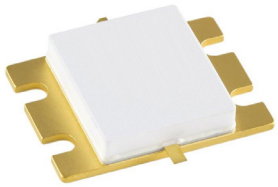
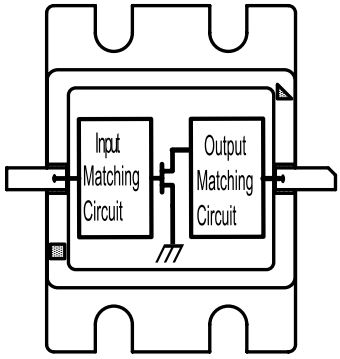
S-Band, GaN/SiC, 50-Ohm RF Power Transistor

2.7 - 3.1 GHz | 300 W typ | 58% Efficiency typ | 14.5dB Gain typ | 50 V | 150μs Pulse Length, 10% Duty Cycle

IGT2731M300 is a high power GaN-on-SiC RF power transistor that is fully matched to 50Ω at both the input and output. It supplies a minimum of 300W of peak output power, with typically >14.5B of associated gain and 58% efficiency. It operates from a 50V 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 300W
- Fully matched to 50Ω at both input and output
- 100% RF Tested Under 150μs, 10% duty cycle pulse conditions
- RoHS and REACH Compliant

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	13	14.5	17	dB	P_{OUT} = 300W f = 2.7, 2.9, 3.1GHz 150μs pulse length, 10% duty cycle V_{DS} = 50V, I_{DS} = 52mA
Drain Efficiency	η	50	58	70	%	
Pulse Droop	D	-0.8	-0.2	+0.2	dB	
Input Return Loss	IRL	5	23	30	dB	
Load Mismatch Stability	VSWR-S	2:1				
VSWR Withstand	VSWR-LMT	3:1				
Second Harmonic			-30		dBc	P_{OUT} = 300W f = 2.9 GHz 150μs pulse length, 10% duty cycle V_{DS} = 50V, I_{DS} = 52mA
Third Harmonic			-60		dBc	

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	-4.0	-3.0	-2.5	V	V_{DS} = 50V, I_{DS} = 2mA
Quiescent Gate Voltage	V_Q		-2.4		V	V_{DS} = 50V, I_{DS} = 52mA

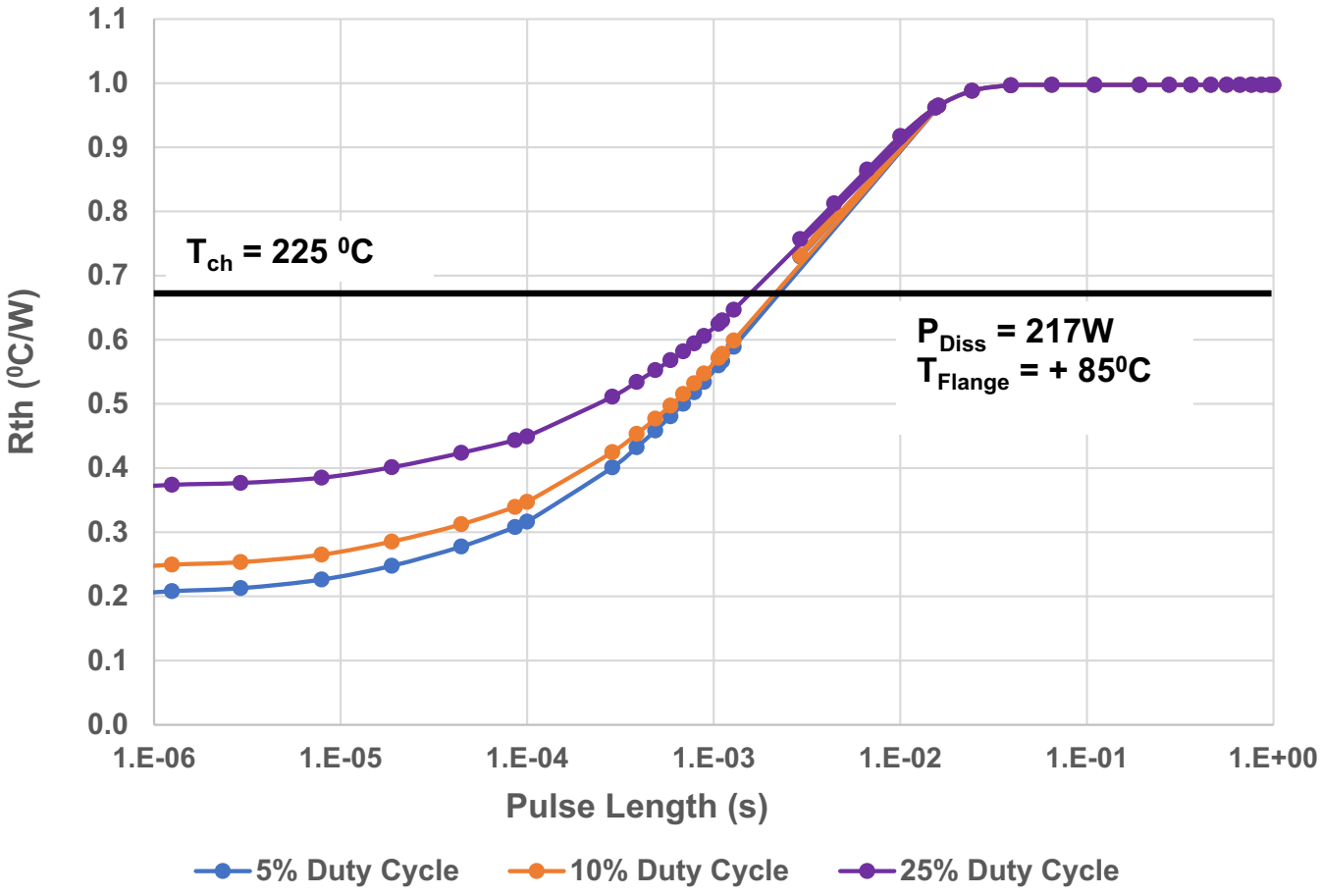
Table 3. Absolute Maximum Ratings (Not Simultaneous). Case temperature = 25 ^{0}C unless otherwise stated.

Parameter	Symbol	Value	Units
DC Drain-Source Voltage	V_{DS}	120	V
DC Gate-Source Voltage	V_{GS}	-8 to +1.5	V
DC Drain Current	I_D	24	A
DC Gate Current	I_G	2.4	mA
RF Input Power	$P_{RF,IN}$	12	W
Operating Channel Temperature	T_{CH}	-55 to +225	^{0}C
Storage Temperature	T_{STG}	-55 to +150	^{0}C
Soldering Temperature	T_{SOLDER}	260 for 10s	^{0}C

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

Table 4. Thermal Resistance (Case temperature = 85 ^{0}C unless otherwise stated)

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Peak Thermal Resistance, Channel to Case	R_{TH}		0.38		^{0}C/W	P_{DISS} = 217W 150µs pulse length, 10% duty cycle V_{DS} = 50V



TYPICAL RF PERFORMANCE

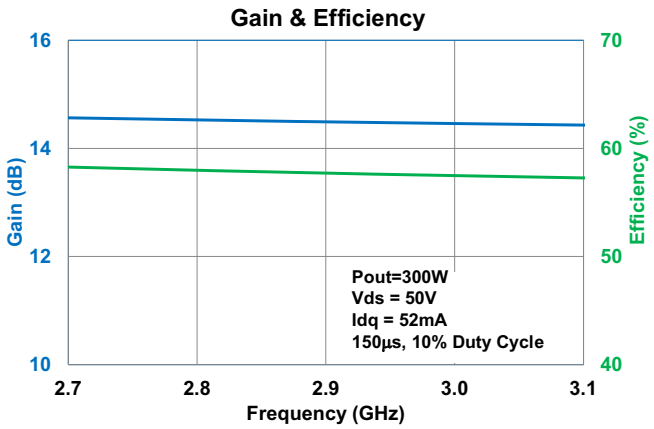


Figure 1

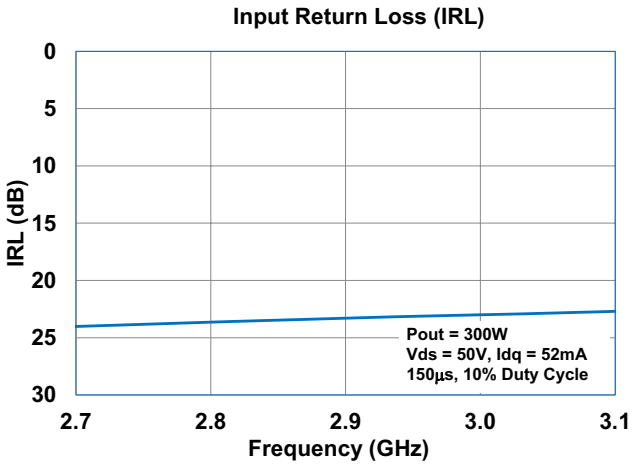
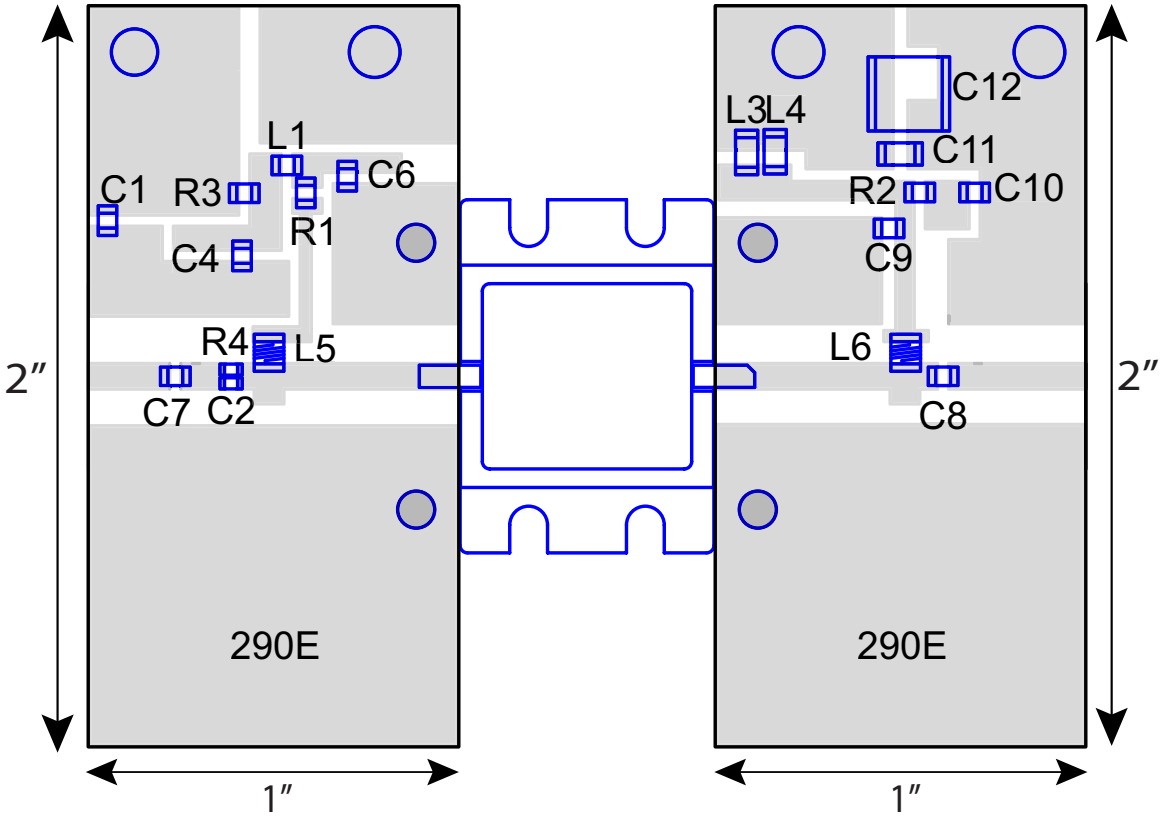


Figure 2

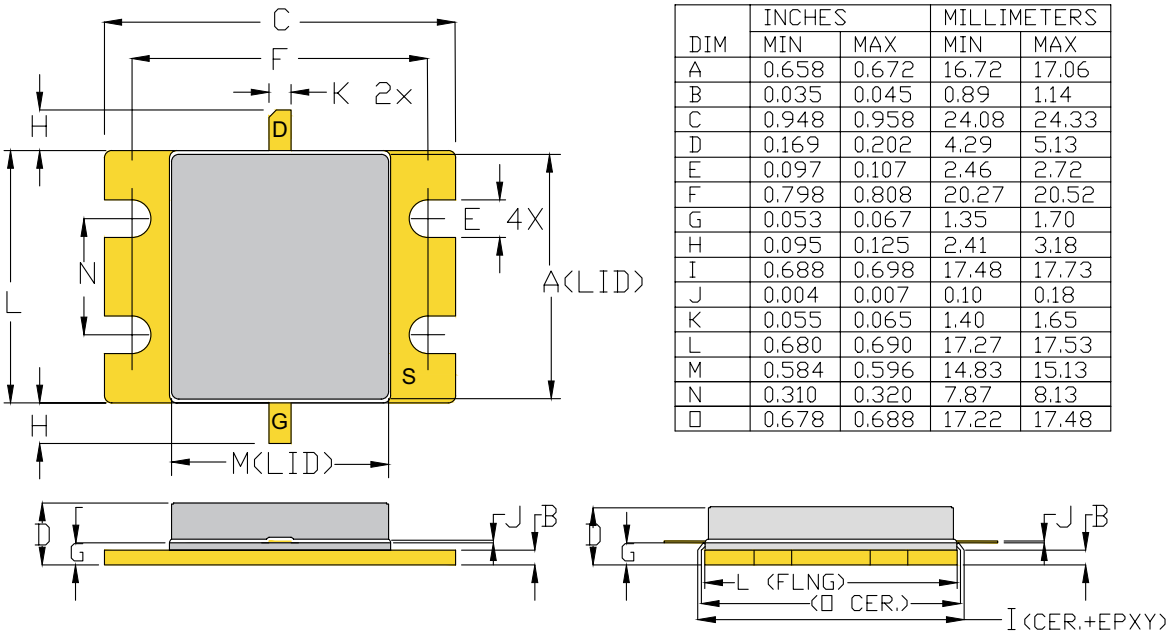
TEST FIXTURE



Bill of Materials for IGT2731M300 Test Fixture

Designator	Description	Quantity
C1	CAP 39pF, 250V, 0805	1
C2	CAP 10pF, 250V, 0603	1
C4	CAP 1000pF, 50V, 0805, X7R	1
C6, C9	CAP 5.6pF, 250V, 0805	2
C7	CAP 12pF, 250V, 0805	1
C8	CAP 15pF, 250V, 0805	1
C10	CAP 0.1µF, 100V, 0805	1
C11	CAP 1µF, 100V, 1206, X7R	1
C12	CAP 10µF, 100V, 2220, X7R	1
L1	IND FB 120Ω, 0805, 5A	1
L3, L4	IND FB 33Ω, 1206, 6A	2
L5, L6	IND 22nH, 0908	2
R1, R2	RES 10 OHM, 0805	2
R3	RES 0 OHM, 0805	1
R4	RES 100 OHM, 0603	1
PC Board Type	ROGERS RO4350B, 30mil, 1/1oz. Copper	2

PACKAGE PM67A1



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.658	0.672	16.72	17.06
B	0.035	0.045	0.89	1.14
C	0.948	0.958	24.08	24.33
D	0.169	0.202	4.29	5.13
E	0.097	0.107	2.46	2.72
F	0.798	0.808	20.27	20.52
G	0.053	0.067	1.35	1.70
H	0.095	0.125	2.41	3.18
I	0.688	0.698	17.48	17.73
J	0.004	0.007	0.10	0.18
K	0.055	0.065	1.40	1.65
L	0.680	0.690	17.27	17.53
M	0.584	0.596	14.83	15.13
N	0.310	0.320	7.87	8.13
□	0.678	0.688	17.22	17.48

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.

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