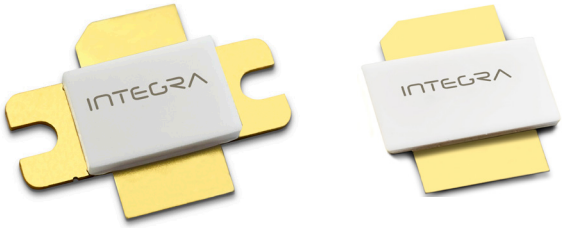
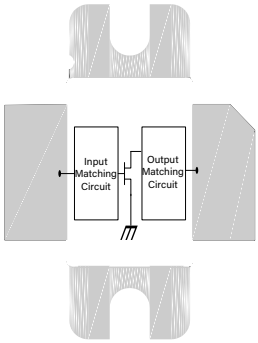
S-Band, GaN/SiC, RF Power Transistor

2.9 - 3.1 GHz | 2700W | 58 % Efficiency typ | 16 dB Gain typ | 125 V | 10μs Pulse Length, 1% Duty Cycle

Introducing IGN2931S2700 and IGN2931S2700S, the pinnacle of S-Band power transistors available today. Powered by Integra's Gen4 GaN/SiC, IGN2931S2700 and IGN2931S2700S deliver an astonishing 2700W of peak output power and boast a typical power gain of 16dB at an impressive 58% drain efficiency, This powerhouse of innovation is designed for practicality and efficiency, enabling replacement of traditional vacuum electron device (VED) based amplifier systems with ease, even at megawatt power levels. Experience unparalleled improvements in system size, weight, power, cost, and complexity, paving the way for the next generation of RF amplifier system performance. Elevate your system architecture with IGN2931S2700 and IGN2931S2700S and witness the future of high-performance system amplification.





FEATURES

- ✓ Solid-State Excellence: Effortlessly replace VEDs with cutting-edge solid-state technology.
- ✓ Advanced GaN/SiC Technology: Powered by Integra's Gen4 GaN/SiC for superior performance.
- ✓ Impressive Efficiency: Achieve a remarkable 58% drain efficiency for optimal operation.
- ✓ Unbeatable Output Power: Delivering 300% more output power than competitors.
- ✓ Streamlined Design: Replace multiple legacy amplifiers with a single, powerful unit.
- ✓ Innovative Architecture: Eliminate complex power combining layers in your amplifier system.

APPLICATIONS

- Particle Accelerators and ISM Systems
- Radar Systems

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

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Gain	G	13.5	16	17.5	dB	P_{OUT} = 2700W f = 2.9, 3.0, 3.1 GHz 10μs pulse length, 1% duty cycle V_{DS} = 125V, I_{DQ} = 150mA
Drain Efficiency	η	45	58	65	%	
Pulse Droop	D	-0.1	-0.3	-0.5	dB	
Input Return Loss	IRL	6	21	25	dB	
VSWR 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}	350	V	25 °C
DC Gate-Source Voltage	V_{GS}	-8 to +1	V	25 °C
DC Drain Current	I_D	72	A	25 °C
DC Gate Current	I_G	14.4	mA	25 °C
RF Input Power	$P_{RF,IN}$	135	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} = 125V, I_{DS} = 1mA
Quiescent Gate Voltage	V_Q		-4.0		V	V_{DS} = 125V, I_{DS} = 150mA

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}		0.044		°C/W	P_{diss} = 1955W 10µs pulse length, 1% duty cycle V_{DS} = 125V

TYPICAL PERFORMANCE

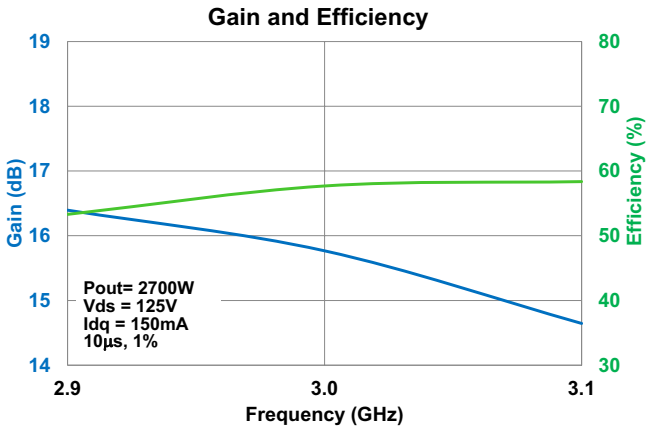


Figure 1

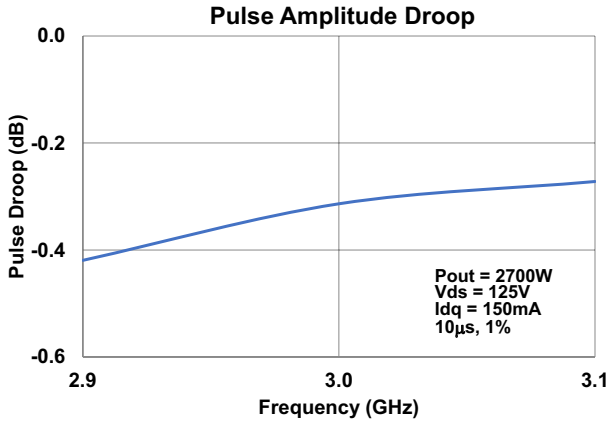


Figure 2

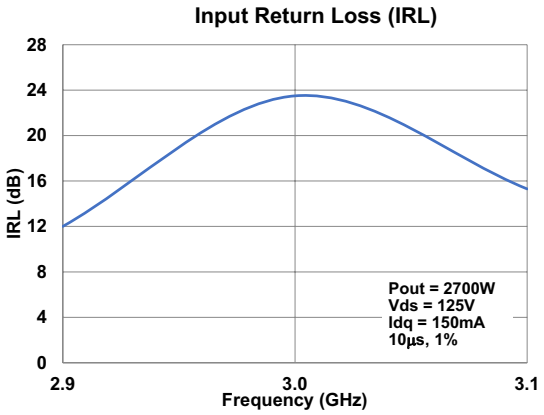
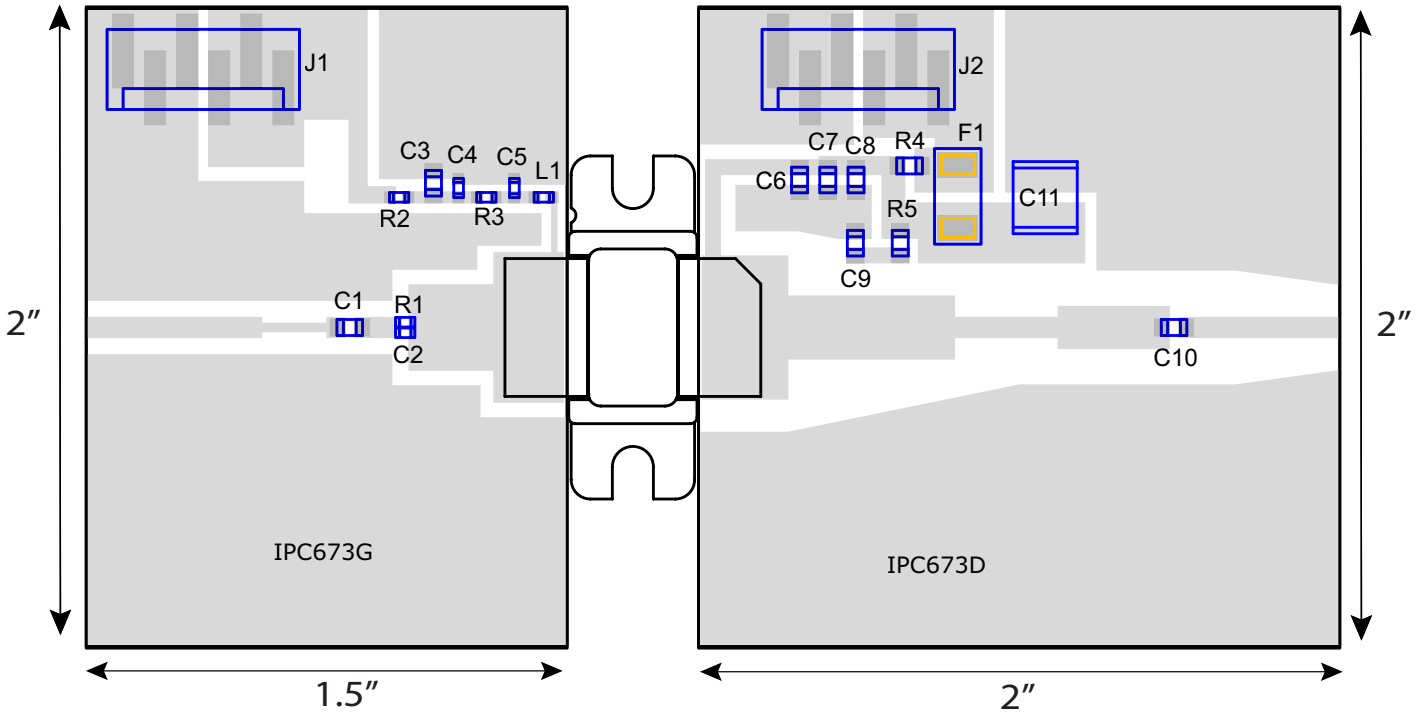


Figure 3

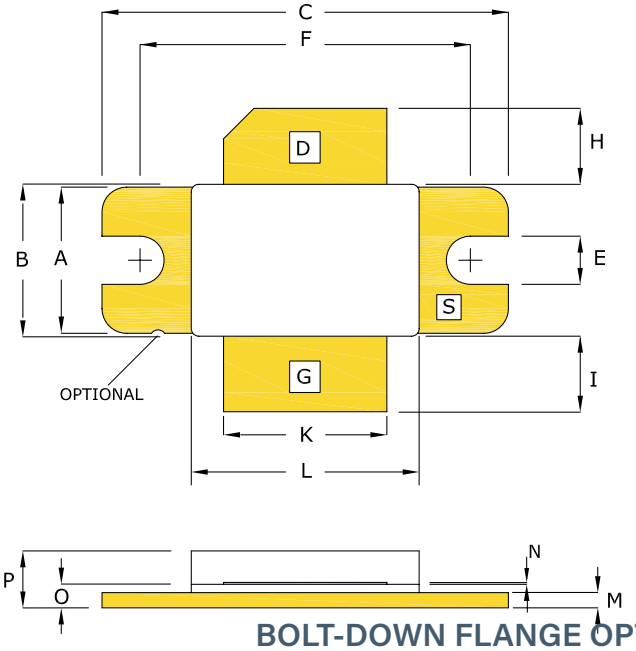
TEST FIXTURE



Bill of Materials for IGN2931S2700 Test Fixture

Designator	Description	Part Number
C1, C6, C10	CAP 15pF, 0805, 250V	600F150JT250XT
C2	CAP 15pF, 0603, 250V	600S150JT250XT
C3	CAP 1000pF, 100V, 0805	08051A102J4T2A
C4	CAP 100pF, 0603, 250V	600S101JT250XT
C5	CAP 10pF, 0603, 250V	600S100JT250XT
C7	CAP 100pF, 0805, 250V	600F101JT250XT
C8, C9	CAP 0.1μF, 0805, 100V	08051C104K4T2A
C11	CAP 10μF, 2220, 100V	22201C106MAT2A
F1	Fuse 10A	CB61F10A-TR1
R1	RES 100 OHM, 0603	
R2, R2, R3	RES 5.11 OHM,0603	
PC BOARD	TACONIC RF-35TC-0300-E-C1/C1, 0.030", 1oz/1oz Copper	

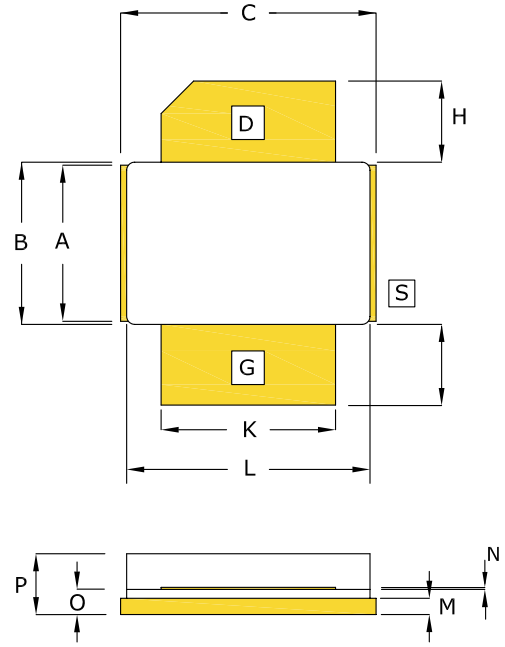
PACKAGE PL64B1



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.380	0.390	9.65	9.91
B	0.395	0.405	10.03	10.29
C	1.065	1.075	27.05	27.31
E	0.123	0.133	3.12	3.38
F	0.865	0.875	21.97	22.23
H	0.180	0.220	4.57	5.59
I	0.180	0.220	4.57	5.59
J	--	--	--	--
K	0.425	0.435	10.80	11.05
L	0.595	0.605	15.11	15.37
M	0.035	0.045	0.89	1.14
N	0.004	0.006	0.10	0.15
□	0.057	0.067	1.45	1.70
P	0.142	0.175	3.61	4.45

PIN SCHEDULE	
D	DRAIN
S	SOURCE
G	GATE

BOLT-DOWN FLANGE OPTION
IGN2931S2700



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.380	0.390	9.65	9.91
B	0.395	0.405	10.03	10.29
C	0.625	0.635	15.88	16.13
E	--	--	--	--
F	--	--	--	--
H	0.180	0.220	4.57	5.59
I	0.180	0.220	4.57	5.59
J	--	--	--	--
K	0.425	0.435	10.80	11.05
L	0.595	0.605	15.11	15.37
M	0.035	0.045	0.89	1.14
N	0.004	0.006	0.10	0.15
□	0.057	0.067	1.45	1.70
P	0.142	0.175	3.61	4.45

PIN SCHEDULE	
D	DRAIN
S	SOURCE
G	GATE

EARLESS FLANGE OPTION
IGN2931S2700S

ESD Rating

Parameter	Rating	Standard
ESD Human Body Model (HBM)	TBD	ESDA/JEDEC JS-001-2012
ESD Charged Device Model (CDM)	TBD	JEDEC JESD22-C11F
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.

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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