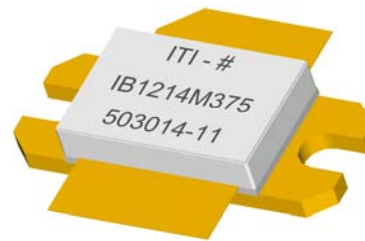


## L-Band Radar Transistor

The high power pulsed radar transistor device part number IB1214M375 is designed for L-Band radar systems operating over the instantaneous bandwidth of 1.215-1.400 GHz. While operating in class C mode this common base device supplies a minimum of 375 watts of peak pulse power under the conditions of 300µs pulse width and 10% duty cycle. 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

### BeO 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 10.2

### US Patent Number

- US7795716

*TYPICAL DATA    TYPICAL DATA    TYPICAL DATA    TYPICAL DATA*

Device Lot / SN	Freq (MHz)	P <sub>OUT</sub> (W)	I <sub>C</sub> (A)	RL (dB)	P <sub>IN</sub> (W)	G (dB)	N <sub>C</sub> (%)	VSWR 1.5:1	VSWR 3:1
D3636-3	1215	375	14.90	15.5	36.65	10.10	59.9	s	p
	1300	375	15.53	17.5	40.93	9.62	57.5	s	p
	1400	375	15.85	15.5	49.66	8.78	56.3	s	p

Conditions: PW=300us, DF=10%, V<sub>cc</sub>=42V

s = stable, p = passed

**MAXIMUM RATINGS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
BD	Collector-Emitter Voltage	$V_{CES}$	--	85	V	$V_{BE}=0V$ .
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	$R_{TH(JC)}$	--	0.17	°C/W	$V_{CC}=42V$ , Pulse Format=300us, 10%, $T_F=25\pm5^\circ C$ , Pin=59W, Pout= 375W, Nc=55%

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	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	$I_{CES}$	--	10.0	mA	$V_{CE}=42V$ , $V_{BE}=0V$ , $T_F=25\pm5^\circ C$ .
100%	DC Current Gain	$H_{FE}$	20	150	--	$V_{CE}=5V$ , $I_C=0.5A$ , $T_F=25\pm5^\circ C$ .

**RF ELECTRICAL CHARACTERISTICS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
100%	Input Return Loss	IRL	10	--	dB	$V_{CC}=V1$ , $PW=PW1$ , $DF=DF1$ , $T_F=25\pm5^\circ C$ , $P_{out}=P_{out1}$ , $P_{out2}$ , $P_{out3}$ , $F=F1$ , $F2$ , $F3$ .
100%	Input Power	$P_{IN}$	--	59.4	W	$V_{CC}=V1$ , $PW=PW1$ , $DF=DF1$ , $T_F=25\pm5^\circ C$ , $P_{out}=P_{out1}$ , $P_{out2}$ , $P_{out3}$ , $F=F1$ , $F2$ , $F3$ .
100%	Power Gain	G	8	--	dB	$V_{CC}=V1$ , $PW=PW1$ , $DF=DF1$ , $T_F=25\pm5^\circ C$ , $P_{out}=P_{out1}$ , $P_{out2}$ , $P_{out3}$ , $F=F1$ , $F2$ , $F3$ .
100%	Collector Efficiency ( $P_o/I_c/V_{CC}$ )	$N_C$	55	--	%	$V_{CC}=V1$ , $PW=PW1$ , $DF=DF1$ , $T_F=25\pm5^\circ C$ , $P_{out}=P_{out1}$ , $P_{out2}$ , $P_{out3}$ , $F=F1$ , $F2$ , $F3$ .
100%	Pulse Amplitude Droop	D	--	0.5	dB	$V_{CC}=V1$ , $PW=PW1$ , $DF=DF1$ , $T_F=25\pm5^\circ C$ , $P_{out}=P_{out1}$ , $P_{out2}$ , $P_{out3}$ , $F=F1$ , $F2$ , $F3$ .
100%	Gain Flatness	GF	--	1.5	dB	Calculate from Gain at each frequency F.
100%	Stability into 1.5:1 VSWR	VSWR-S	--	--	--	1.5:1 output VSWR through 360° phase. No oscillatory or pulse break-up characteristics allowed on detected output pulse.
100%	3:1 Load Mismatch Tolerance	LMT	--	--	--	$V_{CC}=V1$ , $PW=PW1$ , $DF=DF1$ , $T_F=25\pm5^\circ C$ , $P_{out}=375w$ , $F=F1$ , $F2$ , $F3$ . Rotate 3:1 output VSWR through 360° phase. Post test $P_o$ = Pre test $P_o \pm 10W$ .
100%	Insertion Phase	IP	-20	20	DEG	$V_{CC}=V1$ , $PW=PW1$ , $DF=DF1$ , $T_F=25\pm5^\circ C$ , $P_{out}=375W$ , $F=F3$ Measured at middle of Pulse with respect to phase reference, marked in groups of 5 degree margin.
BD	Pulse Risetime	RT	--	80	ns	$V_{CC}=V1$ , $PW=PW1$ , $DF=DF1$ , $T_F=25\pm5^\circ C$ , $P_{out}=P_{out1}$ , $P_{out2}$ , $P_{out3}$ $F=F1$ , $F2$ , $F3$
Note	$V1 = 42V$ ; $PW1 = 300\mu s$ ; $DF1 = 10\%$ ; $P_{out1} = P_{out2} = P_{out3} = 375W$ ; $F1 = 1.215$ GHz, $F2 = 1.300$ GHz, $F3 = 1.400$ GHz.					
Note	$T_F$ = Device flange temperature.					
Note	Screen 'BD' = parameter qualified By Design.					

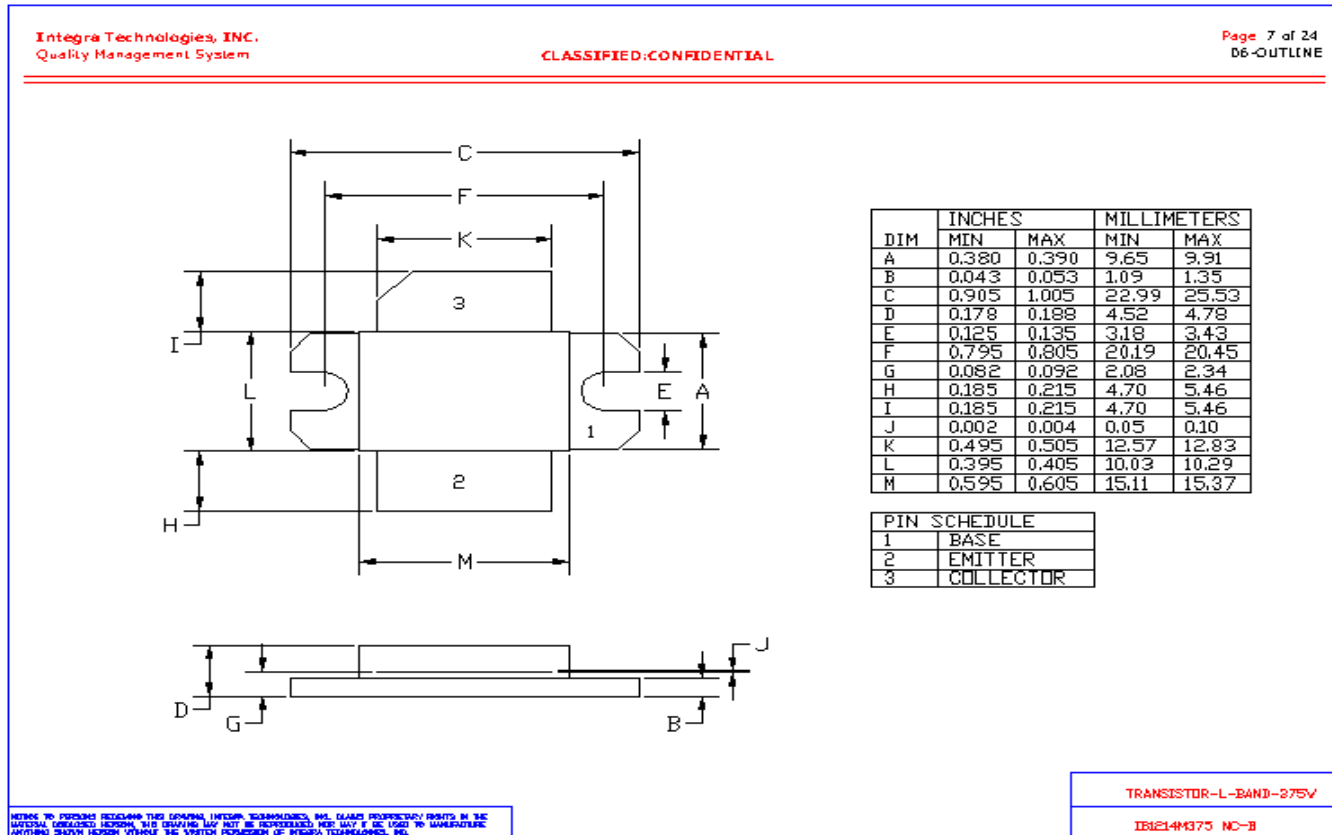
**RF TEST FIXTURE IMPEDANCE CHARACTERISTICS**

Frequency (MHz)	$Z_{IF}$ ( $\Omega$ )	$Z_{OF}$ ( $\Omega$ )
1.215	1.69-j2.14	1.88-j1.16
1.300	1.75-j1.66	1.62-j1.12
1.400	2.03-j0.84	1.14-j0.68

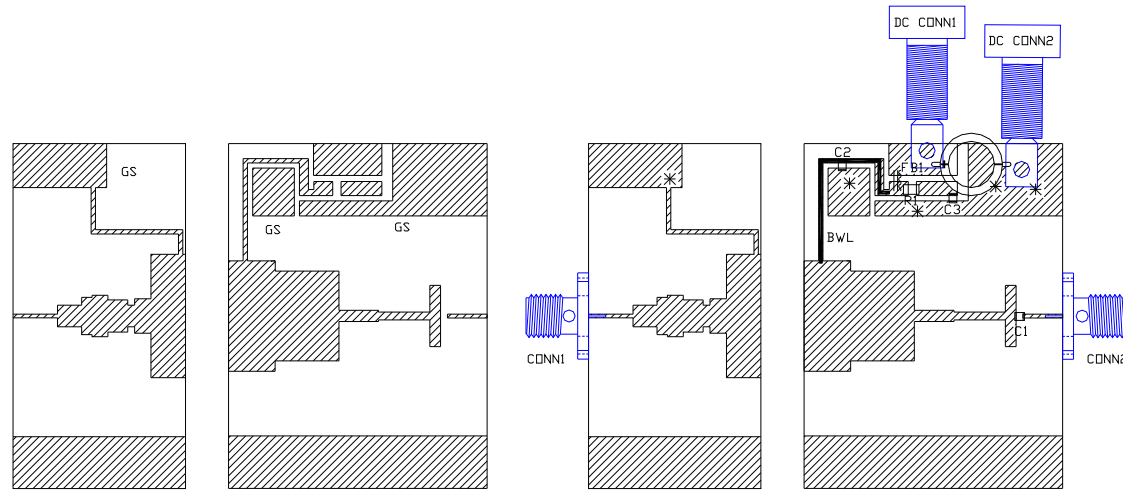
  

Impedance Definition		
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**PACKAGE DIMENSIONAL OUTLINE DRAWING**



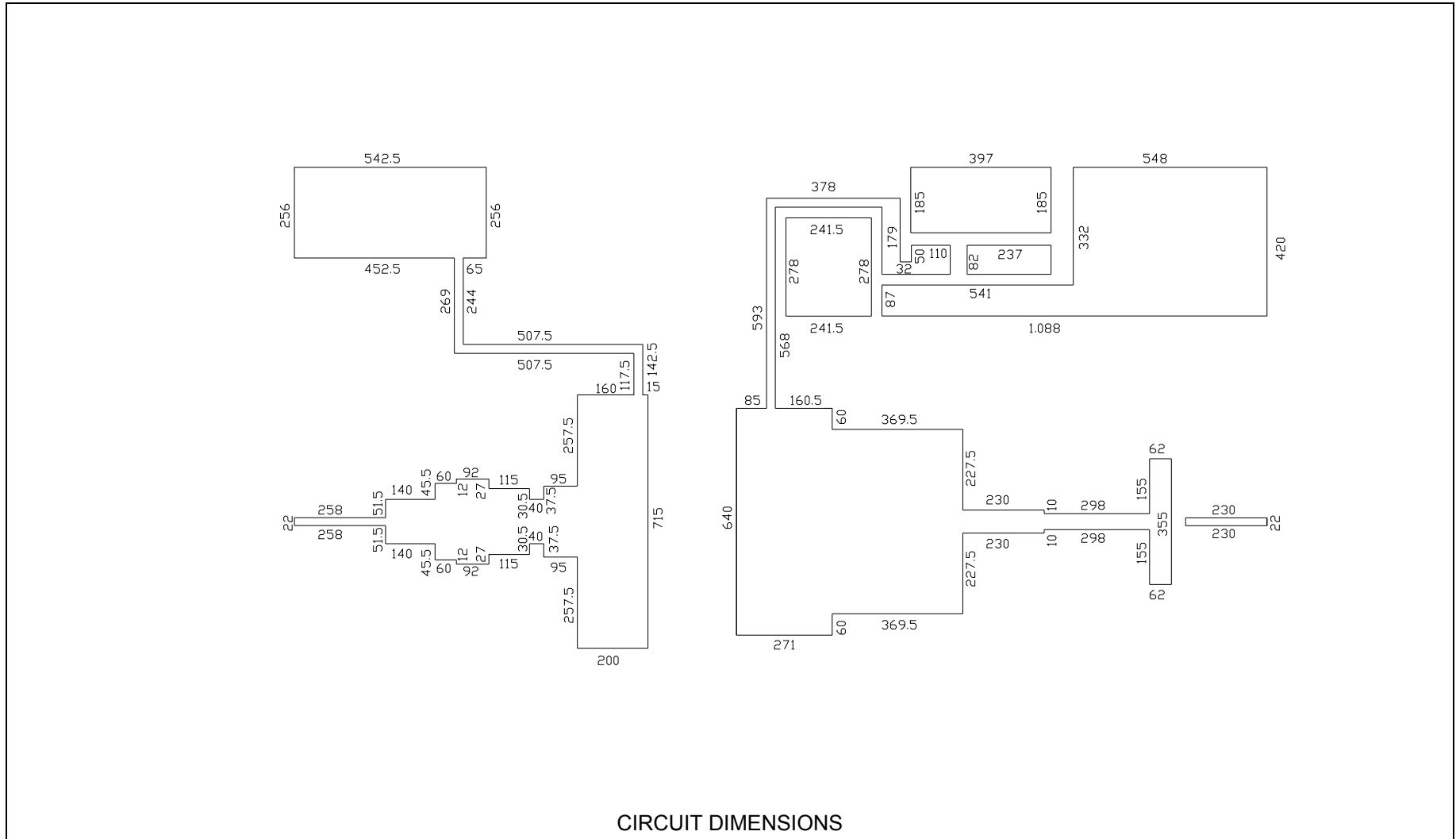
**RF TEST FIXTURE**



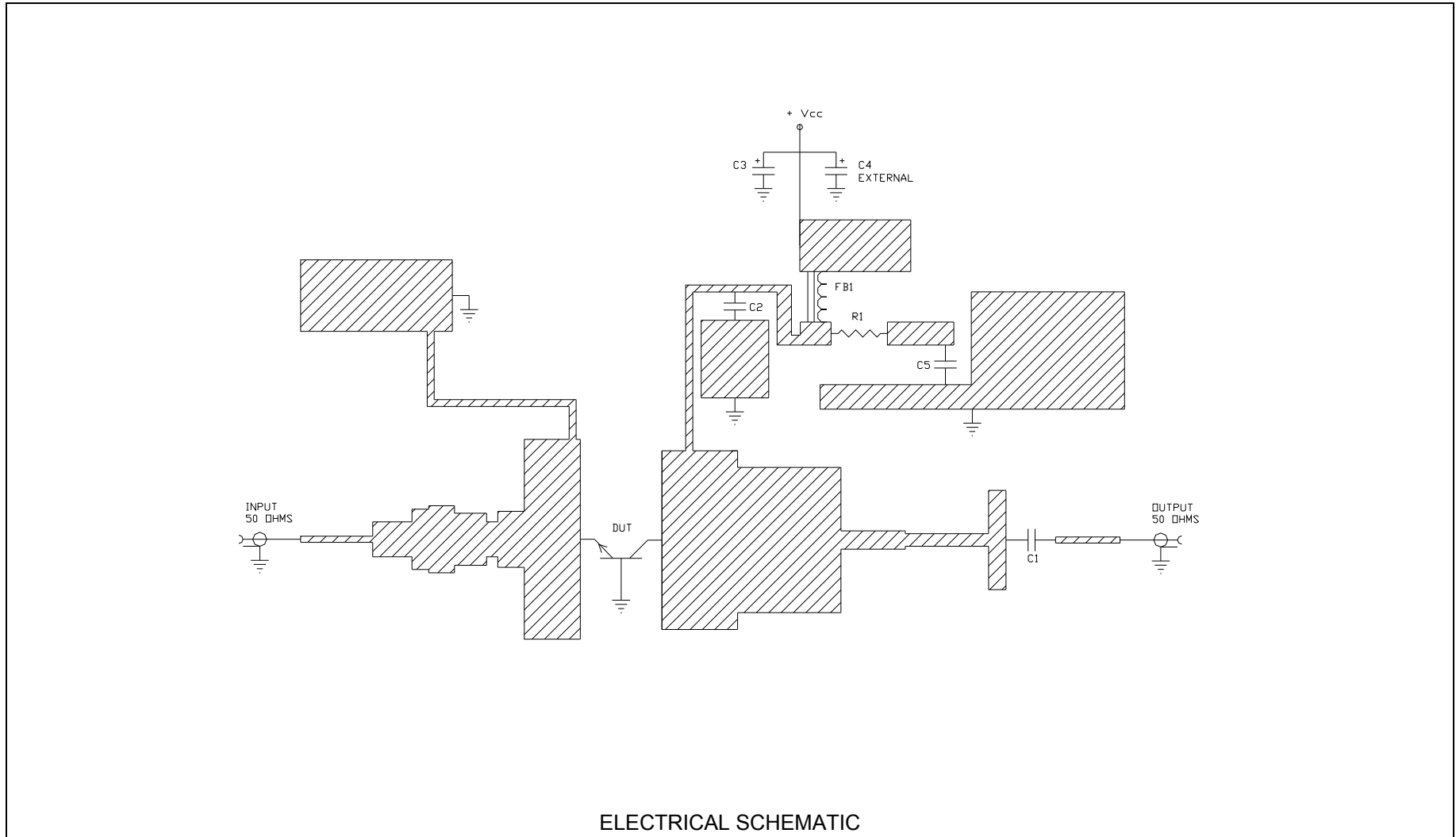
COMPONENT	DESCRIPTION
DUT	TRANSISTOR #IB1214M375, MOUNT HARD TO THE RIGHT
PC BOARD	ROGERS #RD6010, TH=0.025" 1oz. Cu
C1, C2	CHIP CAPACITOR, TYPE ATC100A, 100 pF
C3	ELECTROLYTIC CAPACITOR, 68uF / 63V
C4 - NOT SHOWN	ELECTROLYTIC CAPACITOR, 4700uF / 63V
C5	CHIP CAPACITOR 4.7uF C5750X7R2A475M
FBI	FERRITE BEAD (CYLINDRICAL)
R1	CHIP RESISTOR 10 OHMS
GS	GROUND SHIM, COPPER, TH=0.001"
BLW	BIAS LINE WIRE 22 AWG, WIRE
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 (1.50")
TRANSISTOR CARRIER	2 INCH COPPER - 03
TRANSISTOR CLAMP	NDRYL CLAMP - 04
HEATSINK	2 INCH HEATSINK - 11
DC CONN1	BANANA JACK, RED
DC CONN2	BANANA JACK, BLACK
NOTE	FIXTURE HARDWARE DRAWINGS AVAILABLE ON REQUEST

**ASSEMBLY AND PARTS LIST**

**RF TEST FIXTURE**



**RF TEST FIXTURE**



**DEFINITIONS**

<b>Data Sheet Status</b>	
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.
<b>Maximum Ratings</b>	
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**

<b>Product and environmental safety - toxic materials</b>
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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