

## L-Band Avionics Transistor

The high power pulsed avionics transistor part number IB1011M1100 is designed for TCAS avionics systems operating at 1030 and 1090 MHz. While operating in class C mode under 32 $\mu$ s, 2%, at  $V_{CC} = 60V$ , this common base device supplies a minimum of 1100 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 50 $\Omega$
- 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		Freq (MHz)	PIN (W)	RL (dB)	POUT (W)	GP (dB)	IC (A)	nC (%)	Droop (dB)	VSWR-S 1.5:1	VSWR-LMT 3:1
Date:	2/3/2009										
Assbly Lot - SN:	D2595	1030	145	-16.0	1140	9.0	42.95	44.2	-0.40	S	P
Wafer:	B5DE-4-5										
Test Fixture:	ITI 1191-1161	1090	145	-18.0	1220	9.2	40.80	49.8	-0.30	S	P
Pass / Fail:	Device Passes										
OPERATOR:	FB										
Pulse: 32 $\mu$ s-2%	Vcc=60V										

**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	$R_{TH(JC)}$	--	0.04	°C/W	$V_{CC}=60V$ , Pulse width= 32us, DF=2%, $T_F=25\pm5^\circ C$ , $P_{IN}=145W$ , $N_C=42\%$
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	$I_C = 100mA$ , $V_{BE} = 0V$ , $T_F = 25\pm5^\circ C$ .
100%	Zero Base Voltage Collector Leakage Current	$I_{CES}$	--	500	uA	$V_{CE} = 60V$ , $V_{BE} = 0V$ , $T_F = 25\pm5^\circ C$ .
100%	DC Current Gain	$H_{FE}$	10	100	--	$V_{CE} = 5V$ , $I_C = 500mA$ , $T_F = 25\pm5^\circ C$ .

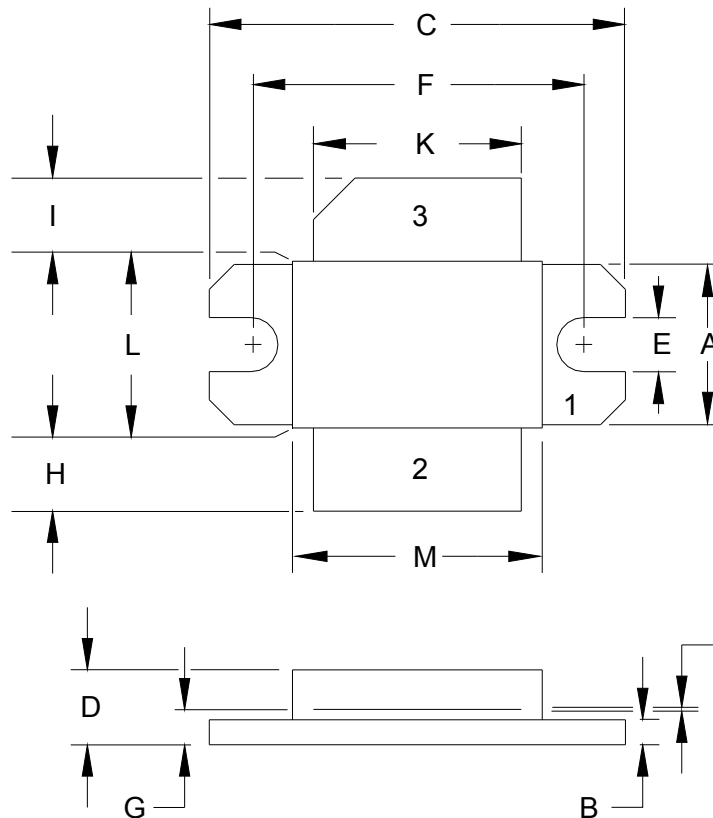
**RF ELECTRICAL CHARACTERISTICS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
100%	Input Return Loss	RL	-18	-10	dB	$V_{CC}=60V$ , $P_{IN}=145W$ , Pulse = Note 2, $T_F=25\pm 5^\circ C$ , $F=F1,F2$
BD	Maximum Overdrive	$P_{IN(MAX)}$	--	193	W	$V_{CC}=60V$ , Pulse = Note 2, $T_F=25\pm 5^\circ C$ , $F=F1,F2$
100%	Power Gain	$G_P$	8.8	10.3	dB	$V_{CC}=60V$ , $P_{IN}=145W$ , Pulse = Note 2, $T_F=25\pm 5^\circ C$ , $F=F1,F2$
100%	Output Power	$P_{OUT}$	1100	1554	W	$V_{CC}=60V$ , $P_{IN}=145W$ , Pulse = Note 2, $T_F=25\pm 5^\circ C$ , $F=F1,F2$
100%	Collector Efficiency ( $P_o/I_c/V_{CC}$ )	$N_C$	42	75	%	$V_{CC}=60V$ , $P_{IN}=145W$ , Pulse = Note 2, $T_F=25\pm 5^\circ C$ , $F=F1,F2$
100%	Pulse Amplitude Droop	Droop	-0.5	0.5	dB	$V_{CC}=60V$ , $P_{IN}=145W$ , Pulse = Note 2, $T_F=25\pm 5^\circ C$ , $F=F1,F2$
100%	Stability into 1.5:1 VSWR	VSWR-S	1.5:1	--	--	$V_{CC}=60V$ , $P_{IN}=145W$ , Pulse = Note 2, $T_F=25\pm 5^\circ C$ , $F=F1,F2$ 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	3:1	--	--	$V_{CC}=60V$ , $P_{IN}=145W$ , Pulse = Note 2, $T_F=25\pm 5^\circ C$ , $F=F1,F2$ Rotate 3:1 output VSWR through 360° phase. Survival.
BD	Pulse Risetime	RT	--	80	ns	$V_{CC}=60V$ , $P_{IN}=145W$ , Pulse = Note 2, $T_F=25\pm 5^\circ C$ , $F=F1,F2$ Measure between 10% and 90% detected power points.
Note 1	F1 = 1030 MHz, F2 = 1090 MHz					
Note 2	Pulse width = 32us, Pulse Duty Factor = 2%.					
Note 3	$T_F$ = Device flange temperature.					
Note 4	Screen 'BD' = parameter qualified By Design.					

**RF TEST FIXTURE IMPEDANCE CHARACTERISTICS**

Frequency (MHz)	$Z_{IF}$ ( $\Omega$ )	$Z_{OF}$ ( $\Omega$ )
1030	2.12-j1.42	0.78-j1.34
1090	1.9-j0.57	0.74-j0.92
Impedance Definition		

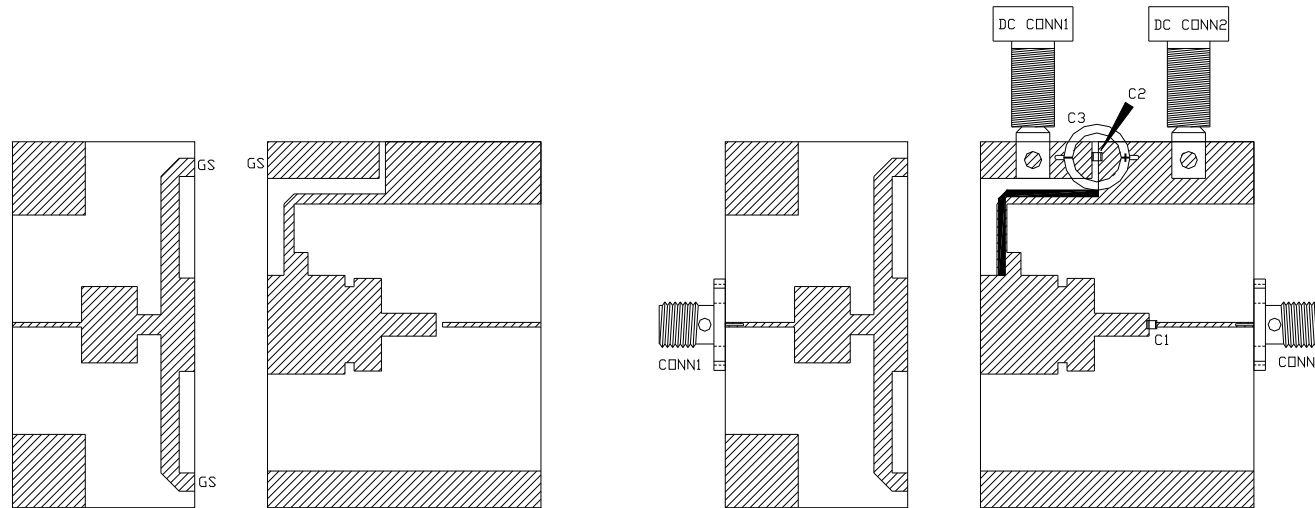
**PACKAGE DIMENSIONAL OUTLINE DRAWING**



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.380	0.390	9.65	9.91
B	0.055	0.065	1.40	1.65
C	0.905	1.005	22.99	25.53
D	0.178	0.188	4.52	4.78
E	0.125	0.135	3.18	3.43
F	0.795	0.805	20.19	20.45
G	0.079	0.091	2.01	2.31
H	0.185	0.215	4.70	5.46
I	0.185	0.215	4.70	5.46
J	0.002	0.004	0.05	0.10
K	0.495	0.505	12.57	12.83
L	0.395	0.405	10.03	10.29
M	0.595	0.605	15.11	15.37

PIN SCHEDULE	
1	BASE
2	EMITTER
3	COLLECTOR

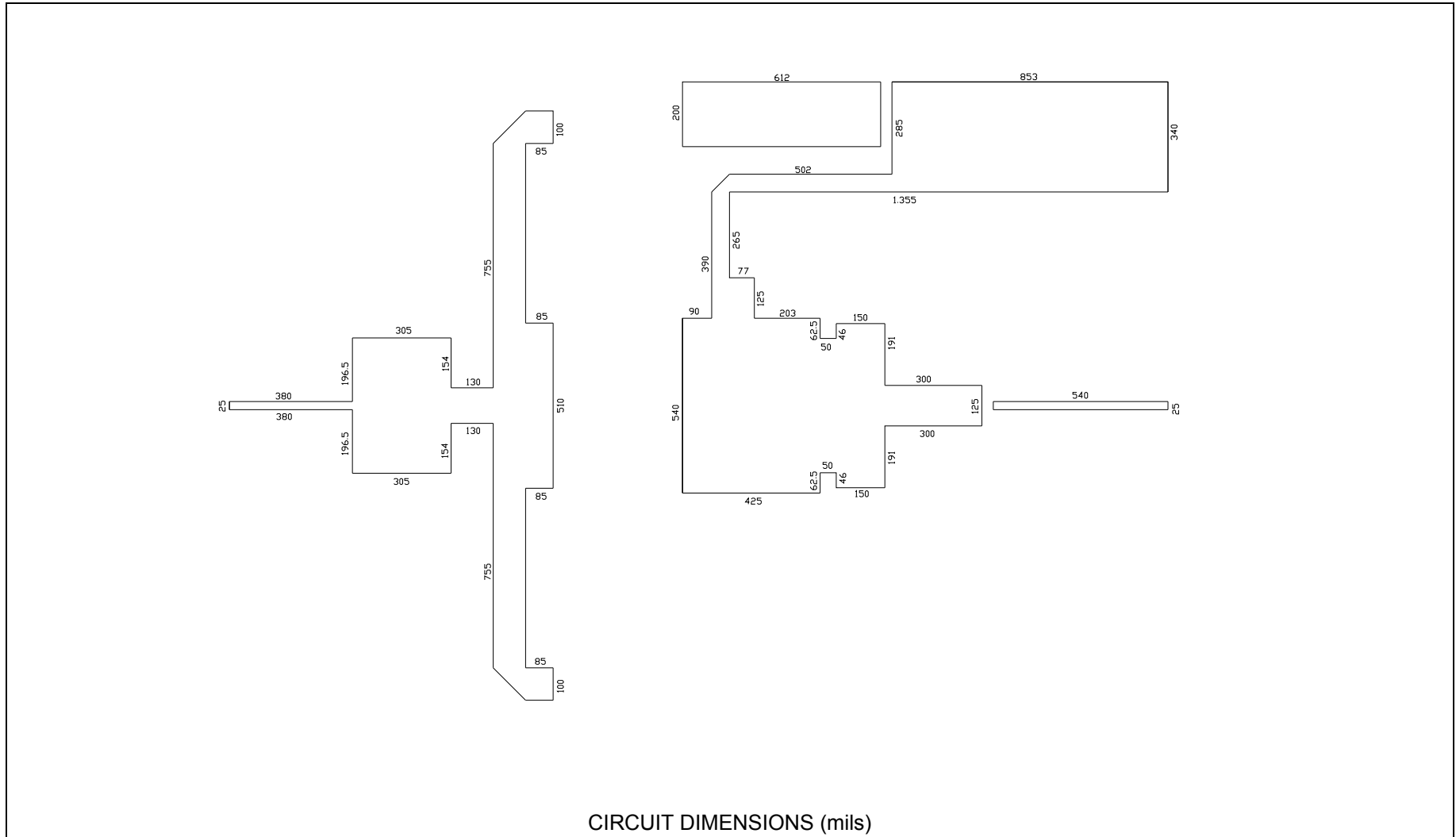
**RF TEST FIXTURE**



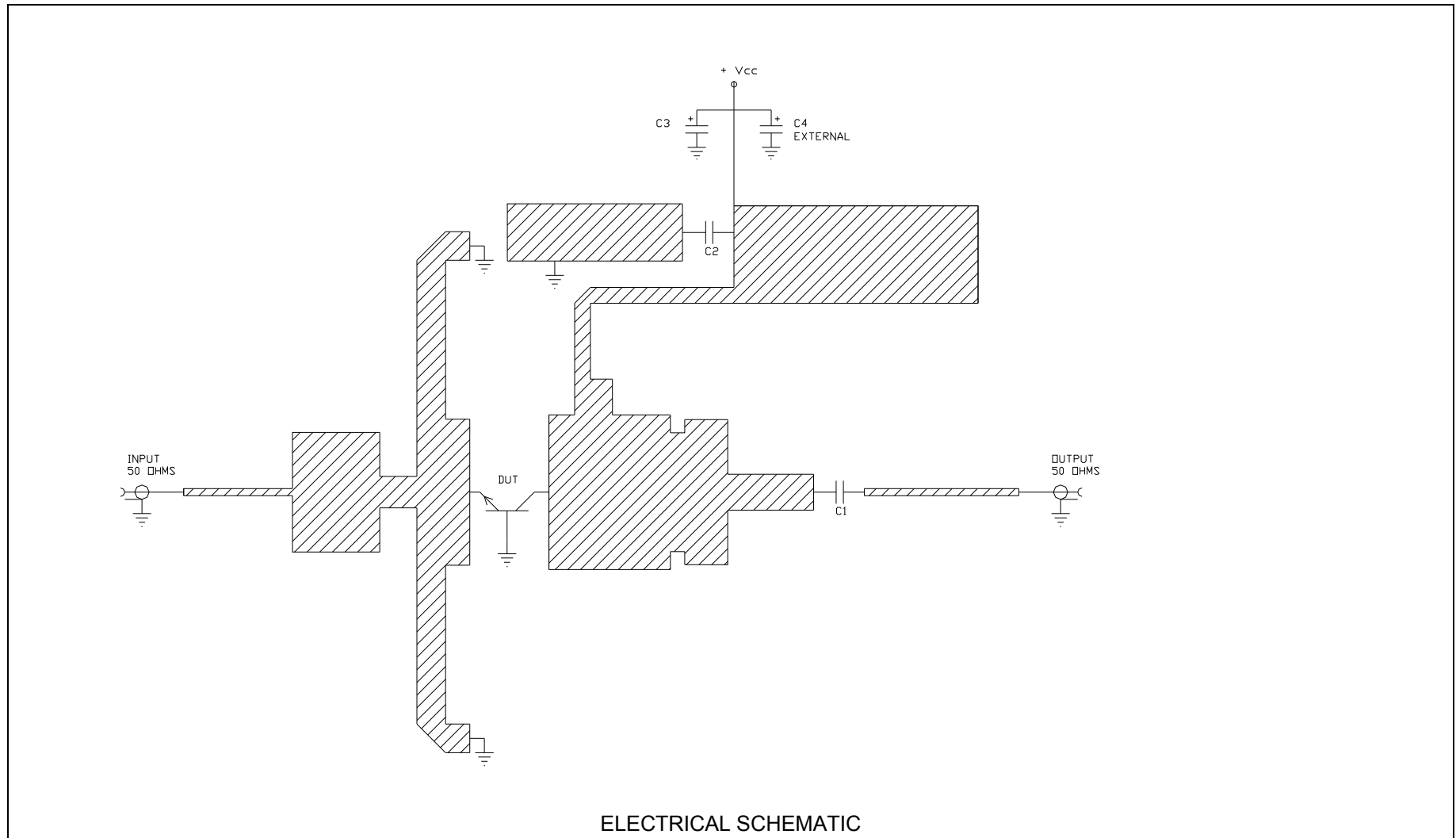
COMPONENT	DESCRIPTION
DUT	TRANSISTOR #IB1011M1100, MOUNT HARD TO THE RIGHT
PC BOARD	ROGERS #R03010, TH=0.025" 1oz. Cu
C1, C2	CHIP CAPACITOR, TYPE ATC100A, 100 pF
C3	ELECTROLYTIC CAPACITOR, 68uF / 63V
C4 (NOT SHOWN)	STORAGE CAPACITOR 8200pF
GS	GRDUND SHIM, COPPER, TH=0.001"
CONN1, CONN2	SMA CONNECTOR, 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 - 03
TRANSISTOR CLAMP	NDRYL CLAMP - 02
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**



**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 and 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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