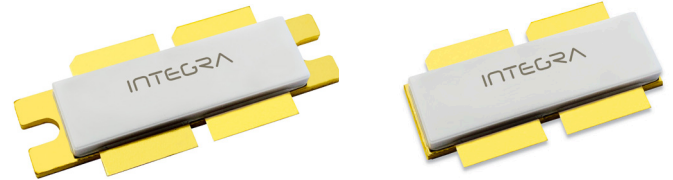


ADVANCED DATA SHEET

L-Band, GaN/SiC, RF Power Transistor

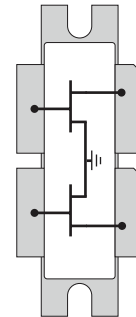
1030 MHz | 3600 W typ | 75% Efficiency typ | 19 dB Gain typ | 100 V | 32μs Pulse Length, 4% Duty Cycle

IGN1030S3600 and IGN1030S3600S are high power GaN-on-SiC RF power transistors that have been designed to suit the unique needs of IFF/SSR avionics systems. Under 32μs, 4% duty cycle pulse conditions, they supply 3600 W of peak output power with typically > 19dB of associated gain and 70% efficiency. They operate from a 100 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 >3600 W
- Pre-matched Input Impedance
- High Efficiency - up to 75% during the RF pulse
- 100% RF Tested
- RoHS and REACH Compliant
- Full non-linear electrothermal model available, please contact the factory



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	18.0	19.0	22.0	dB	$P_{OUT} = 3600W$ $f = 1030 \text{ MHz}$ 32μs pulse length, 4% duty cycle $V_{DS} = 100V, I_{DS} = 75mA \text{ per side}$
Drain Efficiency	η	60	70	80	%	
Pulse Droop	D	-0.5	-0.3	+0.2	dB	
Input Return Loss	IRL	10	14	18	dB	
Load Mismatch Stability	VSWR-S	2:1				
VSWR Withstand	VSWR-LMT	5:1				
Second Harmonic			-41		dBc	
Third Harmonic			-47		dBc	

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

Note 2: Harmonics not measured in production testing.

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	$V_{DS} = 100V, I_{DS} = 1mA$
Quiescent Gate Voltage	V_Q		-2.8		V	$V_{DS} = 100V, I_{DS} = 75mA \text{ per side}$

Table 3. Absolute Maximum Ratings (Not Simultaneous)

Parameter	Symbol	Value	Units	Test Conditions
DC Drain-Source Voltage	V_{DS}	400	V	25 °C
DC Gate-Source Voltage	V_{GS}	-8 to +1.0	V	25 °C
DC Drain Current	I_D	144	A	25 °C
DC Gate Current	I_G	144	mA	25 °C
RF Input Power	P_{RFIN}	90	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 4. Thermal Resistance (Case temperature = 85 °C unless otherwise stated)

Parameter	Symbol	Typ	Units	Test Conditions
Peak Thermal Resistance per side, Channel to Case	R_{TH}	0.1	°C/W	$P_{diss} = 600W$ per side 32μs pulse length, 4% duty cycle $V_{DS} = 100V$

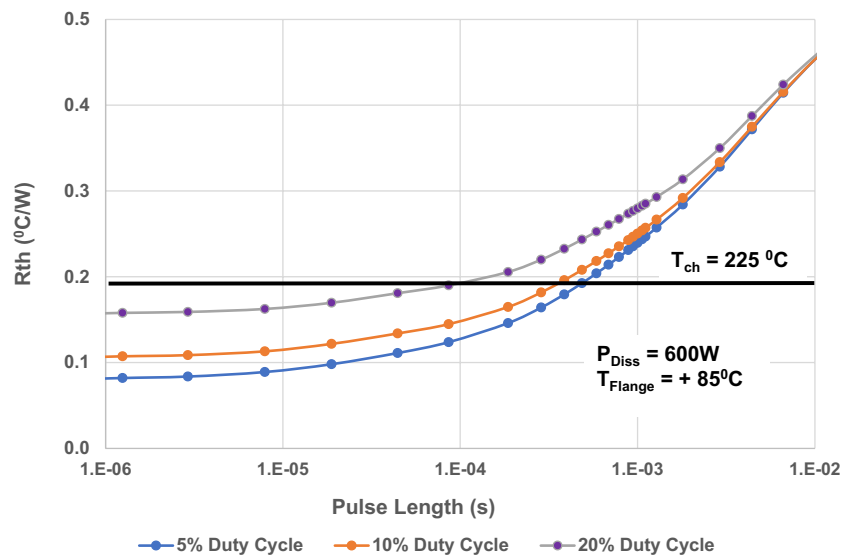


Table 5. Test Fixture One Side to Ground Source & Load Impedances (Case temperature = 25 °C unless otherwise stated)

Frequency (MHz)	Z_{IF}	Z_{OF} Fundamental	Z_{OF} Second Harmonic	Units	Test Conditions
1030	1.15 - j 1.04	1.02 - j 0.10	0.13 + j 3.21	Ω	$P_{OUT} = 3600W$ 32μs pulse length, 4% duty cycle $V_{DS} = 100V$, $I_{DS} = 75mA$ per side

Note: Source and load impedances are terminal to ground and are measured looking into the test fixture with an identical signal simultaneously applied to both terminals i.e. even mode excitation.

TYPICAL PERFORMANCE

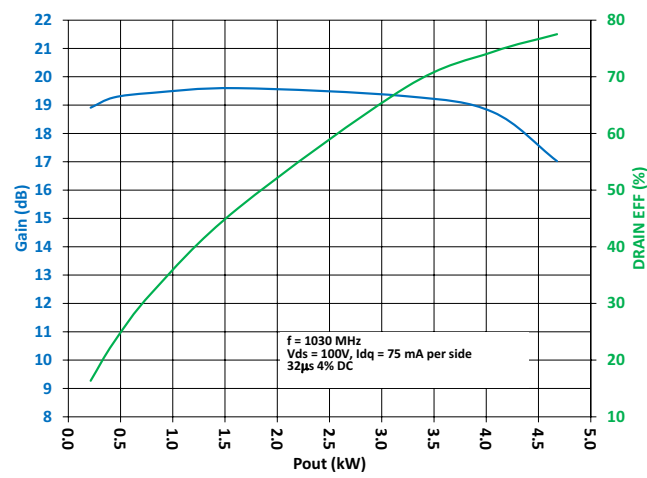
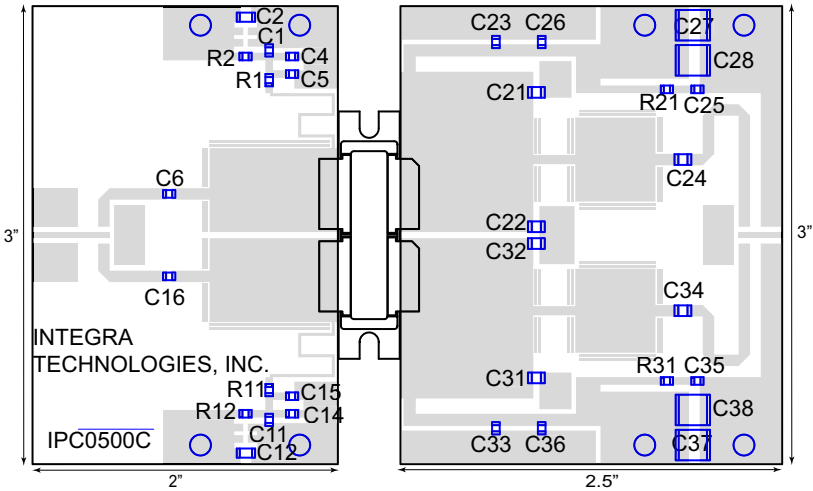


Figure 1

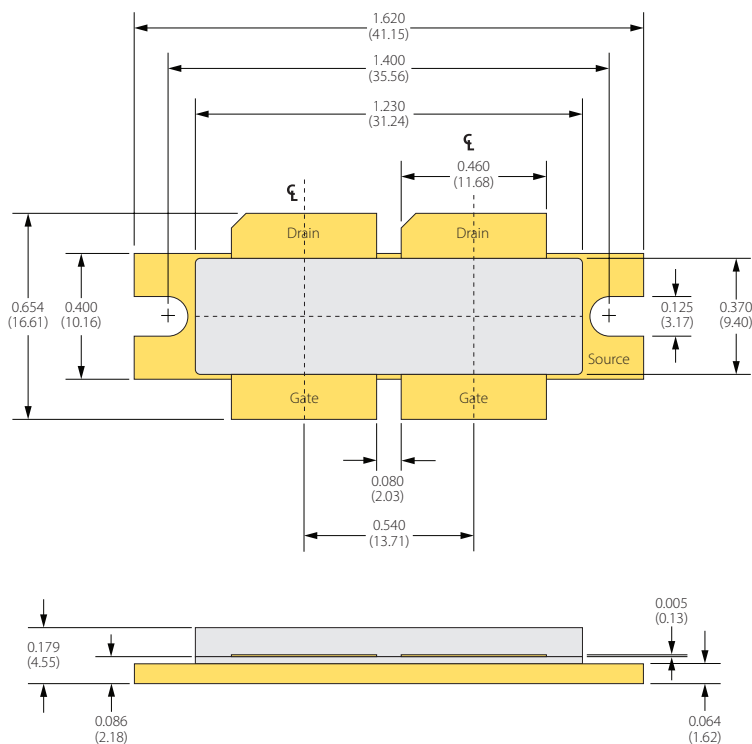
TEST FIXTURE



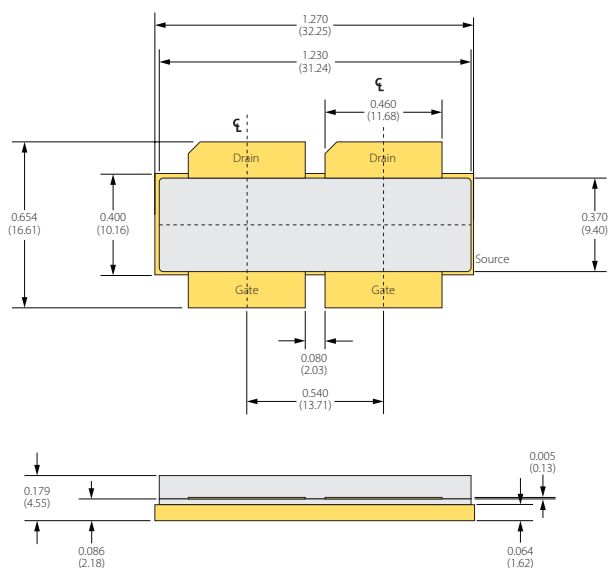
Bill of Materials for IGN1030S3600 Test Fixture

Designator	Description	Quantity	Part Number
C1, C11, C25, C35	CAP 0.068μF, 0805, 250V, X7R	4	C0805C683KARACAUTO
C2, C12	CAP 1μF, 100V, 1206, X7R	2	12061C105K4T2A
C4, C14	CAP 1000pF, 100V, 0805	2	08051A102J4T2A
C5, C6, C15, C16, C23, C26, C33, C36	CAP 33pF, 0805	8	ATC600F330
C24, C34	CAP 150pF, 1111	2	ATC800B151
C27, C28, C37, C38	CAP 2.2μF, 250V, 2220, X7R	2	C5750X7T2E225K250KA
R2, R12	RES, 100 OHM, 0805	2	ERJ-6ENF1000V
R1, R11, R21, R31	RES, 150HM, 0805	4	ERJ-6ENF150V
PC Board Type	ROGERS RO3006, 25mil, 2/2oz. Copper	2	

PACKAGE PL124A1



BOLT-DOWN FLANGE OPTION
IGN1030S3600



EARLESS FLANGE OPTION
IGN1030S3600S

Dimensions: Inches (mm)

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

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.

Disclaimer

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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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