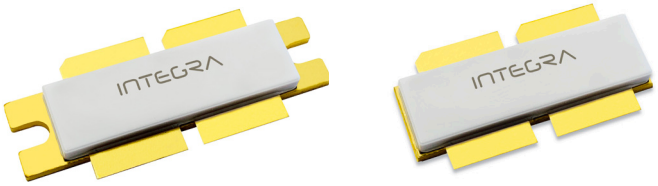
UHF-Band, GaN/SiC, RF Power Transistor

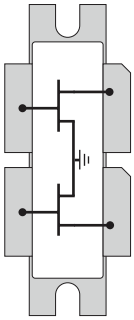
915 MHz | 5 kW typ | 80% Efficiency typ | 19 dB Gain typ | 100 V | 1μs Pulse Length, 1% Duty Cycle

IGN0910S5000 and IGN0910S5000S are high power GaN-on-SiC RF power transistors that have been designed to suit the unique needs of Medical and ISM systems. Under 1μs, 1% duty cycle pulse conditions, they typically supply 5kW of peak output power with typically > 19dB of gain and 80% 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 5 kW
- Pre-matched Input Impedance
- High Efficiency - up to 80% during the RF pulse
- 100% RF Tested
- RoHS and REACH Compliant



APPLICATIONS

- Medical systems
- ISM

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

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Gain	G	17.0	19.0	22.0	dB	P_{OUT} = 5kW
Drain Efficiency	η	65	80	85	%	f = 915 MHz
Pulse Droop	D	-0.5	-0.3	+0.2	dB	10μs pulse length, 4% duty cycle
Input Return Loss	IRL	10	14	18	dB	
Load Mismatch Stability	VSWR-S	2:1				V_{DS} = 100V, I_{DS} = 75mA per side
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 2. 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 per side	I_D	156	A	25 °C
DC Gate Current per side	I_G	15.6	mA	25 °C
RF Input Power	$P_{RF,IN}$	60	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 3. 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		-3.1		V	V_{DS} = 100V, I_{DS} = 75mA per side

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

Parameter	Symbol	Typ	Units	Test Conditions
Peak Thermal Resistance (total device), Channel to Case	R_{TH}	0.04	°C/W	P_{diss} = 1250W 1µs pulse length, 1% 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}	Units	Test Conditions
915	1.6 - j 0.8	1.2 + j 0.2	Ω	P_{OUT} = 5kW 1µs pulse length, 1% duty cycle V_{DS} = 100V, I_{DS} = 75mA per side

Note: Source and load impedances are single-sided port to a 100 Ohm load impedance and are measured looking into the test fixture.

TYPICAL PERFORMANCE

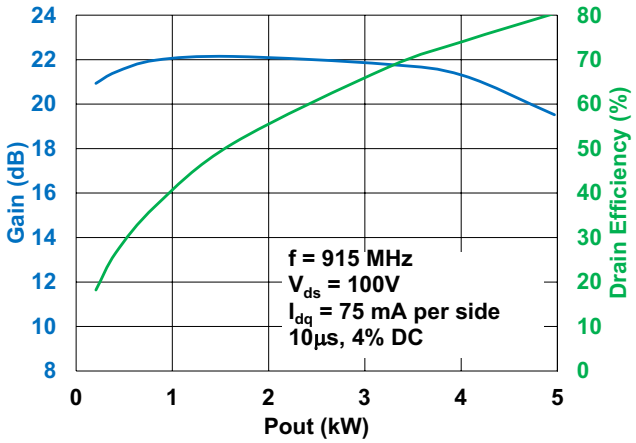
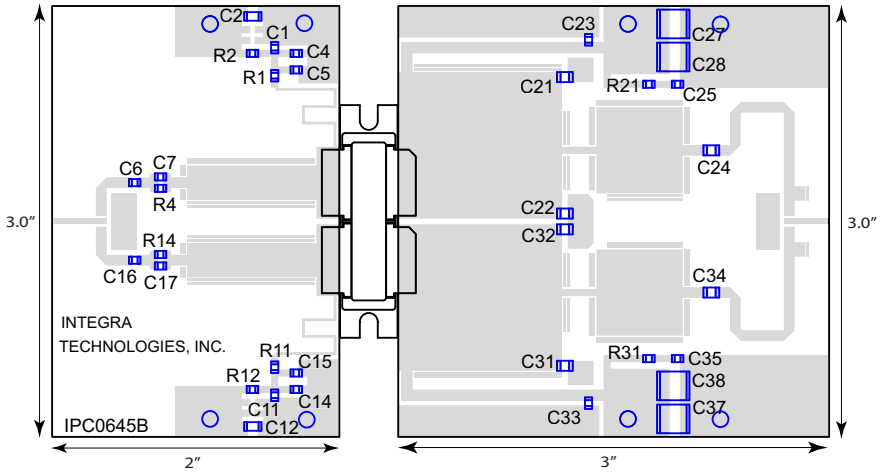


Figure 1

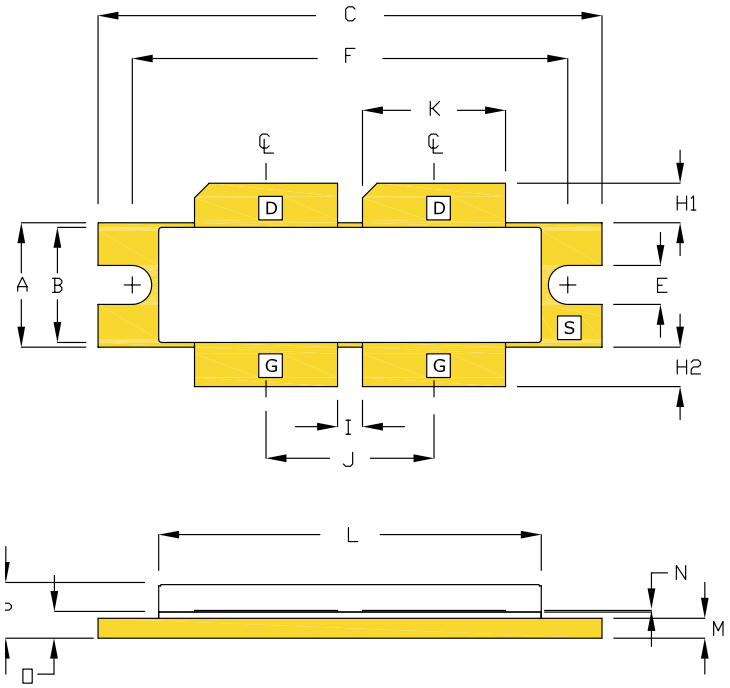
TEST FIXTURE



Bill of Materials for IGN0910S5000 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, C7, C15, C16, C17, C23, C33	CAP 100pF, 0805	8	ATC600F101
C21, C22, C31, C32	CAP 4.7pF, 1111	4	ATC800B4R7B
C27, C28, C37, C38	CAP 2.2µF, 250V, 2220, X7R	4	C5750X7T2E225K250KA
R1, R11, R21, R31	RES 15 OHM, 0805	4	CRCW080515R0JNEA
R2, R12	RES 100 OHM, 0805	2	CRCW0805100RFKTA
R4, R14	RES 5.1 OHM, 0805	2	CRCW08055R10JNEA
PC Board Type	ROGERS RO6006, 25mil, 2/2oz. Copper	2	

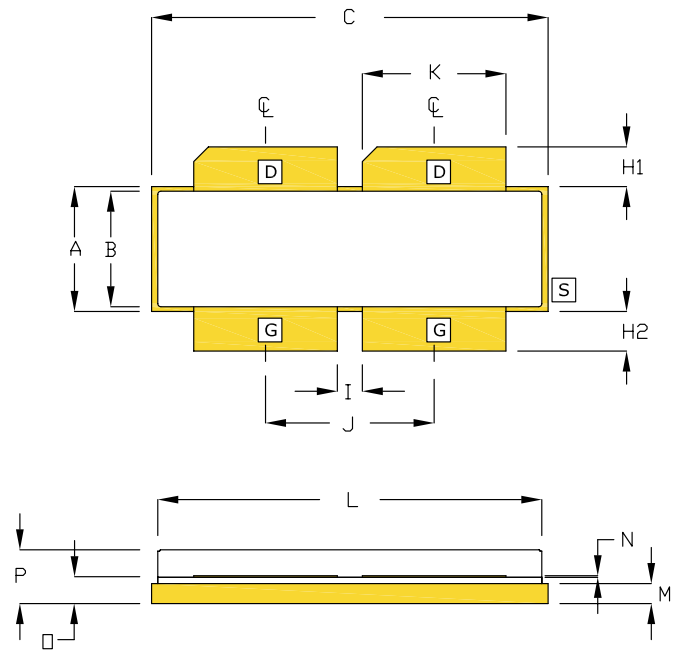
PACKAGE PL124A1



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.395	0.405	10.03	10.29
B	0.366	0.374	9.29	9.49
C	1.615	1.625	41.02	41.27
E	0.120	0.130	3.05	3.30
F	1.395	1.405	35.43	35.69
H1	0.120	0.130	3.05	3.30
H2	0.120	0.130	3.05	3.30
I	0.075	0.085	1.90	2.16
J	0.535	0.545	13.59	13.84
K	0.455	0.465	11.55	11.81
L	1.218	1.242	30.93	31.54
M	0.059	0.069	1.499	1.752
N	0.004	0.007	0.10	0.18
□	0.079	0.089	2.00	2.26
P	0.165	0.188	4.19	4.77

PIN	SCHEDULE
D	DRAIN
S	SOURCE
G	GATE

BOLT-DOWN FLANGE OPTION
IGN0910S5000



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.395	0.405	10.03	10.29
B	0.366	0.374	9.29	9.49
C	1.265	1.275	32.13	32.38
E	--	--	--	--
F	--	--	--	--
H1	0.120	0.130	3.05	3.30
H2	0.120	0.130	3.05	3.30
I	0.075	0.085	1.90	2.16
J	0.535	0.545	13.59	13.84
K	0.455	0.465	11.55	11.81
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P	0.165	0.188	4.19	4.77

PIN	SCHEDULE
D	DRAIN
S	SOURCE
G	GATE

EARLESS FLANGE OPTION
IGN0910S5000S

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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