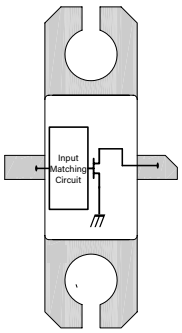
# L-Band, GaN/SiC, RF Power Transistor

**1.20 - 1.40 GHz | 160W typ | 60% Efficiency typ | 18dB Gain typ | 100V | 100µs Pulse Length, 4% Duty Cycle**

IGN1214M100HV and IGN1214M100HVS are high power GaN-on-SiC RF power transistors that have been designed specifically for use in L- band radar systems. They operate over the full bandwidth of 1.20 - 1.40 GHz. They supply a minimum of 100W of peak output power, with typically 17.5dB of associated gain and 55% efficiency. They operate from a 100V supply voltage.

## FEATURES

- GaN on SiC HEMT Technology
- Output Power 100 W Minimum
- Pre-matched Input Impedance
- 100% RF Tested
- RoHS and REACH Compliant
- IGN1214M100HV has a bolt-down flange, IGN1214M100HVS is the earless flange option
- Enhanced thermal conductivity flange




## APPLICATIONS

- L-band Radar Systems

### Table 1. RF Electrical Characteristics (Case temperature = 25+/-5 °C unless otherwise stated)

| Parameter | Symbol | Min | Typ | Max | Units | Test Conditions |
|---|---|---|---|---|---|---|
| **Gain** | G | 16 | 17.5 | 19 | dB | $P_{OUT}$ = 100W<br>f = 1.2, 1.3, 1.4 GHz<br>100µs pulse length, 4% duty cycle<br>$V_{DS}$ = 100V, $I_{DQ}$ = 4mA |
| **Drain Efficiency** | η | 45 | 55 | 65 | % | |
| **Pulse Droop** | D | -0.6 | -0.45 | 0 | dB | |
| **Input Return Loss** | IRL | 7 | 14 | 20 | 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. DC Electrical Characteristics (Case temperature = 25+/-5 °C unless otherwise stated)

| Parameter | Symbol | Min | Typ | Max | Units | Test Conditions |
|---|---|---|---|---|---|---|
| **Gate Pinch-Off Voltage** | $V_P$ | -4.0 | -3.0 | -2.5 | V | $V_{DS}$ = 100V, $I_{DS}$ = 1mA |
| **Quiescent Gate Voltage** | $V_Q$ | | -2.8 | | V | $V_{DS}$ = 100V, $I_{DS}$ = 4mA |

## Table 3. Absolute Maximum Ratings (Not Simultaneous)

| Parameter | Symbol | Value | Units | Test Conditions |
|---|---|---|---|---|
| DC Drain-Source Supply Voltage | $V_{DS}$ | 300 | | 25 °C |
| DC Gate-Source Voltage | $V_{GS}$ | -8 to +1 | V | 25 °C |
| DC Drain Current | $I_D$ | 4 | A | 25 °C |
| DC Gate Current | $I_G$ | 0.4 | mA | 25 °C |
| RF Input Power | $P_{RF,IN}$ | 4 | 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 | |

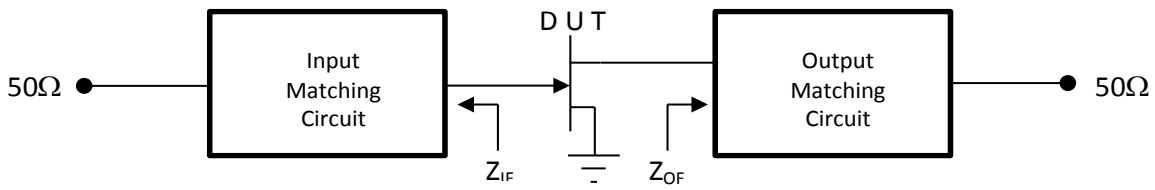
**Note: Operation outside the limits given in this table may cause permanent damage to the transistor**

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

| Parameter | Symbol | Min | Typ | Max | Units | Test Conditions |
|---|---|---|---|---|---|---|
| Peak Thermal Resistance, Channel to Case | $R_{TH}$ | | 0.7 | | °C/W | $P_{DISS}$ = 81.8W<br>100µs pulse length, 4% duty cycle<br>$V_{DS}$ = 100V |

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

| Frequency (GHz) | $Z_{IF}$ | $Z_{OF}$ | Units | Test Conditions |
|---|---|---|---|---|
| 1.2 | 6.5 - j 4.0 | 10.9 + j 10.6 | Ω | $P_{OUT}$ = 100W<br>100µs pulse length, 4% duty cycle<br>$V_{DS}$ = 100V, $I_{DQ}$ = 4mA |
| 1.3 | 6.4 - j 2.6 | 11.1 + j 11.3 | Ω | |
| 1.4 | 6.3 - j 1.0 | 11.2 + j 12.4 | Ω | |



## TYPICAL PERFORMANCE

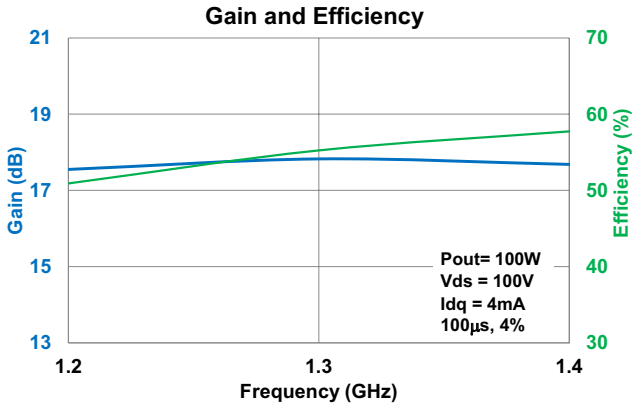



Figure 1

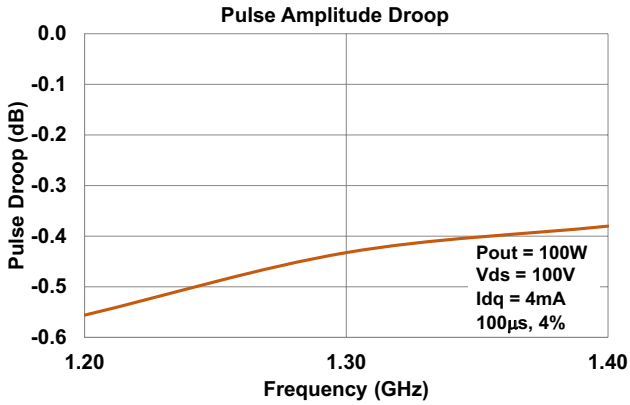



Figure 2

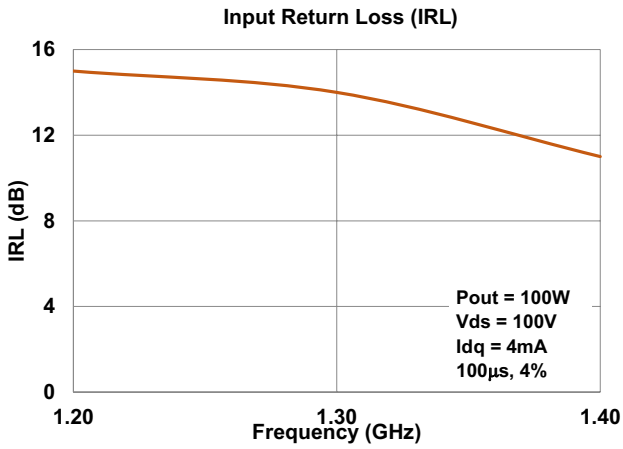
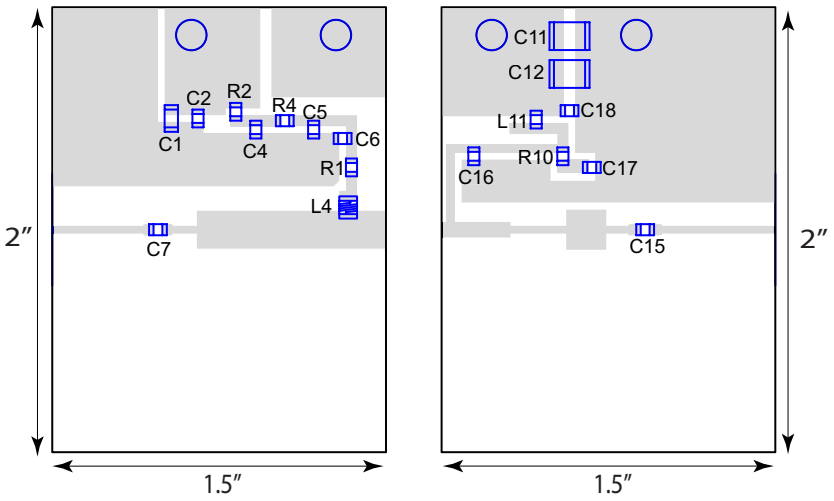



Figure 3

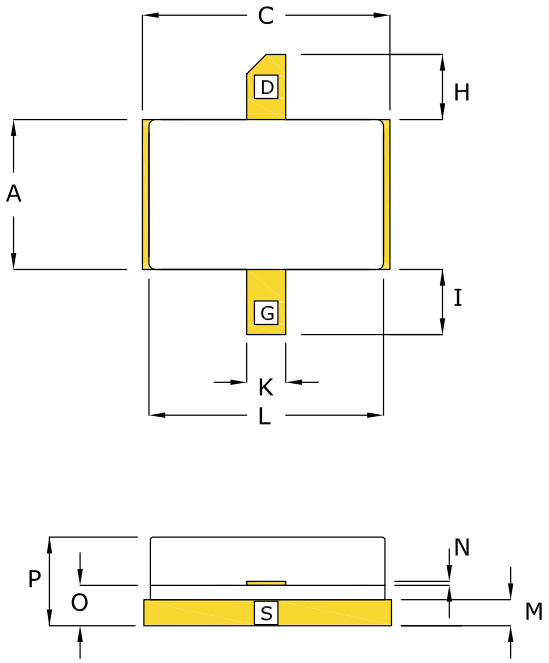
## TEST FIXTURE




## Bill of Materials for IGN1214M100HV Test Fixture

| Designator | Description | Quantity | Part Number |
|---|---|---|---|
| C1 | CAP 1μF, 100V, 1206, X7R | 1 | 12061C105K4T2A |
| C2, C5 | CAP 1000pF, 0805, 100V | 2 | 08051A102J4T2A |
| C4, C17, C18 | CAP 0.068μF, 0805, 250V, X7R | 3 | C0805C683KARAC#A |
| C6, C7, C15, C16 | CAP 18pF, 0805 | 4 | ATC600F180 |
| C11, C12 | CAP 1μF, 1812, 200V, X7R | 2 | 18122C105KAT2A |
| L4 | IND 39nH, 1008 | 1 | 1008CS-390XJLB |
| L11 | IND FB, 38 OHM, 6A, 1206 | 1 | Z1206C380BPWST |
| R1, R10 | RES 5.1 OHM, 0805 | 2 | CRCW08055R1JNEA |
| R2 | RES 200 OHM, 0805 | 1 | CRCW0805200RFKTA |
| R4 | RES 0 OHM 0805 | 1 | CRCW08050000ZSTA |
| PC Board Type | ROGERS RT3006, 25mil, 1/1oz. Copper | 2 | |

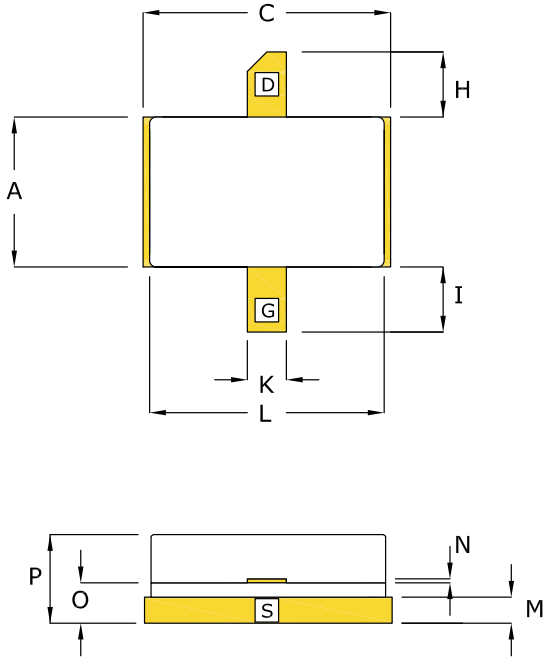
## PACKAGE PL32C2




| DIM | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 0.225 | 0.235 | 5.72 | 5.97 |
| B | -- | -- | -- | -- |
| C | 0.375 | 0.385 | 9.53 | 9.78 |
| E | -- | -- | -- | -- |
| F | -- | -- | -- | -- |
| 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 |
| □ | 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 |

## IGN1214M100HV




| DIM | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 0.225 | 0.235 | 5.72 | 5.97 |
| B | -- | -- | -- | -- |
| C | 0.375 | 0.385 | 9.53 | 9.78 |
| E | -- | -- | -- | -- |
| F | -- | -- | -- | -- |
| 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 |
| □ | 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 |

## IGN1214M100HVS

## 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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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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