0.357	0.363	9.07	9.22
M	0.035	0.045	0.89	1.14
N	0.004	0.006	0.10	0.15
□	0.057	0.067	1.45	1.70
P	0.131	0.154	3.33	3.91



PIN SCHEDULE	
D	DRAIN
S	SOURCE
G	GATE

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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