

UHF Band, GaN/SiC, RF Power Transistor

406 - 460 MHz | 100W typ | 65% Efficiency typ | 20.5 dB Gain typ | 100 V | 300µs Pulse Length, 6% Duty Cycle

IGN0450M80HV is a high power GaN-on-SiC RF power transistor that has been designed to suit the unique needs of UHF radar systems. It operates over the full 406-460 MHz bandwidth. Under 300µs, 6% duty cycle pulse conditions, it supplies a minimum of 80W of peak output power. It operates from a 100V 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 >80W
- Pre-matched Input Impedance
- High Efficiency - up to 65%
- 100% RF Tested Under 300µs, 6% duty cycle pulse conditions
- RoHS and REACH Compliant

APPLICATIONS

- UHF Radar Systems

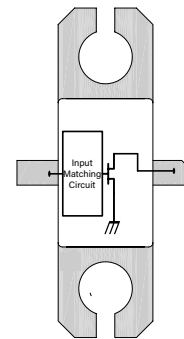


Table 1. RF Electrical Characteristics in Broadband Test Fixture (Case temperature = 30 °C unless otherwise stated)

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Gain	G	17	20.5	23	dB	P _{OUT} = 80W f = 406, 460 MHz 300µs pulse length, 6% duty cycle V _{DS} = 100V, I _{DS} = 6mA
Drain Efficiency	η	50	55	65	%	
Pulse Droop	D	-0.8	-0.5	+0.1	dB	
Load Mismatch Stability	VSWR-S		2:1			
VSWR Withstand	VSWR-LMT		5:1			

Note: 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}	250	V	25 °C
DC Gate-Source Voltage	V_{GS}	-8 to +1.0	V	25 °C
DC Drain Current	I_D	3	A	25 °C
DC Gate Current	I_G	0.3	mA	25 °C
RF Input Power	$P_{RF,IN}$	1	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 3. DC Electrical Characteristics (Case temperature = 25 °C unless otherwise stated)

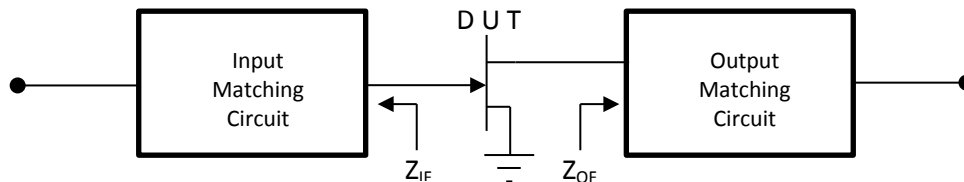
Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Gate Pinch-Off Voltage	V_P	-5.0			V	$V_{DS} = 100V, I_{DS} = 1mA$
Quiescent Gate Voltage	V_Q		-2.8		V	$V_{DS} = 100V, I_{DS} = 6mA$

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

Parameter	Symbol	Typ	Test Conditions
Peak Thermal Resistance, Channel to Case	R_{TH}	TBD	$P_{DISS} = 65W$ 300µs pulse length, 6% duty cycle $V_{DS} = 100V$

Table 5. Source & Load Impedances for Test Fixture

Frequency (MHz)	Z_{IF}	Z_{OF} Fundamental	Units	Test Conditions
406	8.92 + j 8.63	34.72 + j 21.22	Ω	$P_{OUT} = 80W$ 300µs pulse length, 6% duty cycle $V_{DS} = 100V, I_{DS} = 6mA$
460	7.42 + j 11.73	34.23 + j 21.80	Ω	



TYPICAL PERFORMANCE

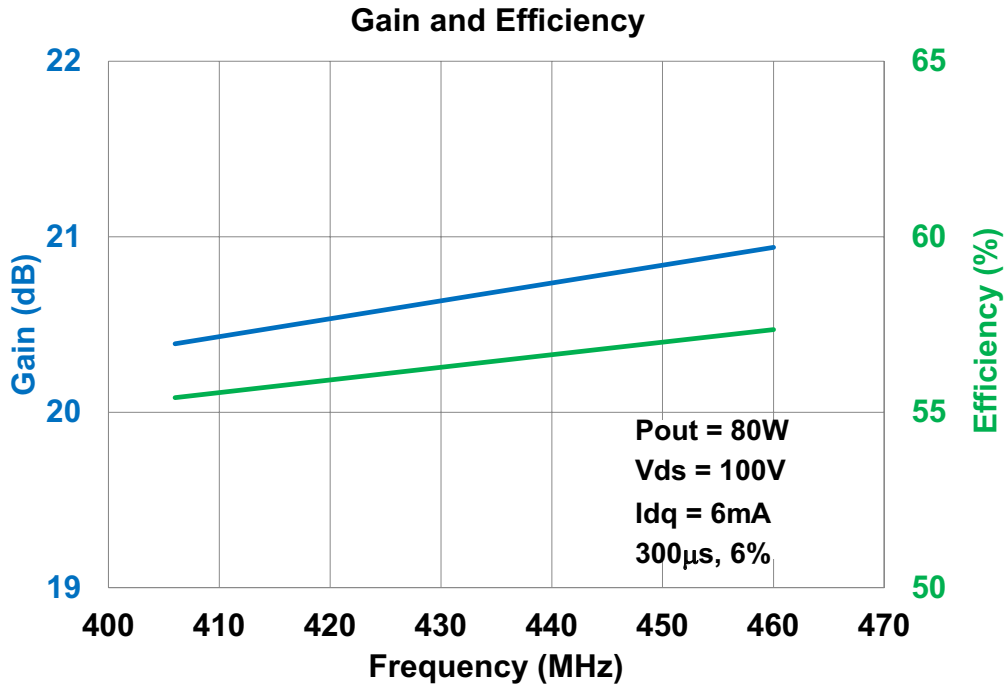


Figure 1

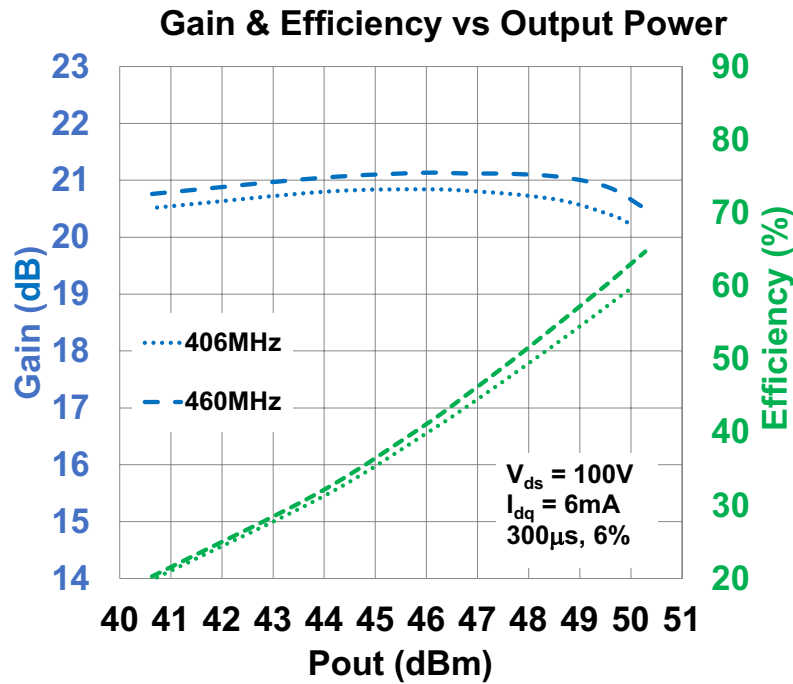
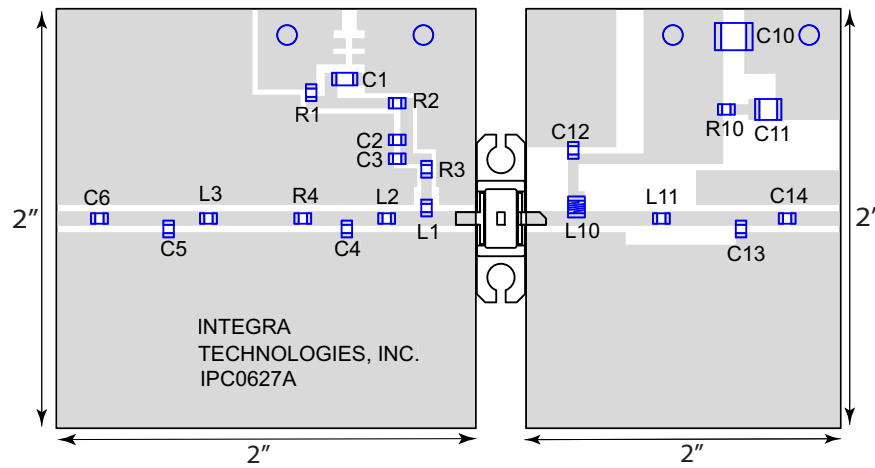


Figure 2

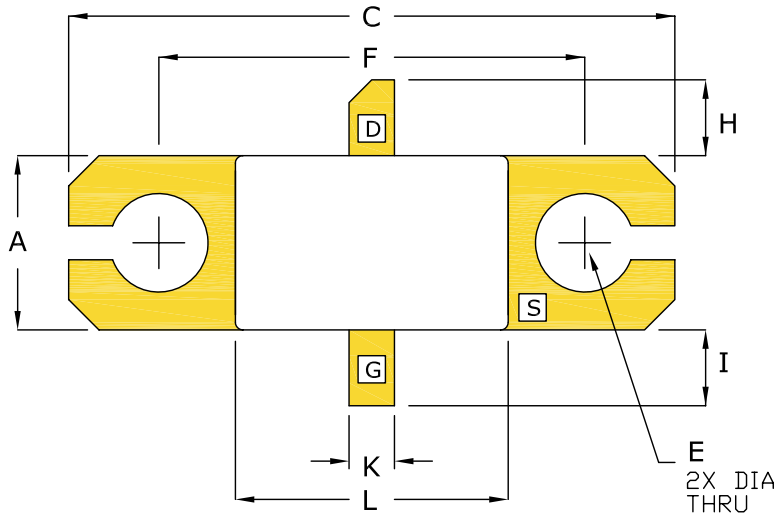
TEST FIXTURE



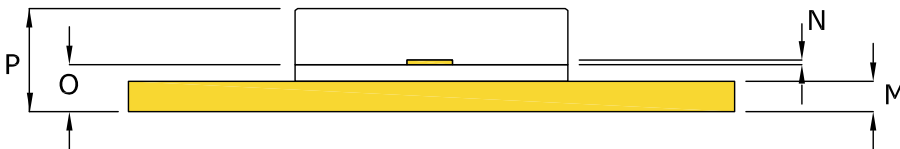
Bill of Materials for IGN0450M80HV Test Fixture

Designator	Description	Quantity	Part Number
C1	CAP 0.1 μ F, 0805, 100V	1	KGM21AR72A104KU
C2	CAP 1000pF, 50V, 0805, X7R	1	C0805C102K5RAC7800
C3, C6, C12, C14	CAP 240pF, 250V, 0805, X7R	4	600F241JT250XT
C4	CAP 18pF, 250V, 0805	4	600F180JT250XT
C5	CAP 5.6pF, 1812, 250V, X7R	1	600F5R6CT250XT
C10	CAP 1 μ F, 1812, 200V	1	18122C104KAZ2A
C11	CAP 0.1 μ F, 1210, 200V	1	KGM32HR72D104KU
C13	CAP 2.7pF, 0805, 250V	1	600F2R7BT250XT
L1	IND 39nH, 0805	1	0805CS-390XJRC
L2	IND 5.6nH, 0805	1	0805CS-050XJRC
L3	IND 8.2nH, 0805	1	0805CS-080XGEC
L10	IND 39nH, 1008	1	1008CS-390XJLC
L11	IND 7.5nH, 0805	1	0805CS-070XJRC
R1	RES 200 OHM, 0805	1	ERJ-6ENF2000V
R2	RES 0 OHM, 0805	1	ERJ-6EY0R00V
R3, R4, R10	RES 5.1 OHM, 0805	3	ERJ-6GEYJ5R1V
PC Board Type	ROGERS RO4003, 32mil, 1/1oz. Copper	2	

PACKAGE PL32C2



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	0.090	0.110	2.29	2.79
I	0.090	0.110	2.29	2.79
J	--	--	--	--
K	0.055	0.065	1.40	1.65
L	0.357	0.363	9.07	9.22
M	0.035	0.045	0.89	1.14
N	0.004	0.006	0.10	0.15
O	0.057	0.067	1.45	1.70
P	0.131	0.154	3.33	3.91



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.

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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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