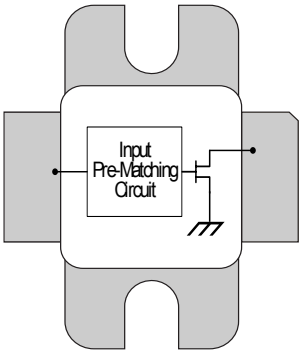
L-Band, GaN/SiC, RF Power Transistor

960-1220 MHz | 600 W typ | 63% Efficiency typ | 18 dB Gain typ | 50 V | Mode S ELM (IGN0912LM500) & Link 16 (IGN0912LM500A)

IGN0912LM500 and IGN0912LM500A are high power GaN-on-SiC RF power transistors that have been designed to suit the needs of IFF/SSR avionics systems, military tactical data links, and TACAN/DME systems. They operate over the full instantaneous bandwidth of 960-1220MHz. IGN0912LM500 under ELM Mode S [48x (32µs on, 18µs off), 6.4% Long Term Duty Cycle] pulse conditions and IGN0912LM500A under Link 16 [444x (7µs on, 6µs off), 22.7% Long Term Duty Cycle] pulse conditions both supply a minimum of 500 W of peak output power, with typically >18 dB of gain and 65% efficiency. 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 >500 W
- Pre-matched Input Impedance
- High Efficiency - 63% typical
- 100% RF Tested Under Mode S ELM (IGN0912LM500) or Link 16 (IGN0912LM500A) pulse conditions
- RoHS and REACH Compliant

APPLICATIONS

- L-band Avionics IFF & SSR Systems - Suitable for both uplink and downlink (Transponder)
- Also suitable for Standard Mode S and Link 16 applications
- TACAN/DME Systems

Table 1. Absolute Maximum Ratings (Not Simultaneous)

Parameter	Symbol	Value	Units	Test Conditions
DC Drain-Source Voltage	V_{DS}	160	V	25 °C
DC Gate-Source Voltage	V_{GS}	-8 to +1	V	25 °C
DC Drain Current	I_D	36	A	25 °C
DC Gate Current	I_G	7.2	mA	25 °C
RF Input Power	$P_{RF,IN}$	11	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 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			V	V_{DS} = 50V, I_{DS} = 1mA
Quiescent Gate Voltage	V_Q		-2.8		V	V_{DS} = 50V, I_{DS} = 75mA

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

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
RF Input Power	$P_{IN, RF}$	6.3	8.0	11.0	W	P_{OUT} = 500W f = 960, 1090, 1220 MHz V_{DS} = 50V, I_{DS} = 75mA IGN0912LM500: Mode S ELM pulse conditions (48 x [32µs on, 18µs off]), LTDC = 6.4% IGN0912LM500A: Link 16 pulse conditions (444 x [7µs on, 6µs off], LTDC = 22.7%
Gain	G	16.6	18.0	19.0	dB	
Drain Efficiency	η	50	63	75	%	
Input Return Loss	IRL	7	12	18	dB	
Pulse Droop	D	-0.5	-0.2	+0.2	dB	
Load Mismatch Stability	VSWR-S	2:1				
VSWR Withstand	VSWR-LMT	3:1				

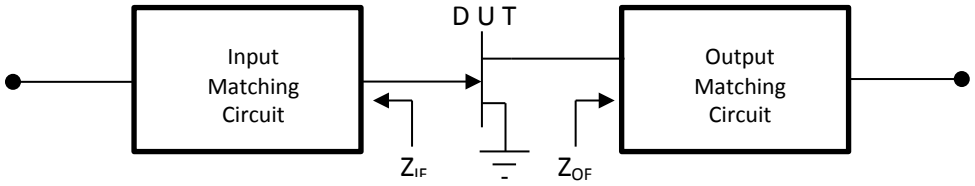
Note: Consult Integra Technologies Application Note 001 for information on how RF output power and pulse droop are measured for the ELM and Link 16 pulse trains.

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}		045		°C/W	P_{DISS} = 293.7W Mode S ELM pulse conditions (48 x [32µs on, 18µs off]), LTDC = 6.4%. V_{DS} = 50V

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

Frequency (MHz)	Z_{IF}	Z_{OF}	Units	Test Conditions
960	6.1 - j 2.4	1.8 + j 0.1	Ω	P_{OUT} = 500W f = 960, 1090, 1220 MHz Mode S ELM pulse conditions (48 x [32µs on, 18µs off]), LTDC = 6.4% V_{DS} = 50V, I_{DS} = 75mA
1090	6.2 - j 0.5	2.0 + j 0.1	Ω	
1220	6.9 - j 1.2	1.6 + j 0.1	Ω	



TYPICAL PERFORMANCE

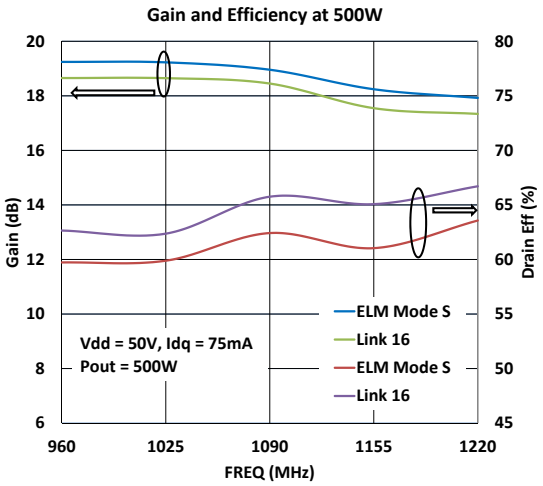


Figure1

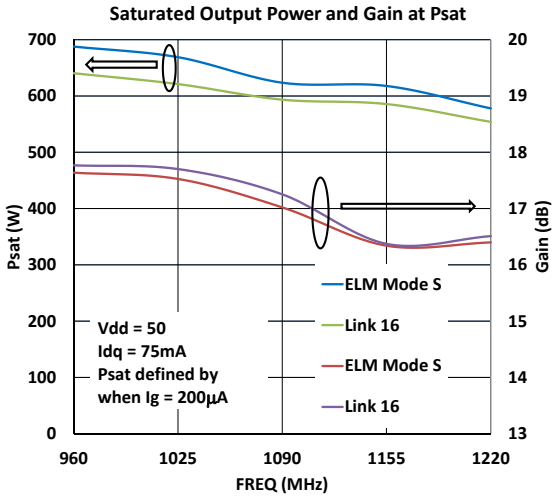


Figure 2

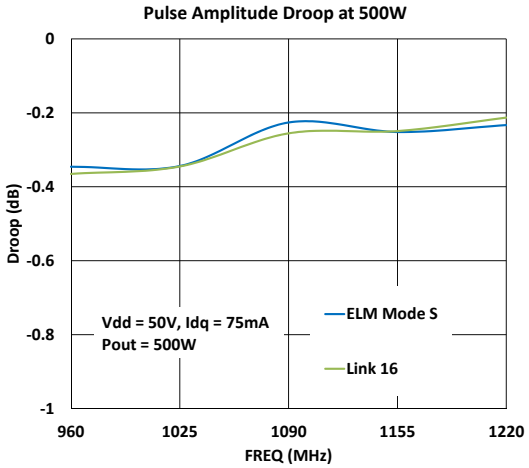
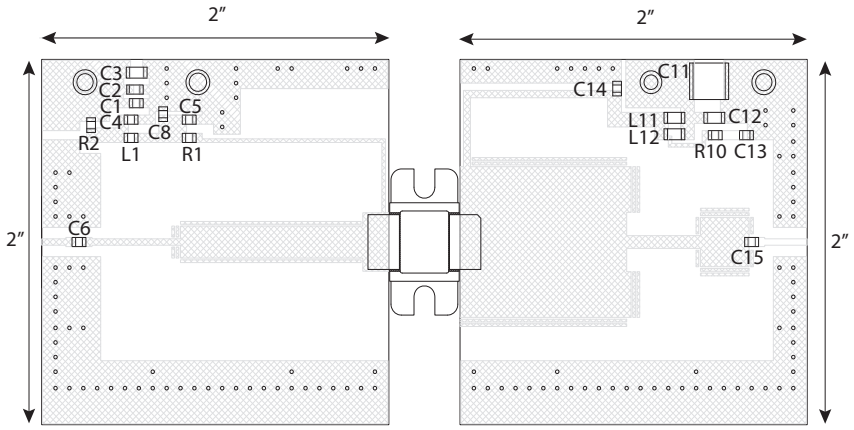


Figure 3

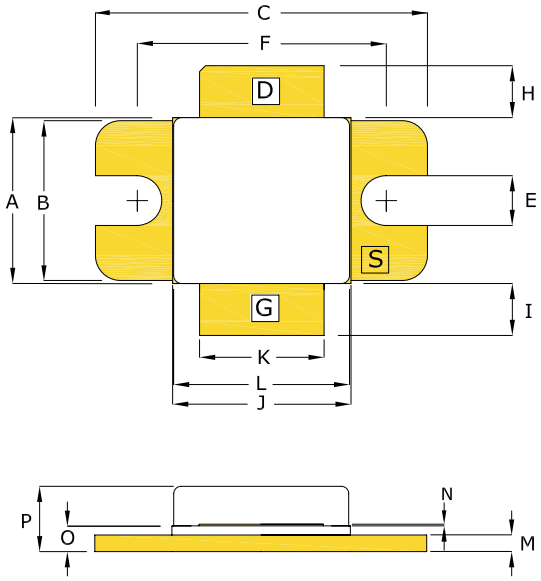
TEST FIXTURE



Bill of Materials for IGN0912LM500 Test Fixture

Designator	Description	Part Number
C1, C4, C13	CAP 0.1μF, 0805, 50V	C0805C104K5RACTU
C2	CAP 33pF	ATC600F330
C5 ,C6, C14, C15	CAP 33pF, Edge Mounted	ATC600F330
C3, C12	CAP 1μF, 1206	C1206C105K5RACTU
C11	CAP 10μF, 2220, 50V, X7R	C2220X106K5RACTU
C7, C16	CAP Electrolytic, 68μF, 63V (mounted external to pcb)	UPJ1J680MPD6TD
C8	CAP 1000pF, 0805, 50V, X7R	C0805C102M5RACTU
L1	IND, FB, 120 OHM, 0805, 5A	ILHB0805ER121V
L11, L12	IND , FB, 33 OHM, 1206, 6A	BLM31PG330SN1L
R1, R10	RES, 15R0, 0805	ERJ-6ENF15R0V
R2	RES, 100 OHM, 0805	ERJ-6ENF1000V
PC Board Type	ROGERS RT6006, 25mil, 1/1oz. Copper	

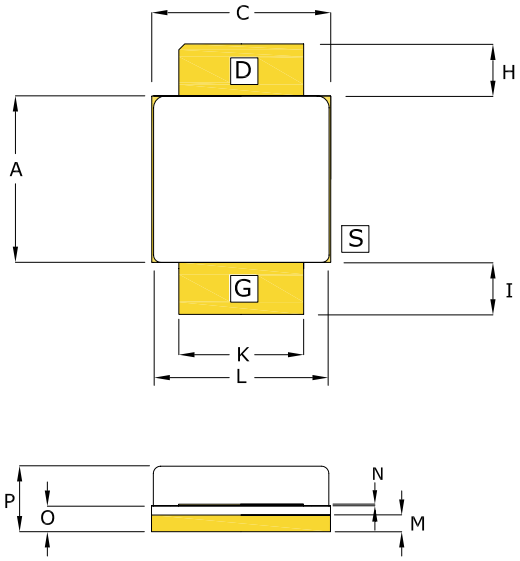
PACKAGE PL44C1



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

BOLT-DOWN FLANGE OPTION
IGN0912LM500 and IGN0912LM500A



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

EARLESS FLANGE OPTION
IGN0912LM500S and IGN0912LM500AS

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.

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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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Final Specification - This data sheet contains final product specifications.
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