

# L-Band, GaN/SiC, RF Power Transistor

1030 & 1090 MHz | 640 W typ | 65% Efficiency typ | 18.5dB Gain typ | 50V | Mode S ELM

IGN1011L600 and IGN1011L600S are high power GaN-on-SiC RF power transistors that have been designed to suit the unique needs of IFF systems. Under ELM Mode S [48x (32μs on, 18μs off), 6.4% Long Term Duty Cycle] pulse conditions, they supply a minimum of 640 W of peak output power, with typically 18.5dB of associated gain and 65% efficiency. They operate from a 50V supply voltage.

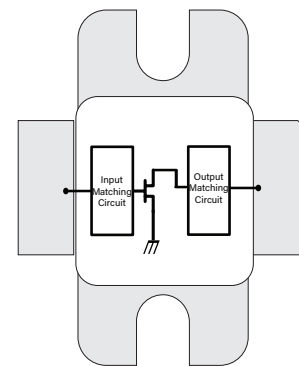


## FEATURES

- GaN on SiC HEMT Technology
- Output Power >640 W
- 100% RF Tested under Under ELM Mode S [48x (32μs on, 18μs off), 6.4% Long Term Duty Cycle] pulse conditions

## APPLICATIONS

- L-band Avionics IFF & SSR Systems
- Suitable for both uplink and downlink (Transponder)



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

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Gain	G	17	18.5	21	dB	$P_{OUT} = 640W$ $f = 1030, 1090 \text{ MHz}$ Mode S ELM pulse conditions (48 x [32μs on, 18μs off]), LTDC = 6.4% $V_{DS} = 50V, I_{DS} = 50mA$
Drain Efficiency	$\eta$	60	65	75	%	
Pulse Droop	D	-0.5	-0.3	0.2	dB	
Input Return Loss	IRL	8	12	20	dB	
Load Mismatch Stability	VSWR-S	2:1				
VSWR Withstand	VSWR-LMT	3:1				

Note 1: Consult Integra Technologies Application Note 001 for information on how RF output power and pulse droop are measured.

Note 2: Efficiency is not corrected in production testing for quiescent current in the off period. The values given above are for measurements made with correction.

**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	$V_{DS} = 50V, I_{DS} = 1mA$
Quiescent Gate Voltage	$V_Q$		-2.9		V	$V_{DS} = 50V, I_{DS} = 50mA$

**Table 3. 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	$I_D$	48	A	25 °C
DC Gate Current	$I_G$	4.8	mA	25 °C
RF Input Power	$P_{RF,IN}$	20	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	

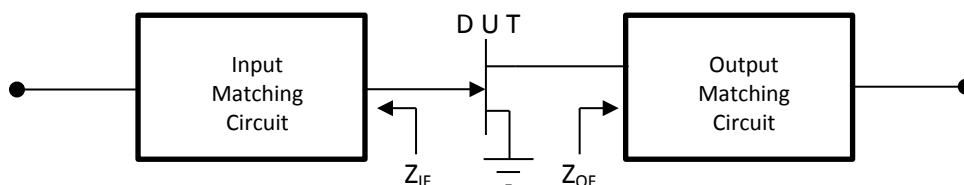
Note: Operation outside the limits given in this table may cause permanent damage to the transistor

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

Parameter	Symbol	Typ	Units	Test Conditions
Peak Thermal Resistance, Channel to Case	$R_{TH}$	0.25	°C/W	$P_{diss} = 345W$ $V_{DS} = 50V$ Mode S ELM pulse conditions (48 x [32µs on, 18µs off]), LTDC = 6.4%

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

Frequency (MHz)	$Z_{IF}$	$Z_{OF}$	Units	Test Conditions
1030	1.51 - j 0.90	1.67 - j 2.49	$\Omega$	$P_{OUT} = 640W$ Mode S ELM pulse conditions (48 x [32µs on, 18µs off]), LTDC = 6.4% $V_{DS} = 100V, I_{DS} = 50mA$
1090	1.55 - j 0.51	1.60 - j 2.34	$\Omega$	



TYPICAL PERFORMANCE

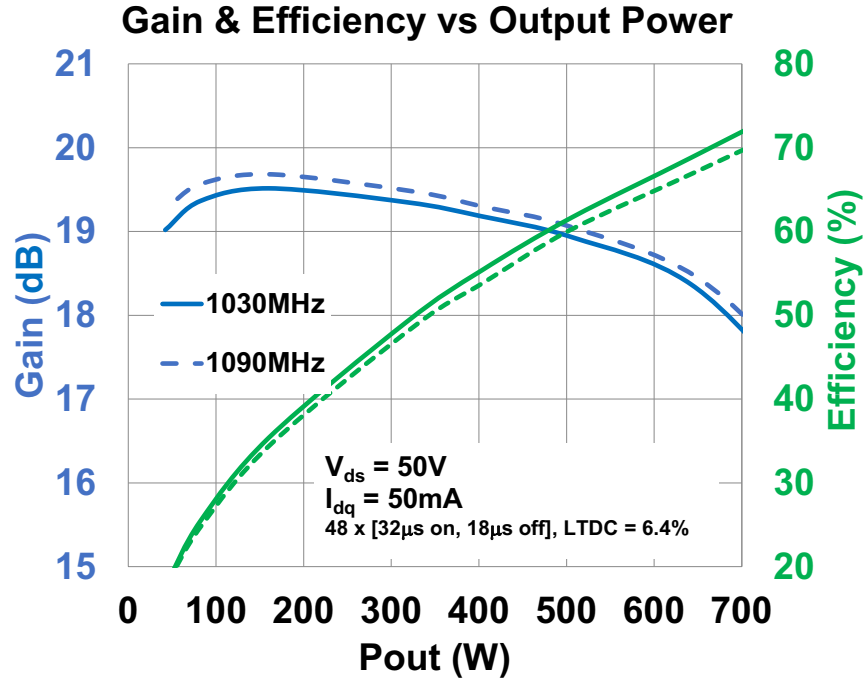


Figure 1

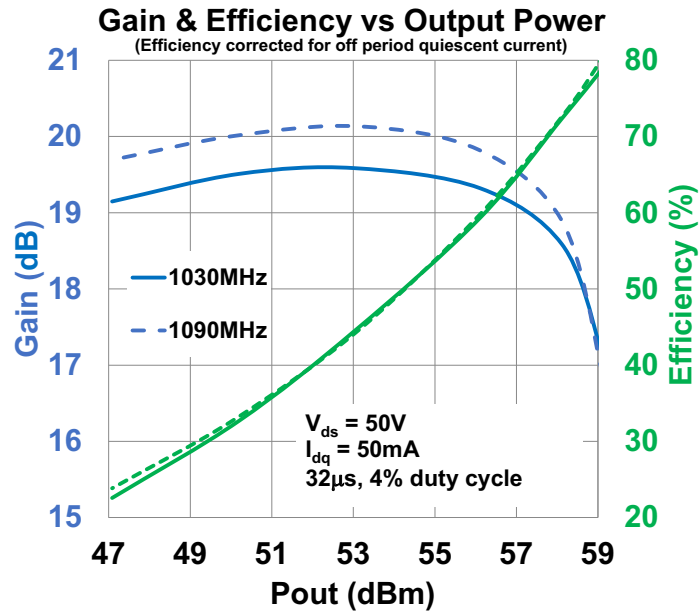
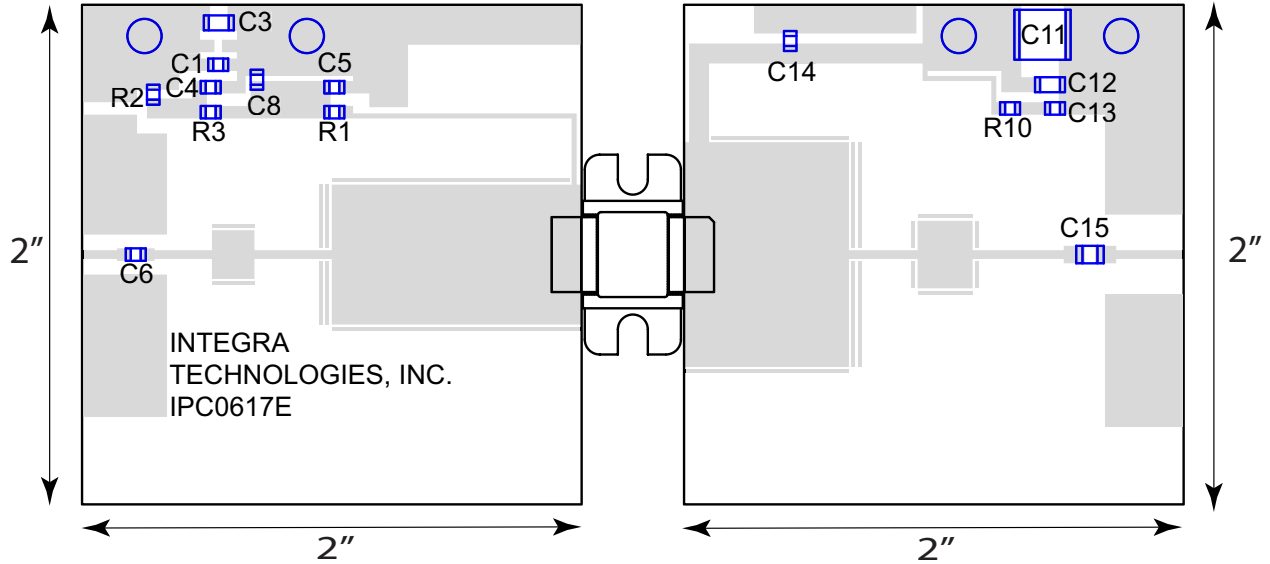


Figure 2

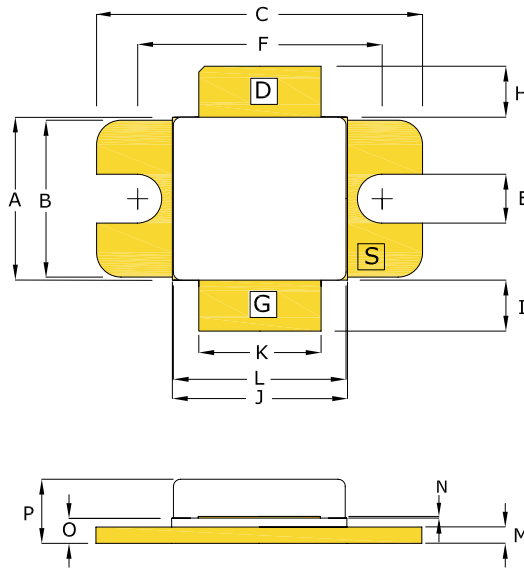
**TEST FIXTURE**



**Bill of Materials for IGN1011L600 Test Fixture**

Designator	Description	Part Number
C1, C4, C13	CAP 0.1 $\mu$ F, 0805, 50V	C0805C104K5RACTU
C3, C12	CAP 1 $\mu$ F	12061C105KAT2A
C5, C6, C14	CAP 33pF, 0805	ATC600F330
C8	CAP 1000pF, 100V, 0805	08051A102J4T2A
C11	CAP 10 $\mu$ F, 2220, 100V, X7R	22201C106MAT2A
C15	CAP 150pF	800B151JT300XT
R1, R10	RES 15 OHM, 0805	CRCW080515R0JNEA
R2	RES 100 OHM, 0805	CRCW0805100RFKTA
R3	RES 0 OHM, 0805	CRCW08050000ZSTA
PC Board Type	ROGERS RT3006, 25mil, 2/2oz. Copper	

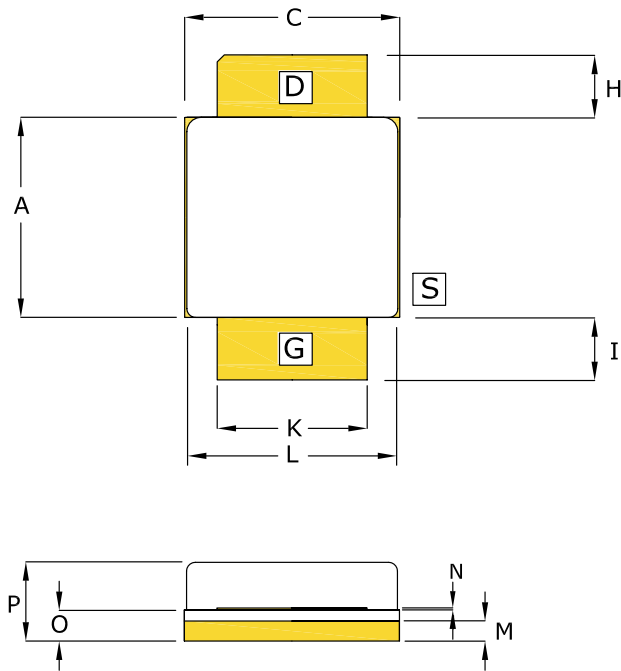
**PACKAGE PL44C1**



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	0.110	0.140	2.79	3.56
I	0.110	0.140	2.79	3.56
J	0.425	0.435	10.80	11.05
K	0.295	0.305	7.49	7.75
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
O	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  
IGN1011L600**



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	0.110	0.140	2.79	3.56
I	0.110	0.140	2.79	3.56
J	--	--	--	--
K	0.295	0.305	7.49	7.75
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
O	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  
IGN1011L600S**

### 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 Sensitivity Level (MSL)	Unlimited Shelf Life	IPC/JEDEC J-STD-020

### 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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