# Part Number: ILD1214M10 (Preliminary)

Integra
TECHNOLOGIES, INC.

## Avionics Band RF Power LDMOS FET

The high power transistor part number ILD1214M10 is designed for L-Band radar operating at 1200-1400 MHz. This LDMOS FET device under 300us, 10% pulse format supplies a minimum of 10-15 watt of peak pulse power. All devices are 100% screened for large signal parameters.


**Silicon LDMOS FET**
- High Power Gain
- Superior thermal stability
- Gold Metal

**Class AB Operation**
- Gate biased to $I_{DQ}$=10mA

**Configuration**
- Common Source

**Gold Metal**
- Maximum Reliability

**BeO - Free Package**
- Metal Based
- Epoxy Seal

**Epoxy Sealed Lid**
- Gross Leak Qualified

**RF Test Fixture**
- Broadband
- Matched to 50Ω
- Long-term Correlation
- 100% Device RF Screening
- No External Tuning Allowed

***PRELIMINARY DATA*** ***PRELIMINARY DATA*** ***PRELIMINARY DATA***

| General Information ILD1214M10 | | Test Sequence Name | Freq (MHz) | PIN (W) | RL (dB) | POUT (W) | GP (dB) | dG (dB) | Id (A) | nd (%) | Droop (dB) | VSWR-S 1.5:1 (P-F) | VSWR-LMT 2:1 (P-F) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date: | 5/8/2009 | | | | | | | | | | | | |
| Assbly Lot - SN : | TBD | Nominal | 1200 | 1 | -13.0 | 20 | 13.08 | | 1.620 | 41.8 | -0.40 | P | P |
| Wafer : | TBD | | | | | | | | | | | | |
| Test Fixture : | NA | Nominal | 1300 | 1 | -18.0 | 22 | 13.42 | 0.41 | 1.480 | 49.5 | -0.26 | P | P |
| Pass / Fail : | Device Passes | | | | | | | | | | | | |
| OPERATOR: | FB | Nominal | 1400 | 1 | -11.0 | 20 | 13.01 | | 1.250 | 53.3 | -0.14 | P | P |
| Pulse:300us-10% | Vd=30V, Idq=10mA | | | | | | | | | | | | |



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## MAXIMUM RATINGS

| Screen | Parameter | Symbol | Min | Max | Units | Test Conditions |
|---|---|---|---|---|---|---|
| BD | Drain-Source Voltage | $V_{DS}$ | -- | 65 | V | -- |
| BD | Gate-Source Voltage | $V_{GS}$ | -0.5 | 12 | 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 | $R_{TH(JC)}$ | -- | TBD | °C/W | $V_{DS}$ =28V, $I_{DQ}$=10mA, $T_F$ = 25±5°C, $P_{IN}$ =1W |
| | | | | | | |
| 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, 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 | Max | Units | Test Conditions |
|---|---|---|---|---|---|---|
| 100% | Drain-Source Breakdown Voltage | $BV_{DSS}$ | 65 | -- | V | $I_{DS}$ =10uA, $V_{GS}$ =0V, $T_F$ =25±5°C. |
| 100% | Drain Leakage Current | $I_{DSS}$ | -- | 1.0 | uA | $V_{DS}$ =28V, $V_{GS}$ =0V, $T_F$ =25±5°C. |
| 100% | Operating Gate Voltage | $V_{GS}$ | 2.5 | 4.0 | V | $V_{DS}$ =28V, $T_F$ =25±5°C. |
| 100% | Gate Leakage Current | $I_{GSS}$ | -- | 1.0 | uA | $V_{GS}$ =10V, $V_{DS}$ =0V, $T_F$ =25±5°C. |



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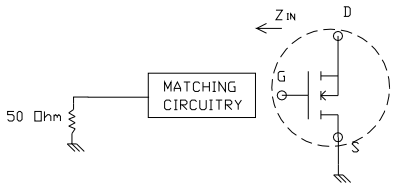
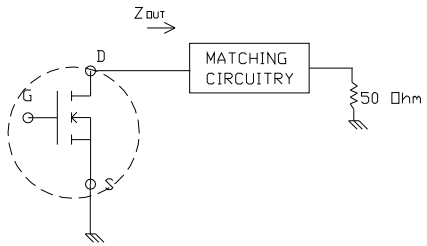
## RF ELECTRICAL CHARACTERISTICS

| Screen | Parameter | Symbol | Min | Max | Units | Test Conditions |
|---|---|---|---|---|---|---|
| 100% | Input Return Loss | RL | -18 | -7 | dB | $V_D$ =30V, Pin=1W, Pulse=PW1 @ F1, F2, F3, $T_F$ =25±5°C, $I_{DQ}$=10mA. |
| 100% | Drain Efficiency | Nd | 30 | 75 | % | $V_D$ =30V, Pin=1W, Pulse=PW1 @ F1, F2, F3, $T_F$ =25±5°C, $I_{DQ}$=10mA. |
| 100% | Power Gain | Gp | 10 | -- | dB | $V_D$ =30V, Pin=1W, Pulse=PW1 @ F1, F2, F3, $T_F$ =25±5°C, $I_{DQ}$=10mA. |
| 100% | Output Power | Pout | 10 | -- | W | $V_D$ =30V, Pin=1W, Pulse=PW1 @ F1, F2, F3, $T_F$ =25±5°C, $I_{DQ}$=10mA. |
| 100% | Signal Amplitude Droop | Droop | -0.5 | 0.5 | dB | $V_D$ =30V, Pin=1W, Pulse=PW1 @ F1, F2, F3, $T_F$ =25±5°C, $I_{DQ}$=10mA. |
| 100% | Stability into 1.5:1 VSWR | VSWR-S | 1.5:1 | -- | -- | $V_D$ =30V, Pin=1W, Pulse=PW1 @ F1, F2, F3, $T_F$ =25±5°C, $I_{DQ}$=10mA<br>Rotate 3:1 output VSWR through 360° phase. No oscillatory or pulse break-up characteristics allowed on detected output pulse. |
| 100% | Load Mismatch Tolerance | VSWR-LMT | 2:1 | -- | -- | $V_D$ =30 Pin=1W, Pulse=PW1 @ F1, F2, F3, $T_F$ =25±5°C, $I_{DQ}$=10mA,<br>Rotate 2:1 output VSWR through 360° phase. |
| | | | | | | |
| Note 1 | F1=1200 MHz, F2=1300 MHz, F3=1400 MHz | | | | | |
| Note 2 | Pulse format: PW1= 300us, 10% | | | | | |
| Note 3 | $T_F$ = Device flange temperature. | | | | | |
| Note 4 | Screen 'BD' = parameter qualified By Design. | | | | | |

## OPTIMAL IMPEDANCE CHARACTERISTICS

| Frequency (MHz) | $Z_{IF}$ (Ω) | $Z_{OF}$ (Ω) |
|---|---|---|
| 1200 | 3.1 –j3.2 | 15 –j2.9 |
| 1300 | 3.3 –j4.6 | 12.1 –j 2 |
| 1400 | 3.5 –j 5 | 10 +j4.4 |
| Impedance Definition |  |  |



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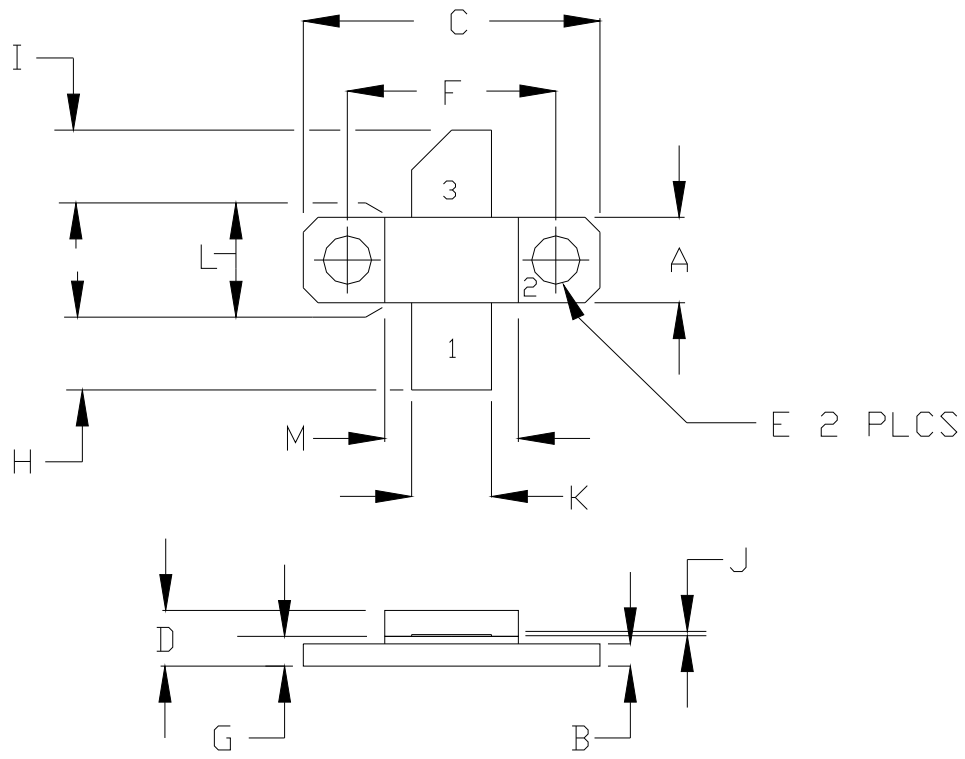
**PACKAGE DIMENSIONAL OUTLINE DRAWING**




| DIM | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 0.225 | 0.235 | 5.71 | 5.96 |
| B | 0.055 | 0.065 | 1.40 | 1.65 |
| C | 0.795 | 0.805 | 20.19 | 20.44 |
| D | 0.140 | 0.160 | 3.55 | 4.06 |
| E | 0.125 | 0.135 | 3.18 | 3.43 |
| F | 0.557 | 0.567 | 14.14 | 14.40 |
| G | 0.077 | 0.087 | 1.95 | 2.20 |
| H | 0.050 | 0.070 | 1.27 | 1.77 |
| I | 0.215 | 0.245 | 5.46 | 6.22 |
| J | 0.215 | 0.245 | 5.46 | 6.22 |
| K | 0.210 | 0.220 | 5.33 | 5.58 |
| L | 0.225 | 0.235 | 5.71 | 5.96 |
| M | 0.355 | 0.365 | 9.01 | 9.27 |

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

NOTES:

LID: LID-PL32-1



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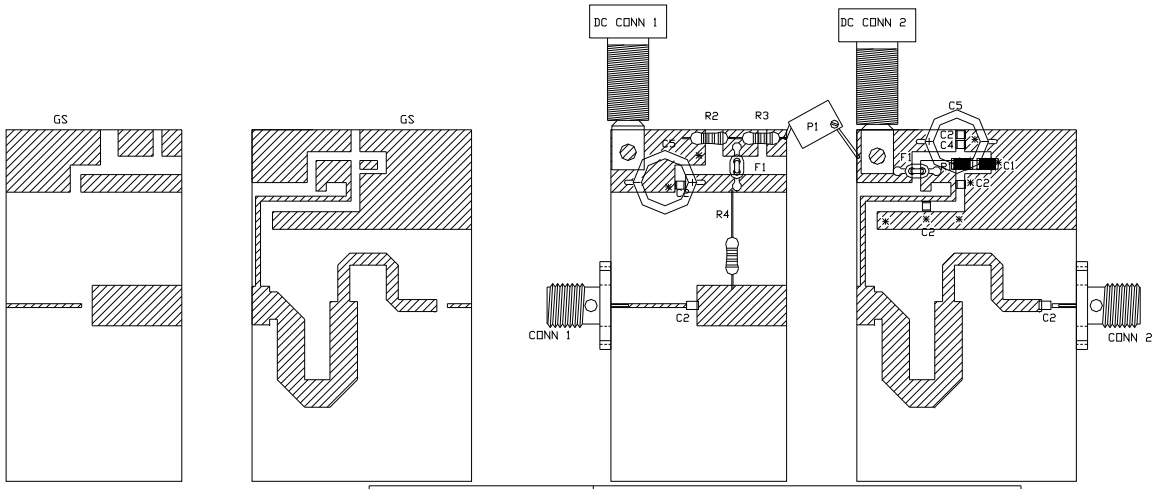
**RF TEST FIXTURE**




| COMPONENT | DESCRIPTION |
|---|---|
| DUT | TRANSISTOR #ILD1214M10 MOUNT HARD TO THE RIGHT |
| PC BOARD | ROGERS #RT6010.2LM 2E/2E .025" |
| C1 | SNUB CAPACITOR 0.1uF |
| C2 | CHIP CAPACITOR ATC100A 100pF |
| C4 | CHIP CAPACITOR ATC100A 4.7uF |
| C5 (NOT SHOWN) | ELECTROLYTIC CAPACITOR 68uF |
| R1 | SNUB RESISTOR 6.8 OHMS |
| R2 | RESISTOR 12 K OHMS |
| R3 | RESISTOR 68 K OHMS |
| R4 | 1 M OHMS |
| F1 | BIASWIRE WITH TWIN CORE FERRITE BEAD |
| P1 | POTENTIOMETER 100 K OHMS |
| GS (8 PLACES) | GROUND SHIM, COPPER, TH=0.001" |
| CONN 1, CONN 2 | SMA CONNECTOR, DS #2052-5636-02 |
| INPUT PC BOARD CARRIER | 2 INCH BRASS-03 (1") |
| OUTPUT PC BOARD CARRIER | 2 INCH BRASS-04 (1.25") |
| TRANSISTOR CARRIER | 2 INCH COPPER-01 |
| TRANSISTOR CLAMP | NORYL CLAMP-01 |
| ALUMINUM HEAT SINK | 2 INCH HEATSINK-01 |
| DC CONN 1 | BANANA JACK, BLACK |
| DC CONN 2 | BANANA JACK, RED |
| NOTE | FIXTURE HARDWARE DRAWINGS AVAILABLE ON REQUEST |

ASSEMBLY AND PARTS LIST



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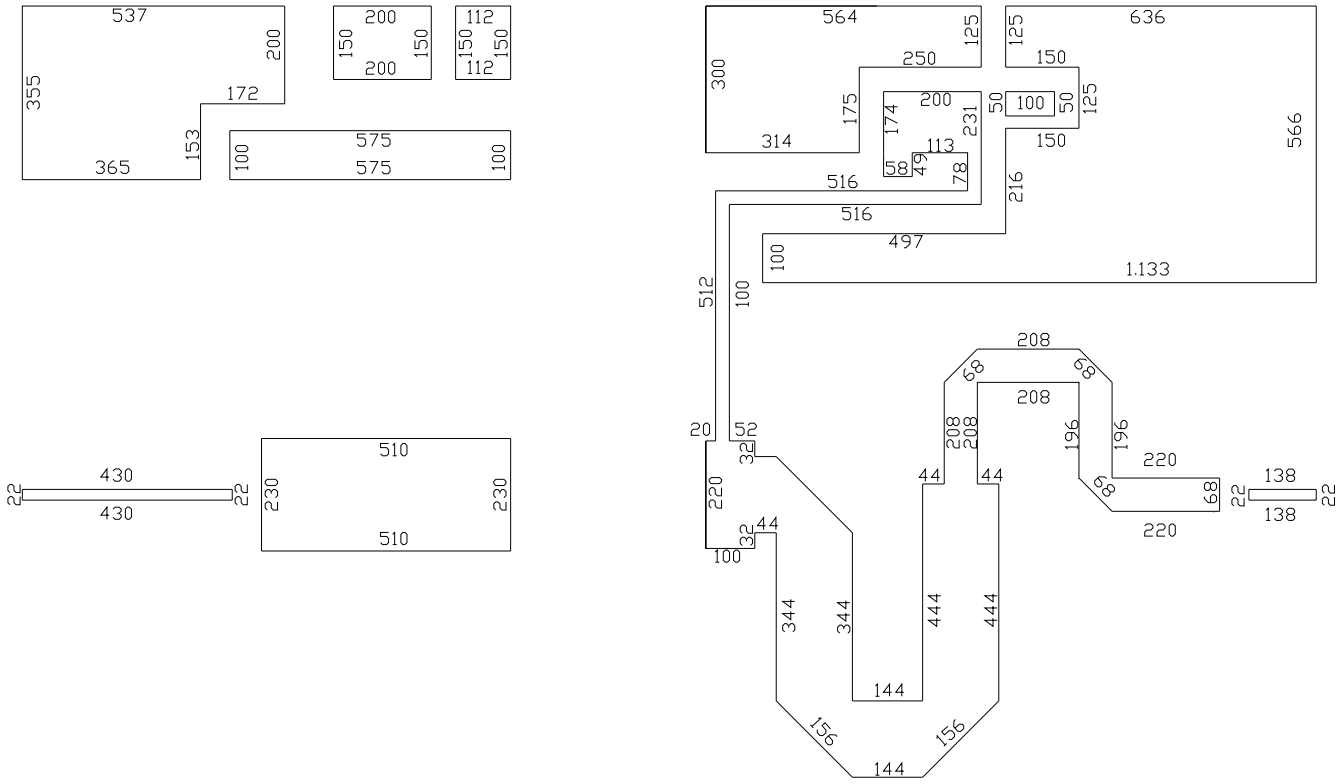
**RF TEST FIXTURE**




CIRCUIT DIMENSIONS



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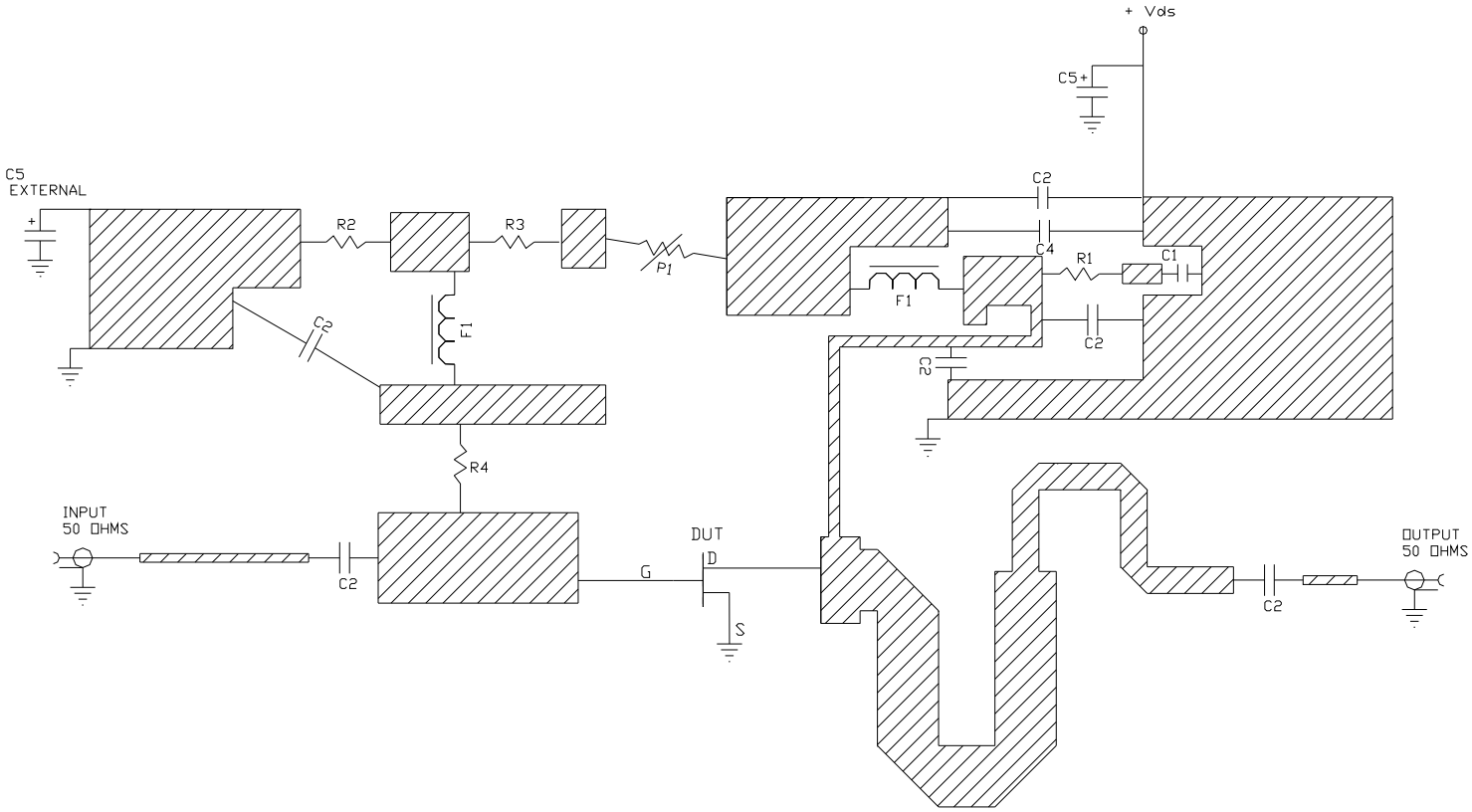
**RF TEST FIXTURE**




ELECTRICAL SCHEMATIC



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## 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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