

## S-Band Radar Transistor

The high power pulsed radar transistor device part number IB3135MH20 is designed for S-Band radar systems operating over the instantaneous bandwidth of 3.1-3.5 GHz. While operating in class C mode this common base device supplies a minimum of 20 watts of peak pulse power under the conditions of 100µs pulse width and 10% duty cycle over the frequency range of 3.1-3.5 GHz. All devices are 100% screened for large signal RF parameters, including power gain compression. Excellent spectral stability into output mismatch over a broad input power range make it ideal for use in reliable high power solid state transmitters. The test fixture includes a passive amplitude sloping network to insure that the device is not overdriven as the operating frequency decreases. This device is rated for a peak output power level of  $P_{PEAK} = 20W @ 10\%$  duty factor. This corresponds to an average power  $P_{AVG} = 2.0W$ .



### 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
- Solder Seal Hermeticity

### RF Test Fixture

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

## TYPICAL DATA TYPICAL DATA TYPICAL DATA TYPICAL DATA

Device	Freq (GHz)	V <sub>CC</sub> (V)	P <sub>IN</sub> (W)	IRL (dB)	P <sub>OUT</sub> (W)	G <sub>P</sub> (dB)	I <sub>C</sub> (A)	N <sub>C</sub> (%)	Droop (dB)
	3.100	36	3.5	-18	33.5	9.8	2.24	4.15	-0.52
50014718	3.300	36	3.5	-14	31.3	9.5	1.93	45.0	-0.23
	3.500	36	3.5	-13	29.6	9.3	1.99	41.4	-0.43

Pulse Format = 100us, 10%

**MAXIMUM RATINGS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
BD	Collector-Emitter Voltage	$V_{CES}$	--	65	V	$V_{BE}=0V$ .
BD	Storage Temperature Range	$T_{STG}$	-65	+200	°C	--
BD	Operating Junction Temperature Range	$T_J$	-55	+200	°C	--
BD	CW Operation	--	--	--	--	Not rated for CW operation.
Note	Screen 'BD' = parameter qualified By Design.					

**THERMAL CHARACTERISTICS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
BD	Thermal Resistance	$R_{TH(JC)}$	--	1.10	°C/W	$V_{CC}=V1$ , $PW=PW1$ , $DF=DF1$ , $T_F=25\pm5^\circ C$ , $P_{OUT}=20W$ .
Note	GB = Guard Band. 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	$BV_{CES}$	65	--	V	$I_C=25mA$ , $V_{BE}=0V$ , $T_F=25\pm5^\circ C$ .
100%	Zero Base Voltage Collector Leakage Current	$I_{CES}$	--	1.0	mA	$V_{CE}=36V$ , $V_{BE}=0V$ , $T_F=25\pm5^\circ C$ .
100%	DC Current Gain	$H_{FE}$	10	100	--	$V_{CE}=5V$ , $I_C=0.1A$ , $T_F=25\pm5^\circ C$ .

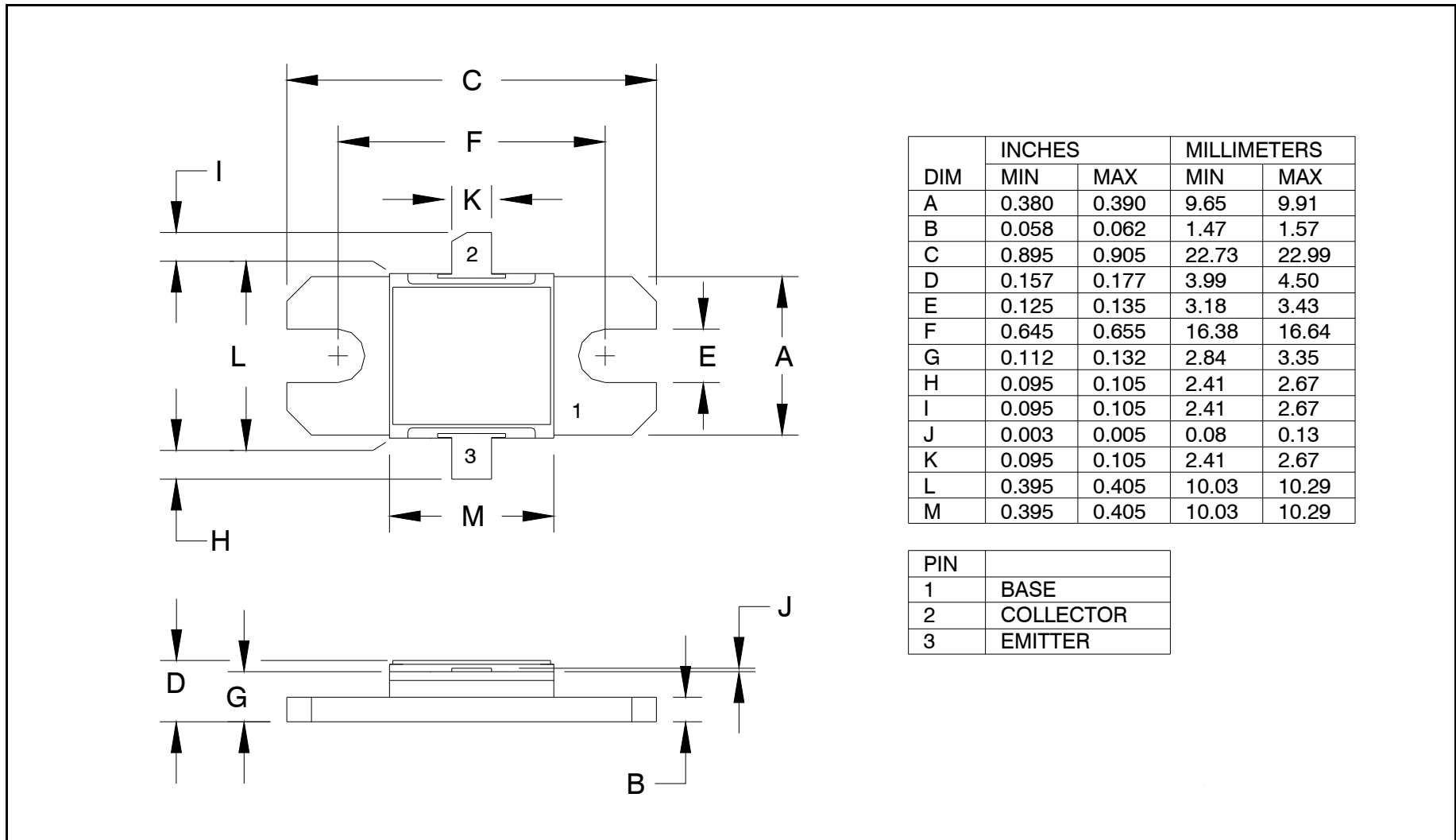
**RF ELECTRICAL CHARACTERISTICS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
100%	Input Return Loss	IRL	-16	-6	dB	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=3.5W, F=F1, F2, F3.$
100%	Output Power	$P_O$	20	35	W	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=3.5W, F=F1, F2, F3.$
100%	Collector Efficiency ( $P_O/I_C/V_{CC}$ )	$N_C$	35	100	%	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=3.5W, F=F1, F2, F3.$
100%	Pulse Amplitude Droop	D	-0.6	0.5	dB	
100%	Delta Insertion Phase Variation	d-IP	-30	+30	Deg	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=3.5W, F=F3.$
100%	Stability into 1.5:1 VSWR	VSWR-S	--	--	--	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=3.5W, F=F1, F2, F3.$ Rotate 1.5:1 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.
100%	2:1 Load Mismatch Tolerance	LMT	--	--	--	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=3.5W, F=F1, F2, F3.$ Rotate 2:1 output VSWR through 360° phase. Survival.
Note	$V1 = 36V; PW1 = 100\mu s; DF1 = 10%; P_{IN1} = 3.5 W; F1 = 3.10 GHz, F2 = 3.30 GHz, F3 = 3.50 GHz.$					
Note	$T_F =$ Device flange temperature. Screen 'BD' = parameter qualified By Design.					

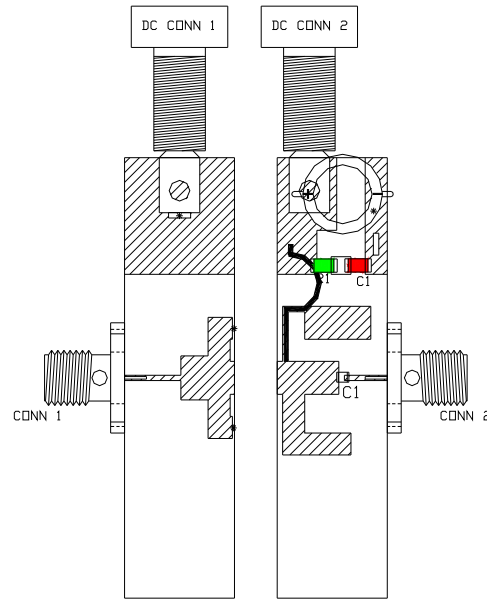
**RF TEST FIXTURE IMPEDANCE CHARACTERISTICS**

Frequency (GHz)	$Z_{IF} (\Omega)$	$Z_{OF} (\Omega)$
3.10	15.7 +j5.5	15.4 -j1.8
3.30	13.0 +j0.8	8.8 -j3.0
3.50	9.8 -j0.1	6.1 -j1.5
Impedance Definition		

**PACKAGE DIMENSIONAL OUTLINE DRAWING**



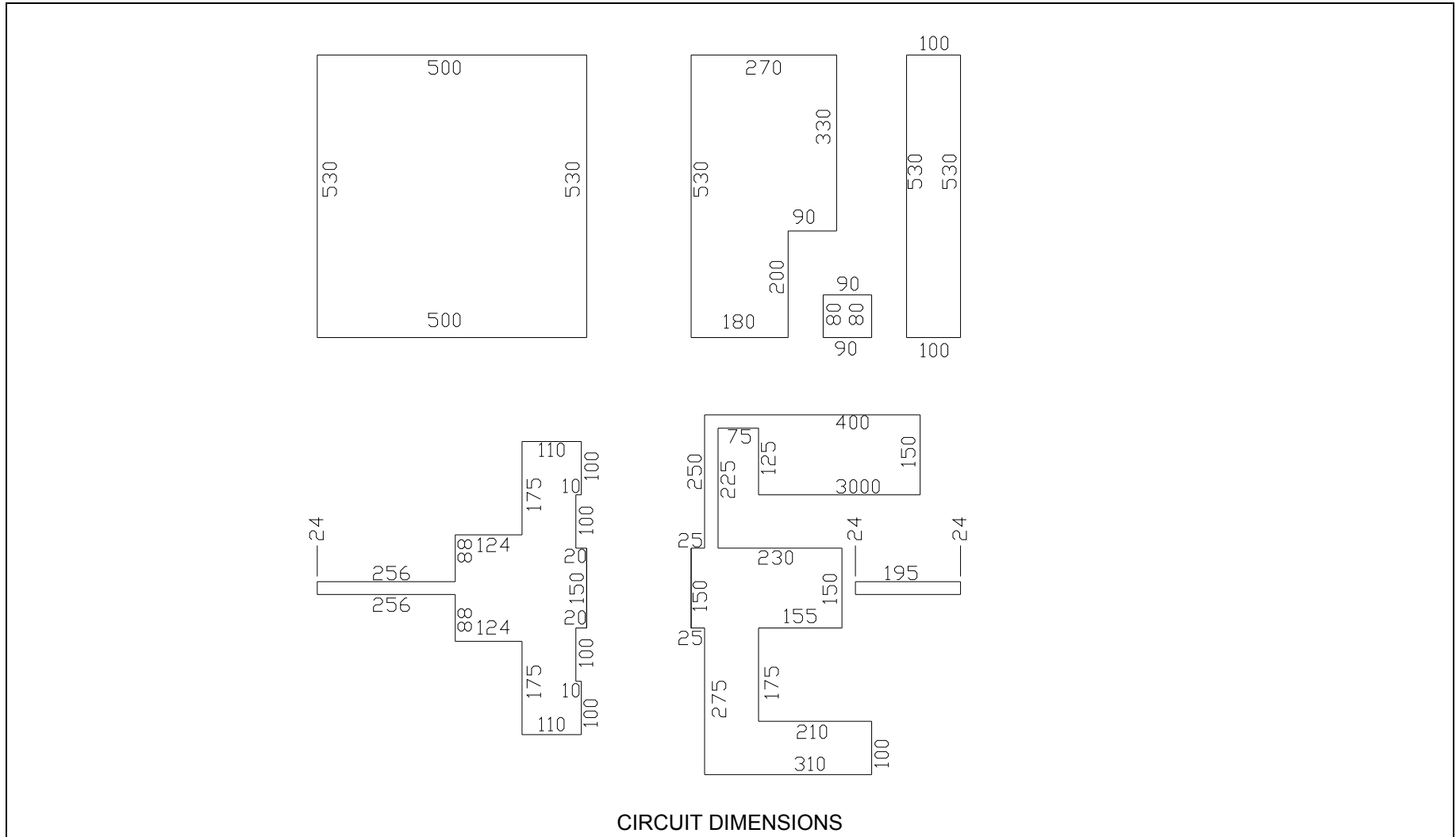
**RF TEST FIXTURE**



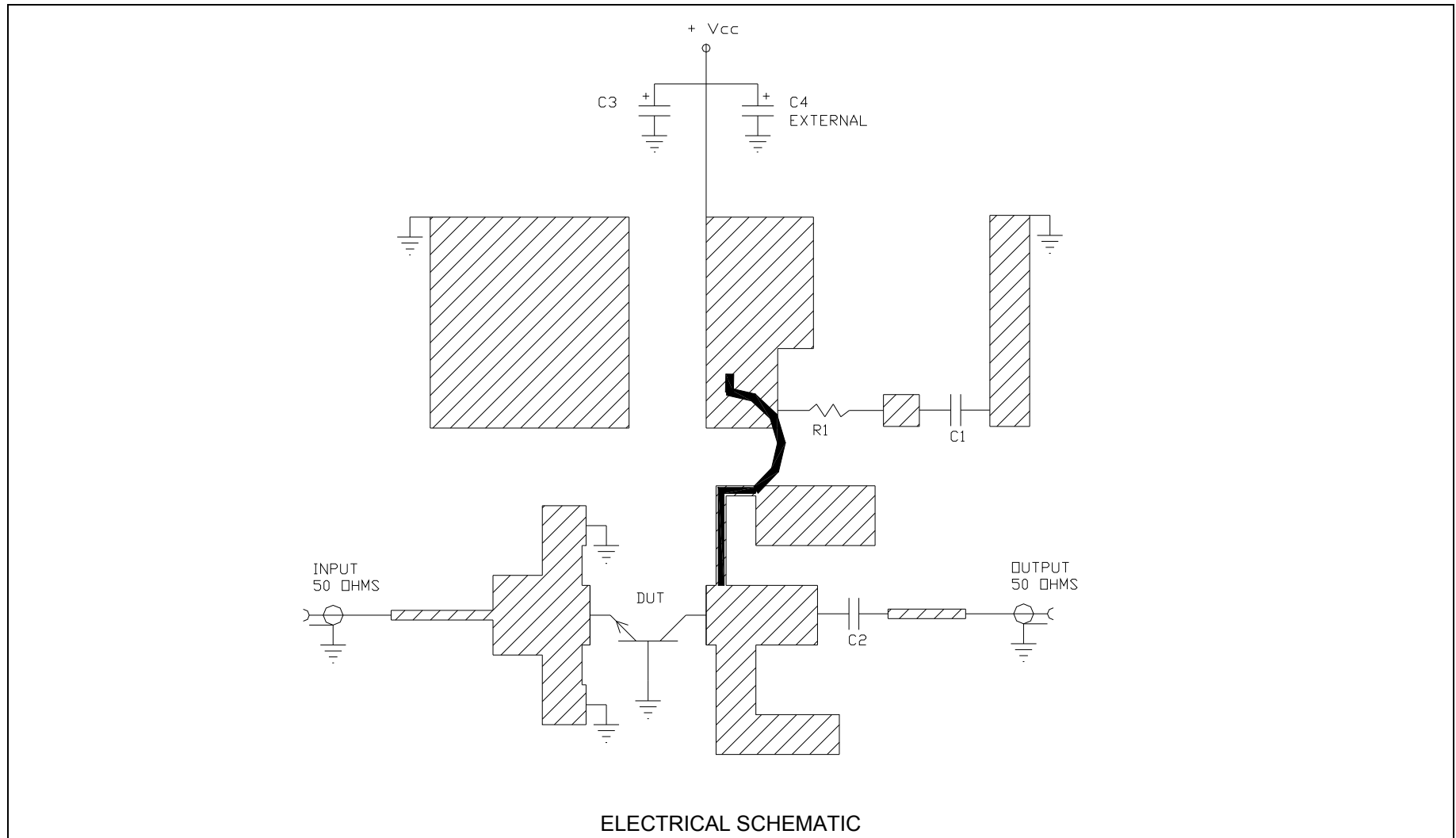
COMPONENT	DESCRIPTION
DUT	TRANSISTOR #IB3135MH20 MOUNT HARD TO THE RIGHT
PC BOARD	ROGERS #RD6010.2 LM .025" 2 Oz Cu
C1	SNUB CAPACITOR 1uF
C2	CHIP CAPACITOR ATC100A - 39pF
C3	ELECTROLYTIC CAPACITOR 68uF / 63V
C4 (NOT SHOWN)	ELECTROLYTIC CAPACITOR, 4700uF / 50V
R1	SNUB RESISTOR 6.81 Ohm
GS (5 PLACES)	GROUND SHIM, COPPER, TH=0.001"
CONN 1, CONN 2	SMA CONNECTOR, DS #2052-5636-02
INPUT PC BOARD CARRIER	2 INCH BRASS-01 (0.5")
OUTPUT PC BOARD CARRIER	2 INCH BRASS-01 (0.5")
TRANSISTOR CARRIER	2 INCH COPPER-02 (P44)
TRANSISTOR CLAMP	NORYL CLAMP-02 (P44)
ALUMINUM HEAT SINK	2 INCH HEATSINK-09
DC CONN 1	BANANA JACK, BLACK
DC CONN 2	BANANA JACK, RED
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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