

# Part Number: IB1012S420A (Preliminary)

# Integra

TECHNOLOGIES, INC.

## L-Band TACAN Transistor

The high power pulsed transistor device part number IB01012S420A is designed for systems operating over the instantaneous bandwidth of 1025-1215 MHz. While operating in class C mode under DME pulsing conditions and  $V_{cc}=50V$ , this common base device supplies a minimum of 420 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 10.2

PRELIMINARY DATA

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	F (MHz)	Pi (W)	Ic (A)	RL (dB)	Po (W)	Nc (G)	G (dB)	dG (dB)	Droop (dB)	VSWR-S 1.5:1 (P-F)	VSWR-LMT 3:1 (P-F)
	1025	50	21	9.8	518	49.3	10.15		-0.08	P	P
	1090	50	18.9	9.6	470	49.7	9.73	0.67	-0.06	P	P
	1215	50	16.9	9.4	444	52.5	9.48		0.03	P	P

$V_{cc}=50V$ , Pulse width= 10us-1%

**MAXIMUM RATINGS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
BD	Collector-Emitter Voltage	$V_{CES}$	--	75	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	$R_{TH(JC)}$	--	TBD	°C/W	$V_{CC}=50V$ , Pulse format=10us/-1%, $T_F=25\pm5^\circ C$ , $P_o=420W$ , $N_C=45\%$
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	$BV_{CES}$	75	--	V	$I_C = 40mA$ , $V_{BE} = 0V$ , $T_F = 25\pm5^\circ C$ .
100%	Zero Base Voltage Collector Leakage Current	$I_{CES}$	--	10	mA	$V_{CE} = 50V$ , $V_{BE} = 0V$ , $T_F = 25\pm5^\circ C$ .
100%	DC Current Gain	$H_{FE}$	20	100	--	$V_{CE} = 5V$ , $I_C = 500mA$ , $T_F = 25\pm5^\circ C$ .

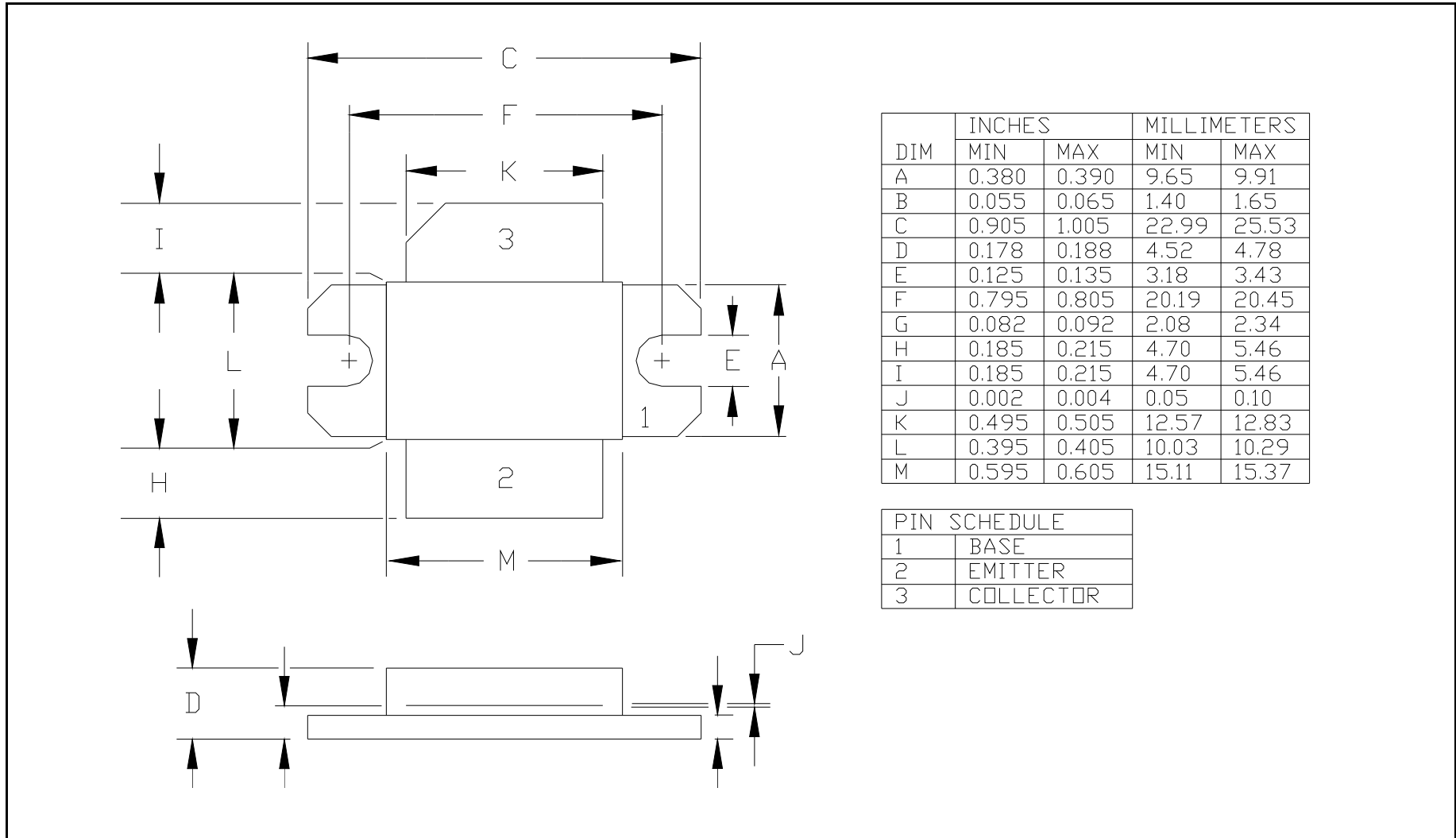
**RF ELECTRICAL CHARACTERISTICS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
100%	Input Return Loss	IRL	-18	-8	dB	$V_{CC}=50V$ , $P_{IN}=50W$ , Pulse = Note 2, $T_F=25\pm 5^\circ C$ , $F=F1$ .
BD	Maximum Overdrive	$P_{IN(MAX)}$	--	66	W	$V_{CC}=50V$ , Pulse = Note 2, $T_F=25\pm 5^\circ C$ , $F=F1$ .
100%	Power Gain	$G_P$	9.24	10.74	dB	$V_{CC}=50V$ , $P_{IN}=50W$ , Pulse = Note 2, $T_F=25\pm 5^\circ C$ , $F=F1$
100%	Output Power	$P_{OUT}$	420	593	W	$V_{CC}=50V$ , $P_{IN}=50W$ , Pulse = Note 2, $T_F=25\pm 5^\circ C$ , $F=F1$
100%	Collector Efficiency ( $P_O/I_C/V_{CC}$ )	$N_C$	45	75	%	$V_{CC}=50V$ , $P_{IN}=50W$ , Pulse = Note 2, $T_F=25\pm 5^\circ C$ , $F=F1$ .
BD	Pulse Amplitude Droop	D	-0.5	0.5	dB	$V_{CC}=50V$ , $P_{IN}=50W$ , Pulse = Note 2, $T_F=25\pm 5^\circ C$ , $F=F1$ .
100%	Gain Flatness	$\Delta G$		1.5	dB	Delta between highest gain and lowest gain from 1025-1215MHz
100%	Stability into 1.5:1 VSWR	VSWR-S	--	--	--	$V_{CC}=50V$ , $P_{IN}=50W$ , Pulse = Note 2, $T_F=25\pm 5^\circ C$ , $F=F1$ . 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	LMT	3:1	--	--	$V_{CC}=50V$ , $P_{IN}=50W$ , Pulse = Note 2, $T_F=25\pm 5^\circ C$ , $F=F1$ . Rotate 3:1 output VSWR through 360° phase. Survival.
Note 1	F1 = 1025/1090/1215 MHz.					
Note 2	Pulse width = DME (10us, -1%)					
Note 3	$T_F$ = Device flange temperature.					
Note 4	Screen 'BD' = parameter qualified By Design.					

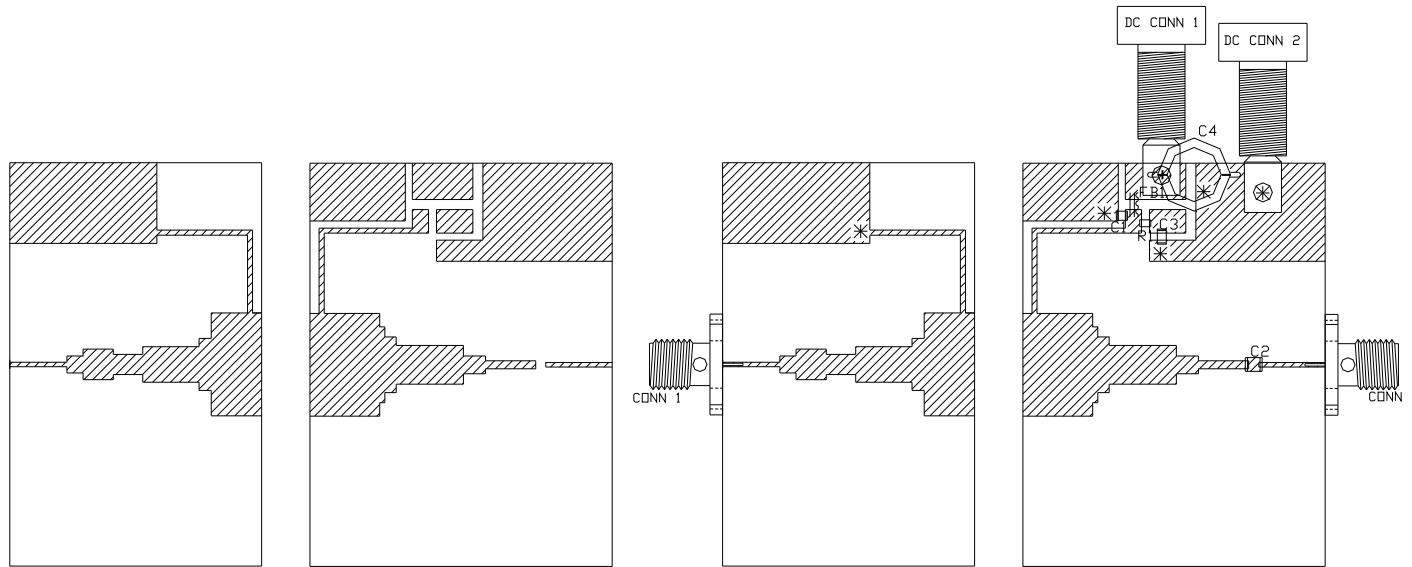
**RF TEST FIXTURE IMPEDANCE CHARACTERISTICS**

Frequency (MHz)	$Z_{IF}$ ( $\Omega$ )	$Z_{OF}$ ( $\Omega$ )
1025	2.25 – j3.00	1.62 – j2.70
1090	2.26 – j2.37	1.60 – j2.20
1215	2.45 – j1.30	1.58 – j 1.36
Impedance Definition		

**PACKAGE DIMENSIONAL OUTLINE DRAWING**



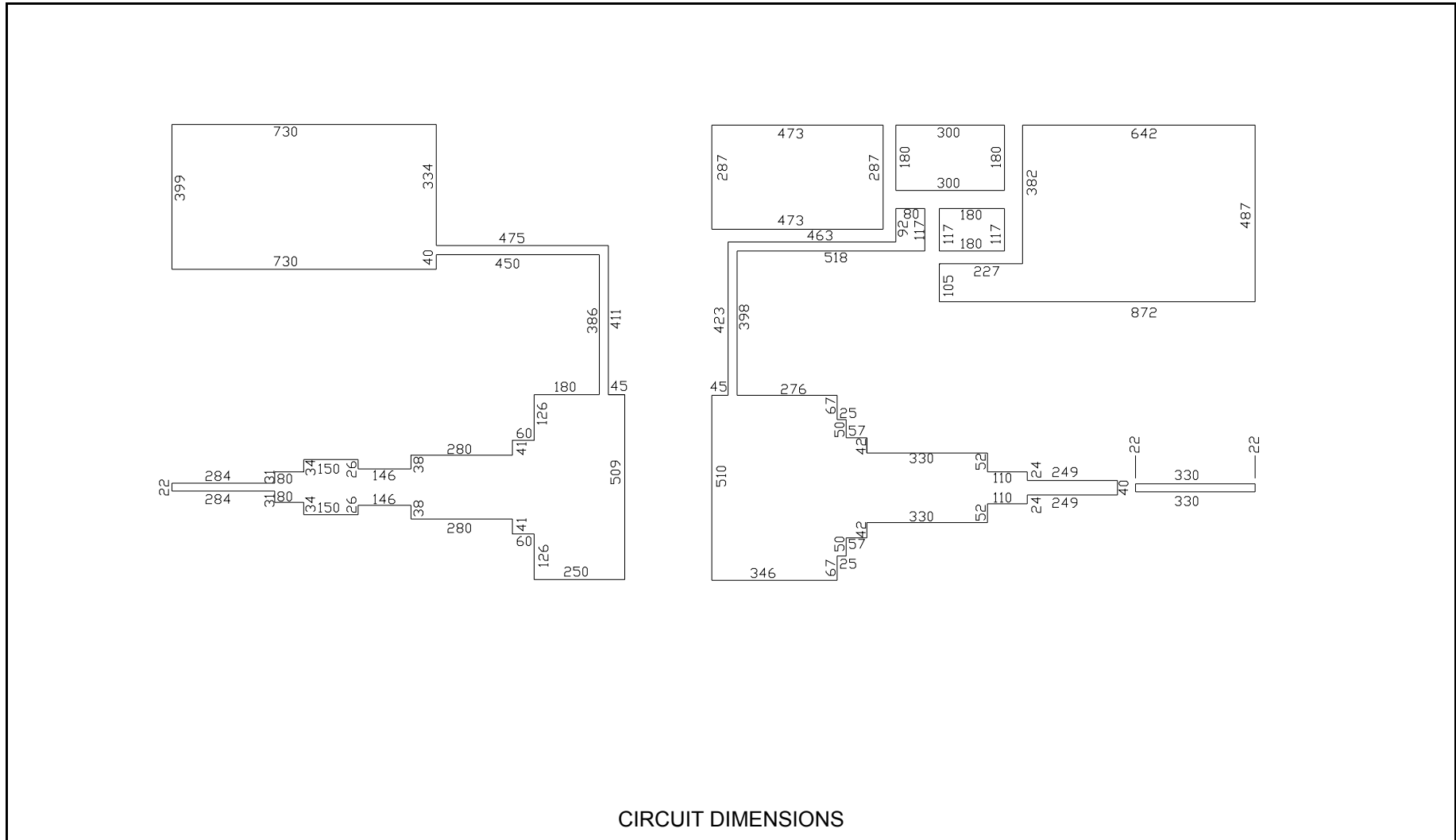
**RF TEST FIXTURE**



COMPONENT	DESCRIPTION
DUT	TRANSISTOR #IB1012S420A MOUNT HARD TO THE RIGHT
PC BOARD	ROGERS #RD 3010 .025" 1oz, Cu
C1, C2	CHIP CAPACITDR ATC100A <100pF
C3	CHIP CAPACITDR 4.7uF C5750X7R2A75M
C4	ELECTROLYTIC CAPACITDR 68uF/63V
C5 (NOT SHOWN)	ELECTROLYTIC CAPACITDR, 4700uF / 50V
R1	CHIP RESISTOR 6.8OHMS
FB1	FERRITE BEAD (CYLINDRICAL)
GS (3 PLACES)	GROUND SHIM, COPPER, TH=0.001"
CONN 1, CONN 2	SMA CONNECTOR, DS #2052-5636-02
INPUT PC BOARD CARRIER	2 INCH BRASS-04 (1.25")
OUTPUT PC BOARD CARRIER	2 INCH BRASS-05 (1.5")
TRANSISTOR CARRIER	2 INCH COPPER-03 (P64)
TRANSISTOR CLAMP	NDRYL CLAMP-04
ALUMINUM HEAT SINK	2 INCH HEATSINK-11
DC CONN 1	BANANA JACK, RED
DC CONN 2	BANANA JACK, BLACK
NOTE	FIXTURE HARDWARE DRAWINGS AVAILABLE ON REQUEST

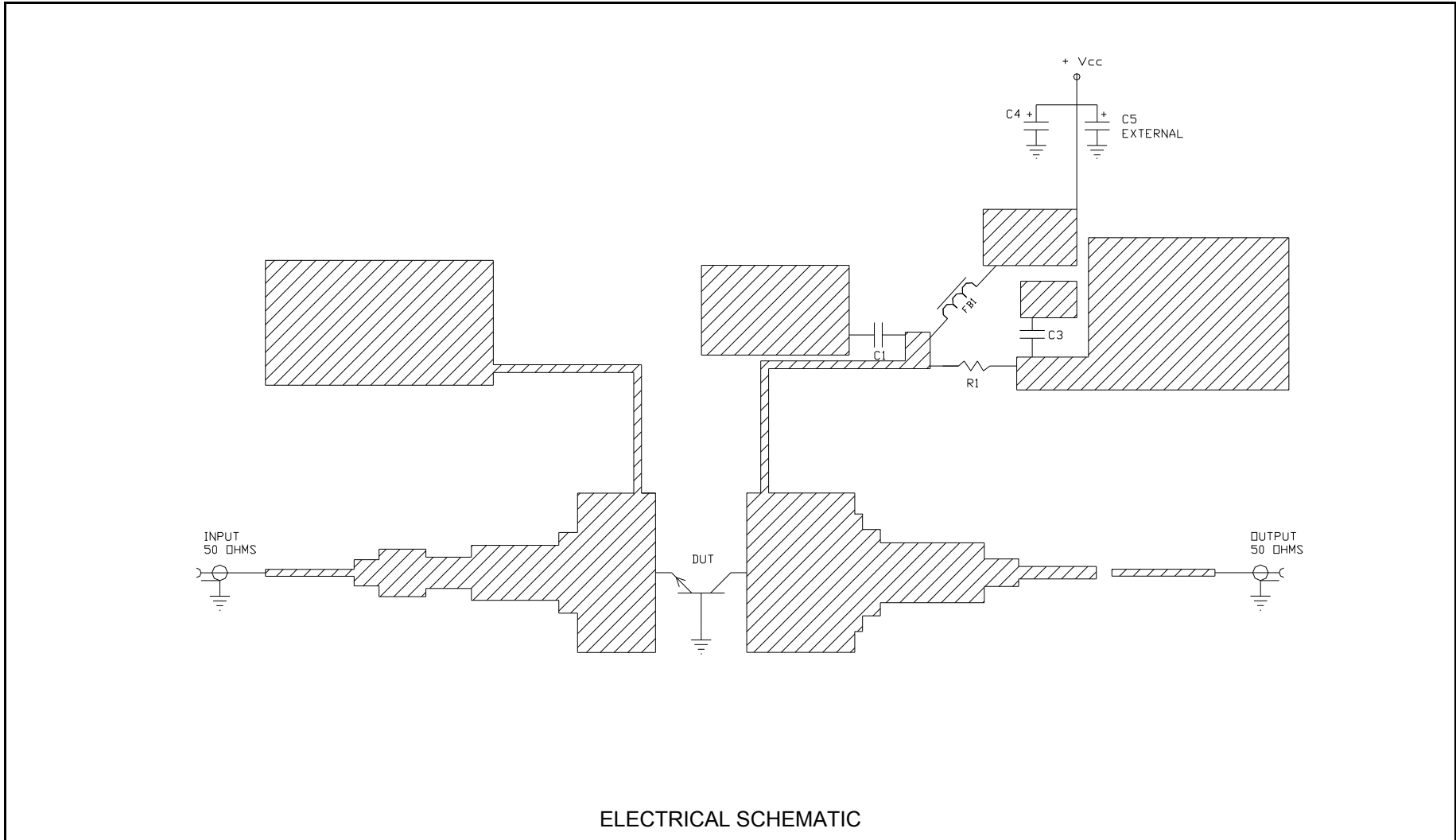
**ASSEMBLY AND PARTS LIST**

**RF TEST FIXTURE**



CIRCUIT DIMENSIONS

**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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