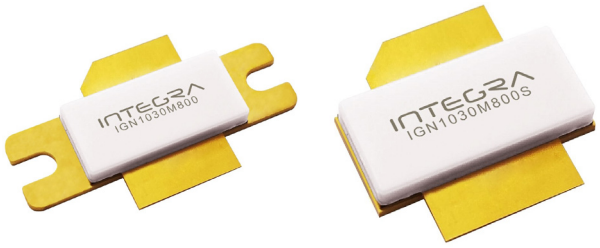
L-Band, GaN/SiC, RF Power Transistor

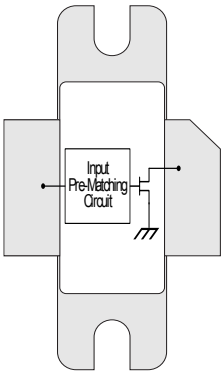
1030 MHz | 800 W typ | 65% Efficiency typ | 17 dB Gain typ | 50 V | 128µs Pulse Length, 2% Duty Cycle

IGN1030M800 and IGN1030M800S are high power GaN-on-SiC RF power transistors that have been designed to suit the unique needs of IFF/SSR avionics systems. They operate at 1030 MHz. Under 128µs, 2% duty-cycle pulse conditions, they supply a minimum of 800 W of peak output power, with typically 17 dB of associated gain and 65% 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 >800 W
- Pre-matched Input Impedance
- High Efficiency - up to 65%
- 100% RF Tested Under 128µs, 2% duty-cycle pulse conditions
- RoHS and REACH Compliant
- Full non-linear electrothermal model available, please contact the factory



APPLICATIONS

- L-band Avionics IFF & SSR Systems

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

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
RF Input Power	$P_{IN, RF}$	12	16	20	W	P_{OUT} = 800W f = 1030 MHz 128µs, 2% duty-cycle pulse conditions V_{DS} = 50V, I_{DS} = 150mA
Gain	G	16	17	18	dB	
Drain Efficiency	η	55	65	75	%	
Pulse Droop	D	-0.6	-0.3	+0.2	dB	
Input Return Loss	IRL	18	16	10	dB	
Load Mismatch Stability	VSWR-S	2:1				
VSWR Withstand	VSWR-LMT	5:1				

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

Table 2. Absolute Maximum Ratings (Not Simultaneous)

Parameter	Symbol	Value	Units	Test Conditions
DC Drain-Source Voltage	V_{DS}	180	V	25 °C
DC Gate-Source Voltage	V_{GS}	-8 to +1.0	V	25 °C
DC Drain Current	I_D	72	A	25 °C
DC Gate Current	I_G	7.2	mA	25 °C
RF Input Power	$P_{RF,IN}$	25	W	25 °C
Operating Channel Temperature	T_{CH}	-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} = 50V, I_{DS} = 1mA
Quiescent Gate Voltage	V_Q		-2.8		V	V_{DS} = 50V, I_{DS} = 150mA

Table 4. Test Fixture Source & Load Impedances (Case temperature = 25 °C unless otherwise stated)

Frequency (MHz)	Z_{IF}	Z_{OF} Fundamental	Z_{OF} Second Harmonic	Units	Test Conditions
1030	4.3 - j 1.5	1.0 + j 0.35	27 + j 21	Ω	P_{OUT} = 800W f = 1030 MHz 128µs, 2% duty-cycle pulse conditions V_{DS} = 50V, I_{DS} = 150mA

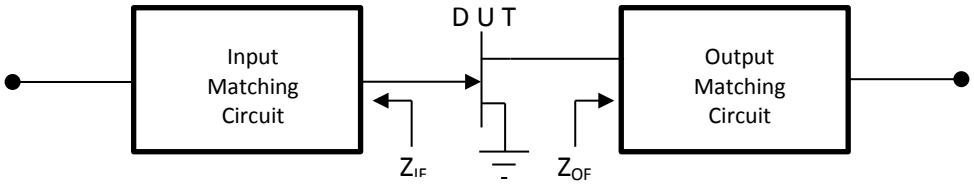
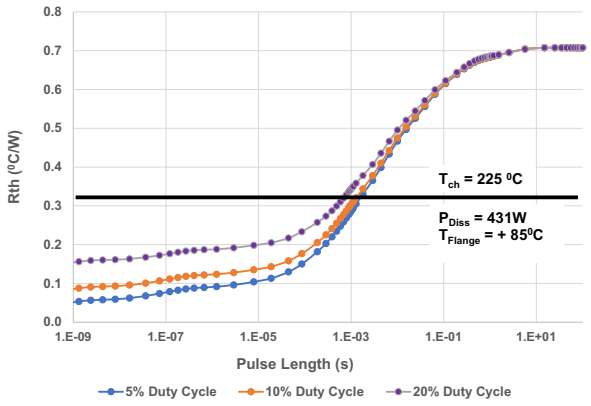


Table 5. Thermal Resistance (Case temperature = 85 °C unless otherwise stated)

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Peak Thermal Resistance, Channel to Case	R_{TH}		0.14		°C/W	P_{DISS} = 431W 128µs, 2% duty-cycle pulse conditions V_{DS} = 50V



TYPICAL PERFORMANCE

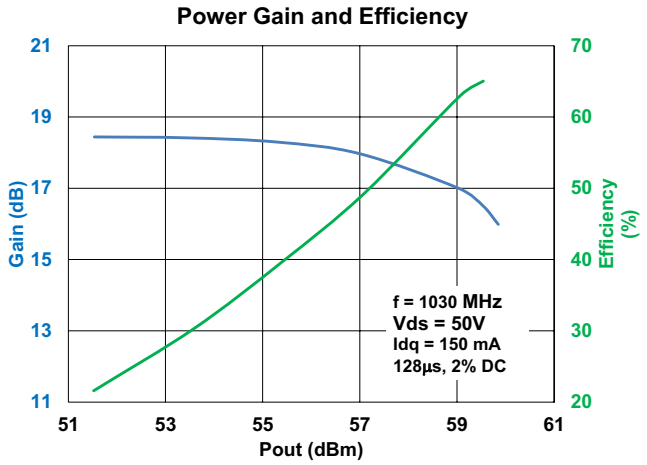


Figure 1

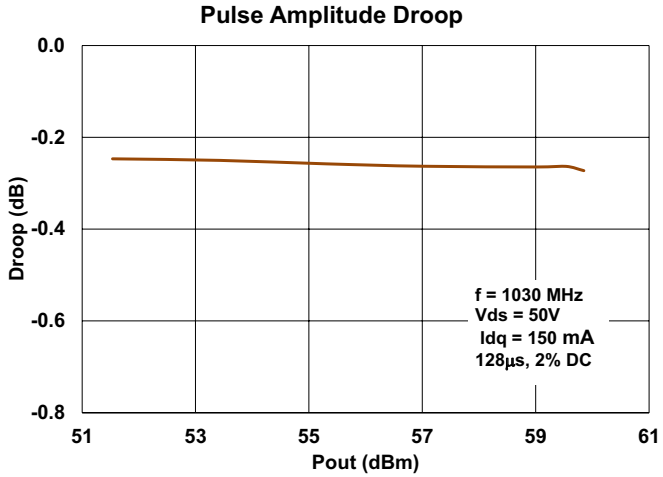
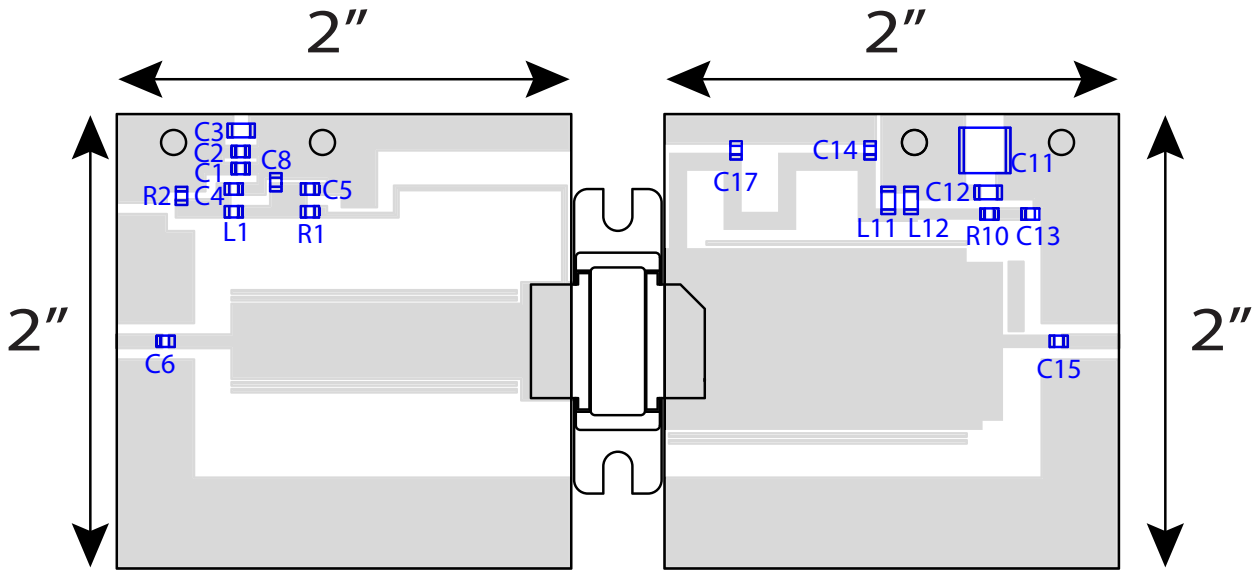


Figure 2

TEST FIXTURE

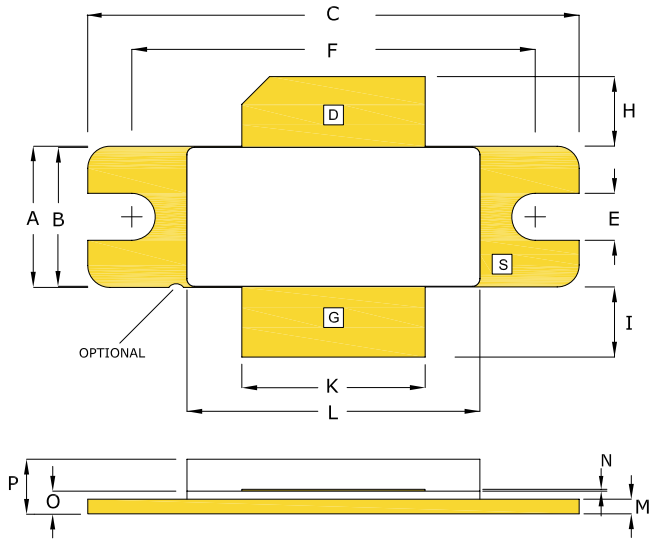


Note:Energy storage capacitors C7 and C16 are mounted external to the PCB between the drain and ground terminals and between the gate and ground terminals. It is recommended that they be placed as close as possible to the test fixture in order to minimise pulse droop.

Bill of Materials for IGN1030M800 Test Fixture

Designator	Description	Part Number
C1, C4, C13	CAP 0.1μF, 0805, 50V, X7R	C0805C104K5RACTU
C3, C12	CAP 1μF, 1206, 50V, X7R	C1206C105K5RACTU
C5 ,C6, C14, C15, C17	CAP 33pF, 0805	600F330JT250XT
C7, C16	CAP 68μF, 63V, Electrolytic	UPJ1J680MPD6TD
C8	CAP 1000pF, 0805, 50V	08051A102J4T2A
C11	CAP 10μF, 2220, 100V, X7R	C2220X106K5RACTU
L1	RES 0 OHM, 0805	6GEY0R00V
L11, L12	IND , FB, 33 OHM, 1206, 6A	BLM31PG330SN1L
R1, R10	RES, 15R0, 0805	ERJ-6ENF15R0V
R2	RES, 100 OHM, 0805	ERJ-6ENF1000V
PC Board Type	Rogers RO4350B-030, 30mil, 1/1oz. Copper	

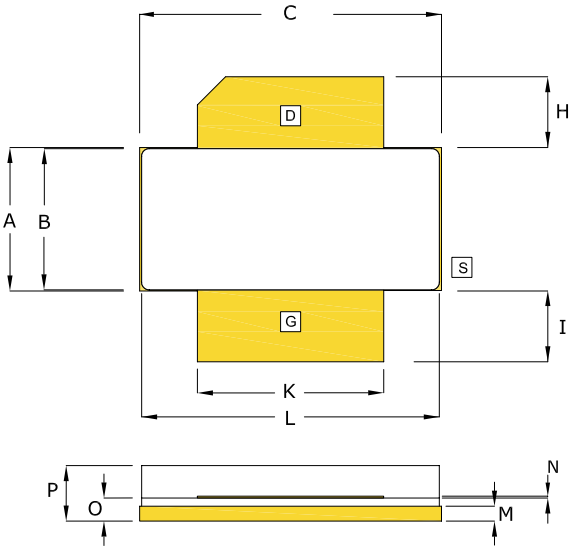
PACKAGE PL84A1



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.380	0.390	9.65	9.91
B	0.364	0.374	9.25	9.50
C	1.335	1.345	33.91	34.16
E	0.123	0.133	3.12	3.38
F	1.095	1.105	27.81	28.06
H	0.170	0.210	4.32	5.33
I	0.170	0.210	4.32	5.33
J	--	--	--	--
K	0.495	0.505	12.57	12.83
L	0.772	0.788	19.60	20.01
M	0.035	0.045	0.89	1.14
N	0.003	0.006	0.10	0.18
O	0.057	0.067	1.45	1.70
P	0.132	0.164	3.35	4.17

PIN SCHEDULE	
D	DRAIN
S	SOURCE
G	GATE

BOLT-DOWN FLANGE OPTION
IGN1030M800



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.380	0.390	9.65	9.91
B	0.364	0.374	9.25	9.50
C	0.805	0.815	20.45	20.70
E	--	--	--	--
F	--	--	--	--
H	0.170	0.210	4.32	5.33
I	0.170	0.210	4.32	5.33
J	--	--	--	--
K	0.495	0.505	12.57	12.83
L	0.772	0.788	19.60	20.01
M	0.035	0.045	0.89	1.14
N	0.003	0.006	0.10	0.18
O	0.057	0.067	1.45	1.70
P	0.132	0.164	3.35	4.17

PIN SCHEDULE	
D	DRAIN
S	SOURCE
G	GATE

EARLESS FLANGE OPTION
IGN1030M800S

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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