

## UHF Radar Transistor

The high power pulsed radar transistor device part number IB450S300 is designed for UHF radar systems operating at 450 MHz. While operating in class C mode this common base device supplies a minimum of 300 watts of peak pulse power under the conditions of 30 $\mu$ s pulse width and 10% duty cycle. All devices are 100% screened for large signal RF parameters. Excellent spectral stability into output mismatch over a broad input power range make it ideal for use in reliable high power solid state transmitters.



This device is designed to be used to drive 4 IB450S300 devices.

*TYPICAL DATA    TYPICAL DATA    TYPICAL DATA    TYPICAL DATA*

Device	Freq (MHz)	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)	$\eta_c$ (%)	Droop (dB)
2099-5	450	40	20.8	25.5	300	11.6	11.8	63.6	0.10
2099-6	450	40	22.2	24.0	300	11.3	11.67	64.3	0.10

Pulse Format = 30 $\mu$ s/10%

### 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
- Micro-strip structure on soft pc board with dielectric constant 10.2

**MAXIMUM RATINGS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
BD	Collector-Emitter Voltage	$V_{CES}$	--	80	V	$V_{BE}=0V$ .
BD	Emitter-Base Voltage	$V_{EBO}$	--	3.5	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	$R_{TH(JC)}$	--	0.25	°C/W	$V_{CC}=V1$ , $PW=PW1$ , $DF=DF1$ , $T_F=25\pm5^\circ C$ , $P_{OUT}=300W$ , $F=F1$ .
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	$BV_{CES}$	80	--	$V_{CC}$	$I_C=30mA$ , $V_{BE}=0V$ , $T_F=25\pm5^\circ C$ .
100%	Zero Base Voltage Collector Leakage Current	$I_{CES}$	--	7.5	MA	$V_{CE}=40V$ , $V_{BE}=0V$ , $T_F=25\pm5^\circ C$ .
100%	DC Current Gain	$H_{FE}$	20	90	--	$V_{CE}=5V$ , $I_C=0.25A$ , $T_F=25\pm5^\circ C$ .

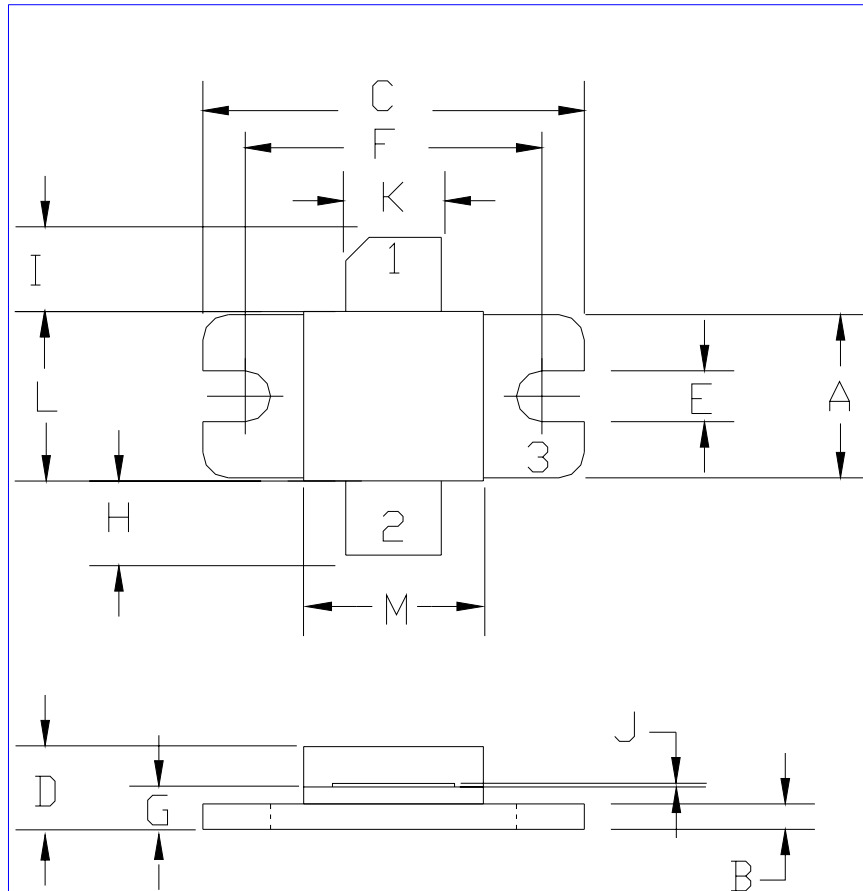
**RF ELECTRICAL CHARACTERISTICS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
100%	Input Return Loss	IRL	9	--	dB	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{OUT}=P_{OUT1}, F=F1.$
100%	Power Gain	$G_P$	9.5	--	dB	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{OUT}=P_{OUT1}, F=F1.$
100%	Collector Efficiency ( $P_O/I_C/V_{CC}$ )	$N_C$	50	--	%	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{OUT}=P_{OUT1}, F=F1.$
100%	Pulse Amplitude Droop	D	--	0.5	dB	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{OUT}=P_{OUT1}, F=F1.$
100%	Stability into 1.5:1 VSWR	VSWR-S	--	--	--	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{OUT}=P_{OUT1}, F=F1.$ 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%	3:1 Load Mismatch Tolerance	LMT	--	--	--	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{OUT}=P_{OUT1}, F=F1.$ Rotate 3:1 output VSWR through 360° phase. Post-test $P_{OUT} = \text{Pre-test } P_{OUT} \pm 10W.$
BD	Pulse Risetime	RT	--	180	ns	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{OUT}=P_{OUT1}, P_{OUT2}, P_{OUT3}, F=F1, F2, F3.$ Measure between 10% and 90% detected power points.
Note 1	$V1 = 40V; PW1 = 30\mu s; DF1 = 10%; P_{OUT1} = 300W; F1 = 450 \text{ MHz}.$					
Note 2	$T_F = \text{Device flange temperature}.$					
Note 3	Screen 'BD' = parameter qualified By Design.					

**RF TEST FIXTURE IMPEDANCE CHARACTERISTICS**

Frequency (MHz)	$Z_{IF} (\Omega)$	$Z_{OF} (\Omega)$
450	1.27-j2.61	2.45-j0.980
Impedance Definition		

**PACKAGE DIMENSIONAL OUTLINE DRAWING**



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.380	0.390	9.65	9.91
B	0.055	0.065	1.39	1.65
C	0.895	0.905	22.73	22.99
D	0.205	0.215	5.20	5.46
E	0.125	0.135	3.18	3.43
F	0.695	0.705	17.65	17.91
G	0.095	0.105	2.41	2.66
H	0.195	0.205	4.87	5.13
I	0.195	0.205	4.87	5.13
J	0.004	0.006	0.10	0.15
K	0.220	0.230	5.58	5.84
L	0.395	0.405	10.03	10.29
M	0.419	0.429	10.64	10.89

PIN SCHEDULE	
1	COLLECTOR
2	EMITTER
3	BASE

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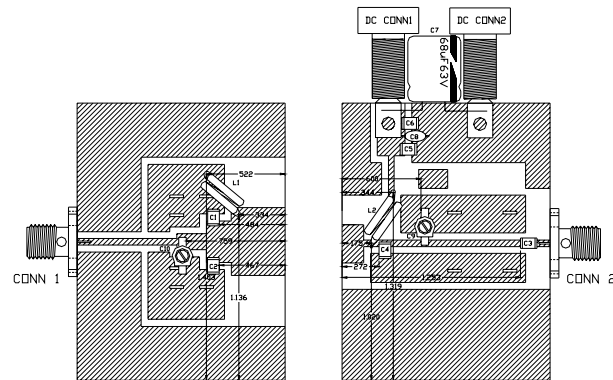
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IB450S300

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**RF TEST FIXTURE**



COMPONENT	DESCRIPTION
DUT	TRANSISTOR #IB450S300 MOUNT HARD TO THE RIGHT
PC BOARD	ROGERS #6010E TH=0.025
C1	CHIP CAPACITOR 22pF
C2	CHIP CAPACITOR 8.2pF
C3	CHIP CAPACITOR 470pF
C4	CHIP CAPACITOR 20pF
C5	CHIP CAPACITOR 470pF
C6	CHIP CAPACITOR 0.1uF
C7	ELECTROLYTIC CAPACITOR 68uF 63V
C8	ELECTROLYTIC CAPACITOR 11uF
D9	VARIABLE CHIP CAPACITOR 1.2 TO 3pF
D10	VARIABLE CHIP CAPACITOR 1.4 TO 6pF
L1	2 TURNS #18 WIRE
L2	2 TURNS #18 WIRE
DC CONN 1	BANANA JACK, BLACK
DC CONN 2	BANANA JACK, RED
TRANSISTOR CLAMP	NORYL CLAMP - 03
HEAT SINK	2 INCH HEATSINK - 11
INPUT PC BOARD CARRIER	1.50 INCH BRASS - 05
OUTPUT PC BOARD CARRIER	1.50 INCH BRASS - 05
NOTE	FIXTURE HARDWARE DRAWINGS AVAILABLE ON REQUEST

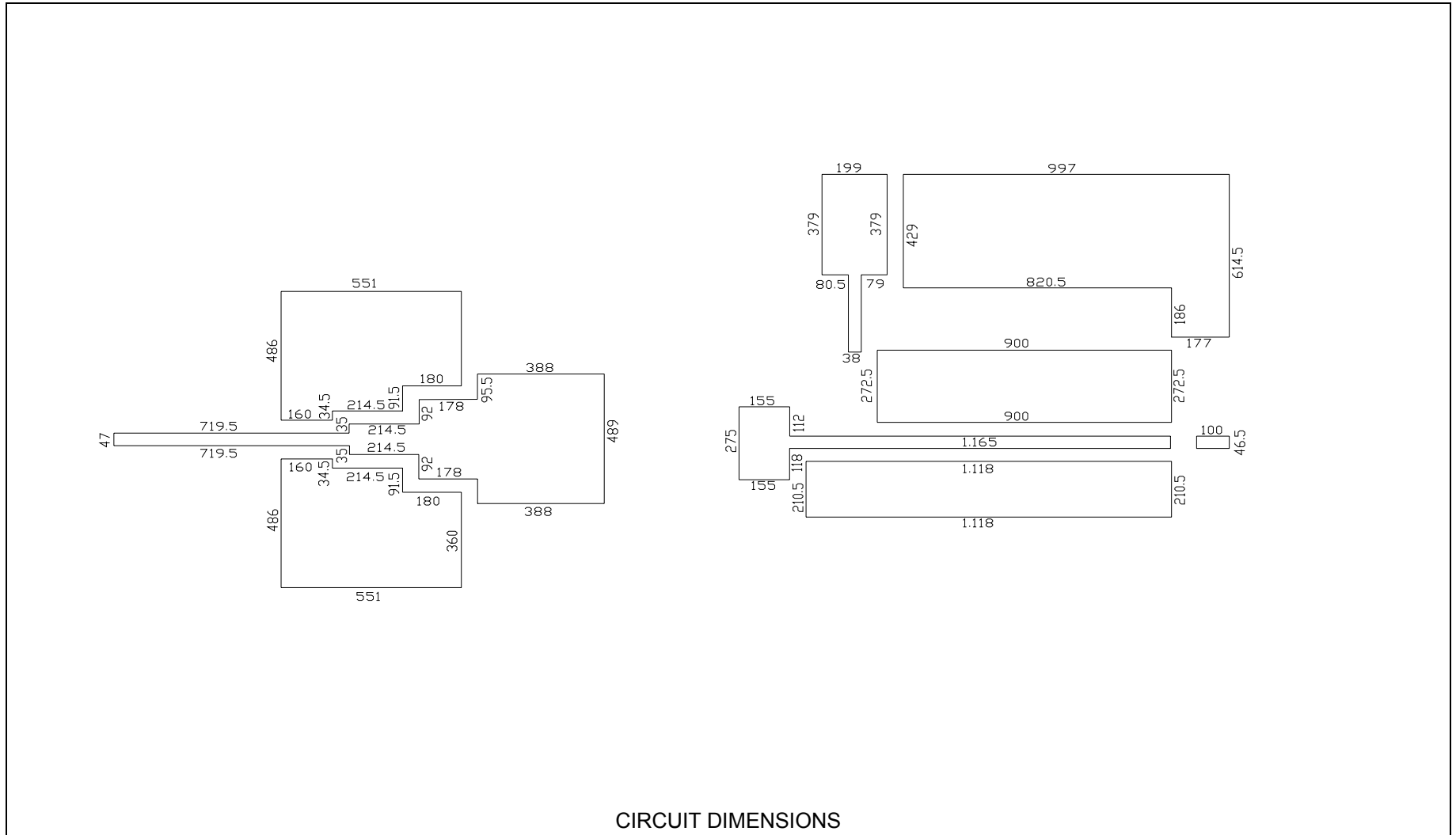
ASSEMBLY PARTS AND LIST

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SHEET NAME: 09-RF-TEST-FIXTURE-1- OF - 2	REV: NC

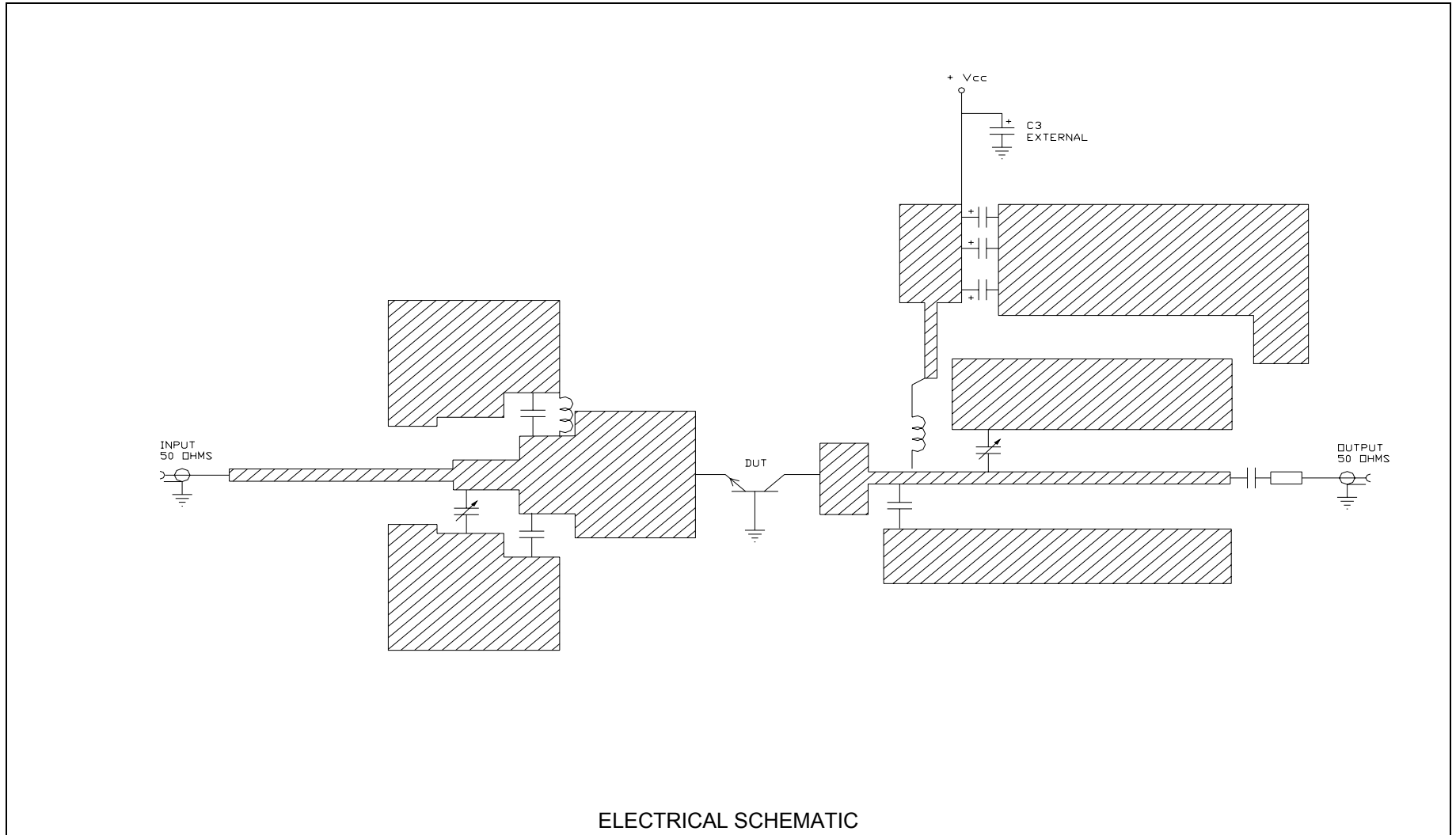
**ASSEMBLY AND PARTS LIST**

**RF TEST FIXTURE**



CIRCUIT DIMENSIONS

**RF TEST FIXTURE**



ELECTRICAL SCHEMATIC

**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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