

## L-Band Radar Transistor

The high power pulsed radar transistor device part number IB1214M32 is designed for L-Band radar systems operating over the instantaneous bandwidth of 1.200 - 1.400 GHz. While operating in class C mode this common base device supplies a minimum of 32 watts of peak pulse power under the conditions of 100 $\mu$ s pulse width and 10% duty cycle, and Pin=4W. 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 50 $\Omega$
- Long-term Correlation
- 100% Device RF Screening
- No External Tuning Allowed

**TYPICAL DATA    TYPICAL DATA    TYPICAL DATA    TYPICAL DATA**

General Information	Test Sequence Name	Freq (MHz)	PIN (W)	RL (dB)	POUT (W)	GP (dB)	dG (dB)	IC (A)	nc (%)	Droop (dB)	VSWR-S (P-F)	VSWR-LMT (P-F)
IB1214M32												
Date: 4/6/2009												
Assbly Lot - SN : D2530-5	Nominal	1200	4.0	-17.0	46.0	10.61		2.130	54.0	0.19	P	P
Wafer : GL1E-2-4												
Test Fixture : 1093	Nominal	1300	4.0	-18.0	48.0	10.79	0.53	2.190	54.8	0.13	P	P
Pass / Fail : Device Passes												
OPERATOR: FB	Nominal	1400	4.0	-15.0	52.0	11.14		2.370	54.9	0.08	P	P
Pulse: 100us-10%												
Vcc=40V												

**MAXIMUM RATINGS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
BD	Collector-Emitter Voltage	$V_{CES}$	--	75	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	$T_J$	-40	+150	°C	--
Note	Screen 'BD' = parameter qualified By Design.					

**THERMAL CHARACTERISTICS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
BD	Thermal Resistance	$R_{TH(JC)}$	--	0.76	°C/W	$V_{CC}=40V$ , Pulse Format=100us, 10%, $T_F=25\pm 5^\circ C$ , $P_{in}=4W$ , $P_{out}=32W$ , $N_c=50\%$
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 1071.6, 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	$BV_{CES}$	75	--	V	$I_C=10mA$ , $V_{BE}=0V$ , $T_F=25\pm 5^\circ C$ .
100%	Zero Base Voltage Collector Leakage Current	$I_{CES}$	--	100	$\mu A$	$V_{CE}=40V$ , $V_{BE}=0V$ , $T_F=25\pm 5^\circ C$ .
100%	DC Current Gain	$H_{FE}$	20	120	--	$V_{CE}=5V$ , $I_C=0.1A$ , $T_F=25\pm 5^\circ C$ .
100%	Reverse Base-Emitter Breakdown Voltage	$BV_{EBO}$	2	--	V	$I_b=10mA$ , $T_F=25\pm 5^\circ C$ .
100%	Emitter Base Leakage Voltage	$I_{EBO}$	--	1	mA	$V_{EB}=2V$ , $I_c=0mA$ , $T_F=25\pm 5^\circ C$ .

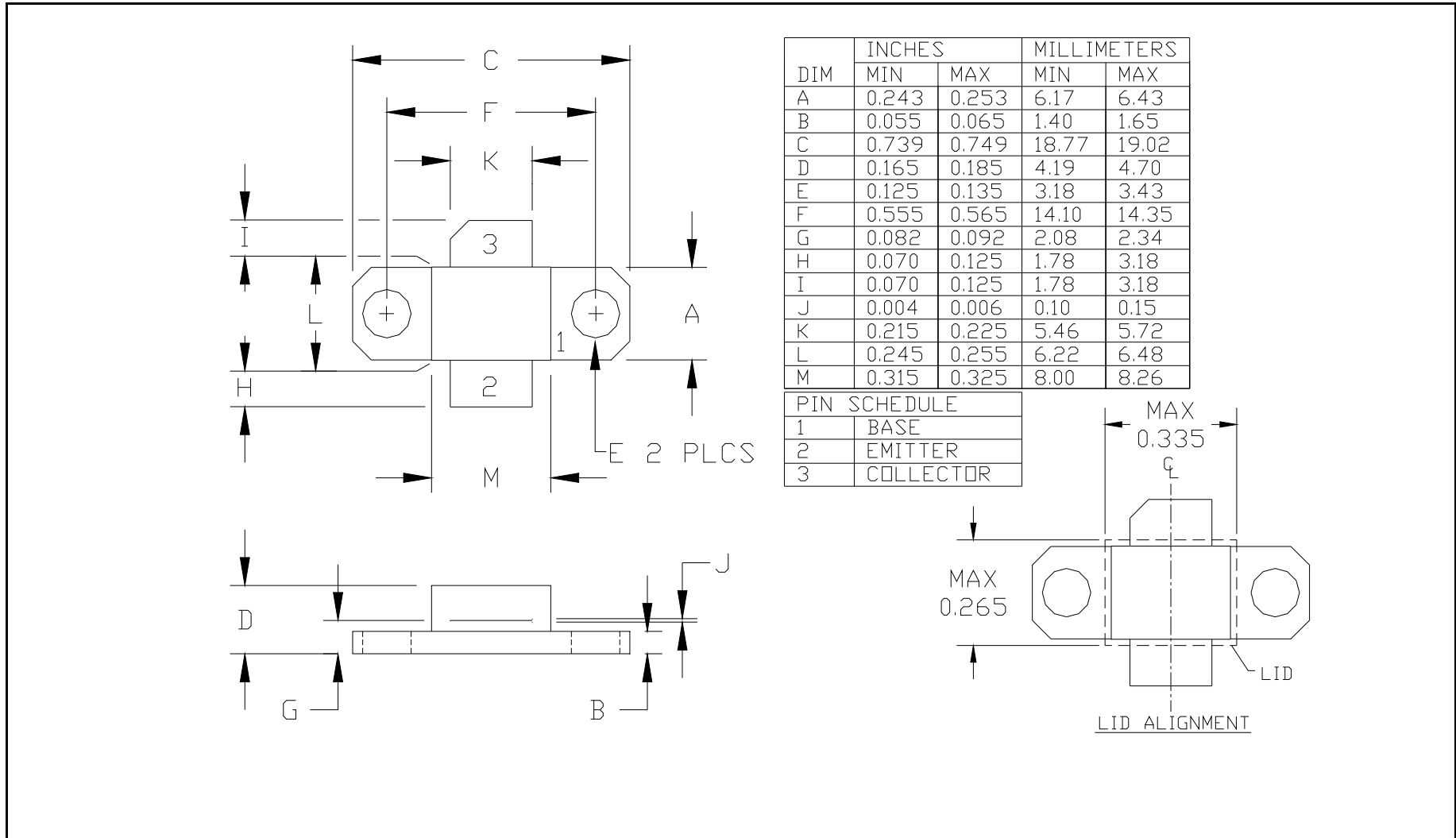
**RF ELECTRICAL CHARACTERISTICS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
100%	Input Return Loss	RL	-18	-10	dB	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, P_{IN2}, P_{IN3}, F=F1, F2, F3.$
100%	Output Power	$P_{OUT}$	32.0	79.8	W	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, P_{IN2}, P_{IN3}, F=F1, F2, F3.$
100%	Power Gain	Gp	9	13	Db	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, P_{IN2}, P_{IN3}, F=F1, F2, F3.$
100%	Collector Efficiency ( $P_o/I_c/V_{CC}$ )	$N_C$	50	75	%	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, P_{IN2}, P_{IN3}, F=F1, F2, F3.$
100%	Pulse Amplitude Droop	Droop	-0.5	0.5	dB	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, P_{IN2}, P_{IN3}, F=F1, F2, F3.$
100%	Gain Flatness	Gf	0	1.5	dB	Calculate from gain at each frequency.
100%	Stability into 1.5:1 VSWR with +0.75dB overdrive	VSWR-S	--	--	--	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	VSWR-LMT	--	--	--	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, P_{IN2}, P_{IN3}, F=F1, F2, F3.$ Rotate 2:1 output VSWR through 360° phase. Post test $P_o$ = Pre test $P_o \pm 10W$ .
Note	$V1 = 40V; PW1 = 100\mu s; DF1 = 10\%; P_{IN} = P_{IN2} = P_{IN3} = 4W; F1 = 1.200 \text{ GHz}, F2 = 1.300 \text{ GHz}, F3 = 1.400 \text{ GHz}.$					
Note	$T_F$ = Device flange temperature.					
Note	Screen 'BD' = parameter qualified By Design.					

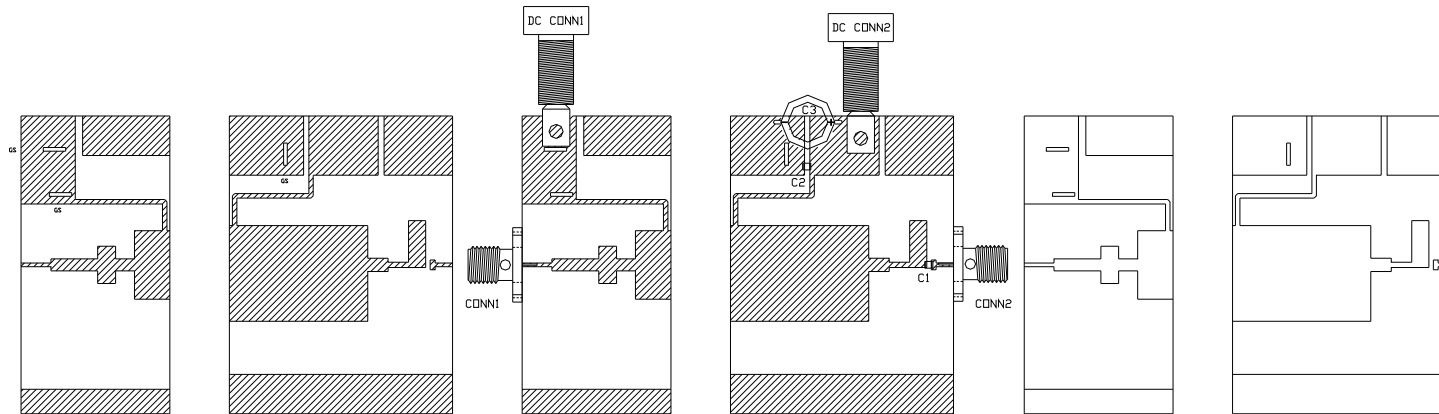
**BROADBAND RF TEST FIXTURE IMPEDANCE CHARACTERISTICS**

Frequency (GHz)	$Z_{IF}$ ( $\Omega$ )	$Z_{OF}$ ( $\Omega$ )
1.200	3.32 - j3.22	2.18 + j2.1
1.300	3.37 - j2.28	2.4 + j1.91
1.400	3.6 - j1.53	2 + j1.93
Impedance Definition		

**PACKAGE DIMENSIONAL OUTLINE DRAWING**



**RF TEST FIXTURE**

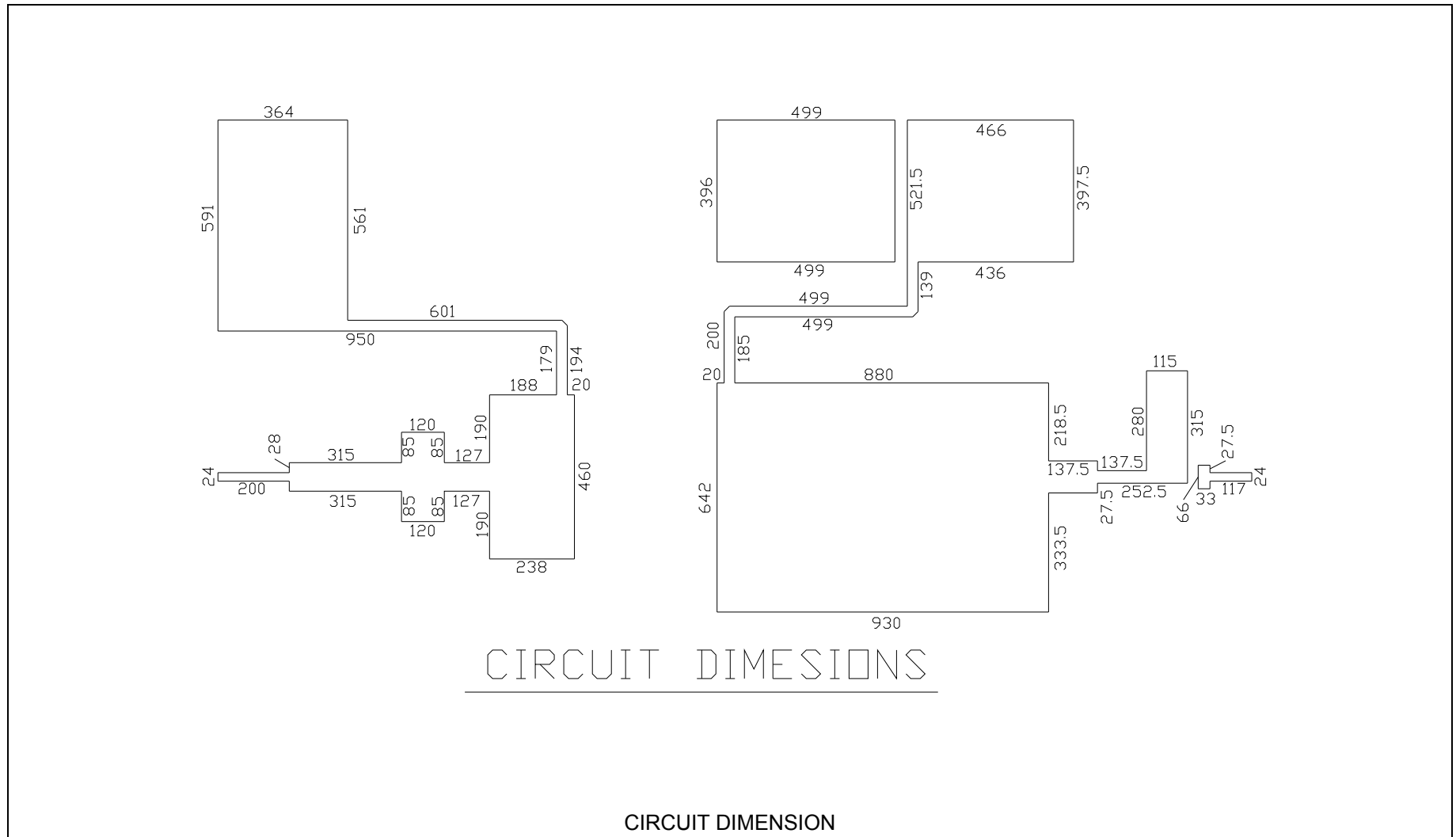


COMPONENT	DESCRIPTION
DUT	TRANSISTOR #IB1214M32, MOUNT HARD TO THE RIGHT
PC BOARD	ROGERS #R03010, TH=0.025" 1oz. Cu
C1, C2	CHIP CAPACITOR, TYPE ATC100A, 100 pF
C3	ELECTROLYTIC CAPACITOR, 68µF / 6.3V
GS	GROUND SHIM, COPPER, TH=0.001"
CONN1, CONN2	SMA CONNECTOR, TYPE DS #2052-5636-02
INPUT PC BOARD CARRIER	2 INCH BRASS - 03 (1.00")
OUTPUT PC BOARD CARRIER	2 INCH BRASS - 05 (1.50")
TRANSISTOR CARRIER	2 INCH COPPER - 01
TRANSISTOR CLAMP	NORYL CLAMP - 01
HEATSINK	2 INCH HEATSINK - 11
DC CONN1	BANANA JACK, BLACK
DC CONN2	BANANA JACK, RED
NOTE	FIXTURE HARDWARE DRAWINGS AVAILABLE ON REQUEST

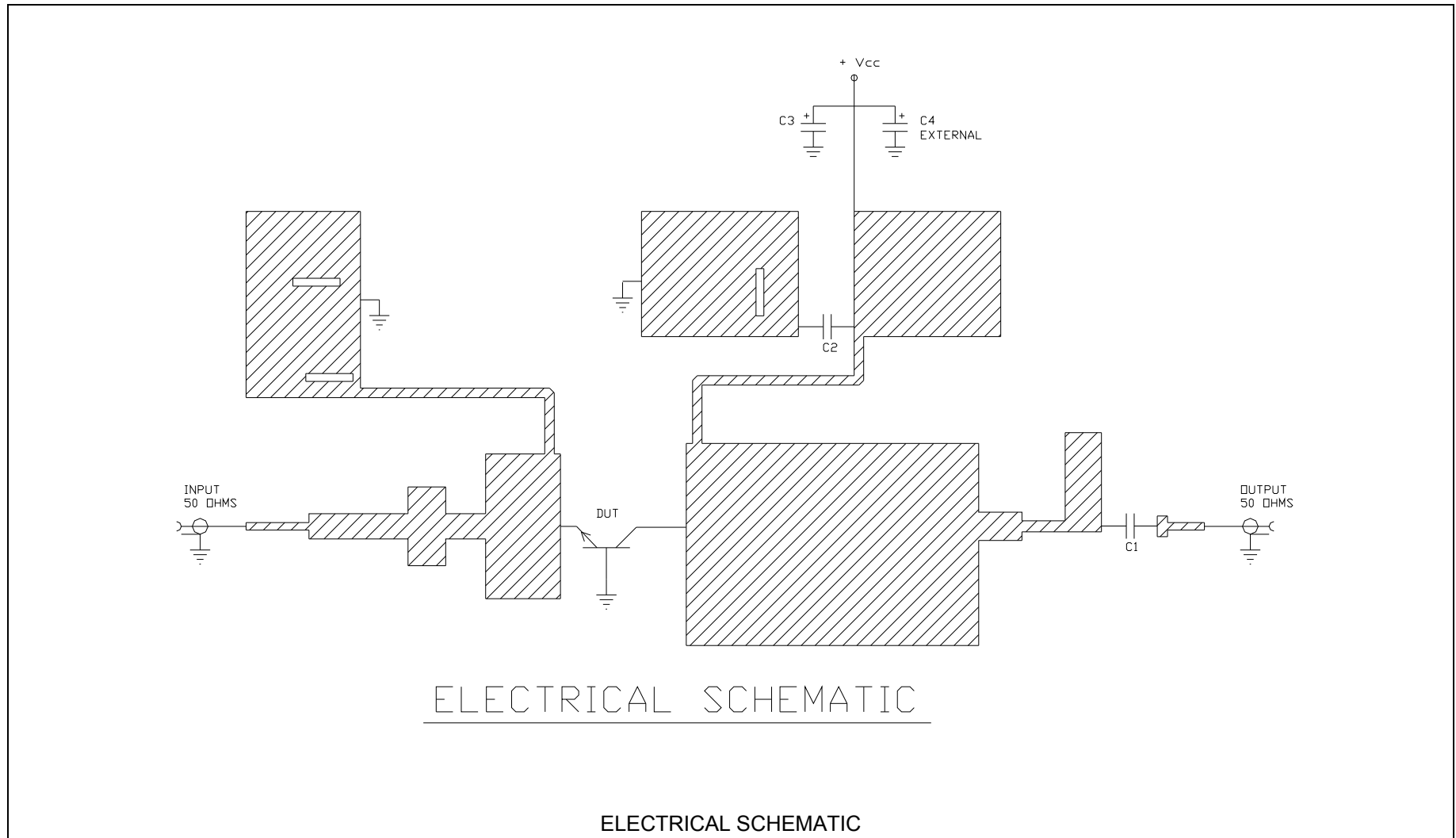
ASSEMBLY AND PARTS LIST

**ASSEMBLY AND PART 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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