SURFACE MOUNT top hat

Directional Coupler

DBTC-17-5LX+

50Ω 17 dB 50 to 2000 MHz

FEATURES

- Very Flat Coupling
- Very Broadband, Multi Octave
- Temperature Stable, LTCC Base
- All Welded Construction
- Leads Attached for Better Solderability
- Micro Miniature Coupler
- Aqueous Washable
- Protected by US Patents 6,140,887 & 6,784,521

Generic photo used for illustration purposes only

CASE STYLE: AT1642

+RoHS Compliant
The +Suffix identifies RoHS Compliance.
See our website for methodologies and qualifications

APPLICATIONS

- Cellular
- PCS
- DECT/PHS
- GSM

ELECTRICAL SPECIFICATIONS AT +25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		50		2000	MHz
Mainline Loss[1]	50-1000		0.9	1.4	dB
	1000-1500		1.0	1.5	
	1500-2000		1.1	1.6	
Nominal Coupling	50-1000		17.0±0.7		dB
	1000-1500		17.2±0.9		
	1500-2000		17.5±1.0		
Coupling Flatness	50-1000			±0.9	dB
	1000-1500			±1.0	
	1500-2000			±0.8	
Directivity	50-1000	13	20		dB
	1000-1500	10	20		
	1500-2000		14		
VSWR[2]	50-1000		1.2		:1
	1000-1500		1.2		
	1500-2000		1.2		
Input Power	50-1000			2.0	W
	1000-1500			2.0	
	1500-2000			2.0	

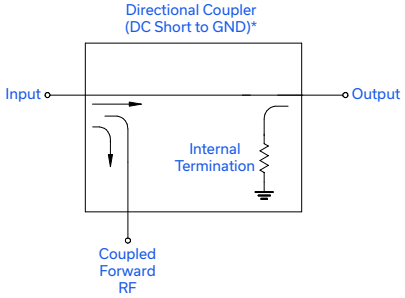
1. Includes theoretical coupled power loss of 0.07 dB at 17 dB coupling.
2. For coupled port VSWR above 500 MHz, 1.6:1 typ.

ABSOLUTE MAXIMUM RATINGS

Parameter	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.

ELECTRICAL SCHEMATIC



* Electrical schematic is for directional coupler with internal transformer(s) that routes DC from RF ports to ground.

SURFACE MOUNT top hat

Directional Coupler DBTC-17-5LX+

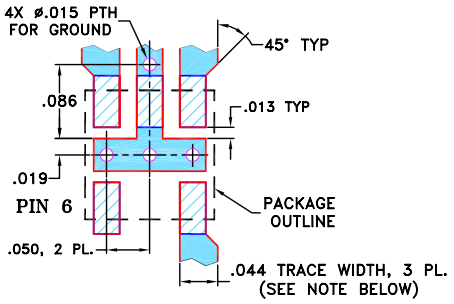
50Ω 17 dB 50 to 2000 MHz

PIN CONNECTIONS

INPUT	3
OUTPUT	4
COUPLED	1
GROUND	2
ISOLATE (DO NOT USE)	6

PRODUCT MARKING: DR

DEMO BOARD MCL P/N: TB-DBTC-17-5LX+
SUGGESTED PCB LAYOUT (PL-150)

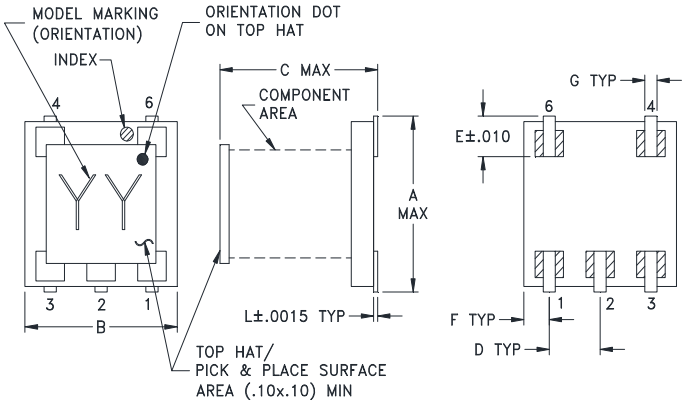


NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" ± 0.0015"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

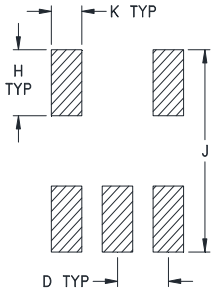
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

OUTLINE DRAWING



PCB Land Pattern



Suggested Layout,
Tolerance to be within±.002

OUTLINE DIMENSIONS (Inches / mm)

A	B	C	D	E	F
.166	.150	.155	.050	.037	.025
4.22	3.81	3.94	1.27	0.94	0.64

G	H	J	K	L	wt
.012	.060	.184	.030	.004	grams
0.30	1.52	4.67	0.76	0.10	0.10

TAPE & REEL INFORMATION: F76

SURFACE MOUNT top hat

Directional Coupler

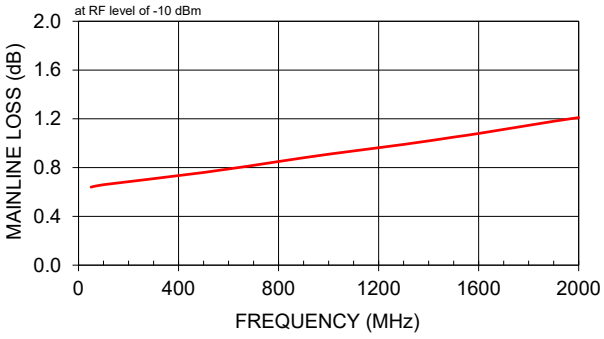
DBTC-17-5LX+

50Ω 17 dB 50 to 2000 MHz

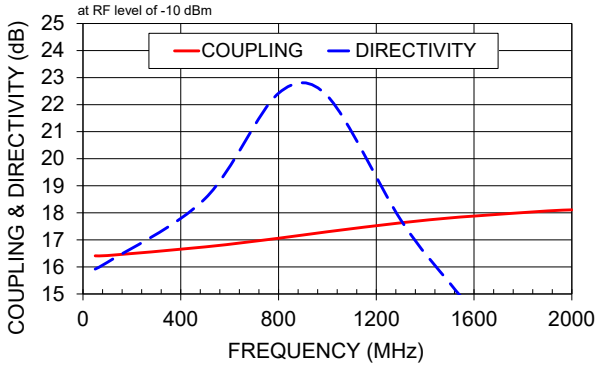
TYPICAL PERFORMANCE DATA

Frequency (MHz)	Mainline Loss (dB) In-Out	Coupling (dB) In-Cpl	Directivity (dB)	Return Loss (dB) In	Out	Cpl
50	0.64	16.41	15.92	23.43	27.62	18.46
100	0.66	16.42	16.17	23.56	27.75	18.62
500	0.76	16.74	18.53	22.36	23.13	18.78
800	0.85	17.06	22.42	21.45	21.80	18.22
1000	0.91	17.30	22.32	21.67	21.94	17.08
1300	0.99	17.63	17.74	22.81	22.71	14.85
1500	1.05	17.81	15.41	24.84	24.12	13.40
1600	1.08	17.88	14.43	25.91	24.48	12.71
1900	1.18	18.07	12.20	28.04	25.71	10.95
2000	1.21	18.11	11.55	28.07	25.90	10.50

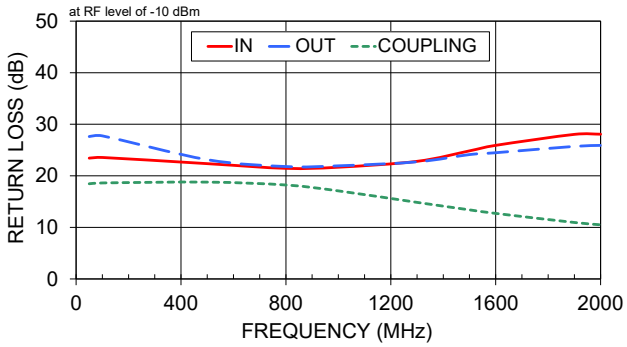
MAINLINE LOSS



COUPLING & DIRECTIVITY



RETURN LOSS



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-Circuits 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-Circuits' website at www.minicircuits.com/terms/viewterm.html

Directional Coupler DBTC-17-5LX+

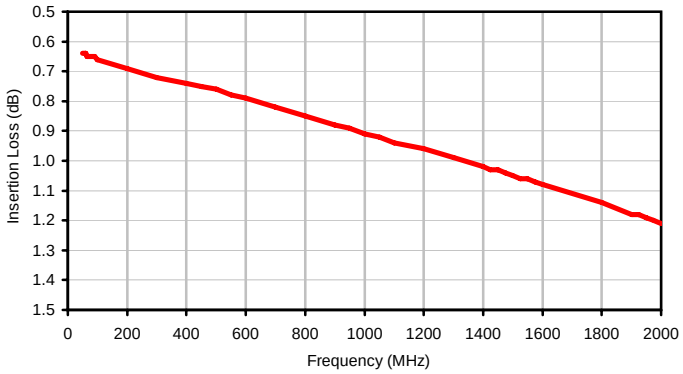
Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)	COUPLING (dB)	DIRECTIVITY (dB)	RETURN LOSS (dB)		
				IN	OUT	CPL
50.0	0.64	16.41	15.92	23.43	27.62	18.46
55.0	0.64	16.41	15.94	23.49	27.68	18.49
60.0	0.64	16.41	15.96	23.56	27.71	18.52
65.0	0.65	16.41	15.99	23.61	27.75	18.54
70.0	0.65	16.41	16.02	23.61	27.77	18.56
80.0	0.65	16.41	16.07	23.62	27.82	18.59
90.0	0.65	16.42	16.13	23.58	27.81	18.61
100.0	0.66	16.42	16.17	23.56	27.75	18.62
200.0	0.69	16.49	16.50	23.18	26.76	18.66
300.0	0.72	16.57	17.00	22.83	25.30	18.64
400.0	0.74	16.66	17.60	22.50	23.97	18.77
450.0	0.75	16.70	18.10	22.33	23.56	18.78
500.0	0.76	16.74	18.53	22.36	23.13	18.78
550.0	0.78	16.78	19.08	22.05	22.64	18.81
600.0	0.79	16.83	19.78	21.96	22.46	18.73
700.0	0.82	16.94	20.99	21.60	22.01	18.51
800.0	0.85	17.06	22.42	21.45	21.80	18.22
900.0	0.88	17.18	23.75	21.40	21.65	17.76
950.0	0.89	17.24	22.98	21.43	21.72	17.44
1000.0	0.91	17.30	22.32	21.67	21.94	17.08
1050.0	0.92	17.36	21.47	21.51	21.73	16.77
1100.0	0.94	17.41	20.58	21.65	21.85	16.42
1200.0	0.96	17.53	19.09	22.21	22.34	15.63
1300.0	0.99	17.63	17.74	22.81	22.71	14.85
1400.0	1.02	17.72	16.46	23.59	23.24	14.13
1425.0	1.03	17.74	16.17	23.83	23.33	13.93
1450.0	1.03	17.76	15.90	24.14	23.55	13.74
1475.0	1.04	17.78	15.64	24.55	23.87	13.56
1500.0	1.05	17.81	15.41	24.84	24.12	13.40
1525.0	1.06	17.83	15.16	25.00	24.17	13.24
1550.0	1.06	17.84	14.88	25.16	24.14	13.07
1575.0	1.07	17.86	14.64	25.46	24.25	12.89
1600.0	1.08	17.88	14.43	25.91	24.48	12.71
1700.0	1.11	17.95	13.55	27.15	25.32	12.12
1800.0	1.14	18.01	12.88	27.83	25.45	11.48
1900.0	1.18	18.07	12.20	28.04	25.71	10.95
1925.0	1.18	18.07	12.03	27.83	25.47	10.83
1950.0	1.19	18.08	11.84	27.98	25.52	10.71
1975.0	1.20	18.09	11.68	28.14	25.76	10.60
2000.0	1.21	18.11	11.55	28.07	25.97	10.50

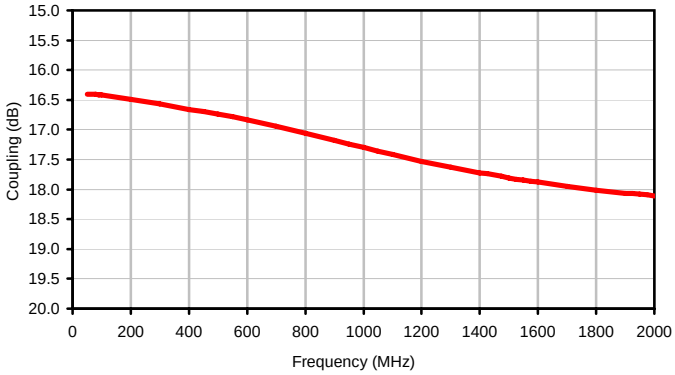
Directional Coupler DBTC-17-5LX+

Typical Performance Curves

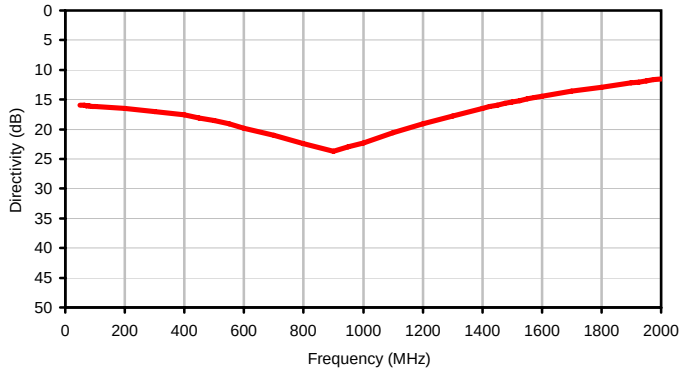
Insertion Loss



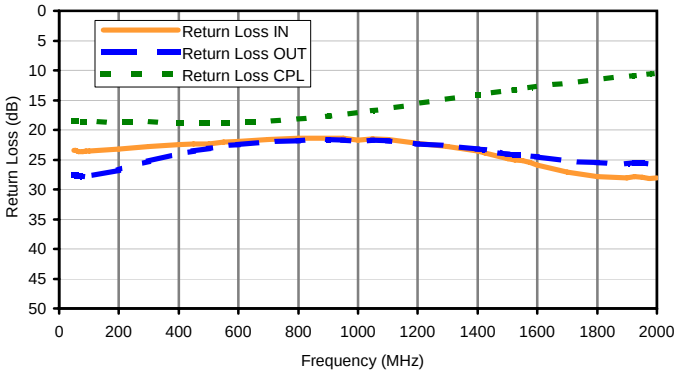
Coupling



Directivity



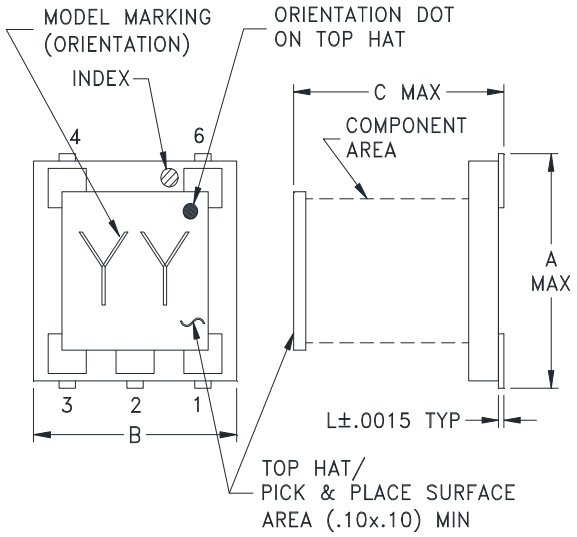
Return Loss



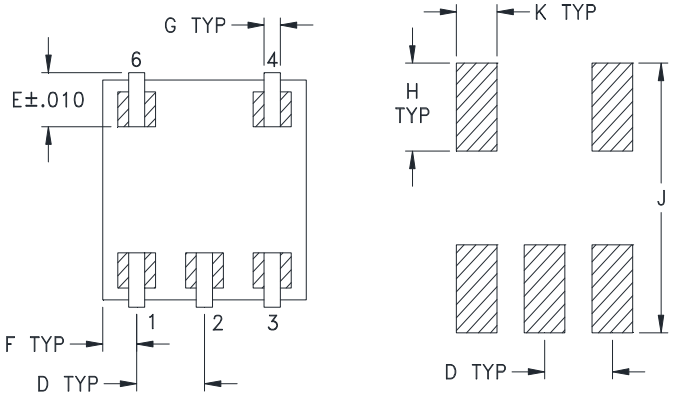
Case Style AT

Outline Dimensions

AT1642



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE #	A	B	C	D	E	F	G	H	J	K	L	WT. GRAMS
AT1642	.166 (4.22)	.150 (3.81)	.155 (3.94)	.050 (1.27)	.037 (0.94)	.025 (.64)	.012 (.30)	.060 (1.52)	.184 (4.67)	.030 (.76)	.004 (0.10)	.10

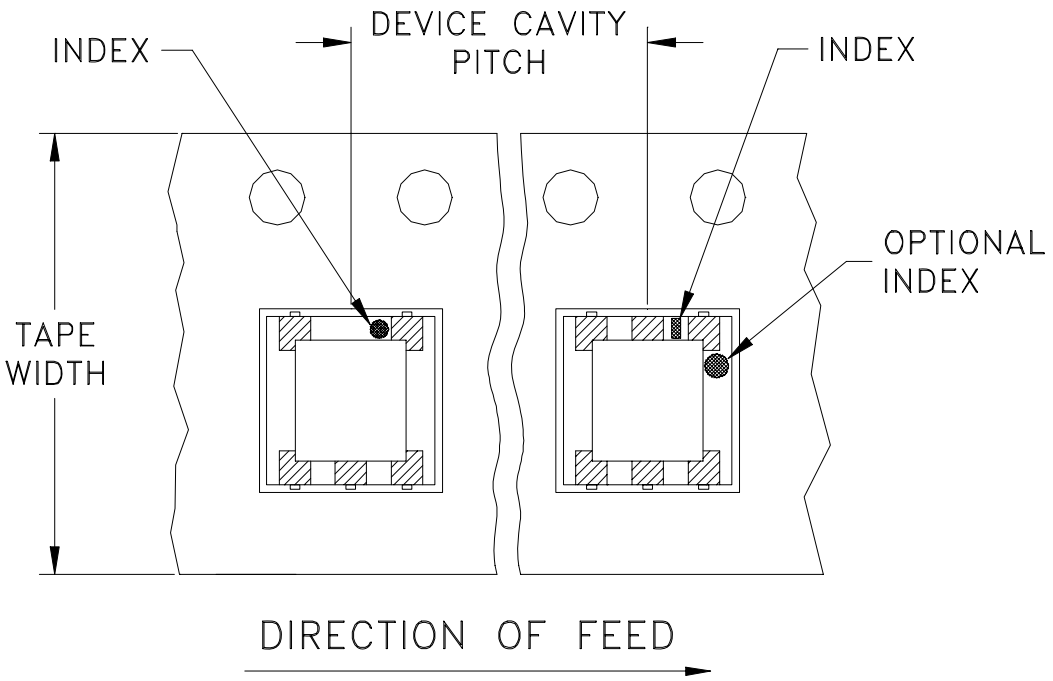
Dimensions are in inches (mm). Tolerances: 2 Pl. ± .01; 3 Pl. ± .005

Notes:

1. Open style, ceramic base.
2. Termination finish:
   For RoHS Case Styles: Tin plate.
3. Top-hat total thickness: .013 inches MAX.
4. Orientation Dot on Top Hat & Marking on the Substrate both refers to Pin #6 of the Unit.

Tape & Reel Packaging TR-F76

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
12	8	7	20
			50
			100
			200
			500
		13	1000
			2000

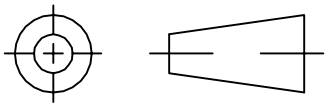
Note: Please consult individual model data sheet to determine device per reel availability.

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

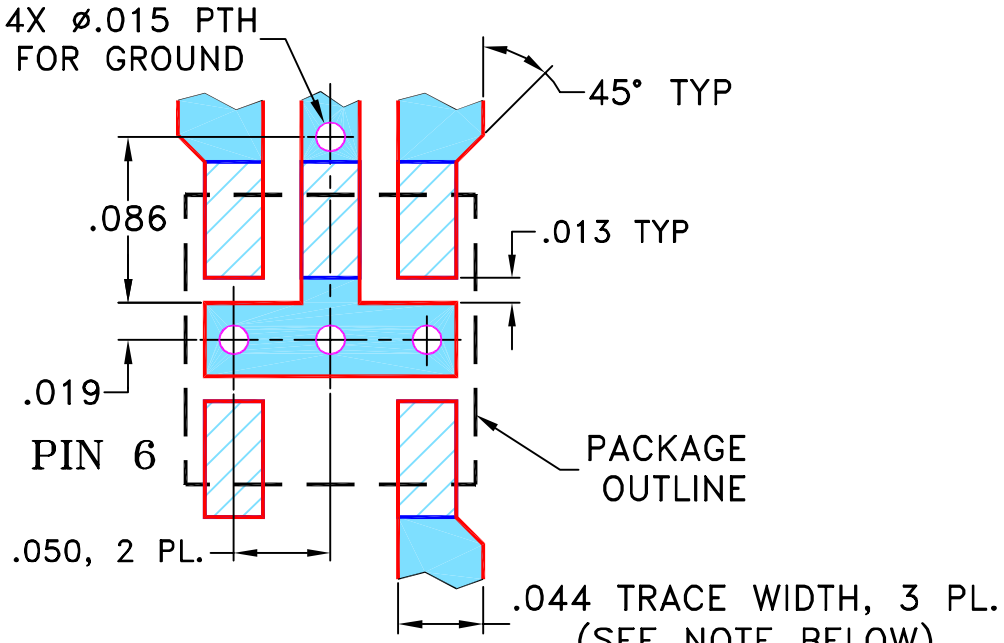
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

THIRD ANGLE PROJECTION



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M90454	NEW RELEASE	01/16/04	AV	WP
A	M93049	AT1030 WAS AT1029	07/02/04	MMG	WP
B	M102713	ADDED "...WITH SMOBC"	01/17/06	MMG	IL

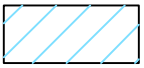
SUGGESTED MOUNTING CONFIGURATION FOR AT1030 CASE STYLE, "na" PIN CONNECTION



NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" ± 0.0015"; 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

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	AV	01/08/04
TOLERANCES ON:	CHECKED	IL	01/16/04
2 PL DECIMALS ±	APPROVED	WP	01/16/04
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

ASHEETA1.DWG REV:A DATE:01/12/95

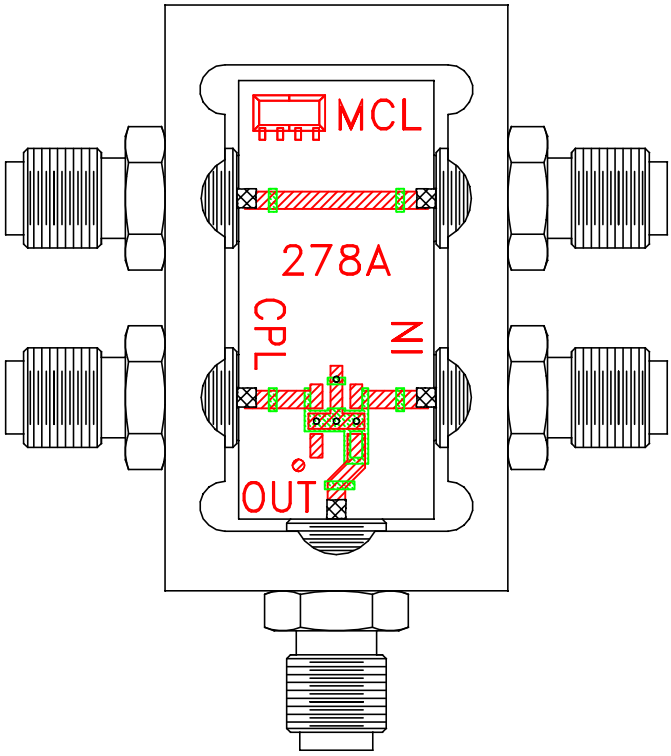
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, na, AT1030, DBTC, TB-278

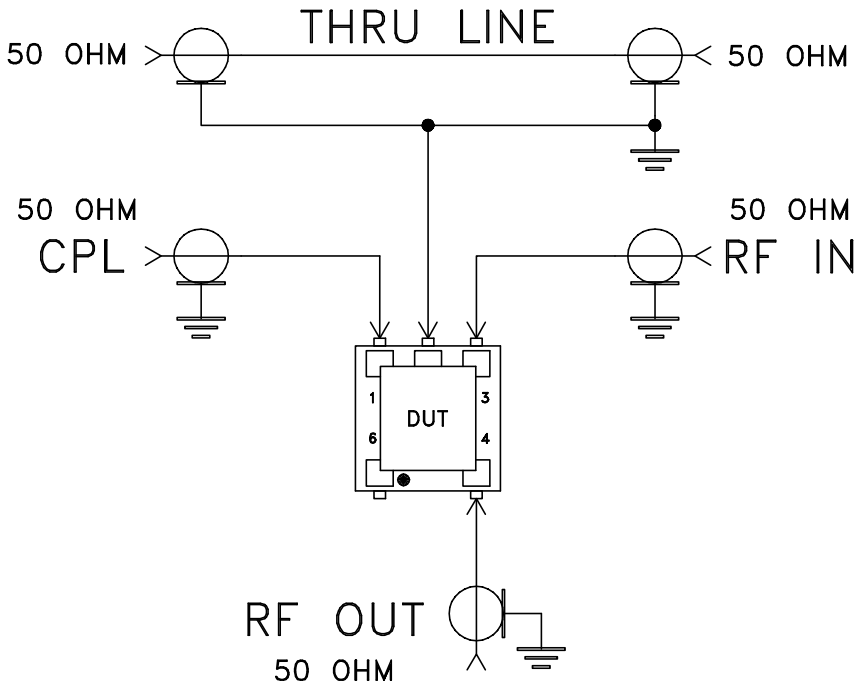
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-150	B

FILE:	SCALE:	SHEET:
98PL150	10:1	1 OF 1

Evaluation Board and Circuit



TB-278



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: Rogers RO4350B or its equivalent, Dielectric Constant=3.5, Thickness=.020"

Mini-Circuits®

Mini-Circuits

Environmental Specifications ENV02T1

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