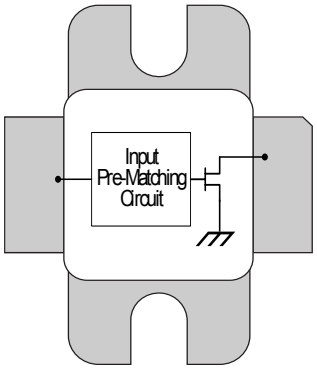
L-Band, GaN/SiC, RF Power Transistor

1.03 & 1.09 GHz | 400W typ | 68% Efficiency typ | 20.5 dB Gain typ | 50 V | 32μs Pulse Length, 4% Duty Cycle

IGN1011S350 and IGN1011S350S are high power GaN-on-SiC RF power transistors that have been designed to suit the unique needs of IFF and avionic systems. They operate at both 1030 and 1090 MHz. Under 32μs, 4% duty cycle pulse conditions, they supply a minimum of 350 W of peak output power. 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 >350W
- Pre-matched Input Impedance
- High Efficiency - up to 68%
- 100% RF Tested Under 32μs, 4% duty cycle pulse conditions
- RoHS and REACH Compliant



APPLICATIONS

- IFF and SSR Avionic Systems

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	54	A	25 °C
DC Gate Current	I_G	5.4	mA	25 °C
RF Input Power	$P_{RF,IN}$	40	W	25 °C
Operating Channel Temperature	T_J	-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		-2.8		V	V_{DS} = 50V, I_{DS} = 50mA

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

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Gain	G	17	18.5	20	dB	P_{OUT} = 350W
Drain Efficiency	η	55	63	70	%	f = 1.03, 1.09GHz
Pulse Droop	D	-0.4	-0.1	0.2	dB	32µs pulse length, 4% duty cycle
Load Mismatch Stability	VSWR-S		2:1			
VSWR Withstand	VSWR-LMT		5:1			V_{DS} = 50V, I_{DS} = 50mA

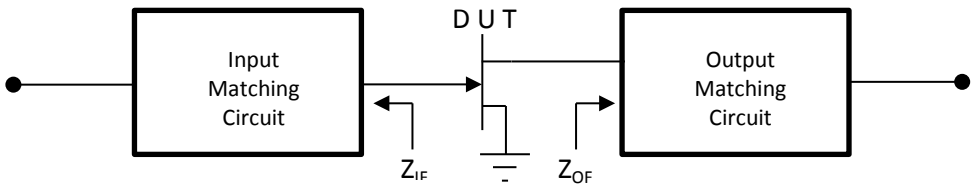
Note: Consult Integra Technologies Application Note 001 for information on how RF output power and pulse droop are measured.

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

Parameter	Symbol	Typ	Test Conditions
Peak Thermal Resistance, Channel to Case	R_{TH}	0.3	P_{DISS} = 206W 32µs pulse length, 4% duty cycle V_{DS} = 50V

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

Frequency (GHz)	Z_{IF}	Z_{OF} Fundamental	Units	Test Conditions
1.03	2.7 - j 2.4	2.1 + j 0.2	Ω	P_{OUT} = 350W 32µs pulse length, 4% duty cycle V_{DS} = 50V, I_{DS} = 50mA
1.09	2.7 - j 1.9	2.3 + j 0.6	Ω	



TYPICAL PERFORMANCE IN STANDARD TEST FIXTURE

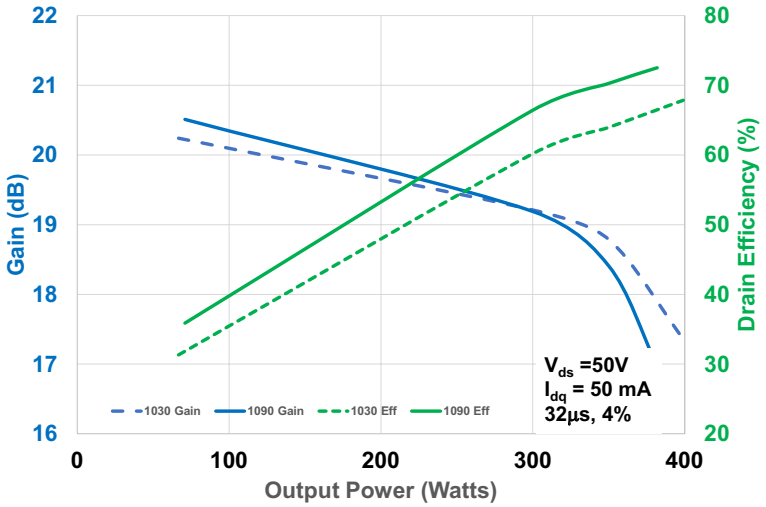


Figure 1

TYPICAL PERFORMANCE IN MINIATURIZED TEST FIXTURE

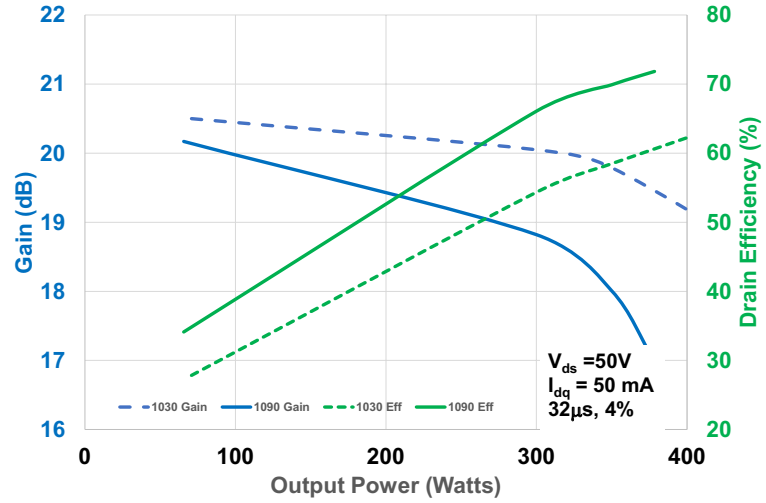
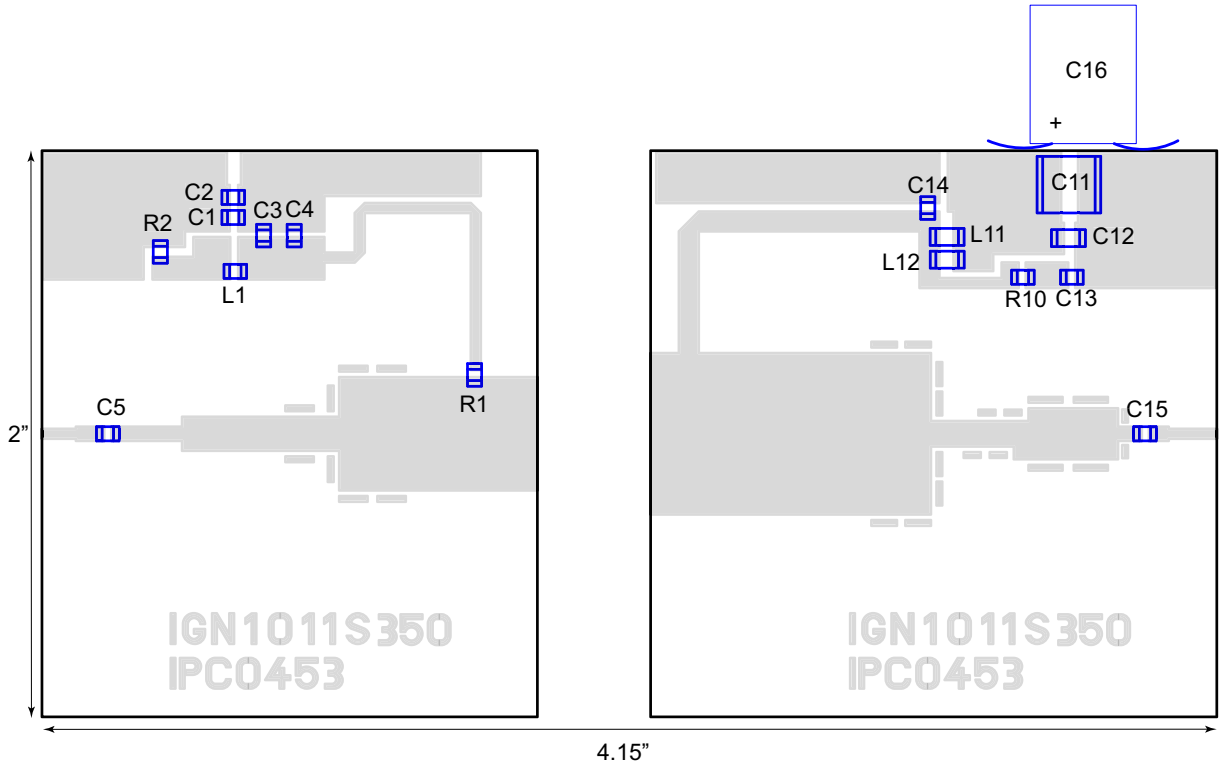


Figure 2

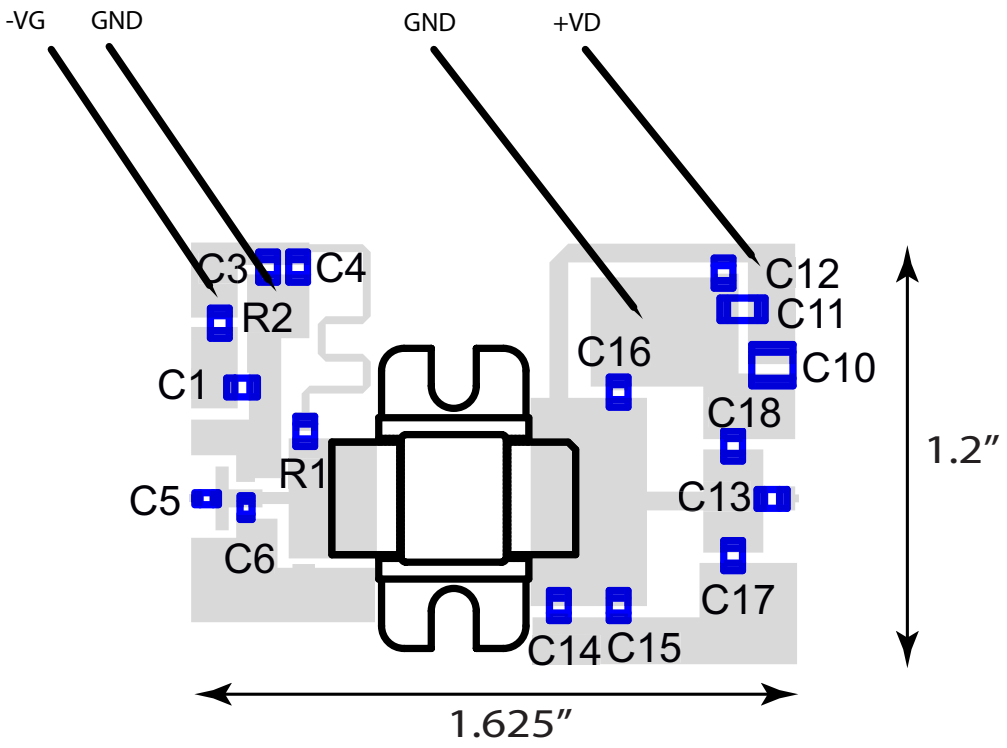
STANDARD TEST FIXTURE



Bill of Materials for IGN1011S350 Standard Test Fixture

Designator	Description	Part Number
C1, C13	CAP 0.01µF, 0805, 50V	0805C103K4Z2A
C2, C4	CAP 18pF, 0805, 50V	ATC600F180
C3	CAP 1000pF, 0805, 50V, X7R	0805C102K5RACTU
C5, C6, C15	CAP 18pF, 0805, Edge Mount	ATC600F180
C11	CAP 10µF, 2220, 100V, X7R	22201C106MAT2A
C12	CAP 1µF, 1206	12061C105KAT2A
C14	CAP 100pF	ATC600F102
C16	CAP 68µF, 63V, Electrolytic	UPJ1J680MPD
L1	IND FB, 120 OHM, 0805, 5A	ILHB0805ER121V
L11, L12	IND FB 33 OHM, 1206, 6A	BLM31PG330SH1L
R1, R10	RES 10 OHM, 0805, 0.1W	ERJ-2GEJ100X
R2	RES 100 OHM, 0805, 0.1W	ERJ-2RKF1000X
PC Board Type	ROGERS RT6006 25mil, 1/1oz. Copper	

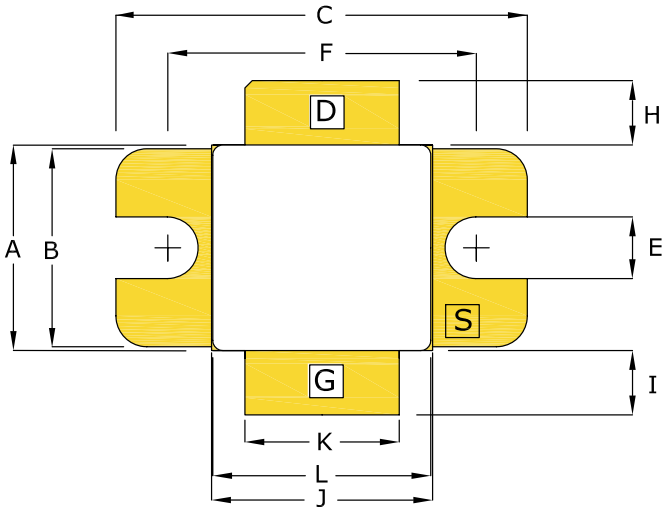
MINIATURIZED TEST FIXTURE



Bill of Materials for Miniaturized Test Fixture

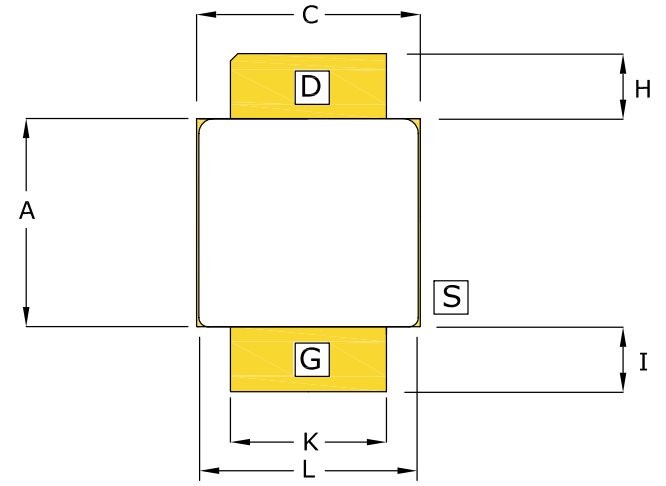
Designator	Description	Part Number
C1	CAP 0.01µF, 0805, 100V	0805C103K4Z2A
C3	CAP 1000pF, 0805, 50V, X7R	C0805C102K5RACTU
C4	CAP 10pF, 0805, 250V	ATC600F100
C5	CAP 10pF, 0603, 250V	ATC600S100
C6	CAP 6.3PF, 0805, 250V	ATC600S6R3
C10	CAP 100pF, 2220, 100V, X7R	ATC100B102
C11	CAP 1µF, 1206, 100V	12061C105KAT2A
C12	CAP 100pF, 0805, 100V	ATC600F102
C13	CAP 18pF, 0805, 100V	ATC600F180
C14	CAP 2.7pF, 0805, 100V	ATC600F2R7
C15	CAP 5.6pF, 0805, 100V	ATC600F5R6
C16	CAP 4.7pF, 0805, 100V	ATC600F4R7
C17	CAP 3.3pF, 0805, 100V	ATC600F3R3
C18	CAP 1.2pF, 0805, 100V	ATC600F1R2
C19	CAP 68µF, 63V, Electrolytic	UPJ1J680MPD
L1	IND FB, 120 OHM, 0805, 5A	ILHB0805ER121V
R1	RES 10 OHM, 0805, 0.1W	ERJ-6ENF10R0V
R2	RES 100 OHM, 0805, 0.1W	ERJ-6ENF1000V
PC Board Type	ROGERS RO3010 25mil, 1/1oz. Copper	

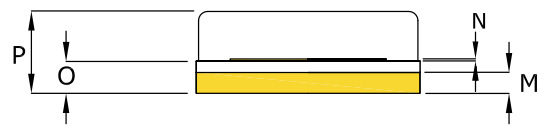
PACKAGE PL44C1 FLANGED AND EARLESS VERSIONS



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
□	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





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
□	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

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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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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