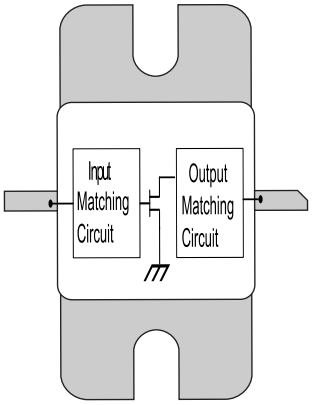
S-Band, GaN/SiC, 50-Ohm RF Power Transistor

2.7 - 3.1 GHz | 130 W typ | 62% Efficiency typ | 16dB Gain typ | 50 V | 300μs Pulse Length, 10% Duty Cycle

IGT2731M130 and IGT2731M130S are high power GaN-on-SiC RF power transistors that are fully matched to 50Ω at both the input and output. They supply a minimum of 130W of peak output power, with typically >16dB of gain and 62% efficiency. They operate from a 50 V supply voltage. For optimal thermal efficiency, the transistors are housed in a metal-based package with an epoxy-sealed ceramic lid.



FEATURES

- GaN on SiC HEMT Technology
- Output Power 130W
- Fully matched to 50Ω at both input and output
- High Efficiency - 62% typical
- 100% RF Tested Under 300μs, 10% duty cycle pulse conditions
- RoHS and REACH Compliant
- IGT2731M130 has a bolt-down flange, IGT2731M130S has an ear-less flange for solder attach only

APPLICATIONS

- S-band Radar Systems

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

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Gain	G	14	16	20	dB	P_{OUT} = 130W f = 2.7, 2.9, 3.1 GHz 300μs pulse length, 10% duty cycle V_{DS} = 50V, I_{DS} = 25mA
Drain Efficiency	η	40	55	75	%	
Pulse Droop	D	-0.8	-0.4	+0.2	dB	
Input Return Loss	IRL	-18	-10	-7	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 2. Absolute Maximum Ratings (Not Simultaneous). Case temperature = 25 °C unless otherwise stated.

Parameter	Symbol	Value	Units	Test Conditions
DC Drain-Source Voltage	V_{DS}	160	V	
DC Gate-Source Voltage	V_{GS}	-8 to +1.5	V	
DC Drain Current	I_D	12	A	
DC Gate Current	I_G	12	mA	
RF Input Power	$P_{RF,IN}$	$P_{IN, MAX}$	W	$P_{IN, MAX}$ defined by I_G =0 in forward direction under RF operation
Operating Junction Temperature	T_J	-55 to +200	°C	
Storage Temperature	T_{STG}	-55 to +150	°C	
Soldering Temperature	T_{SOLDER}	260 for 10s	°C	

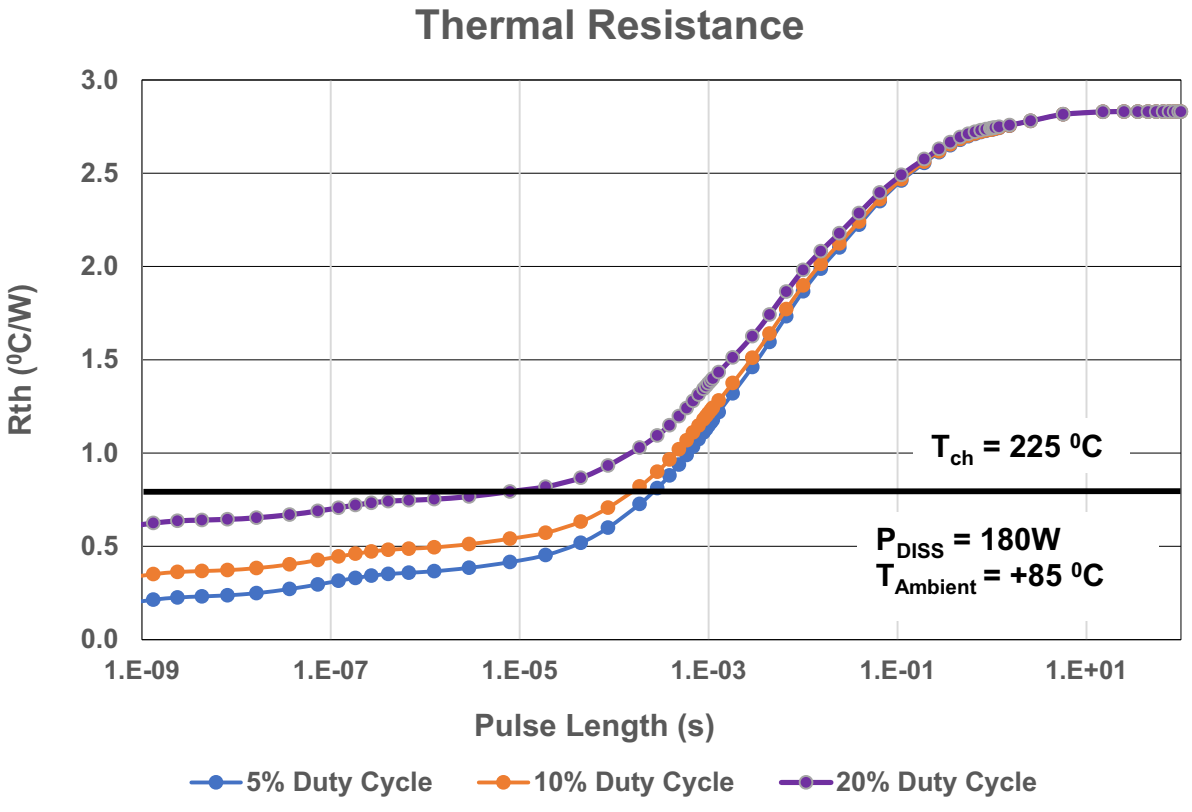
Note: Operation outside the limits given in this table may cause permanent damage to the transistor

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	-4.0	-3.0	-2.5	V	V_{DS} = 50V, I_{DS} = 2mA
Quiescent Gate Voltage	V_Q		-2.3		V	V_{DS} = 50V, I_{DS} = 25mA

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}		0.9		°C/W	P_{DISS} =180 W 300µs pulse length, 10% duty cycle V_{DS} = 50V



TYPICAL PERFORMANCE

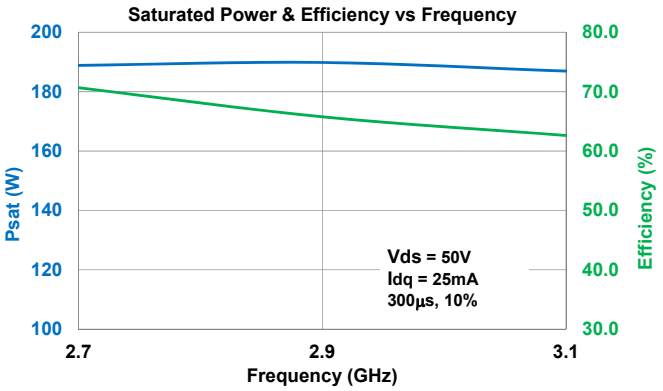


Figure 1

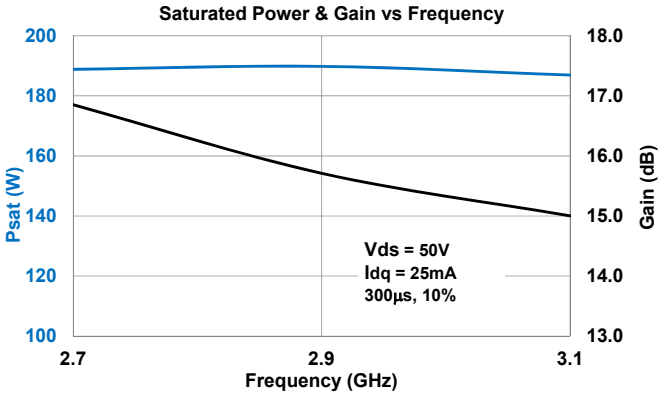


Figure 2

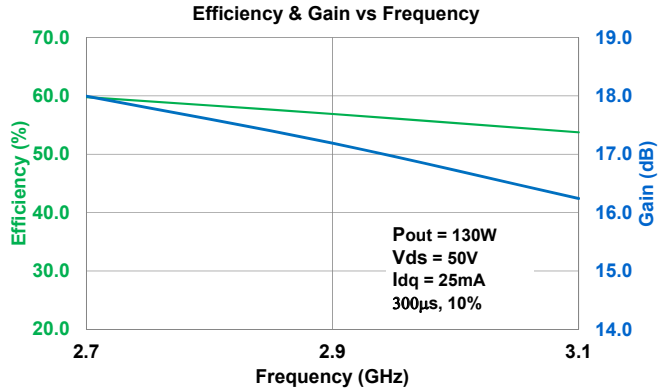


Figure 3

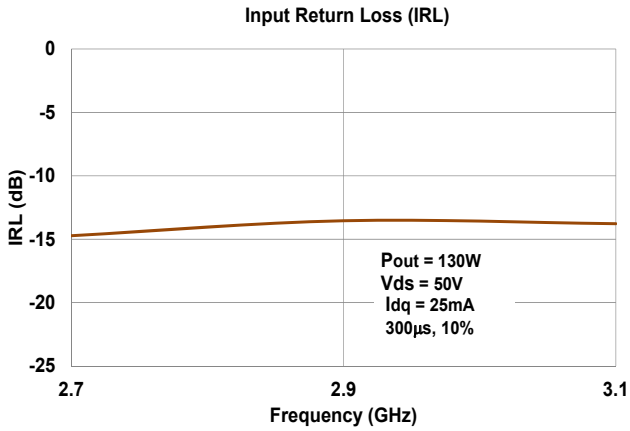


Figure 4

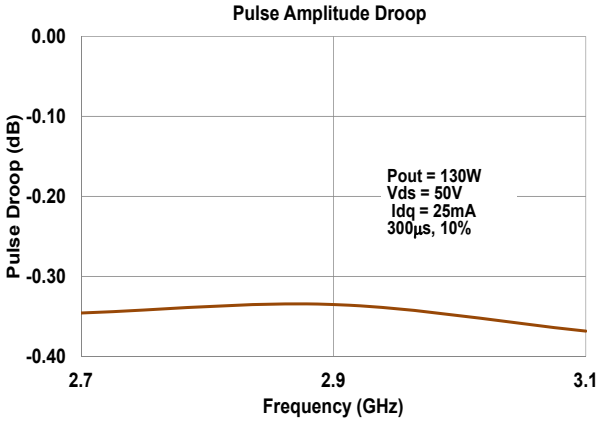
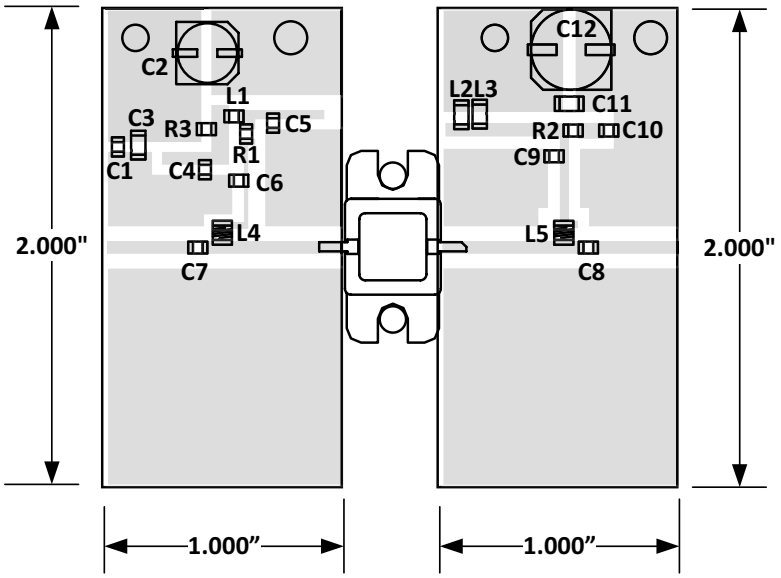


Figure 5

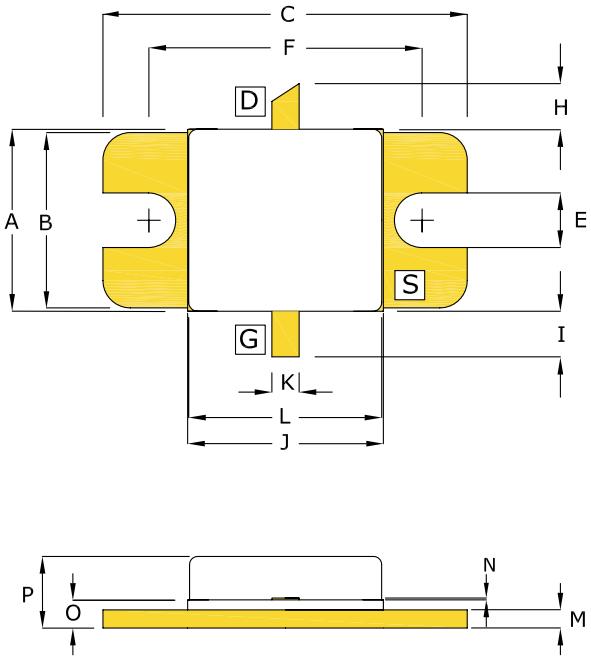
TEST FIXTURE



Bill of Materials for IGT2731M130 Test Fixture

Designator	Description	Quantity	Part Number
C1, C4, C10	CAP 0.1μF, 0805, 100V	3	C0805C104K1RAL
C2	CAP 47μF, 20%, SMD, Polymer	1	PCV1E470MCL2GS
C3, C11	CAP 1μF, 1206, 100V, X7R	2	GRM31CR72A105KA01L
C5	CAP, 39pF, 0805 250V	1	ATC600F390
C6, C9	CAP 5.6pF, +/-0.25, 0805, 250V, Edge Mount	2	ATC600F5R6CT
C7, C8	CAP 12pF,+/-5%, 0805, 250V	2	ATC600F120CT
C12	CAP 68μF, 20%, 63V, SMD	1	EEE-FK1J680P
L1	IND FB 120Ω, 0805, 5A	1	ILHB0805ER121V
L2, L3	IND FB 33Ω@100MHz, 1206, 6A	2	BLM31PG330S
L4, L5	IND 22nH, 0908	2	0908SQ-22NGL
R1, R2	RES 100Ω, 0805	2	
R3	RES 470Ω, 0805	1	
PC Board	DK=3.6, 30 mils, 1oz/1oz Copper	2	RO4350B-03011

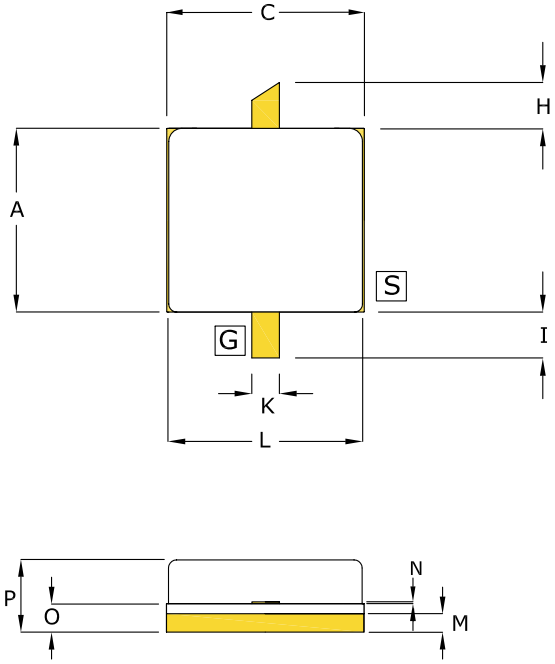
PACKAGE PL44A1



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	0.090	0.110	2.29	2.79
I	0.090	0.110	2.29	2.79
J	0.425	0.435	10.80	11.05
K	0.055	0.065	1.40	1.65
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
□	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
IGT2731M130



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	0.090	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	0.420	0.428	10.67	10.87
M	0.035	0.045	0.89	1.14
N	0.004	0.007	0.10	0.18
□	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
IGT2731M130S

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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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.

Integra Technologies, 321 Coral Circle, El Segundo, CA 90245-4620 | Phone: 310-606-0855 | Fax: 310-606-0865