

Broadband Transistor

IGN0110UM100 is a dual gallium nitride (GaN) high electron mobility transistor (HEMT). This device is designed for Broadband applications operating over the 100MHz – 1GHz instantaneous frequency band. Under CW conditions it supplies a minimum of 100 watts of output power with 12dB gain. Specified operation is with Class AB bias. It is also operable under a wide range of pulse widths and duty factors. It operates with spectral purity into all phases of 3:1 output load VSWR. All devices are 100% screened for large signal RF parameters in a fixed tuned broadband matching circuit / test fixture. The use of external tuners is not allowed during screening.



GaN on Silicon Carbide FET

- High Power Gain
- Excellent Thermal Stability
- Gold Metal

Depletion Mode Device

- Negative Gate Voltage to Bias
- Bias Sequencing Required
- See App Note to Prevent Damage

Gold Metal System

- Complete Gold System
- Gold Bond Wires
- Gold Package Metal
- Maximum Reliability

Class AB

- Specified with AB bias

Metal - Ceramic

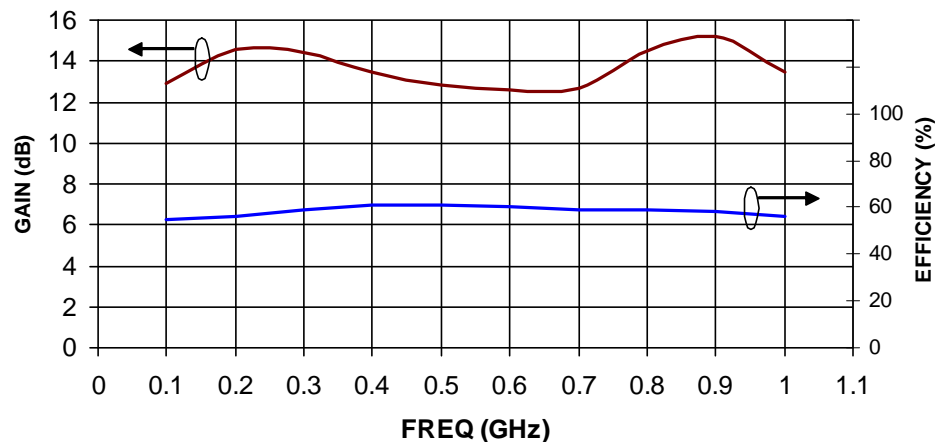
- Metal Based
- Epoxy Seal

High Power RF Test / Fixture

- Broadband
- Matched to 50 Ω (ohms)
- Long-term Correlation
- 100% Device RF Screening
- No External Tuning required

BROADBAND RF DATA

Output Power = 100W CW
Vdd = 28V, Idq = 480mA



MAXIMUM RATINGS

| Screen | Parameter | Symbol | Min | Max | Units | Test Conditions |
|--------|----------------------------------------------|-----------|-----|------|-------|-----------------|
| BD | Drain-Source Voltage | V_{DS} | -- | 60 | V | -- |
| BD | Gate-Source Voltage | V_{GS} | -10 | 0 | V | -- |
| BD | Storage Temperature Range | T_{STG} | -55 | +150 | °C | -- |
| BD | Operating Junction Temperature Range | T_J | -55 | +200 | °C | -- |
| Note | Screen 'BD' = parameter qualified By Design. | | | | | |

THERMAL CHARACTERISTICS

| Screen | Parameter | Symbol | Min | Max | Units | Test Conditions |
|--------|----------------------------------------------|--------------|-----|------|-------|-------------------------------------------------------------------------------|
| BD | Thermal Resistance | $R_{TH(JC)}$ | -- | 0.50 | °C/W | $V_{DD}=V1, I_{DQ}=I_{DQ1}, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{OUT}=100W$ |
| Note | Screen 'BD' = parameter qualified By Design. | | | | | |

PROCESSING SPECIFICATIONS

| Screen | Parameter | Symbol | Min | Max | Units | Test Conditions |
|--------|------------------------------------------------------------------------------------------|--------|-----|-----|-------|-----------------------------------------------|
| 100% | DC Wafer Probe | -- | -- | -- | -- | Per Integra specification. |
| Q1 | Wafer DC and RF Qualification | -- | -- | -- | -- | Per Integra specification. |
| LM | Wire Bond Strength | -- | -- | -- | -- | Line monitor per Integra specification. |
| 100% | Pre-cap visual inspection | -- | -- | -- | -- | Per Integra specification |
| 100% | Gross leak test | -- | -- | -- | -- | MIL-STD-750D, Method 1071.6, Test Condition C |
| Note | Screen 'Q1' = parameter is qualified by assembly and test of 3 pieces minimum per wafer. | | | | | |
| Note | Screen 'LM' = parameter is qualified by assembly line monitor. | | | | | |

DC ELECTRICAL CHARACTERISTICS

| Screen | Parameter | Symbol | Min | Typ | Max | Units | Test Conditions |
|--------|------------------------|-------------|-----|------|------|-------|---------------------------------------------------------------------|
| 100% | Drain Leakage Current | I_{D-OFF} | -- | -- | 1.0 | mA | $V_{GS} = -6V, V_{DS} = 28V, T_F = 25\pm5^\circ C, \text{Per Side}$ |
| 100% | Gate Threshold Voltage | V_{GS-TH} | -- | -2.5 | -3.5 | V | $V_{DS} = 5V, I_D = 480mA, T_F = 25\pm5^\circ C, \text{Per Side}$ |

RF ELECTRICAL CHARACTERISTICS

| Screen | Parameter | Symbol | Min | Max | Units | Test Conditions |
|--------|---------------------------------------------------------------------------------------|----------|-----|-----|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 100% | Input Return Loss | RL | -18 | -5 | dB | $V_{DD}=V1, I_{DQ}=I_{DQ1}, PW=PW1, DF=DF1, T_F=T_{F1}, P_{OUT}=P_{OUT1}, F=F1, F2, F3.$ |
| 100% | Input Power | P_{IN} | 2.5 | 6.3 | W | $V_{DD}=V1, I_{DQ}=I_{DQ1}, PW=PW1, DF=DF1, T_F=T_{F1}, P_{OUT}=P_{OUT1}, F=F1, F2, F3.$ |
| 100% | Drain Efficiency | η_D | 50 | 75 | % | $V_{DD}=V1, I_{DQ}=I_{DQ1}, PW=PW1, DF=DF1, T_F=T_{F1}, P_{OUT}=P_{OUT1}, F=F1, F2, F3.$ |
| 100% | Power Gain | Gp | 12 | 16 | dB | $V_{DD}=V1, I_{DQ}=I_{DQ1}, PW=PW1, DF=DF1, T_F=T_{F1}, P_{OUT}=P_{OUT1}, F=F1, F2, F3.$ |
| 100% | 3:1 Load Mismatch Stability | VSWR-S | S | -- | -- | $V_{DD}=V1, I_{DQ}=I_{DQ1}, PW=PW1, DF=DF1, T_F=T_{F1}, P_{OUT}=P_{OUT1}, F=F1, F2, F3.$ Rotate 3:1 output VSWR through 360° phase. No oscillatory or pulse break-up characteristics allowed on detected output pulse. All non-harmonically related signals must be at least -65 dBc. |
| Note 1 | $V1 = 28V; I_{DQ1} = 480mA; PW1 = CW; DF1 = CW$ | | | | | |
| Note 2 | Output Power Test Levels: $P_{OUT1} = 100W$ | | | | | |
| Note 3 | Test Frequencies: $F1 = 0.1 \text{ GHz}, F2 = 0.6 \text{ GHz}, F3 = 1.0 \text{ GHz}.$ | | | | | |
| Note 4 | $T_{F1} = 25 \pm 5^\circ C =$ Device flange temperature. | | | | | |
| Note 5 | Screen 'BD' = parameter qualified By Design. | | | | | |

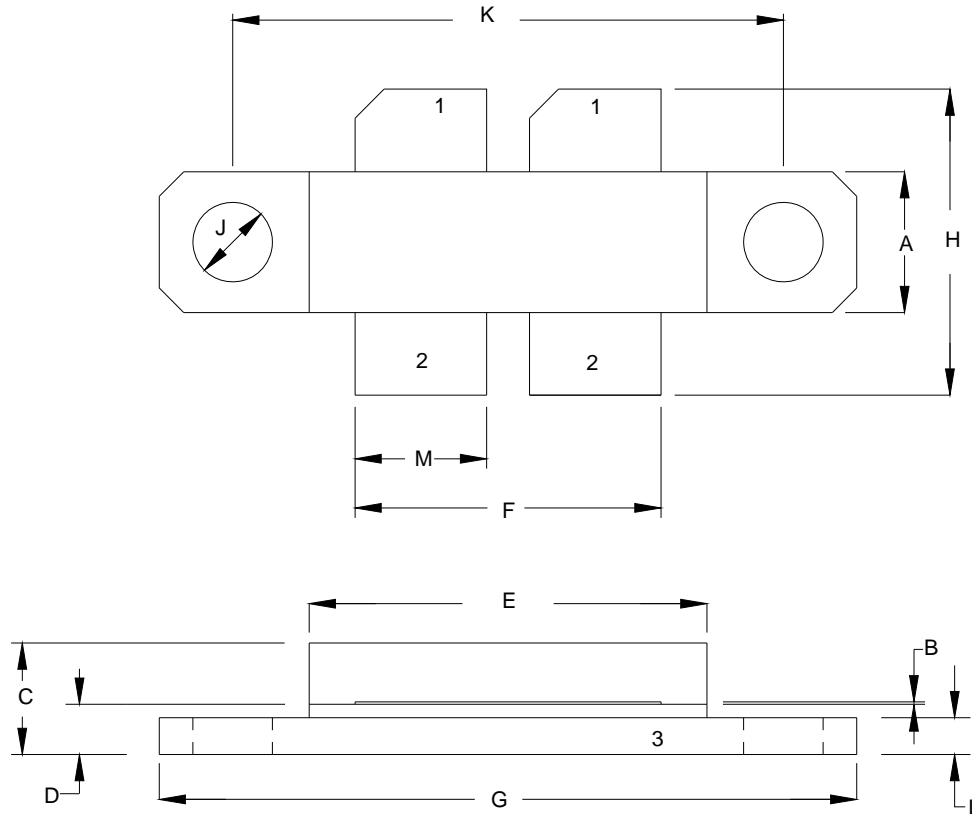
RF TEST FIXTURE IMPEDANCE CHARACTERISTICS

| Frequency (GHz) | $Z_{IF} (\Omega)$ | $Z_{OF} (\Omega)$ |
|-----------------------------------|-------------------|-------------------|
| 0.1 | $10.2 + j 0.6$ | $11.3 - j 2.7$ |
| 0.3 | $13.5 - j 1.1$ | $10.8 - j 4.7$ |
| 0.6 | $8.1 - j 6.2$ | $7.8 - j 7.2$ |
| 0.8 | $6.2 - j 4.8$ | $4.3 - j 9.2$ |
| 1.0 | $6.3 - j 12.3$ | $1.3 - j 8.3$ |
| Differential Impedance Definition | | |

S PARAMETERS (ONE HALF DEVICE) 28V, 480mA

| FREQ MHz | S11 | | S21 | | S12 | | S22 | |
|-------------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|
| | Mag (dB) | Ang (deg) | Mag (dB) | Ang (deg) | Mag (dB) | Ang (deg) | Mag (dB) | Ang (deg) |
| 100 | -0.40 | -158.94 | 25.73 | 97.66 | -39.96 | 9.86 | -2.39 | -172.72 |
| 200 | -0.38 | -170.47 | 19.82 | 88.45 | -40.01 | 6.07 | -2.29 | -176.26 |
| 300 | -0.40 | -175.00 | 16.27 | 83.45 | -39.94 | 3.78 | -2.26 | -177.48 |
| 400 | -0.39 | -177.61 | 13.78 | 79.30 | -40.01 | 4.18 | -2.25 | -178.31 |
| 500 | -0.40 | -179.43 | 11.85 | 75.58 | -39.92 | 2.93 | -2.24 | -179.11 |
| 600 | -0.40 | 179.13 | 10.27 | 72.08 | -40.03 | 2.87 | -2.23 | -179.97 |
| 700 | -0.39 | 177.90 | 8.94 | 68.65 | -39.92 | 4.24 | -2.19 | 178.97 |
| 800 | -0.41 | 176.72 | 7.75 | 65.11 | -39.89 | 3.86 | -2.16 | 177.59 |
| 900 | -0.41 | 175.75 | 6.68 | 61.73 | -40.02 | 3.87 | -2.18 | 176.05 |
| 1000 | -0.41 | 174.72 | 5.65 | 58.46 | -40.15 | 5.42 | -2.25 | 174.47 |
| 1100 | -0.40 | 173.83 | 4.68 | 55.76 | -40.53 | 6.68 | -2.34 | 173.55 |
| 1200 | -0.40 | 173.01 | 3.81 | 53.62 | -40.45 | 8.19 | -2.42 | 173.17 |

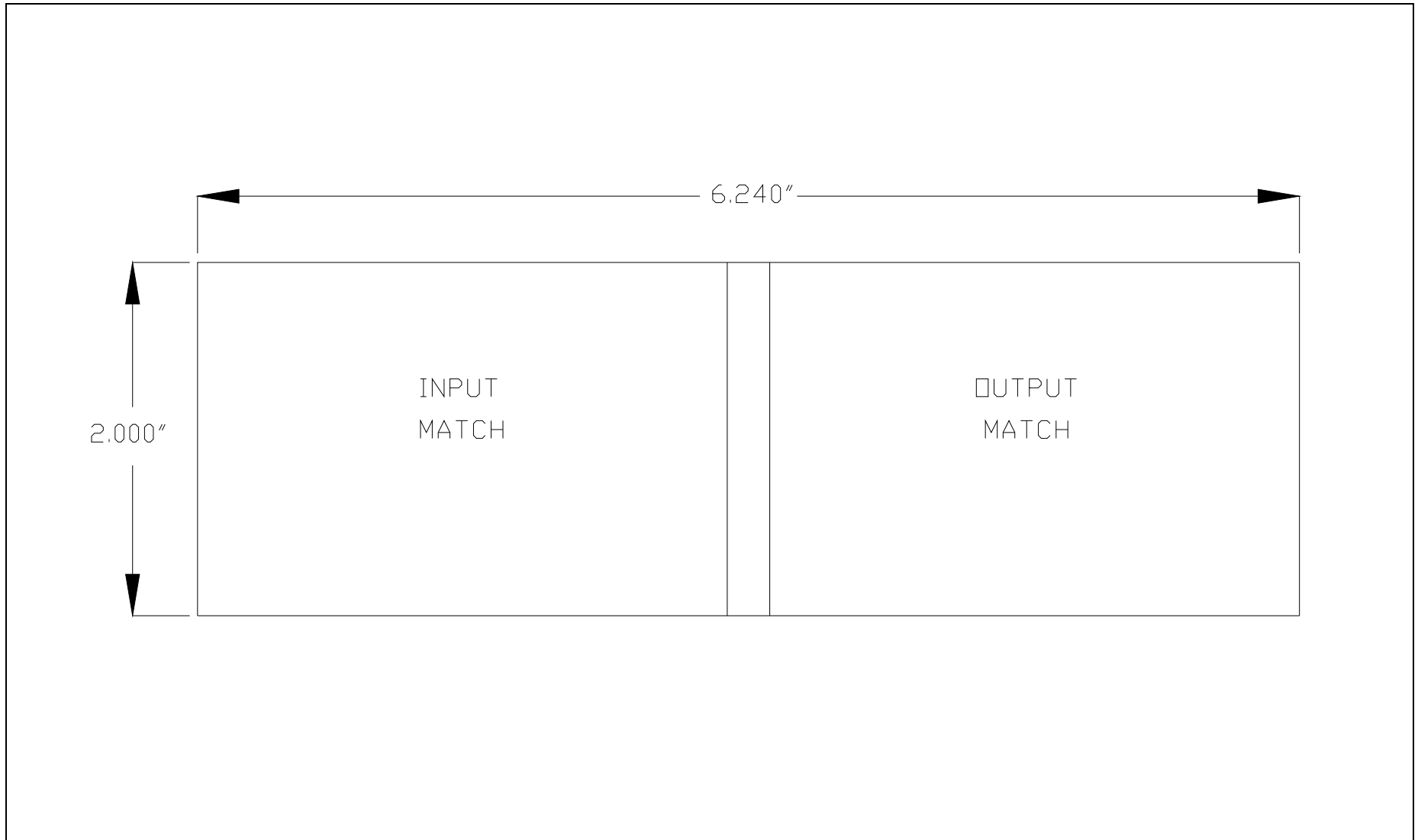
PACKAGE DIMENSIONAL OUTLINE DRAWING



| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.225 | 0.235 | 5.72 | 5.97 |
| B | 0.003 | 0.005 | 0.08 | 0.13 |
| C | 0.177 | 0.187 | 4.50 | 4.75 |
| D | 0.077 | 0.087 | 1.96 | 2.21 |
| E | 0.645 | 0.655 | 16.38 | 16.64 |
| F | 0.495 | 0.505 | 12.57 | 12.83 |
| G | 1.135 | 1.145 | 28.83 | 29.08 |
| H | 0.490 | 0.510 | 12.44 | 12.95 |
| J | 0.128 | 0.132 | 3.25 | 3.35 |
| K | 0.895 | 0.905 | 22.73 | 22.99 |
| L | 0.055 | 0.065 | 1.40 | 1.65 |
| M | 0.210 | 0.220 | 5.35 | 5.60 |

| PIN SCHEDULE | |
|--------------|--------|
| 1 | DRAIN |
| 2 | GATE |
| 3 | SOURCE |

RF TEST FIXTURE



CONTACT FACTORY FOR RF TEST FIXTURE CAD DRAWING WITH CIRCUIT DIMENSIONS AND COMPONENT LIST

DEFINITIONS

| Data Sheet Status | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Proposed Specification | This data sheet contains proposed specifications. |
| Preliminary Specification | This data sheet contains specifications based on preliminary measurements and data. |
| Product 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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