

# High Power Directional Coupler

50Ω 30 to 500 MHz

JYDC-23-1HP+  
JYDC-23-1HP



Generic photo used for illustration purposes only

CASE STYLE: BJ937

+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

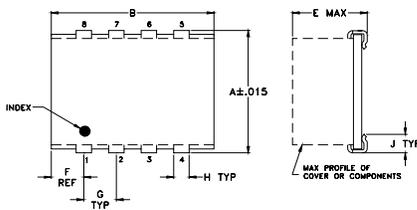
## Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Permanent damage may occur if any of these limits are exceeded.	

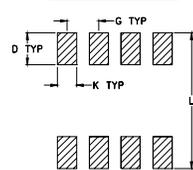
## Pin Connections

INPUT	1
OUTPUT	7
COUPLED	3
GROUND	2,4,6,8
50Ω TERM EXTERNAL	5

## Outline Drawing



## PCB Land Pattern



Suggested Layout,  
Tolerance to be within ±.002

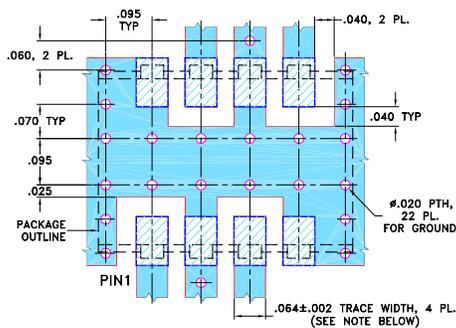
## Outline Dimensions (inch/mm)

A	B	C	D	E	F	G
.395	.520	--	.100	.230	.110	.100
10.03	13.21	--	2.54	5.84	2.79	2.54

H	J	K	L	wt
.047	.065	.065	.425	grams
1.19	1.65	1.65	10.80	0.85

## Demo Board MCL P/N: TB-194 Suggested PCB Layout (PL-166)



- NOTE: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.030" ± 0.002". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.  
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
  - DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

## Notes

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.  
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.  
C. The parts covered by this specification document are subject to Mini-Circuit's standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuit's website at [www.minicircuits.com/WCLStore/terms.jsp](http://www.minicircuits.com/WCLStore/terms.jsp)

## Features

- high power handling, 10 watts
- low mainline loss, 0.2 dB typ.
- excellent VSWR, 1.10:1 typ.
- excellent directivity, 24 dB typ.
- protected by US Patent 6,140,887

## Applications

- VHF/UHF receivers
- cellular

## Directional Coupler Electrical Specifications

FREQ. (MHz)	COUPLING (dB)		MAINLINE LOSS <sup>1</sup> (dB)				DIRECTIVITY (dB)				VSWR (:1)	POWER INPUT, W		
	Nom.	Max. Flatness	L		U		L		U			Typ.	Max.	Max.
			Typ.	Max.	Typ.	Max.	Typ.	Min.	Typ.	Min.				
30-500	23.5±1.0	±1.2	0.1	0.3	0.2	0.4	26	20	23	19	1.1	10	10	

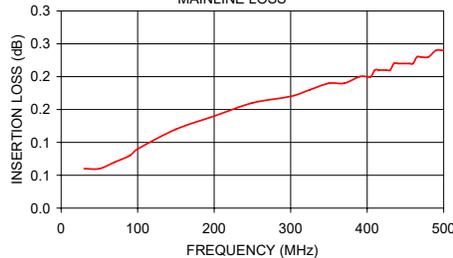
L = 30-250 MHz U = 250-500 MHz

1. Mainline loss includes theoretical power loss at coupled port.

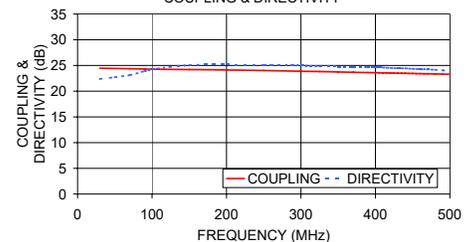
## Typical Performance Data

Frequency (MHz)	Mainline Loss (dB) In-Out	Coupling (dB) In-Cpl	Directivity (dB)	Return Loss (dB)		
				In	Out	Cpl
30.00	0.06	24.46	22.36	24.03	23.99	24.61
50.00	0.06	24.42	22.73	27.59	27.48	28.28
100.00	0.09	24.28	24.26	31.22	30.88	31.98
200.00	0.14	24.12	25.17	30.44	30.18	31.42
250.00	0.16	24.01	25.05	29.38	29.08	30.54
300.00	0.17	23.88	25.01	28.08	28.14	29.60
350.00	0.19	23.74	24.78	27.31	27.26	27.75
400.00	0.20	23.59	24.66	26.41	26.30	26.19
450.00	0.22	23.44	24.35	25.87	25.70	24.40
500.00	0.24	23.29	23.92	25.39	24.91	22.63

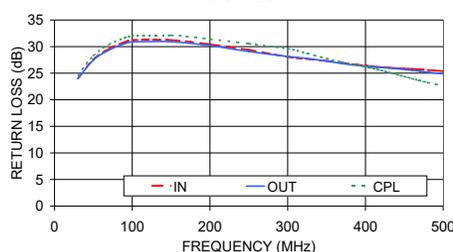
JYDC-23-1HP  
MAINLINE LOSS



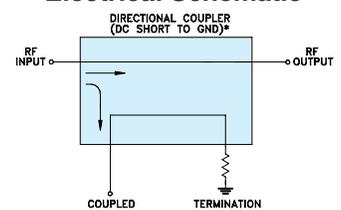
JYDC-23-1HP  
COUPLING & DIRECTIVITY



JYDC-23-1HP  
RETURN LOSS



## Electrical Schematic



\* ELECTRICAL SCHEMATIC IS FOR DIRECTIONAL COUPLER WITH INTERNAL TRANSFORMER(S) AND EXTERNAL TERMINATION.



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REV. D  
M151107  
ED-11133  
JYDC-23-1HP  
WZ/TD/CP/AM  
200428

# Directional Coupler

# JYDC-23-1HP+

## Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)	COUPLING (dB)	DIRECTIVITY (dB)	RETURN LOSS		
				IN	(dB) OUT	CPL
30.0	0.06	24.46	22.36	24.03	23.99	24.61
50.0	0.06	24.42	22.73	27.59	27.48	28.28
70.0	0.07	24.37	23.13	29.58	29.36	30.38
90.0	0.08	24.31	23.91	30.82	30.53	31.63
100.0	0.09	24.28	24.26	31.22	30.88	31.98
150.0	0.12	24.20	25.06	31.23	30.91	32.13
200.0	0.14	24.12	25.17	30.44	30.18	31.42
250.0	0.16	24.01	25.05	29.38	29.08	30.54
300.0	0.17	23.88	25.01	28.08	28.14	29.60
325.0	0.18	23.81	24.87	27.68	27.78	28.72
350.0	0.19	23.74	24.78	27.31	27.26	27.75
370.0	0.19	23.68	24.74	26.94	26.80	27.08
390.0	0.20	23.62	24.70	26.58	26.44	26.48
400.0	0.20	23.59	24.66	26.41	26.30	26.19
405.0	0.20	23.58	24.64	26.34	26.24	26.04
410.0	0.21	23.56	24.62	26.26	26.17	25.89
415.0	0.21	23.55	24.55	26.20	26.13	25.73
420.0	0.21	23.53	24.52	26.14	26.07	25.55
425.0	0.21	23.52	24.49	26.10	26.01	25.37
430.0	0.21	23.50	24.45	26.04	25.97	25.19
435.0	0.22	23.49	24.45	25.99	25.91	25.00
440.0	0.22	23.47	24.46	25.96	25.85	24.80
445.0	0.22	23.45	24.41	25.91	25.78	24.60
450.0	0.22	23.44	24.35	25.87	25.70	24.40
455.0	0.22	23.42	24.32	25.83	25.63	24.20
460.0	0.22	23.41	24.30	25.80	25.54	24.00
465.0	0.23	23.39	24.29	25.76	25.46	23.81
470.0	0.23	23.38	24.23	25.71	25.37	23.62
480.0	0.23	23.35	24.17	25.62	25.21	23.26
490.0	0.24	23.32	24.06	25.51	25.04	22.94
500.0	0.24	23.29	23.92	25.39	24.91	22.63

### Notes

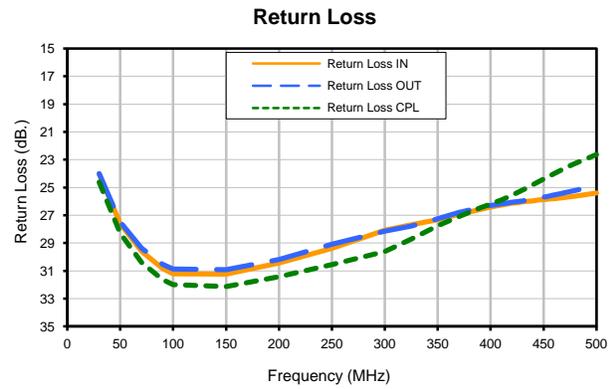
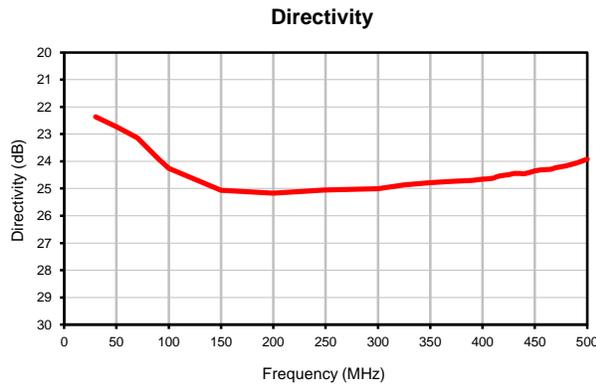
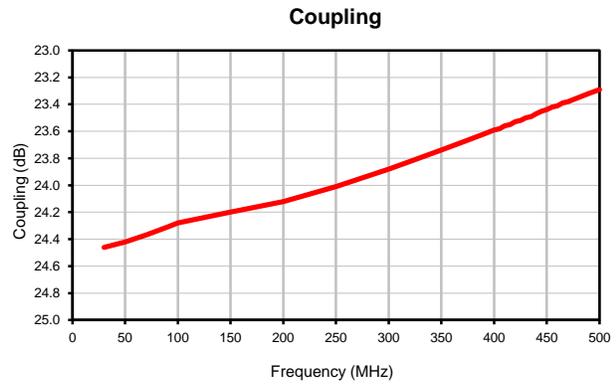
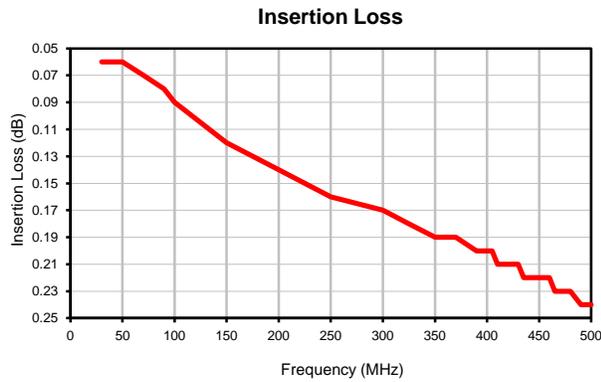
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# Directional Coupler

# JYDC-23-1HP+

## Typical Performance Curves

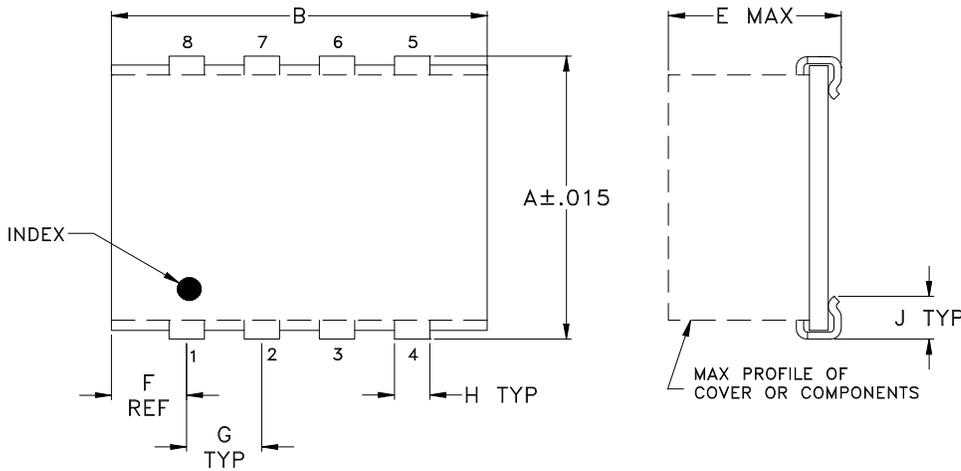


#### Notes

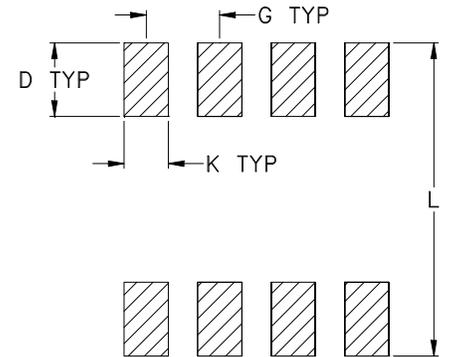
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### Outline Dimensions



### PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm .002$

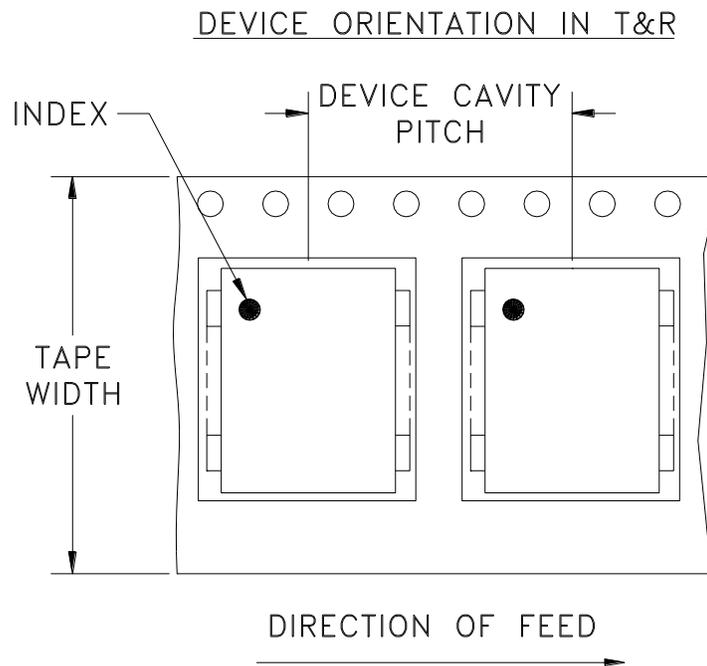
CASE#	A	B	C	D	E	F	G	H	J	K	L	WT. GRAMS
BJ937	.395 (10.03)	.520 (13.21)	-- --	.100 (2.54)	.230 (5.84)	.110 (2.79)	.100 (2.54)	.047 (1.19)	.065 (1.65)	.065 (1.65)	.425 (10.80)	.85

Dimensions are in inches (mm). Tolerances: 2Pl.  $\pm .01$ ; 3Pl.  $\pm .005$

#### Notes:

- Case material: Plastic.
- Base material: Printed wiring laminate.
- Termination finish:
  - For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
  - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

# Tape & Reel Packaging TR-F10



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
24	16	7	10,20,50,100
		13	200,500

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: [www.minicircuits.com/pages/pdfs/tape.pdf](http://www.minicircuits.com/pages/pdfs/tape.pdf)

Note: Please consult individual model data sheet to determine device per reel availability.



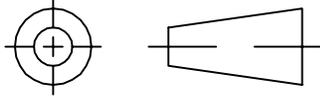
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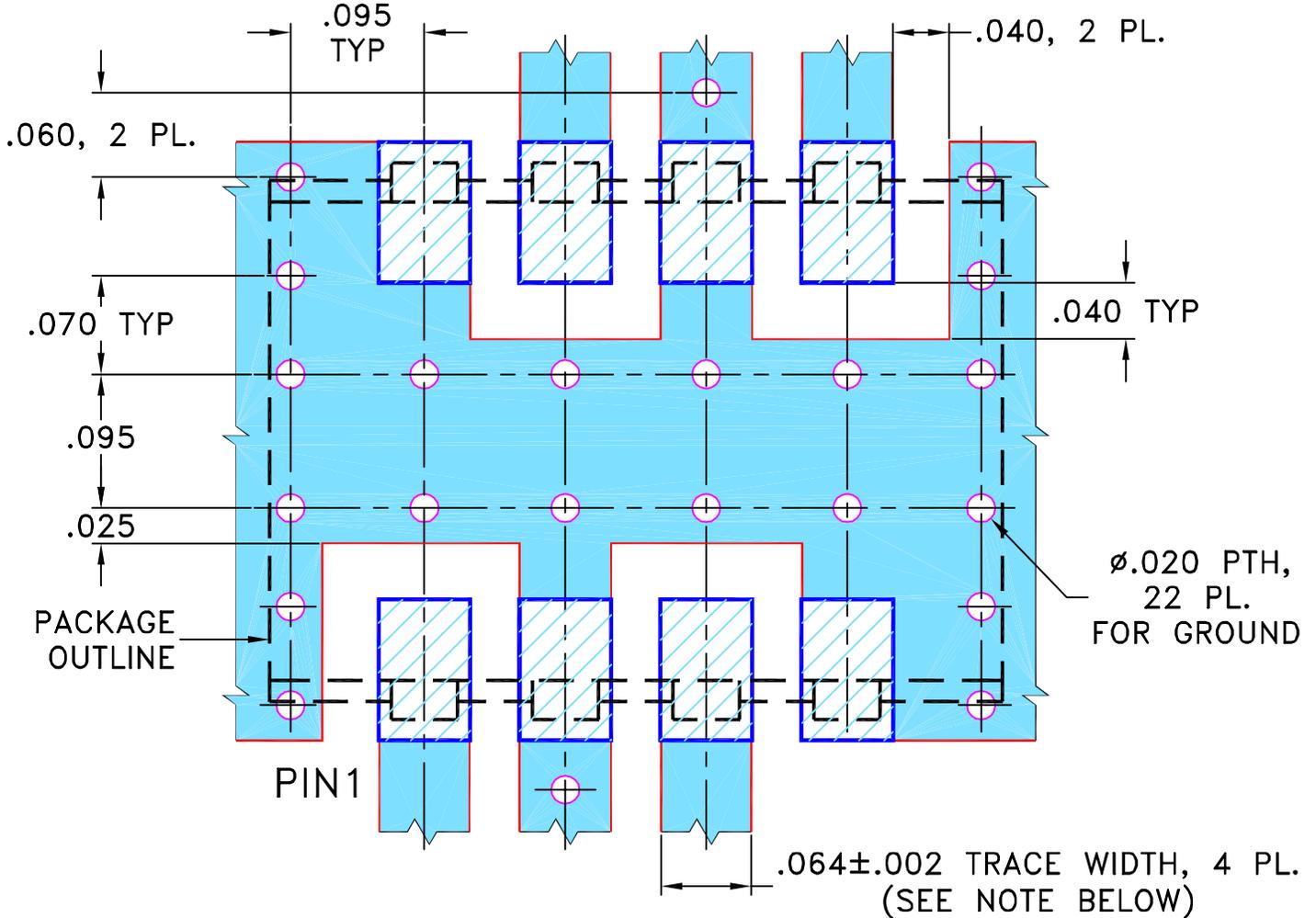
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M93606	NEW RELEASE	08/27/04	MMG	WP
A	M102713	ADDED "...WITH SMOBC"	01/12/06	GF	IL

**SUGGESTED MOUNTING CONFIGURATION  
FOR BJ937 CASE STYLE, "pz" PIN CONNECTION.**



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2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

 DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)  
 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN MMG	08/23/04
TOLERANCES ON:	CHECKED AY	08/27/04
2 PL DECIMALS ±	APPROVED WP	08/27/04
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		

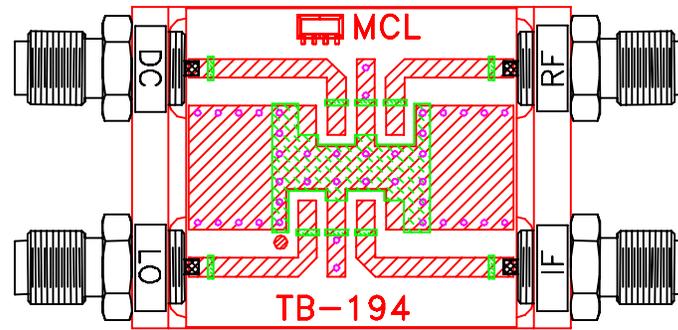
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PL, pz, BJ937, JYDC, TB-194

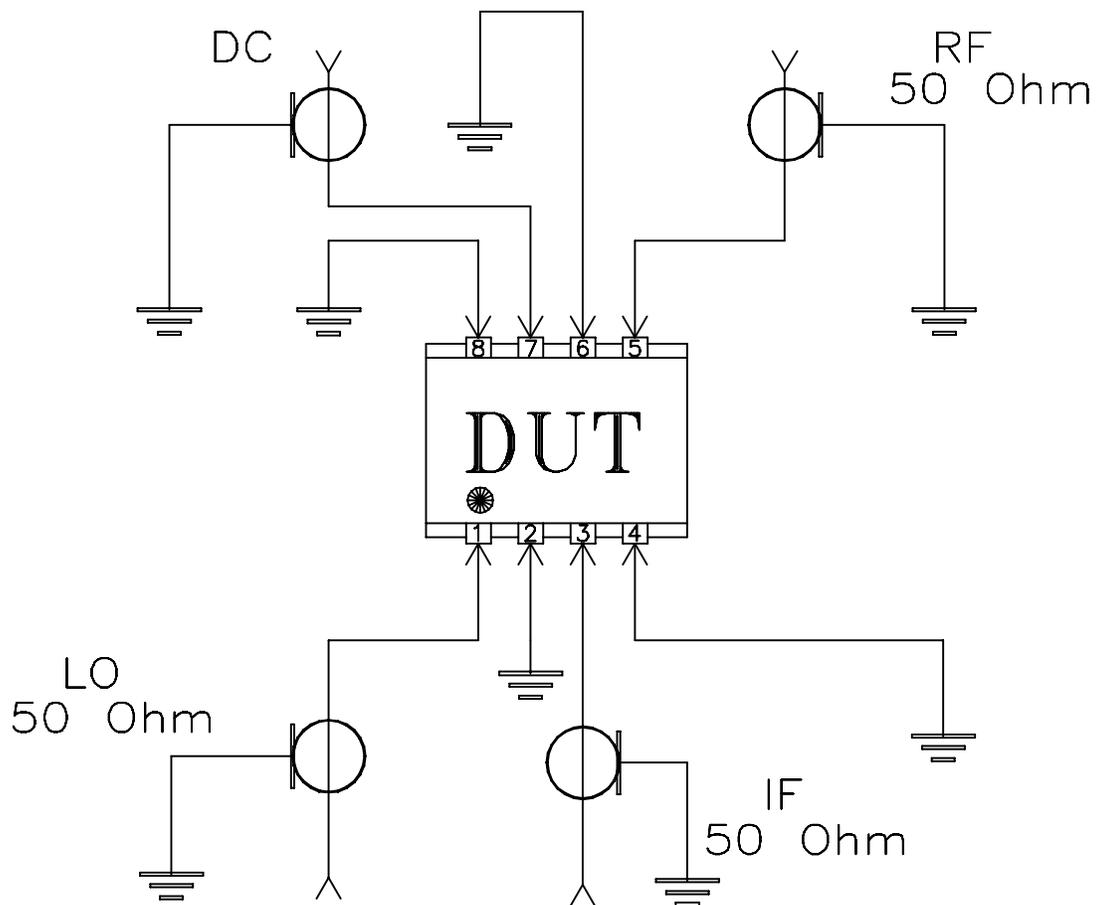
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SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-166	A
FILE:	98PL166	SCALE:	8:1
		SHEET:	1 OF 1

# Evaluation Board and Circuit



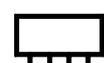
TB-194



Schematic Diagram

## Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,  
Dielectric Constant=3.5, Thickness=.030 inch.

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All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, 95% Coverage
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215