

L-Band, GaN/SiC, RF Power Transistor

1030 MHz | 650W | 60% Efficiency | 18.5 dB Gain | 50 V | 10 μ s Pulse Length, 4% Duty Cycle

IGT1030S650 is a high power RF power transistor that has been designed to suit the unique needs of IFF/SSR avionics systems. It operates at 1030 MHz. Under 10 μ s pulse length, 4% duty cycle pulse conditions, it supplies a minimum of 650 W of peak output power, with typically 18.5 dB of associated gain and 60% efficiency. It operates from a 50 V 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 >650 W
- Fully matched to 50 Ω Impedance at the input and output
- High Efficiency - up to 65%
- Capable of withstanding 10:1 VSWR mismatch
- 100% RF Tested
- RoHS and REACH Compliant

APPLICATIONS

- L-band Avionics IFF/SSR Systems

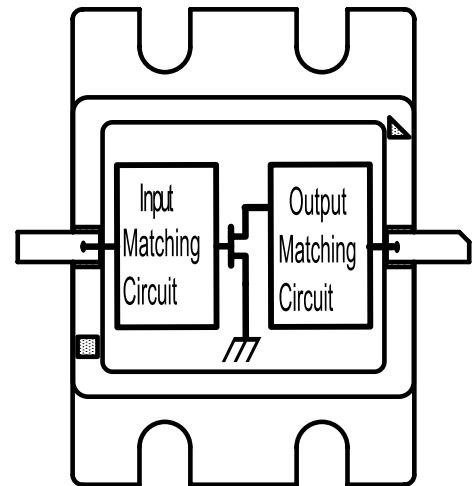


Table 1. RF Electrical Characteristics 100% Tested in Production (Case temperature = 35 °C unless otherwise stated)

| Parameter | Symbol | Min | Typ | Max | Units | Test Conditions |
|-------------------------|----------|------|------|------|-------|--|
| Input Return Loss | IRL | 7 | 21 | 25 | dB | $P_{OUT} = 650W$ $f = 1030 \text{ MHz}$ 10 μ s pulse length, 4% duty cycle $V_{DS} = 50V, I_{DQ} = 100mA$ |
| Gain | G | 17 | 18.5 | 22 | dB | |
| Drain Efficiency | η | 50 | 60 | 80 | % | |
| Pulse Droop | D | -0.4 | -0.2 | +0.2 | dB | |
| Load Mismatch Stability | VSWR-S | 2:1 | | | | |
| VSWR Withstand | VSWR-LMT | 5:1 | | | | |
| Second Harmonic | | | -36 | | dBc | |
| Third Harmonic | | | -60 | | dBc | |

Table 2. Absolute Maximum Ratings (Not Simultaneous)

| Parameter | Symbol | Value | Units | Test Conditions |
|-------------------------------|--------------|-------------|-------|-----------------|
| DC Drain-Source Voltage | V_{DS} | 200 | V | 35 °C |
| DC Gate-Source Voltage | V_{GS} | -8 to +1.0 | V | 35 °C |
| DC Drain Current | I_D | 48 | A | 35 °C |
| DC Gate Current | I_G | 4.8 | mA | 35 °C |
| RF Input Power | $P_{RF,IN}$ | 14 | W | 35 °C |
| Operating Channel Temperature | T_{CH} | -55 to +225 | °C | |
| Storage Temperature | T_{STG} | -55 to +150 | °C | |
| Soldering Temperature | T_{SOLDER} | 350 for 10s | °C | |

Note: Operation outside the limits given in this table may cause permanent damage to the transistor

Table 3. DC Electrical Characteristics (Case temperature = 35 °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 | | -2.7 | | V | $V_{DS} = 50V, I_{DS} = 100 mA$ |

Table 4. RF Characterization - Mismatch Ruggedness (Case temperature = 35 °C unless otherwise stated)

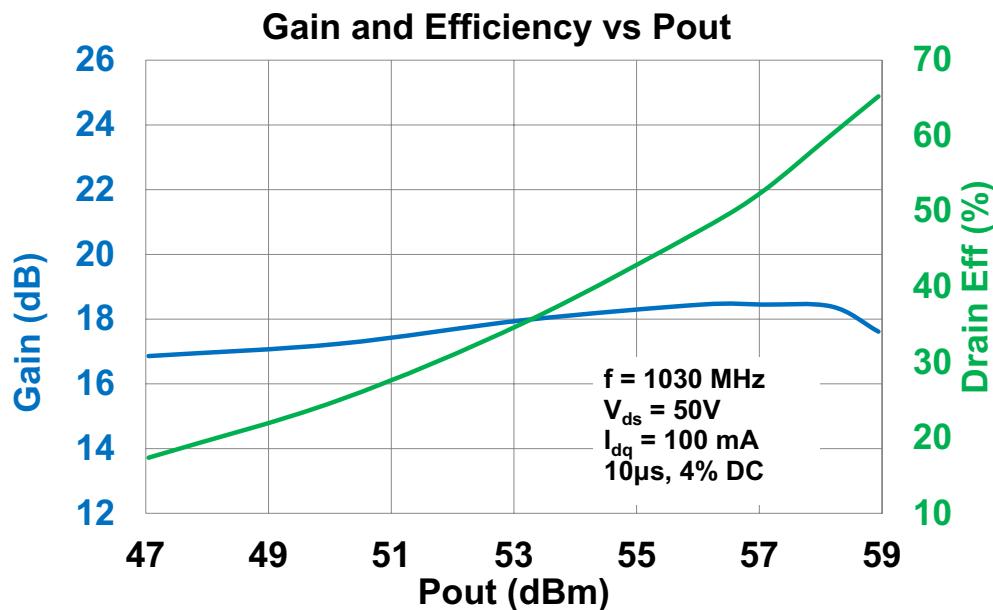
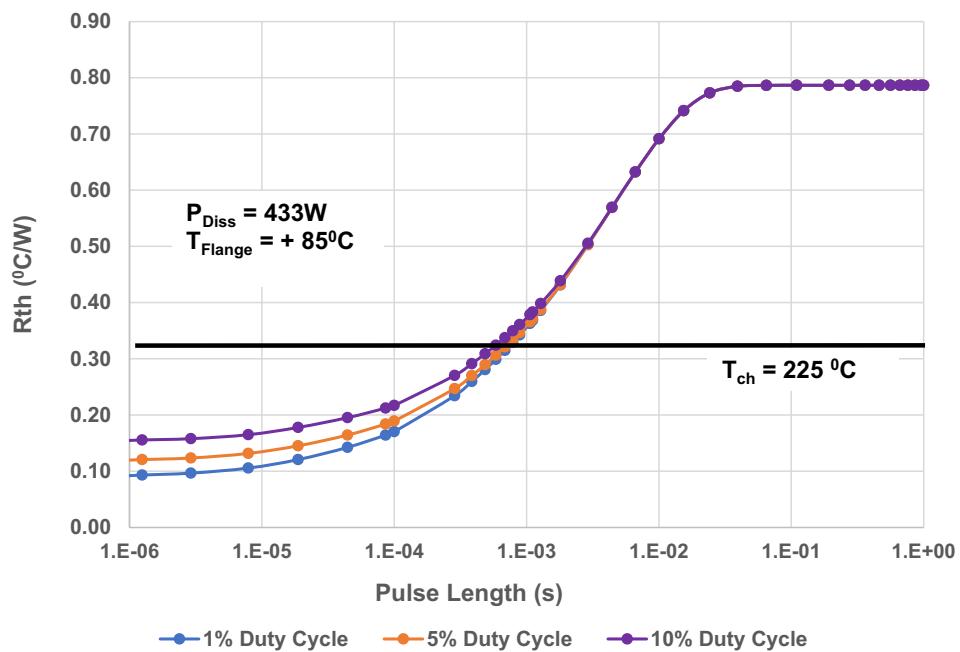
| Parameter | Symbol | Typ | Test Conditions |
|-------------------------------|--------|------|--|
| Impedance Mismatch Ruggedness | VSWR | 10:1 | $P_{OUT} = 650W$ $f = 1030 \text{ MHz}$ 10μs pulse length, 4% duty cycle $V_{DS} = 50V$ |

Table 5. Matching Network Source & Load Impedances (Case temperature = 35°C unless otherwise stated)

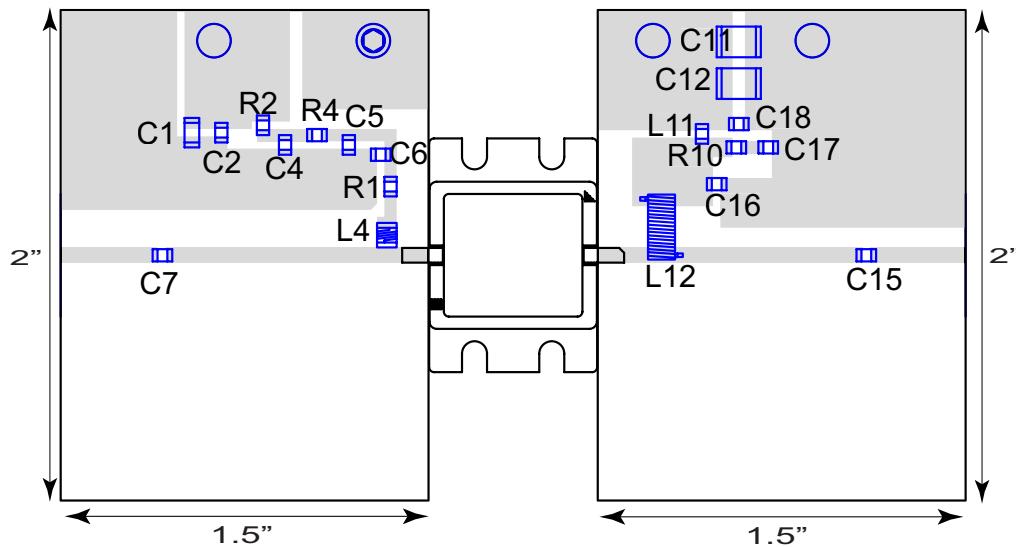
| Frequency (MHz) | Z_{IF} | Z_{OF} | Units |
|-----------------|-----------|-----------|-------|
| 1030, 1090 | $50 + j0$ | $50 + j0$ | Ω |

Table 6. 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} | | 0.13 | | °C/W | $P_{DISS} = 433W$ 10μs pulse length, 4% duty cycle $V_{DS} = 50V$ |

TYPICAL RF PERFORMANCE**Figure 1****TYPICAL THERMAL PERFORMANCE**

TEST FIXTURE

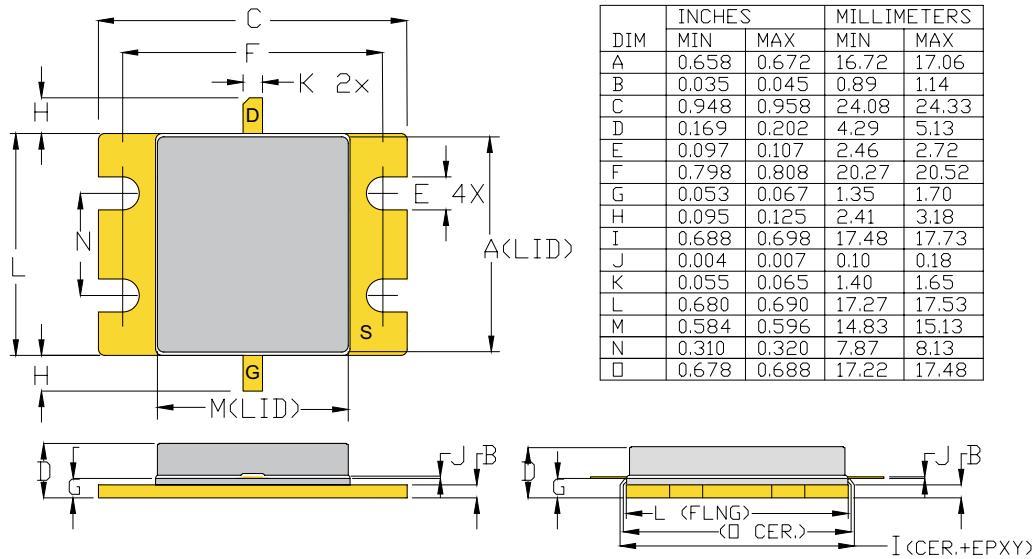


Note: it is recommended that a $4700\mu\text{F}$ 63V electrolytic capacitor be connected between ground and the positive supply terminal of the test fixture, and placed as close as possible to the test fixture, in order to minimise pulse droop.

Bill of Materials for IGT1030S650 Test Fixture

| Designator | Description | Part Number |
|------------------|--|------------------|
| C1 | CAP $1\mu\text{F}$, 1206, 100V, X7R | 12061C105K4T2A |
| C2, C5, C18 | CAP 1000pF , 0805, 100V | 08051A102J4T2A |
| C4, C17 | CAP 0.068pF , 250V, 0805, X7R | C0805C683KARAC#A |
| C6, C7, C15, C16 | CAP 33pF , 0805, 50V | ATC500F330 |
| C11, C12 | CAP $1\mu\text{F}$, 1812, 200V, X7R | 18122C105KAT2A |
| L4 | IND 39nH 1008 | 1008CS-390XJLB |
| L11 | IND, FB, 38 OHM, 6A, 1206 | Z1206C380BPWST |
| L12 | IND, 43 nH | B10TJLB |
| R1 | RES 22 OHM, 0805 | ERJ-6GEYJ220V |
| R2 | RES 200 OHM, 0805 | CRCW0805200RFKTA |
| R4 | RES 0 OHM, 0805 | CRCW08050000ZSTA |
| R10 | RES 5.1 OHM, 0805 | CRCW08055R1JNEA |
| PC BOARD | RO4350B 0.030", 1oz/1oz Copper | |

PACKAGE PM67A1



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 Sensitvity 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.