

L-Band Avionics Transistor

The high power pulsed avionics transistor part number IB1011L110 is designed for L-Band avionics systems operating at 1030 and 1090 MHz. While operating in class C mode under Mode S – ELM pulse burst conditions at $V_{CC} = 48V$, this common base device supplies a minimum of 110 watts of peak pulse power. It utilizes a low loss internal input impedance matching structure to yield maximum device gain and to ease the implementation of external matching circuitry. The new generation bipolar transistor geometry utilizes a gold metallization system to achieve maximum reliability. Emitter ballast resistance is incorporated on the active cell for optimum thermal distribution and maximum reliability. All devices are 100% screened for large signal RF parameters.



Silicon Bipolar

- Ultra-high f_T

Class C Operation

- High Efficiency

Common Base Configuration

- Single Power Supply

Gold Metal

- Maximum Reliability

Emitter Ballasting

- Optimum Thermal Distribution

Internal Impedance Matching

- Ease of Use
- Ultra-low Loss Design

Be0 Package

- Unmatched Thermal Reliability

RF Test Fixture

- Broadband
- Matched to 50Ω
- Long-term Correlation
- 100% Device RF Screening
- No External Tuning Allowed
- Micro-strip structure on soft pc board with dielectric constant 10.5

TYPICAL DATA TYPICAL DATA TYPICAL DATA TYPICAL DATA

| General Information | Test Sequence | Freq | PIN | RL | POUT | GP | IC | nC | Droop | VSWR-S | VSWR-LMT | |
|---------------------|-----------------------------------|---------|------|------|-------|-------|------|------|-------|----------------|--------------|---|
| IB1011L110 | Name | (MHz) | (W) | (dB) | (W) | (dB) | (A) | (%) | (dB) | 1.5:1 (P-F) | 2:1 (P-F) | |
| Date: | 4/17/2009 | | | | | | | | | | | |
| Assbly Lot - SN: | D3807-10 | Nominal | 1030 | 9.00 | -18.0 | 120.0 | 11.2 | 3.86 | 64.8 | -0.14 | P | P |
| Wafer: | NA | | | | | | | | | | | |
| Test Fixture: | NA | | | | | | | | | | | |
| Pass / Fail: | Device Passes | | | | | | | | | | | |
| OPERATOR: | FB | | | | | | | | | | | |
| Vcc=48V | Pulse: 48x(32usON, 18usOFF), 6.4% | | | | | | | | | | | |

MAXIMUM RATINGS

| Screen | Parameter | Symbol | Min | Max | Units | Test Conditions |
|--------|----------------------------------------------|-----------|-----|------|-------|-----------------|
| BD | Collector-Emitter Voltage | V_{CES} | -- | 85 | V | -- |
| BD | Emitter-Base Voltage | V_{EBO} | -- | 2 | 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 | $R_{TH(JC)}$ | -- | 1.54 | °C/W | $V_{CC}=48V$, Pulse format=Mode S - ELM, $T_F=25\pm5^\circ C$, $P_{IN}=10W$, $N_C=50\%$ |
| 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% | Collector-Emitter Breakdown Voltage | BV_{CES} | 85 | -- | V | $I_C = 40mA$, $V_{BE} = 0V$, $T_F = 25\pm5^\circ C$. |
| 100% | Zero Base Voltage Collector Leakage Current | I_{CES} | -- | 100 | μA | $V_{CE} = 48V$, $V_{BE} = 0V$, $T_F = 25\pm5^\circ C$. |
| 100% | DC Current Gain | H_{FE} | 10 | 100 | -- | $V_{CE} = 5V$, $I_C = 0.2A$, $T_F = 25\pm5^\circ C$. |

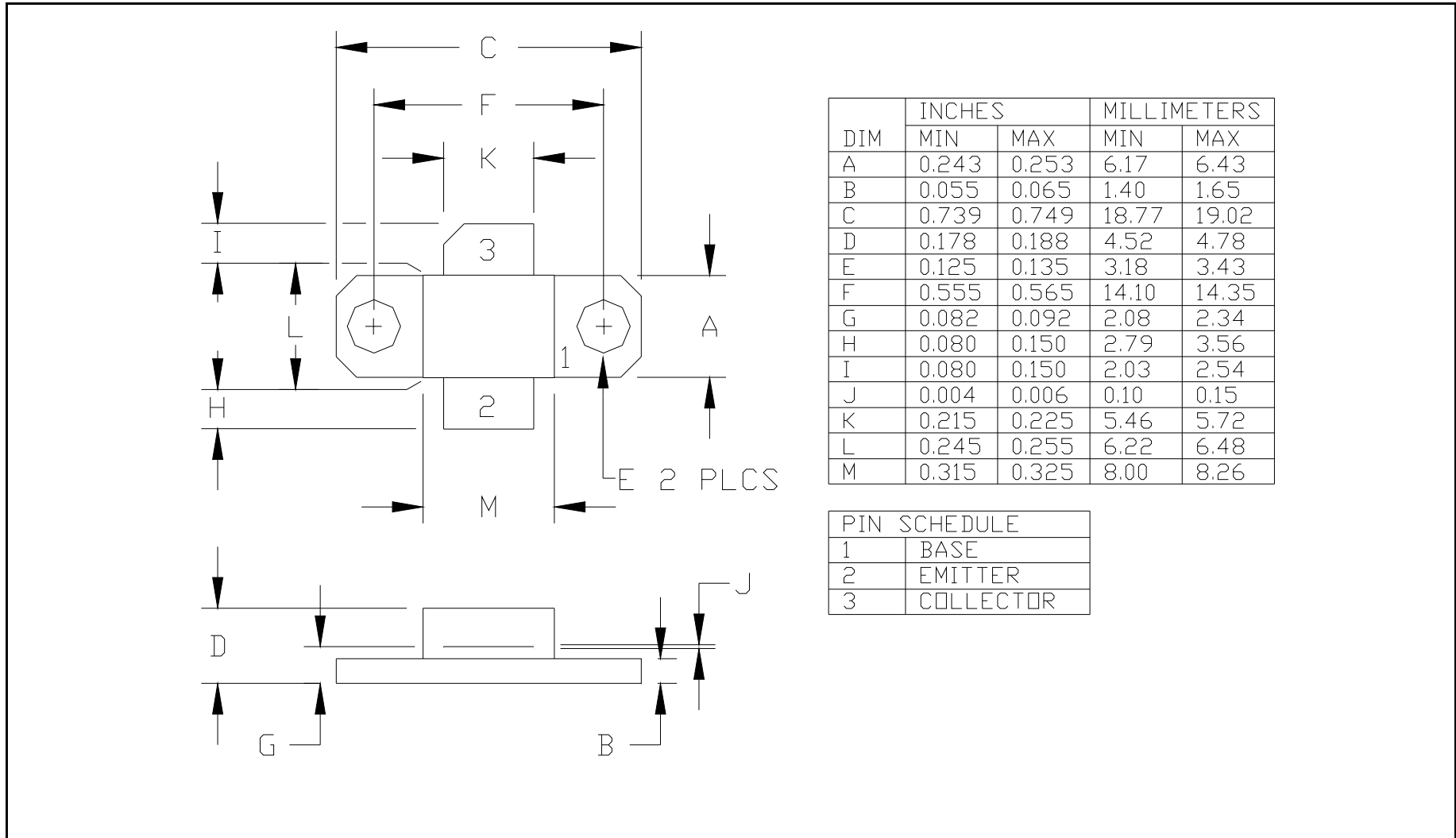
RF ELECTRICAL CHARACTERISTICS

| Screen | Parameter | Symbol | Min | Max | Units | Test Conditions |
|--------|--------------------------------------------------------------------------------|---------------|------|------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 100% | Input Return Loss | RL | -18 | -10 | dB | $V_{CC}=48V$, $P_{IN}=9W$, Pulse = Note 2, $T_F=25\pm5^\circ C$, $F=F1$. |
| BD | Maximum Overdrive | $P_{IN(MAX)}$ | | 12 | W | $V_{CC}=48V$, Pulse = Note 2, $T_F=25\pm5^\circ C$, $F=F1$. |
| 100% | Power Gain | G_P | 10.9 | 12.4 | dB | $V_{CC}=48V$, $P_{IN}=9W$, Pulse = Note 2, $T_F=25\pm5^\circ C$, $F=F1$ |
| 100% | Output Power | P_o | 110 | 156 | W | $V_{CC}=48V$, $P_{IN}=9W$, Pulse = Note 2, $T_F=25\pm5^\circ C$, $F=F1$ |
| 100% | Collector Efficiency ($P_o/I_c/V_{CC}$) | N_C | 58 | 80 | % | $V_{CC}=48V$, $P_{IN}=9W$, Pulse = Note 2, $T_F=25\pm5^\circ C$, $F=F1$. |
| 100% | Pulse Amplitude Droop | Droop | -0.5 | 0.5 | dB | $V_{CC}=48V$, $P_{IN}=9W$, Pulse = Note 2, $T_F=25\pm5^\circ C$, $F=F1$. |
| 100% | Stability into 1.5:1 VSWR | VSWR-S | -- | -- | -- | $V_{CC}=48V$, $P_{IN}=9W$, Pulse = Note 2, $T_F=25\pm5^\circ C$, $F=F1$. Rotate 1.5:1 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 | -- | -- | $V_{CC}=48V$, $P_{IN}=9W$, Pulse = Note 2, $T_F=25\pm5^\circ C$, $F=F1$. Rotate 3:1 output VSWR through 360° phase. Survival. |
| BD | Pulse Risetime | RT | -- | 80 | ns | $V_{CC}=48V$, $P_{IN}=9W$, Pulse = Note 2, $T_F=25\pm5^\circ C$, $F=F1$. Measure between 10% and 90% detected power points. |
| Note 1 | F1 = 1030 MHz. | | | | | |
| Note 2 | Pulse format = Mode S - ELM (32µs on / 18µs off x 48, overall duty cycle 6.4%) | | | | | |
| Note 3 | T_F = Device flange temperature. | | | | | |
| Note 4 | Screen 'BD' = parameter qualified By Design. | | | | | |

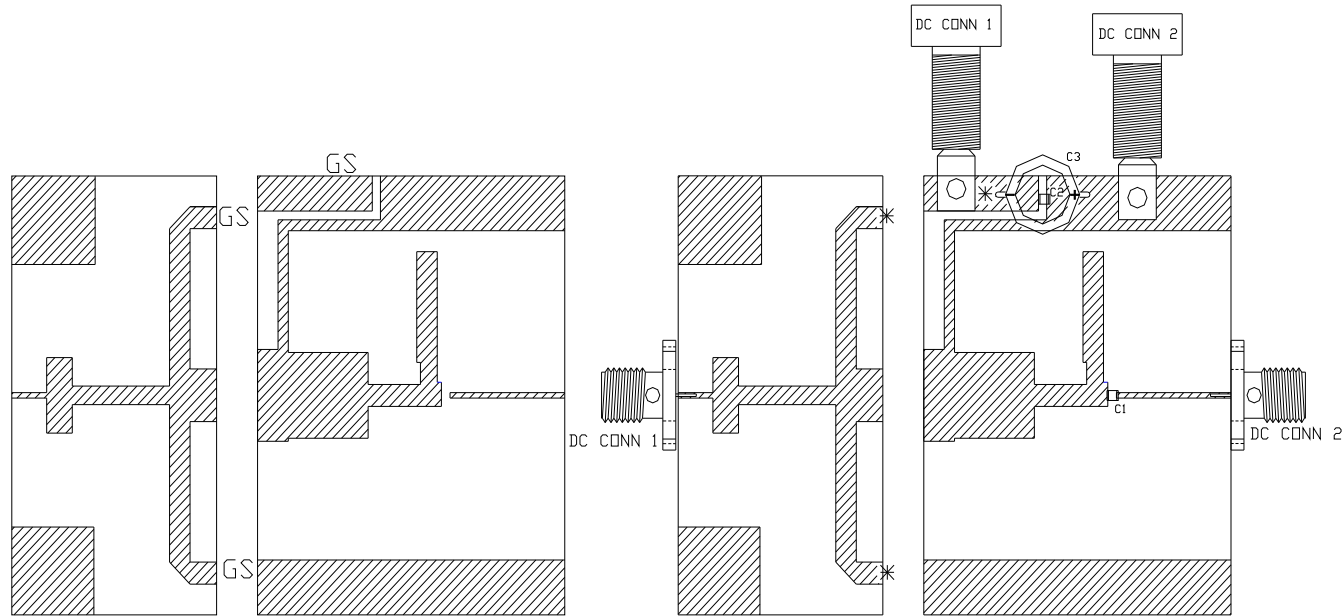
RF TEST FIXTURE IMPEDANCE CHARACTERISTICS

| Frequency (MHz) | Z_{IF} (Ω) | Z_{OF} (Ω) |
|----------------------|-----------------------|-----------------------|
| 1030 | 8.15+j0.26 | 3.2+j2.5 |
| Impedance Definition | | |

PACKAGE DIMENSIONAL OUTLINE DRAWING



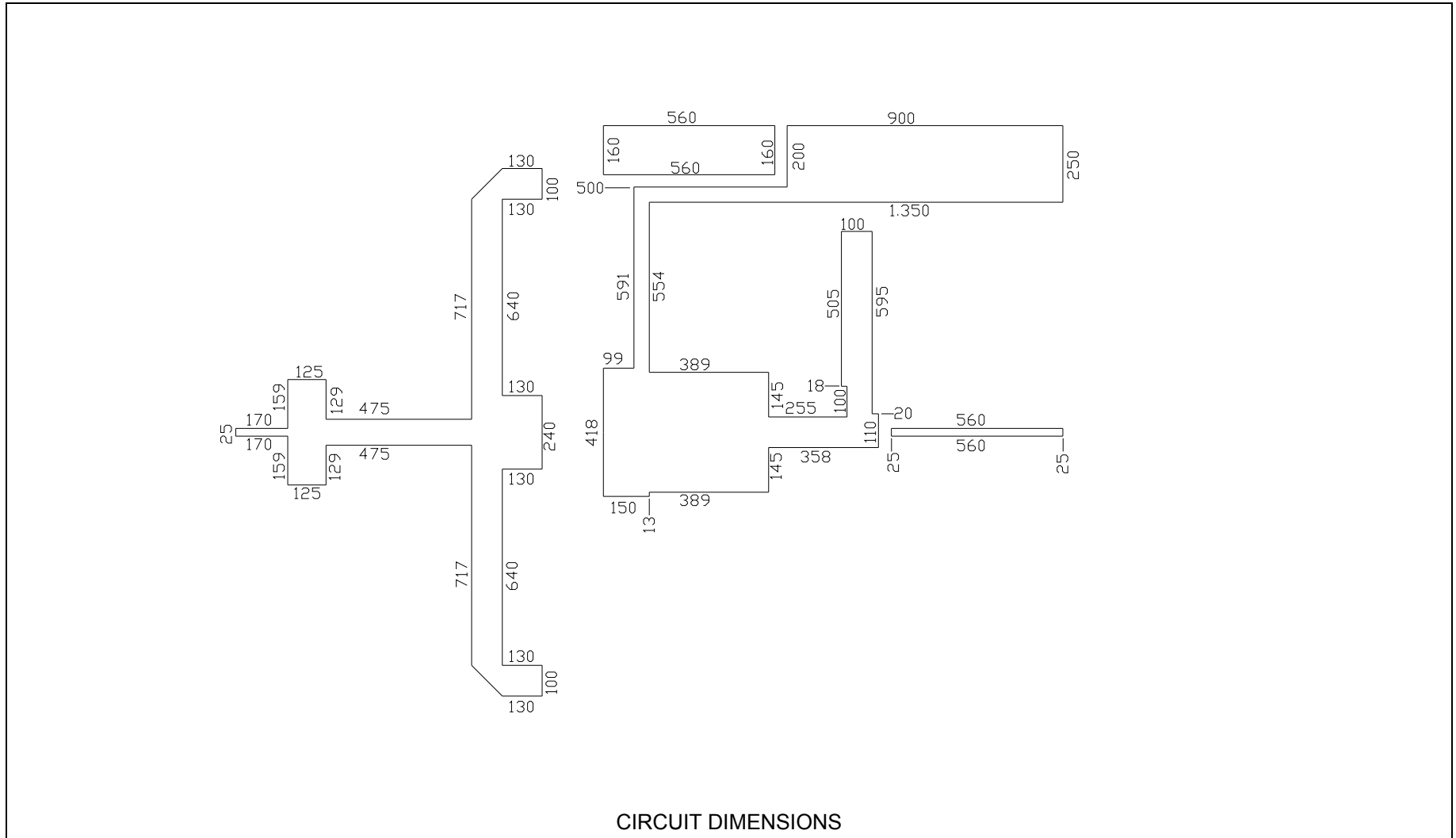
RF TEST FIXTURE



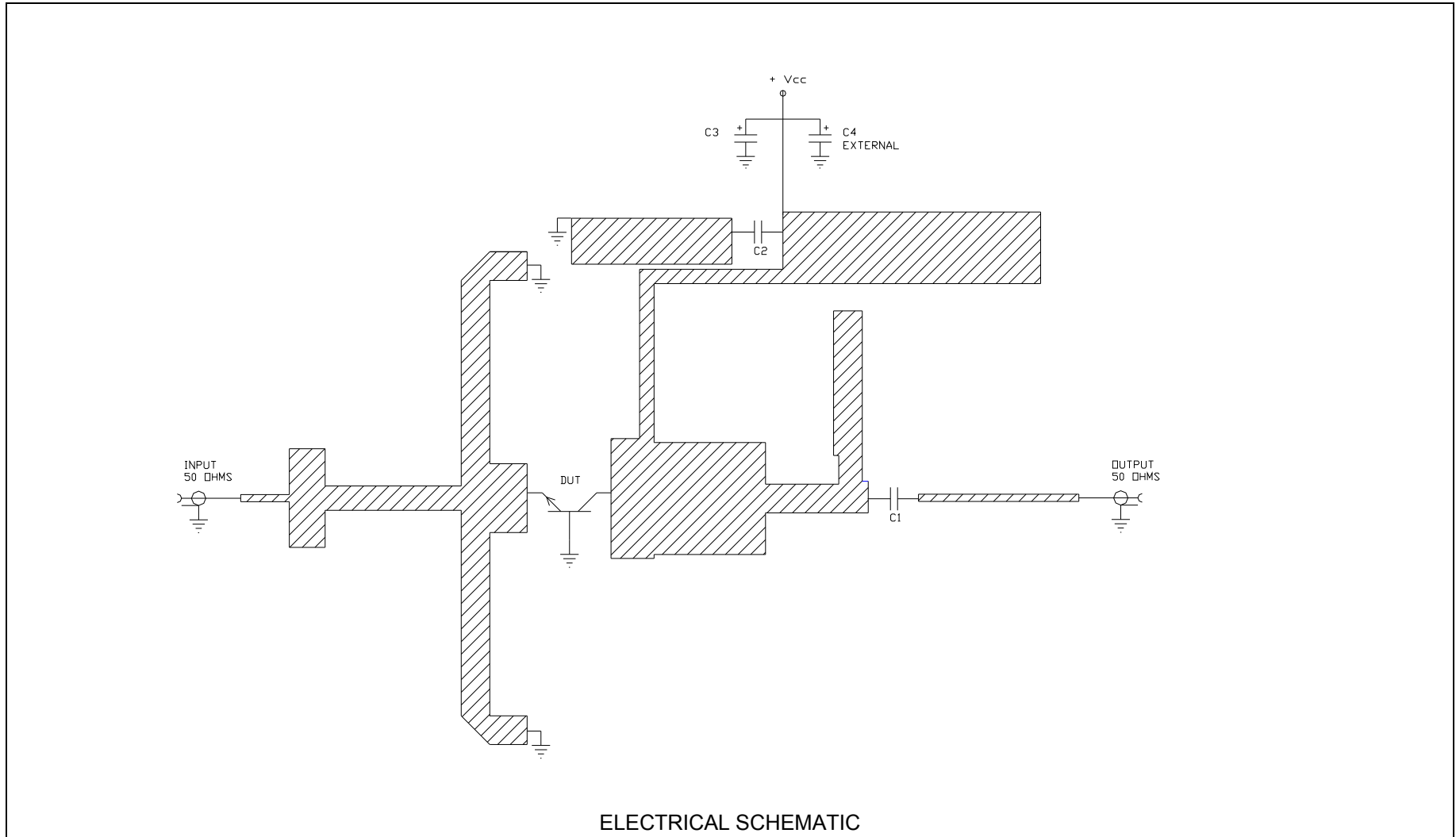
| COMPONENT | DESCRIPTION |
|-------------------------|-------------------------------------------------|
| DUT | TRANSISTOR #IB1011L110, MOUNT HARD TO THE RIGHT |
| PC BOARD | ROGERS #R03010, TH=0.025" 1oz. Cu |
| C1, C2 | CHIP CAPACITOR, TYPE ATC100A, 100 pF |
| C3 | ELECTROLYTIC CAPACITOR, 68uF / 63V |
| C4 (NOT SHOWN) | ELECTROLYTIC CAPACITOR 4700uF |
| GS | GROUND SHIM, COPPER, TH=0.001" |
| CONN1, CONN2 | SMA CONNECTOR, TYPE DS #2052-5636-02 |
| INPUT PC BOARD CARRIER | 2 INCH BRASS - 03 (1.00") |
| OUTPUT PC BOARD CARRIER | 2 INCH BRASS - 05 (1.5") |
| TRANSISTOR CARRIER | 2 INCH COPPER - 01 (P32) |
| TRANSISTOR CLAMP | NORYL CLAMP - 01 |
| ALUMINUM HEATSINK | 2 INCH HEATSINK - 11 |
| DC CONN1 | BANANA JACK, BLACK |
| DC CONN2 | BANANA JACK, RED |
| NOTE | FIXTURE HARDWARE DRAWINGS AVAILABLE ON REQUEST |

ASSEMBLY AND PARTS LIST

RF TEST FIXTURE



RF TEST FIXTURE



ELECTRICAL SCHEMATIC

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. | |

WARNING

| Product and environmental safety - toxic materials |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| This product contains beryllium oxide. The product is entirely safe provided that the BeO base is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with general or domestic waste. |

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