

L-Band, GaN/SiC, RF Power Transistor

1030 and 1090 MHz | 30 W typ | 52% Efficiency typ | 20 dB Gain typ | 50 V | 32μs Pulse Length, 4% Duty Cycle

IGN1011S25 and IGN1011S25S 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 both 1030 and 1090 MHz. Under 32μs pulse length, 4% duty cycle pulse conditions, they supply a minimum of 25 W of peak output power, with typically >20 dB of gain. 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 >25 W
- Pre-matched Input Impedance
- Miniaturized Circuit Design
- 100% RF Tested
- RoHS and REACH Compliant

APPLICATIONS

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

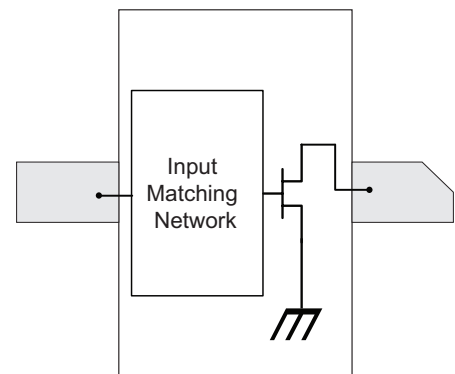


Table 1. Absolute Maximum Ratings (Not Simultaneous)

Parameter	Symbol	Value	Units	Test Conditions
DC Drain-Source Voltage	V_{DS}	150	V	25 °C
DC Gate-Source Voltage	V_{GS}	-8 to +1.0	V	25 °C
DC Drain Current	I_D	2	A	25 °C
DC Gate Current	I_G	2	mA	25 °C
RF Input Power	P_{RFIN}	1	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 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		-2.5		V	$V_{DS} = 50V, I_{DS} = 10mA$

Table 3. RF Electrical Characteristics in Standard Test Circuit (Case temperature = 30 °C unless otherwise stated)

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Gain	G	17	19.5	21.5	dB	$P_{OUT} = 25W$ $f = 1030, 1090 \text{ MHz}$ 32µs pulse length, 4% duty cycle $V_{DS} = 50V, I_{DS} = 10mA$
Drain Efficiency	η	40	50	65	%	
Pulse Droop	D	-0.4	-0.2	+0.2	dB	
Input Return Loss	IRL	8	12	20	dB	
Load Mismatch Stability	VSWR-S		2:1			
VSWR Withstand	VSWR-LMT		5:1			

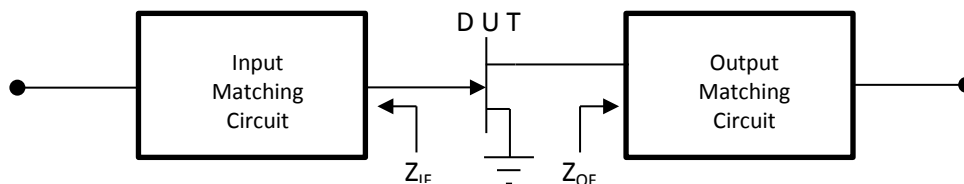
Note 1: Consult Integra Technologies Application Note 001 for information on how RF output power and pulse droop are measured.

Table 4. Thermal Resistance (Case temperature = 25 °C unless otherwise stated)

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Peak Thermal Resistance, Channel to Case	R_{TH}		5.5		°C/W	$P_{diss} = 25W$ 32µs pulse length, 4% duty cycle $V_{DS} = 50V$

Table 5. Source & Load Impedances for Miniaturized Test Fixture

Frequency (MHz)	Z_{IF}	Z_{OF}	Units	Test Conditions
1030	1.6 - j 1.3	24.8 + j 16.2	Ω	$P_{OUT} = 25W$ $f = 1030, 1090 \text{ MHz}$ 32µs pulse length, 4% duty cycle $V_{DS} = 50V, I_{DS} = 10mA$
1090	1.5 - j 0.5	27.8 + j 14.5	Ω	



TYPICAL PERFORMANCE IN STANDARD TEST CIRCUIT

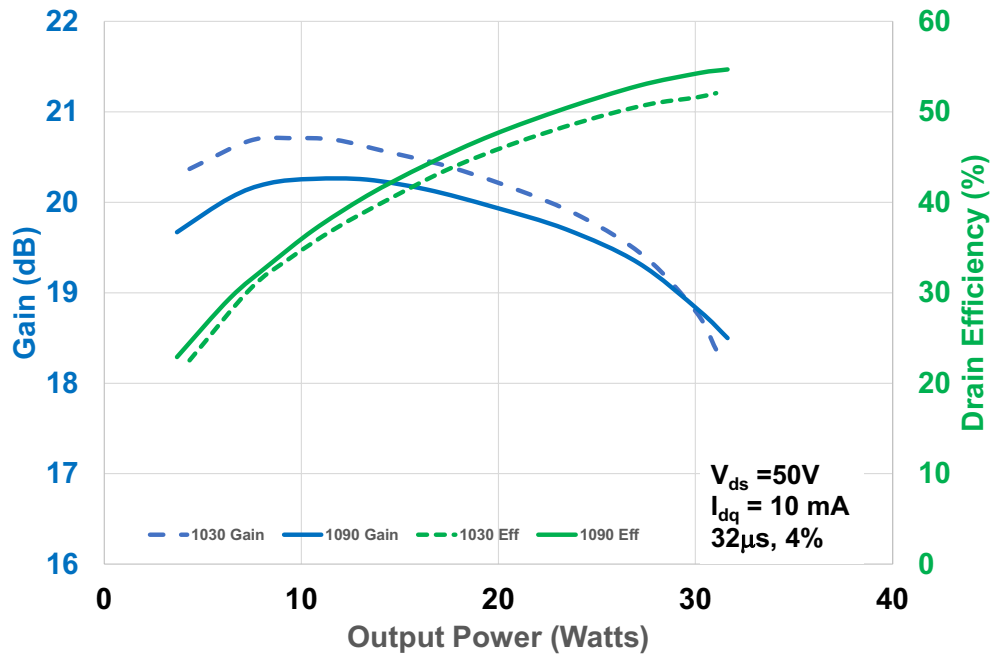


Figure 1

TYPICAL PERFORMANCE IN MINIATURIZED TEST CIRCUIT

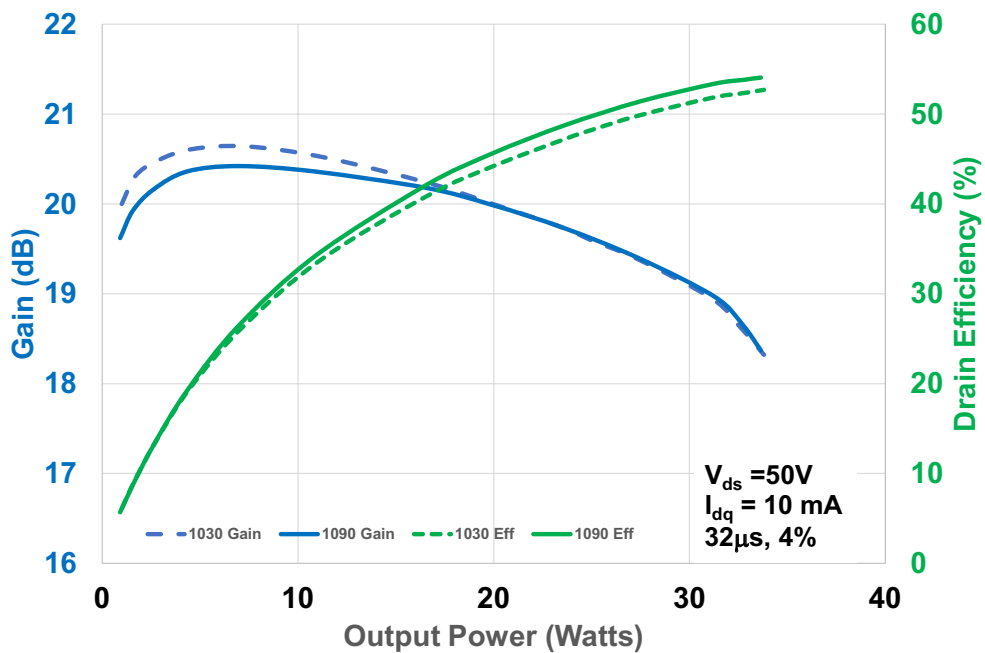
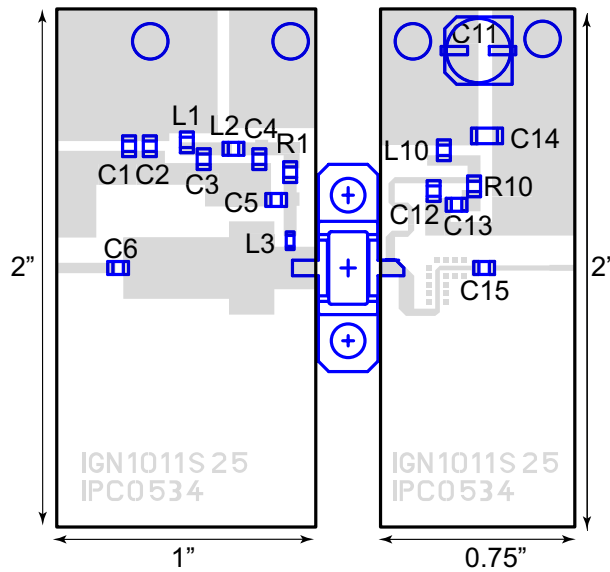


Figure 2

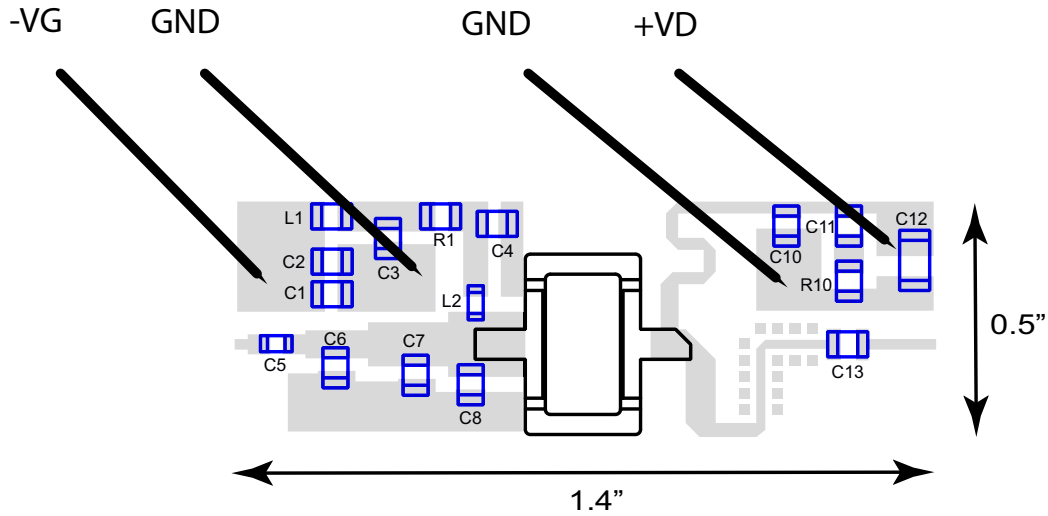
STANDARD TEST FIXTURE



Bill of Materials for IGN1011S25 Standard Test Fixture

Designator	Description
C1	CAP 0.01 μ F, 50V, 0805
C2, C3, C6	CAP 10pF, 50V, 0805
C4	CAP 1000pF, 50V, X7R, 0805
C5, C12	CAP 18pF, 50V, 0805, Edge Mount
C11	CAP 68 μ F, 63V, Electrolytic
C13	CAP 0.1 μ F, 50V, 0805
C14	CAP 1 μ F, 100V, 1206
C15	CAP 18pF, 50V, 0805, Edge Mount
L1, L2, L10	IND FB, 120 OHM, 0805, 5A
L3	IND 120nH
R1, R10	RES 5.1 OHM, 0805
PC Board Type	ROGERS RO6010, 25mil, 1/1oz. Copper

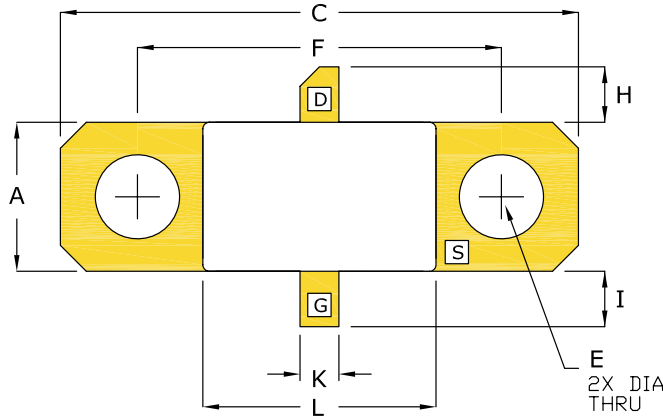
MINIATURIZED TEST FIXTURE



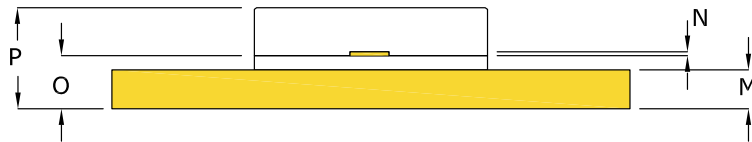
Bill of Materials for IGN1011S25 Miniaturized Test Fixture

Designator	Description
C1	CAP 0.01 μ F, 50V, 0805
C2	CAP 10pF, 50V, 0805
C3	CAP 1000pF, 50V, 0805, X7R
C4, C10	CAP 18pF, 50V, 0805
C5	CAP 10pF, 250V, 0603, Edge Mount
C6	CAP 2.7pF, 250V, 0805, Edge Mount
C7	CAP 6.8pF, 250V, 0805, Edge Mount
C8	CAP 6.3pF, 250V, 0805, Edge Mount
C11	CAP 0.1 μ F, 100V, 0805
C12	CAP 1 μ F, 100V, 1206
C13	CAP 10pF, 250V, 0603, Edge Mount
L1, L2	IND FB 120 OHM, 5A, 0805
R1	RES 10 OHM, 0805
R10	RES 5.1 OHM, 0805
PC Board Type	ROGERS RO3010, 25mil, 1/1oz. Copper

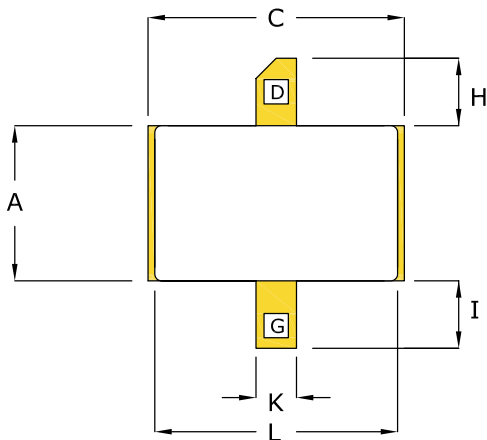
PACKAGE PL32A2 FLANGED AND EARLESS VERSIONS



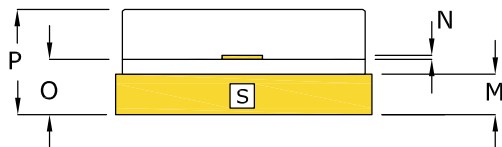
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.225	0.235	5.72	5.97
B	--	--	--	--
C	0.795	0.805	20.19	20.44
E	0.125	0.135	3.18	3.43
F	0.557	0.567	14.14	14.40
H	0.093	0.107	2.36	2.72
I	0.093	0.107	2.36	2.72
J	--	--	--	--
K	0.055	0.065	1.40	1.65
L	0.357	0.363	9.07	9.22
M	0.055	0.065	1.40	1.65
N	0.004	0.006	0.10	0.15
O	0.077	0.087	1.96	2.21
P	0.151	0.174	3.84	4.42



PIN SCHEDULE	
D	DRAIN
S	SOURCE
G	GATE



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.225	0.235	5.72	5.97
B	--	--	--	--
C	0.375	0.385	9.53	9.78
E	--	--	--	--
F	--	--	--	--
H	0.093	0.107	2.36	2.72
I	0.093	0.107	2.36	2.72
J	--	--	--	--
K	0.055	0.065	1.40	1.65
L	0.357	0.363	9.07	9.22
M	0.055	0.065	1.40	1.65
N	0.004	0.006	0.10	0.15
O	0.077	0.087	1.96	2.21
P	0.151	0.174	3.84	4.42



PIN SCHEDULE	
D	DRAIN
S	SOURCE
G	GATE

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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