Balanced to Unbalanced top hat®

RF Transformer

TC1.33-152X-2+

100 to 75Ω 5 to 1800 MHz

Features

- suitable for tin/lead and RoHS solder systems
- wideband, 5 to1800 MHz
- balanced transmission line
- good return loss, 20 dB typ. at 1 dB band
- excellent amplitude unbalance, 0.3 dB typ.
- aqueous washable

Generic photo used for illustration purposes only

CASE STYLE: AT1521

+RoHS Compliant

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

Available Tape and Reel at no extra cost

Reel Size	Devices/Reel
7"	20, 50, 100, 200, 500
13"	1000, 2000

Electrical Specifications at 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Impedance Ratio *(secondary/primary)*			1.33		Ohm
Frequency Range		5		1800	MHz
Insertion Loss*	5 - 1800		1.2	2.3	dB
Amplitude Unbalance	5 - 1200 1200 - 1800		0.4 1.3	1.0 2.1	dB
Phase Unbalance	5 - 1800		5	10	Degree

* Insertion Loss is referenced to mid-band loss, 1.0 dB typ. Measured in 75Ω system.

Maximum Ratings

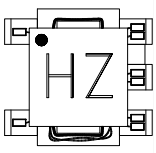
Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	0.25W
DC Current	30mA

Permanent damage may occur if any of these limits are exceeded.

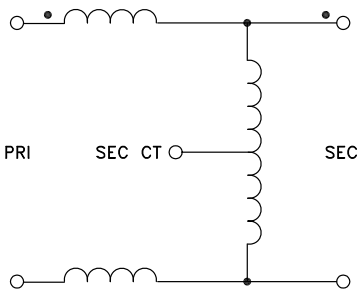
Pin Connections

Function	Pin Number
PRIMARY DOT	6
PRIMARY	4
SECONDARY DOT	1
SECONDARY	3
SECONDARY CT	2

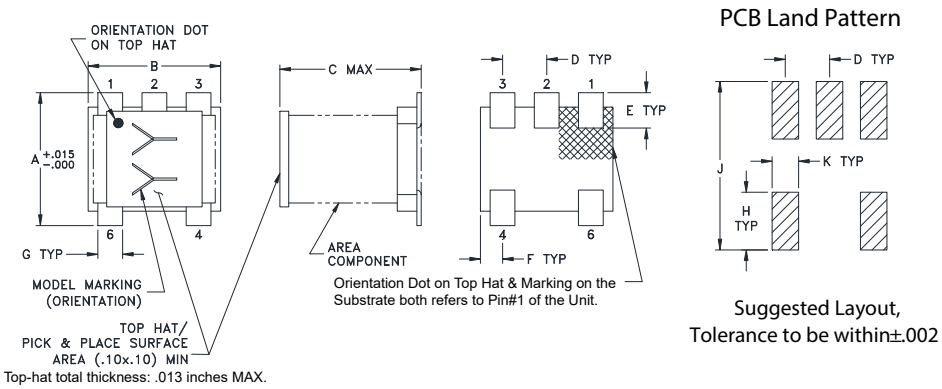
Product Marking



Config. M1



Outline Drawing

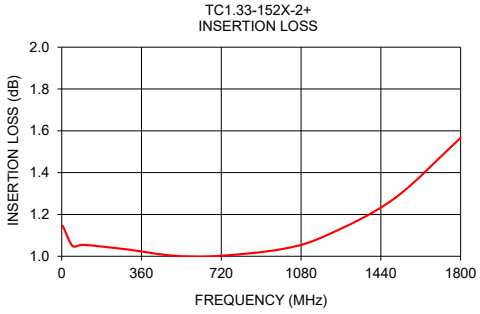


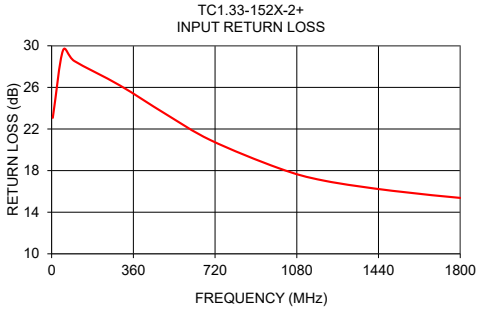
Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H	J
.150	.150	.160	.050	.040	.025	.028	.065	.190
3.81	3.81	4.06	1.27	1.02	0.64	0.71	1.65	4.83

Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT R. LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (Deg.)
5.00	1.14	23.07	0.03	0.23
50.00	1.05	29.55	0.02	0.15
100.00	1.05	28.53	0.02	0.40
300.00	1.03	26.20	0.01	1.08
500.00	1.00	23.47	0.04	1.52
700.00	1.00	20.93	0.14	1.70
1000.00	1.04	18.24	0.34	1.77
1200.00	1.10	17.03	0.56	1.42
1500.00	1.28	16.06	1.09	0.80
1800.00	1.57	15.38	1.68	0.55





Additional 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/MCLStore/terms.jsp

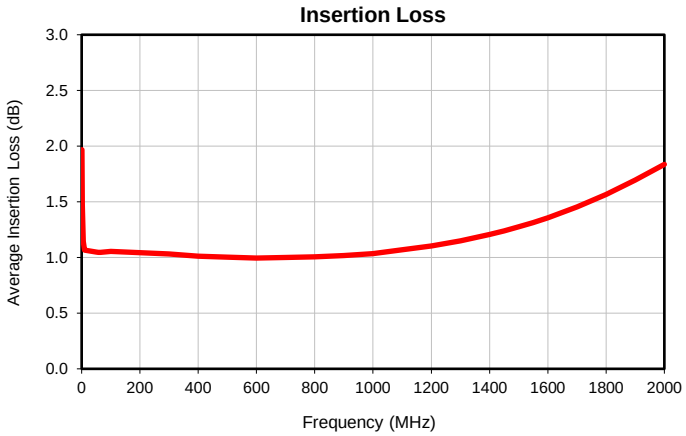
RF Transformer TC1.33-152X-2+

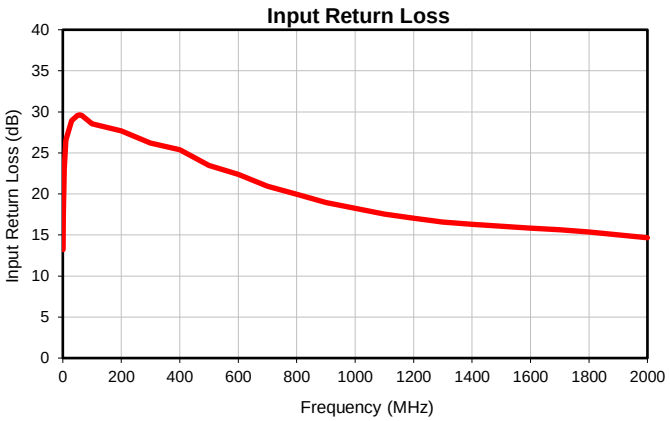
Typical Performance Data

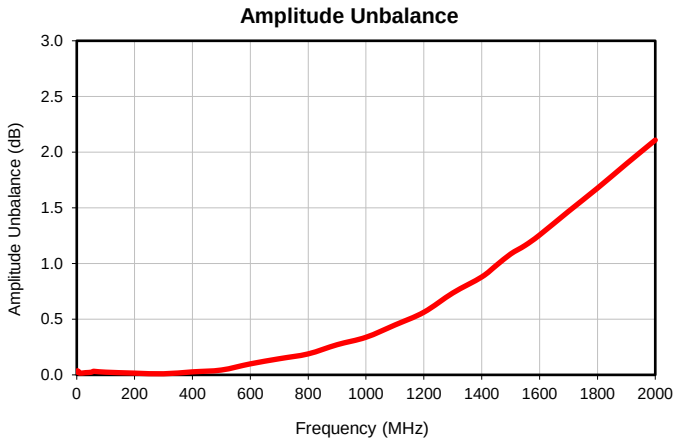
FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (Deg)
1.0	1.97	13.21	0.03	0.33
2.0	1.47	17.38	0.02	0.25
5.0	1.14	23.07	0.03	0.23
10	1.07	26.56	0.02	0.33
30	1.06	28.92	0.02	0.15
50	1.05	29.55	0.02	0.15
57	1.05	29.63	0.03	0.28
65	1.05	29.56	0.03	0.50
100	1.05	28.53	0.02	0.40
200	1.04	27.69	0.02	1.01
300	1.03	26.20	0.01	1.08
400	1.01	25.37	0.03	1.73
500	1.00	23.47	0.04	1.52
600	0.99	22.37	0.10	1.85
700	1.00	20.93	0.14	1.70
800	1.00	19.97	0.19	1.94
900	1.02	18.95	0.27	1.74
1000	1.04	18.24	0.34	1.77
1100	1.07	17.52	0.45	1.47
1200	1.10	17.03	0.56	1.42
1300	1.15	16.59	0.74	1.19
1400	1.21	16.30	0.88	1.09
1450	1.24	16.17	0.98	1.01
1500	1.28	16.06	1.09	0.80
1550	1.31	15.94	1.16	0.62
1600	1.36	15.83	1.26	0.53
1700	1.45	15.64	1.47	0.07
1800	1.57	15.38	1.68	0.55
1900	1.70	15.02	1.89	1.26
2000	1.84	14.66	2.11	2.07

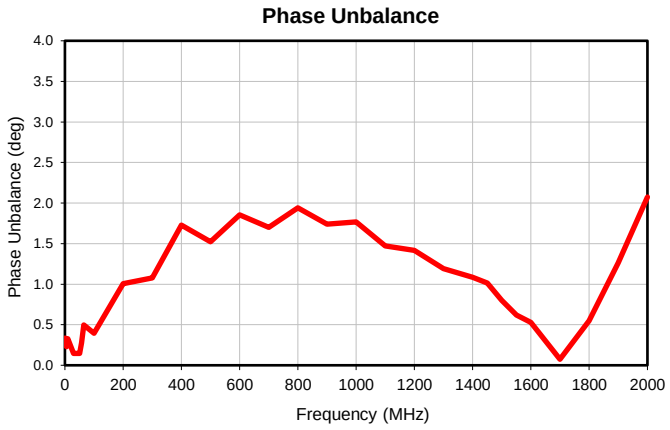
RF Transformer TC1.33-152X-2+

Typical Performance Data







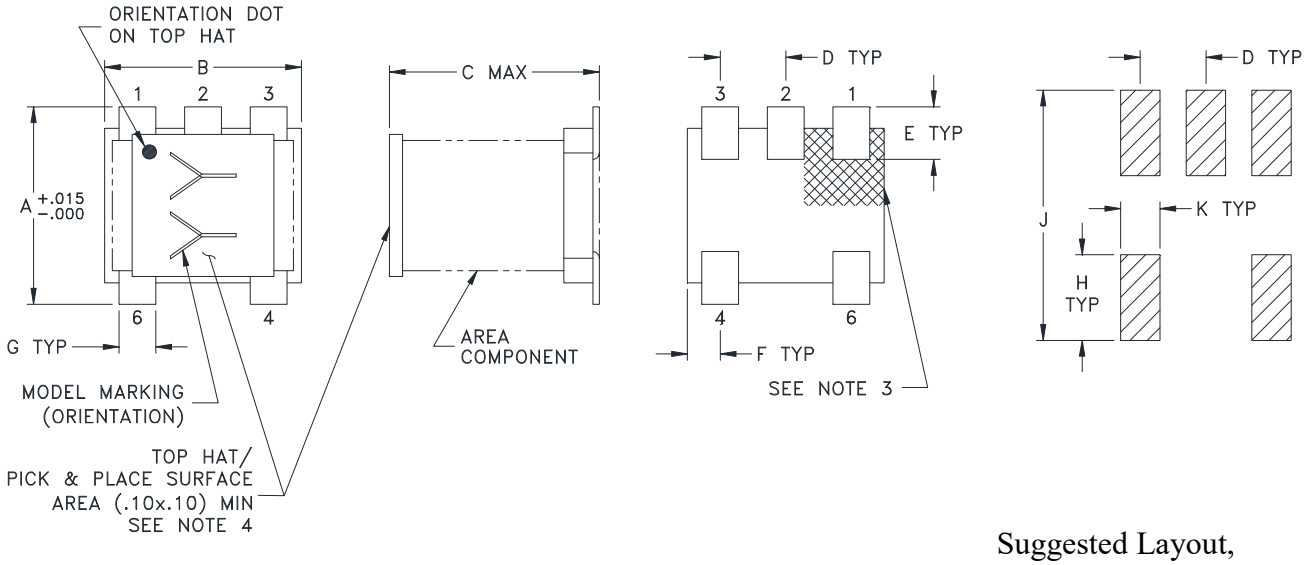


Case Style AT

Outline Dimensions

AT1521

PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

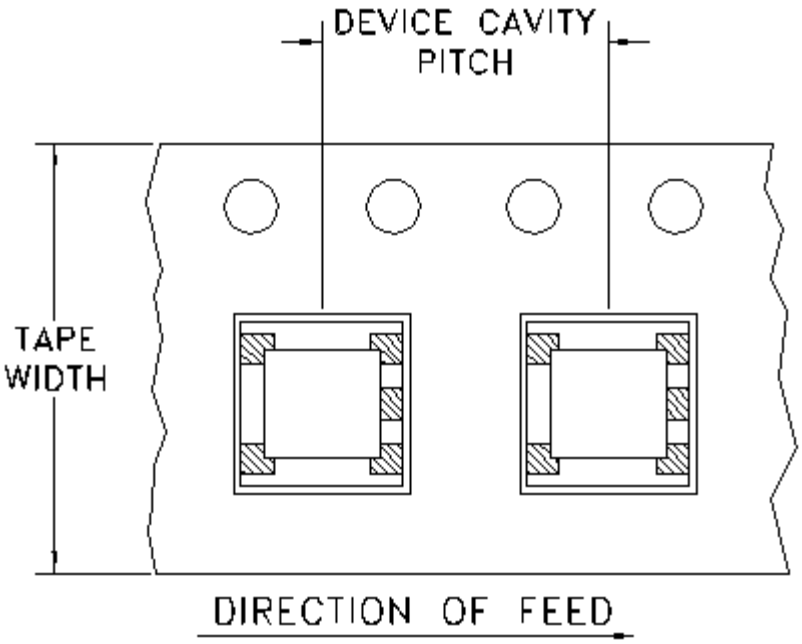
CASE #	A	B	C	D	E	F	G	H	J	K	WT. GRAMS
AT1521	.150 (3.81)	.150 (3.81)	.160 (4.06)	.050 (1.27)	.040 (1.02)	.025 (.64)	.028 (.71)	.065 (1.65)	.190 (4.83)	.030 (.76)	.15

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

Notes:
1. Case material: Plastic.
2. Termination finish:
   For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
3. Orientation Dot on Top Hat & Marking on the Substrate both refers to Pin #1 of the Unit.
4. Top-Hat total thickness: .013 inches MAX.

Tape & Reel Packaging TR-F17

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
12	8	7	Small quantity standards (see note)	20
				50
				100
				200
				500
		13	Standard	1000
				2000

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

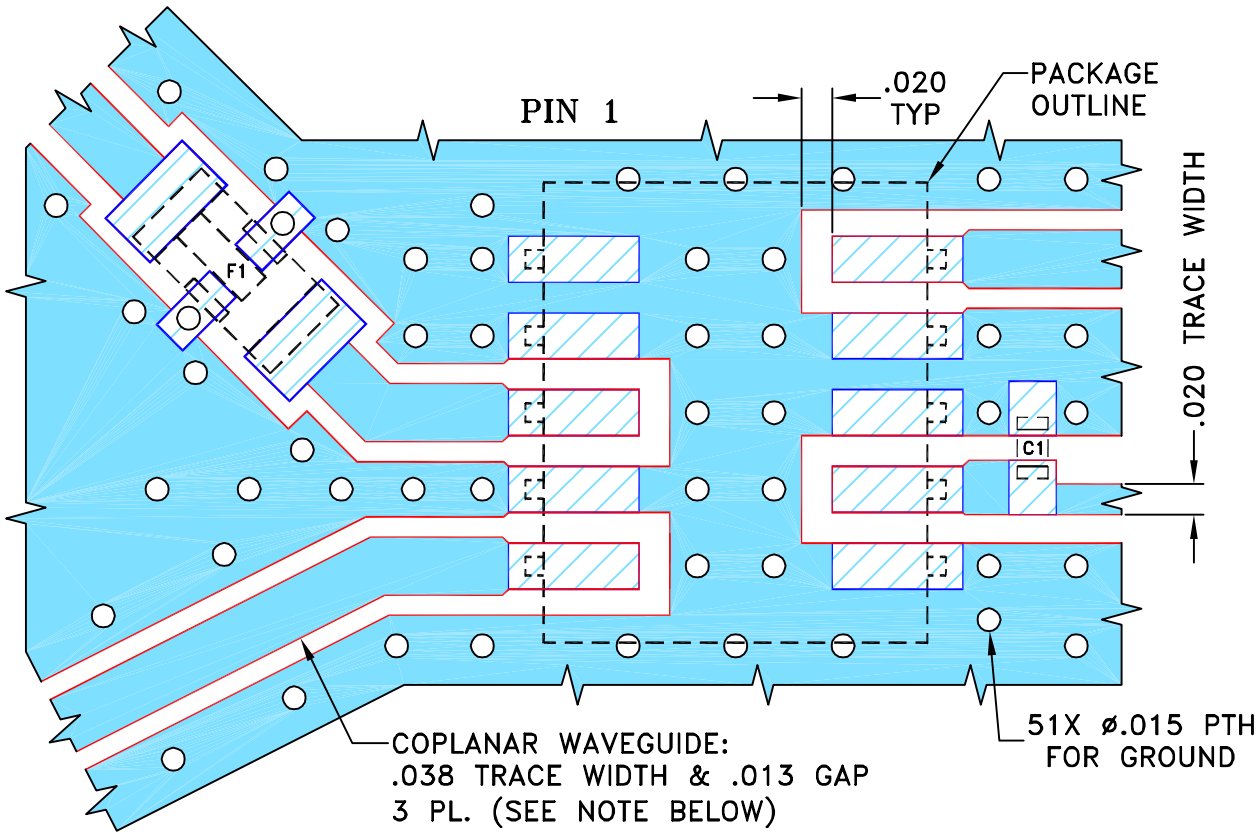
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M89275	NEW RELEASE	10/23/03	AV	DJ
A	M91639	REMOVED NOTE 2	04/14/04	AV	DJ
B	M102713	ADDED "...WITH SMOBC"	01/12/06	GF	IL
C	M115195	MODIFIED PATTERN & TEST BOARD	12/24/07	AV	DJ

SUGGESTED MOUNTING CONFIGURATION FOR DZ1034 CASE STYLE, "10MA01" PIN CODE



CAPACITOR C1: 1000 pF, 0402 SIZE
FILTER F1: LFCN-490+, FV1206 CASE STYLE

NOTE: 1. COPLANAR WAVEGUIDE PARAMETERS ARE 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	10/10/03
TOLERANCES ON:	CHECKED	IL	10/23/03
2 PL DECIMALS ±	APPROVED	DJ	10/23/03
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

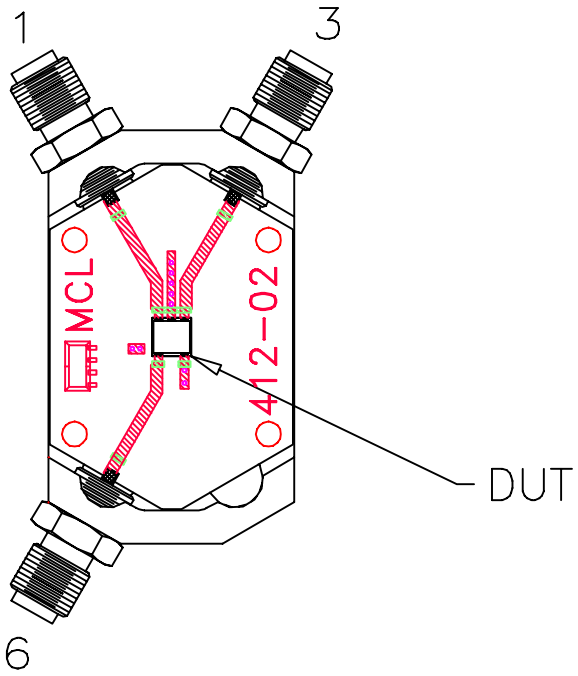
PL, 10MA01, DZ1034, MACA-242H+, TB-403

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-145	C

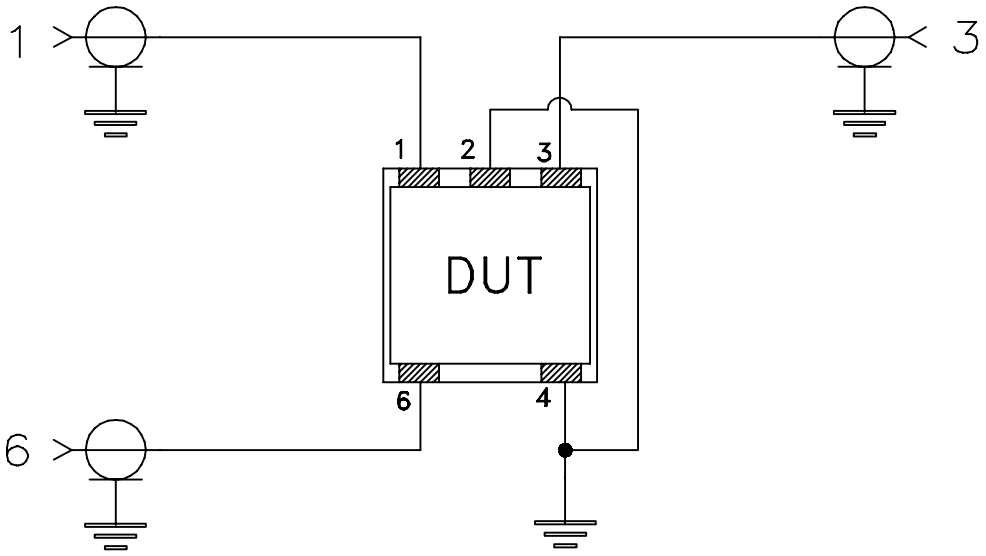
FILE:	SCALE:	SHEET:
98PL145	8:1	1 OF 1

Evaluation Board and Circuit

For Pin Connections refer to Data Sheet of the DUT



TB-145



Schematic Diagram

Notes:

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

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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