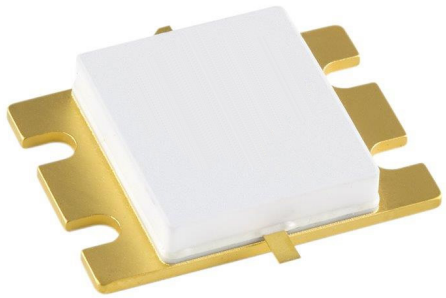
L-Band, GaN/SiC, RF Power Transistor

1030 - 1090 MHz | 550W | 70% Efficiency | 19.5dB Gain | 50 V | 32μs Pulse Length, 4% Duty Cycle

IGT1011S500 is a high power RF power transistor that has been designed to suit the unique needs of IFF/SSR avionics systems. It operates at both 1030 and 1090 MHz. Under 32μs pulse length, 4% duty cycle pulse conditions, it supplies a minimum of 500 W of peak output power, with typically >18.5 dB of associated gain and 55% efficiency. It operates from a 50 V 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 >500 W
- Fully matched to 50 Ω Impedance at the input and output
- High Efficiency - up to 70%
- 100% RF Tested
- RoHS and REACH Compliant

APPLICATIONS

- L-band Avionics IFF/SSR Systems

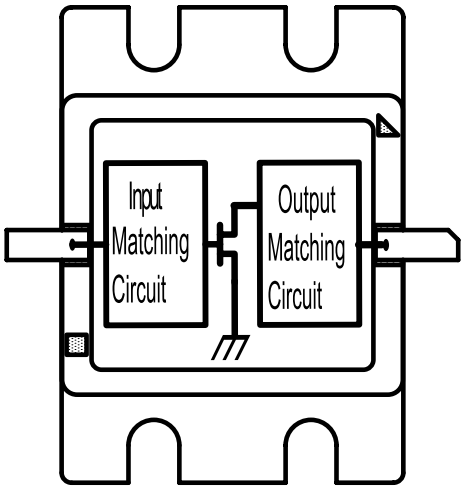


Table 1. RF Electrical Characteristics (Case temperature = 35 °C unless otherwise stated)

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Input Return Loss	IRL	7	10	20	dB	P_{OUT} = 500W f = 1030, 1090 MHz 32μs pulse length, 4% duty cycle V_{DS} = 50V, I_{DQ} =100mA
Gain	G	17	18.5	22	dB	
Drain Efficiency	η	50	55	80	%	
Pulse Droop	D	-0.4	-0.2	+0.2	dB	
Load Mismatch Stability	VSWR-S	2:1				
VSWR Withstand	VSWR-LMT	5:1				

Table 2. Absolute Maximum Ratings (Not Simultaneous)

Parameter	Symbol	Value	Units	Test Conditions
DC Drain-Source Voltage	V_{DS}	130	V	35 °C
DC Gate-Source Voltage	V_{GS}	-8 to +1.0	V	35 °C
DC Drain Current	I_D	36	A	35 °C
DC Gate Current	I_G	3.6	mA	35 °C
RF Input Power	$P_{RF,IN}$	9	W	35 °C
Operating Channel Temperature	T_{CH}	-55 to +225	°C	
Storage Temperature	T_{STG}	-55 to +150	°C	
Soldering Temperature	T_{SOLDER}	350 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 = 35 °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		-2.7		V	V_{DS} = 50V, I_{DS} = 100 mA

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}		0.1		°C/W	P_{DISS} = 333W 32µs pulse length, 4% duty cycle V_{DS} = 50V

Table 5. Matching Network Source & Load Impedances (Case temperature = 35°C unless otherwise stated)

Frequency (MHz)	Z_{IF}	Z_{OF}	Units
1030, 1090	50 + j0	50 + j0	Ω

TYPICAL PERFORMANCE

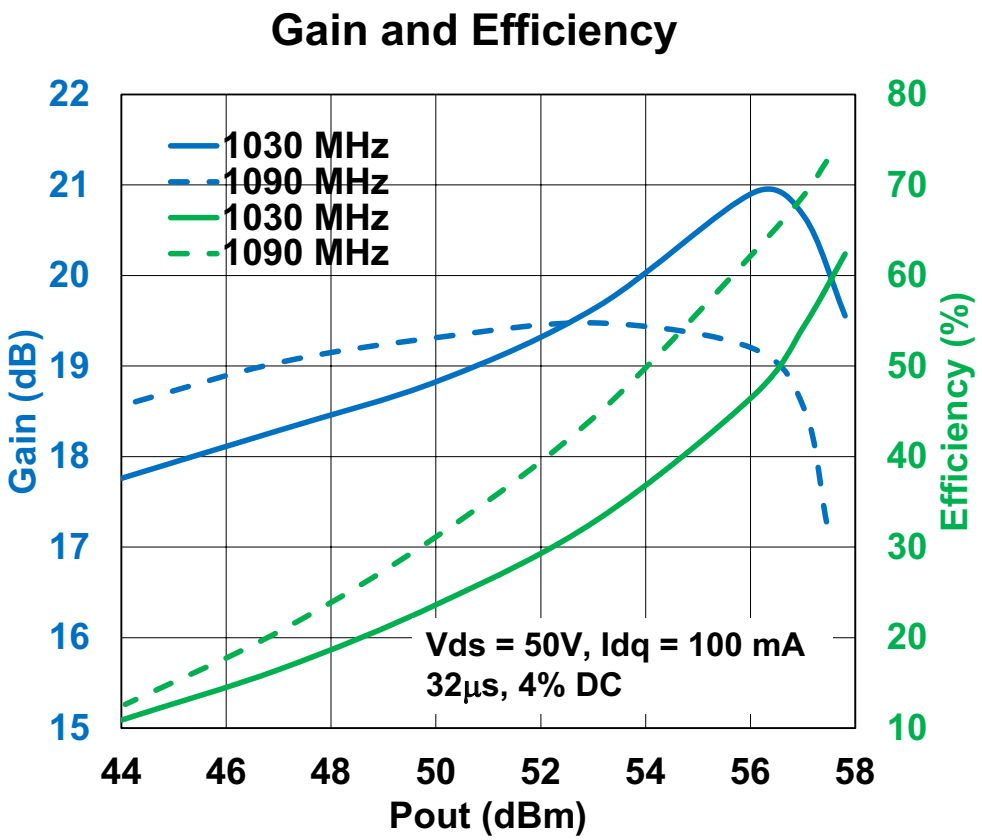
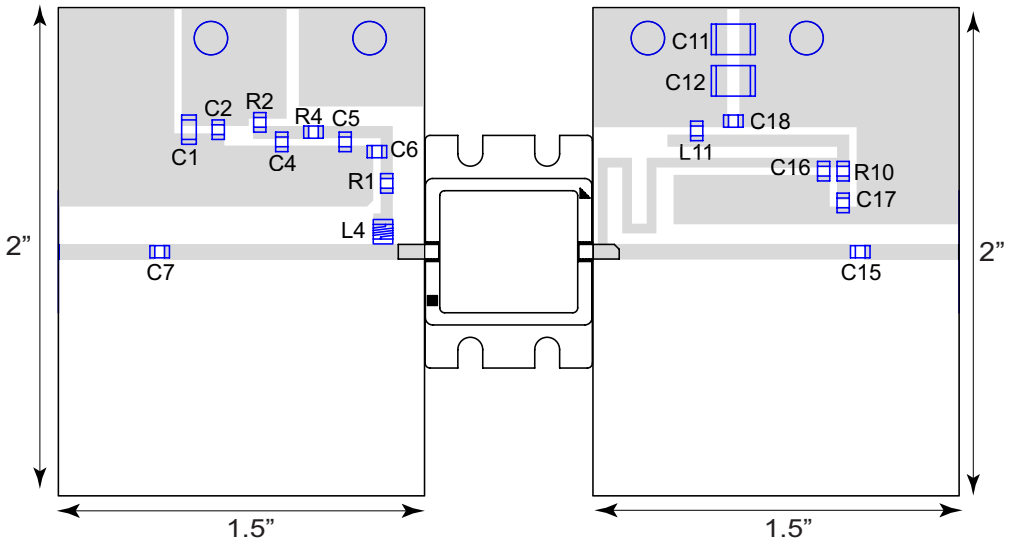


Figure 1

TEST FIXTURE

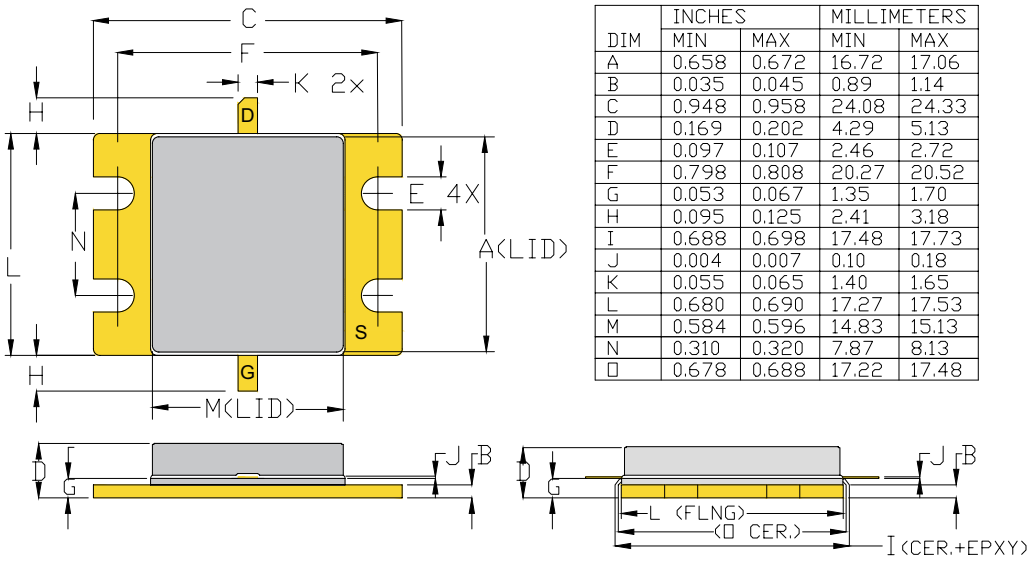


Note:it is recommended that a 4700µF 63V electrolytic capacitor be connected between ground and the positive supply terminal of the test fixture, and placed as close as possible to the test fixture, in order to minimise pulse droop.

Bill of Materials for IGT1011S500 Test Fixture

Designator	Description	Part Number
C1	CAP 1μF, 1206, 100V, X7R	12061C105K4T2A
C2, C5, C18	CAP 1000pF, 0805, 100V	08051A102J4T2A
C4, C17	CAP 0.068pF, 250V, 0805, X7R	C0805C683KARAC#A
C6, C7, C15, C16	CAP 33pF, 0805, 50V	ATC500F330
C11, C12	CAP 1μF, 1812, 200V, X7R	18122C105KAT2A
L4	IND 39nH 1008	1008CS-390XJLB
L11	IND, FB, 38 OHM, 6A, 1206	Z1206C380BPWST
R1	RES 22 OHM, 0805	ERJ-6GEYJ220V
R2	RES 200 OHM,0805	CRCW0805200RFKTA
R4	RES 0 OHM, 0805	CRCW08050000ZSTA
R10	RES 5.1 OHM, 0805	CRCW08055R1JNEA
PC BOARD	RO4350B 0.030", 1oz/1oz Copper	

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.

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.