SURFACE MOUNT top hat

RF Transformer

TC1-1-13M-75X+

75Ω 4.5 to 3000 MHz

FEATURES

- Wideband, 4.5 to 3000 MHz
- Balanced Transmission Line
- Good Return Loss
- Excellent Amplitude Unbalance, 0.7 dB Typ. and Phase Unbalance, 2 Deg Typ. in 1 dB Bandwidth
- Plastic Base With Leads
- Aqueous Washable



Generic photo used for illustration purposes only

CASE STYLE: AT1521

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

ELECTRICAL SPECIFICATIONS AT +25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Impedance Ratio			1		Ohm
Frequency Range		4.5		3000	MHz
Insertion Loss[1]	2000 - 3000 1000 - 2000 4.5 - 1000		3.0 2.0 1.0		dB
Amplitude Unbalance	1000 - 2000 4.5 - 1000		0.5 0.7		dB
Phase Unbalance	1000 - 2000 4.5 - 1000		3.0 2.0		Degree

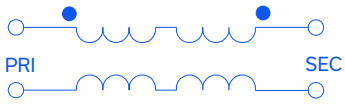
1. Insertion Loss is referenced to mid-band loss, 0.5 dB typ.

ABSOLUTE MAXIMUM RATINGS[2,3]

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

2. Permanent damage may occur if any of these limits are exceeded.
3. The unit has been assessed for survivability up to 105°C; there is no permanent damage.

CONFIG. G



REV. C
ECO-031061
TC1-1-13M-75X+
MCINU
260903

SURFACE MOUNT top hat

RF Transformer

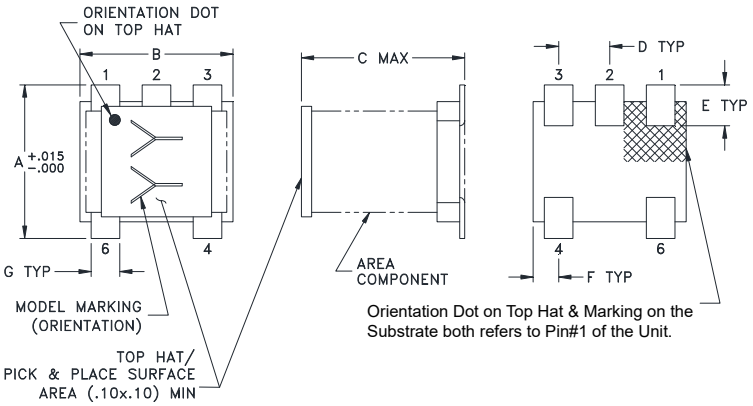
TC1-1-13M-75X+

75Ω 4.5 to 3000 MHz

PIN CONNECTIONS

Function	Pin Number
PRIMARY DOT	6
PRIMARY	4
SECONDARY DOT	1
SECONDARY	3
NOT USED	2

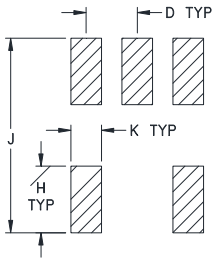
OUTLINE DRAWING



Top-hat total thickness: .013 inches MAX.

PRODUCT MARKING: CN

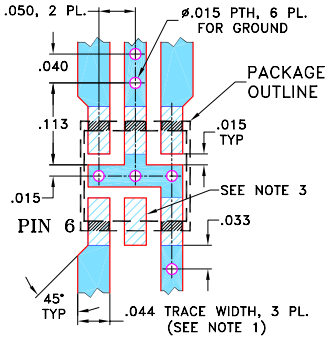
PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002 in

DEMO BOARD MCL P/N: TB-TC1113M-75X+

SUGGESTED PCB LAYOUT PL-244



1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020" ± .0015"; COPPER: 1/2 OZ. ON EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
3. THIS PAD IS NOT REQUIRED FOR AT224 CASE STYLE.

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

OUTLINE DIMENSIONS (inch / mm)

A	B	C	D	E	F	G	H	J	K
.150	.150	.160	.050	.040	.025	.028	.065	.190	.030
3.81	3.81	4.06	1.27	1.02	0.64	0.71	1.65	4.83	0.76

Weight: 0.15 grams

TAPE & REEL INFORMATION: F17

SURFACE MOUNT top hat

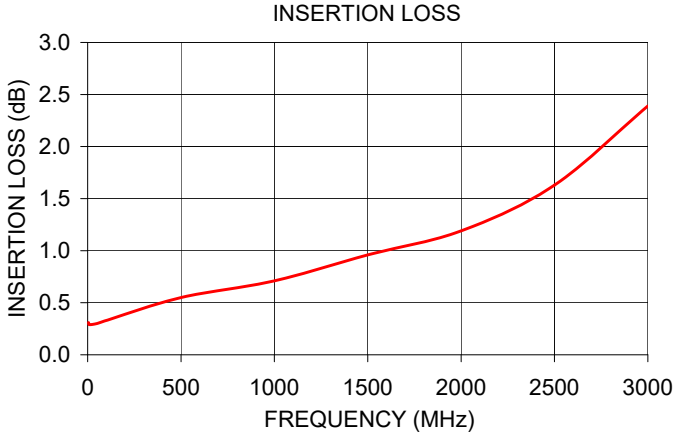
RF Transformer

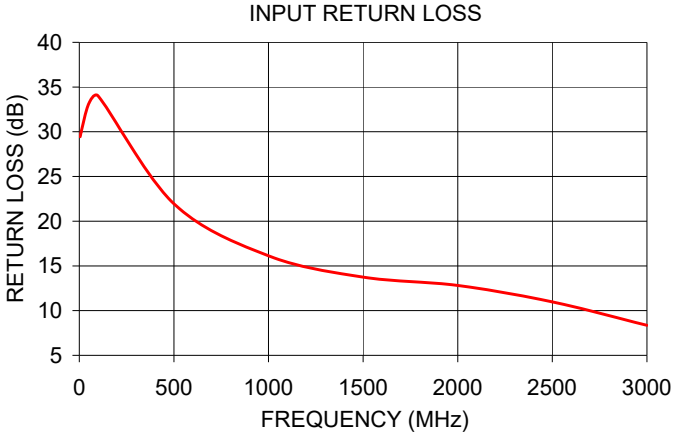
TC1-1-13M-75X+

75Ω 4.5 to 3000 MHz

TYPICAL PERFORMANCE DATA

FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT R. LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (Deg.)
4.5	0.31	29.45	1.10	5.08
10.0	0.29	29.98	0.90	2.60
50.0	0.30	33.14	0.88	0.06
100.0	0.33	34.00	0.91	0.32
500.0	0.55	21.95	0.65	0.81
1000.0	0.71	16.13	0.61	2.12
1500.0	0.96	13.75	0.21	1.23
2000.0	1.19	12.82	0.30	0.38
2500.0	1.63	10.98	0.47	4.03
3000.0	2.39	8.36	0.49	8.50





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

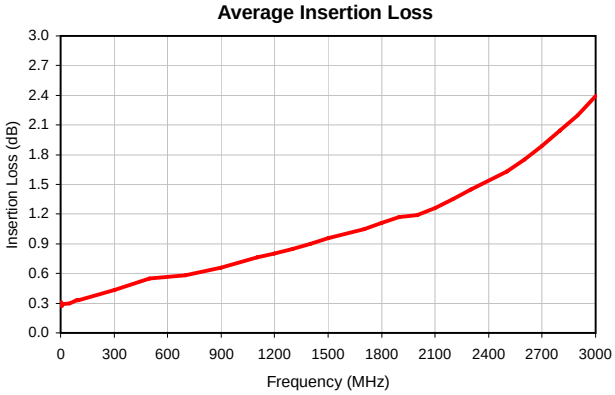
RF Transformer TC1-1-13M-75X+

Typical Performance Data

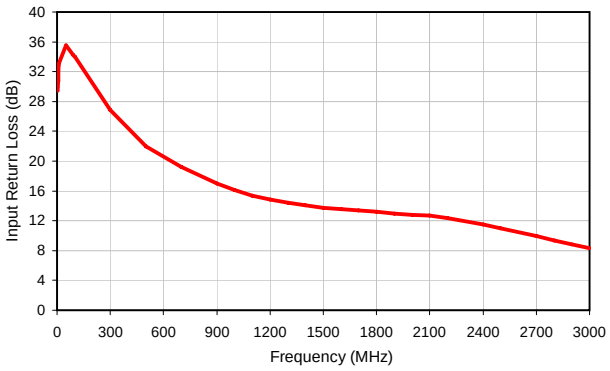
FREQUENCY MHz	AVERAGE INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (deg.)
4.5	0.31	29.45	1.10	5.08
5.0	0.30	29.98	1.06	4.71
6.0	0.29	30.85	1.00	4.10
8.0	0.27	32.25	0.92	3.18
10.0	0.29	33.14	0.90	2.60
50.0	0.30	35.56	0.88	0.06
90.0	0.33	34.25	0.91	0.23
100.0	0.33	34.00	0.91	0.32
300.0	0.43	26.85	0.90	0.62
500.0	0.55	21.95	0.65	0.81
700.0	0.58	19.24	0.74	2.06
900.0	0.66	17.00	0.66	2.26
1000.0	0.71	16.13	0.61	2.12
1100.0	0.76	15.40	0.54	2.05
1200.0	0.80	14.88	0.44	1.90
1300.0	0.85	14.45	0.37	1.96
1400.0	0.90	14.08	0.31	1.61
1500.0	0.96	13.75	0.21	1.23
1600.0	1.00	13.55	0.11	1.13
1700.0	1.05	13.37	0.05	0.82
1800.0	1.11	13.18	0.01	0.31
1900.0	1.17	12.96	0.13	0.45
2000.0	1.19	12.82	0.30	0.38
2100.0	1.26	12.68	0.25	0.52
2200.0	1.35	12.36	0.26	1.43
2300.0	1.45	11.93	0.32	2.54
2400.0	1.54	11.46	0.41	3.35
2500.0	1.63	10.98	0.47	4.03
2600.0	1.75	10.46	0.51	4.73
2700.0	1.89	9.92	0.52	5.58
2800.0	2.04	9.39	0.53	6.41
2900.0	2.20	8.88	0.51	7.36
3000.0	2.39	8.36	0.49	8.50

Typical Performance Data

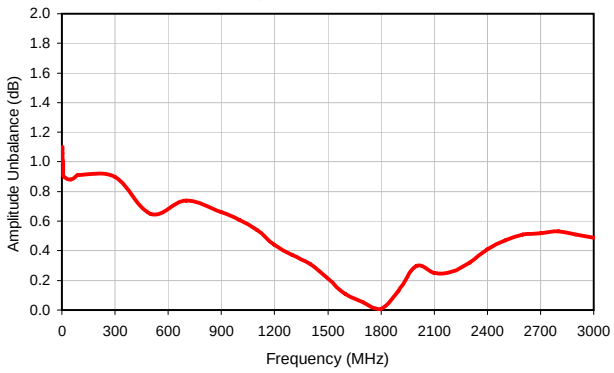
Average Insertion Loss



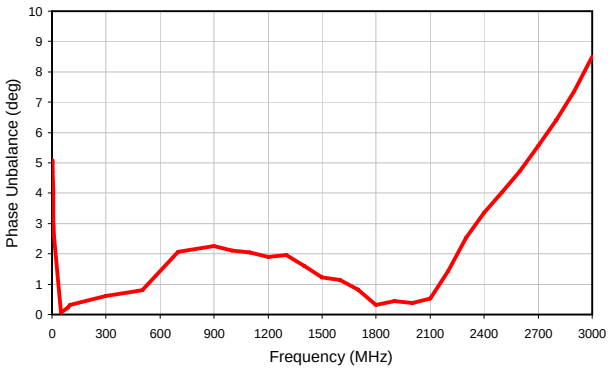
Input Return Loss



Amplitude Unbalance



Phase Unbalance

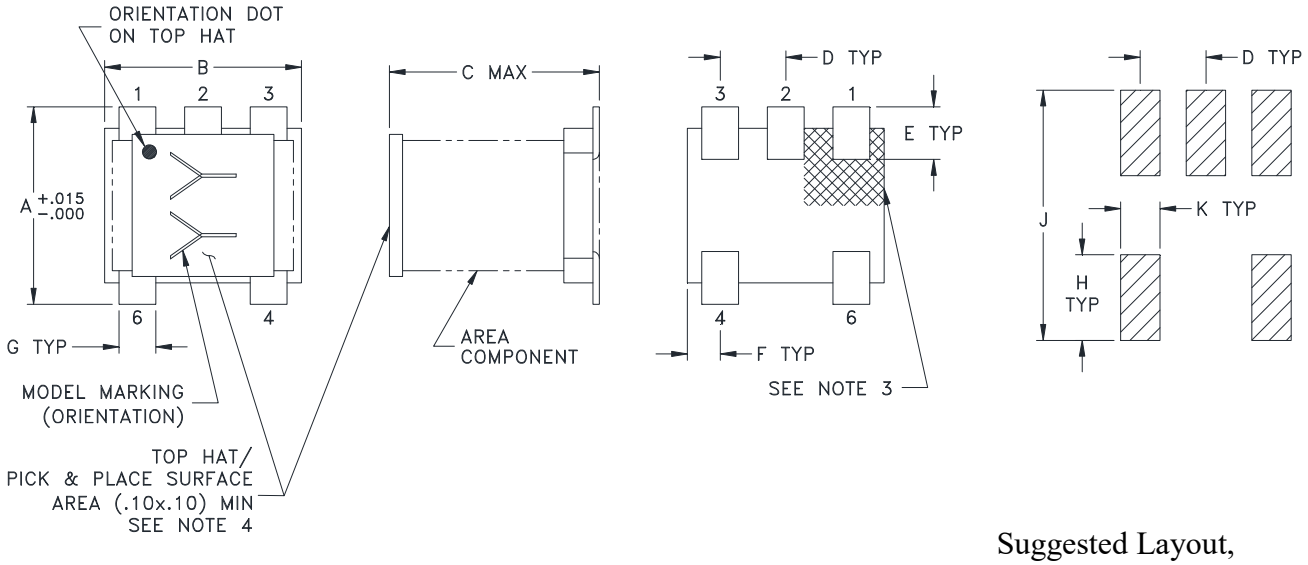


Case Style AT

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

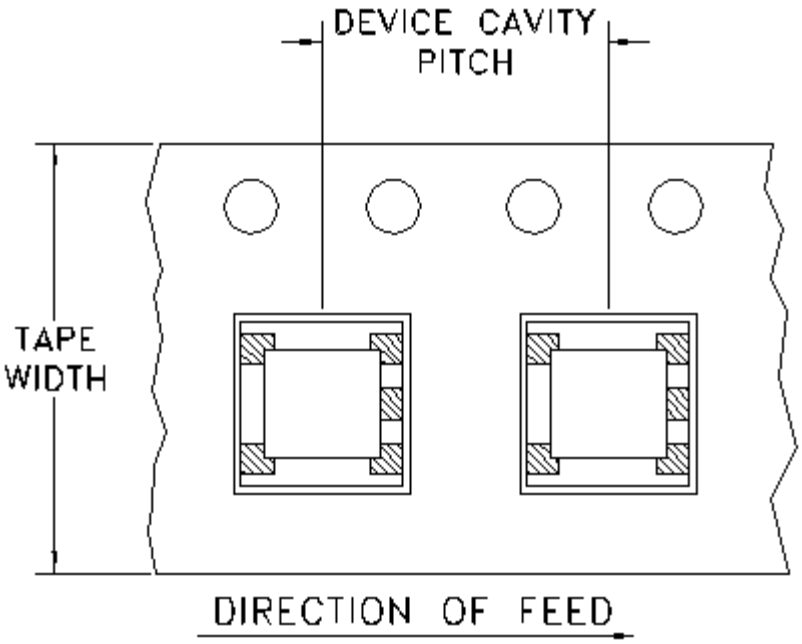
Dimensions are in inches (mm). Tolerances: 2 Pl. ± .01; 3 Pl. ± .005

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.

This document and its contents are the property of Mini-Circuits.

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.

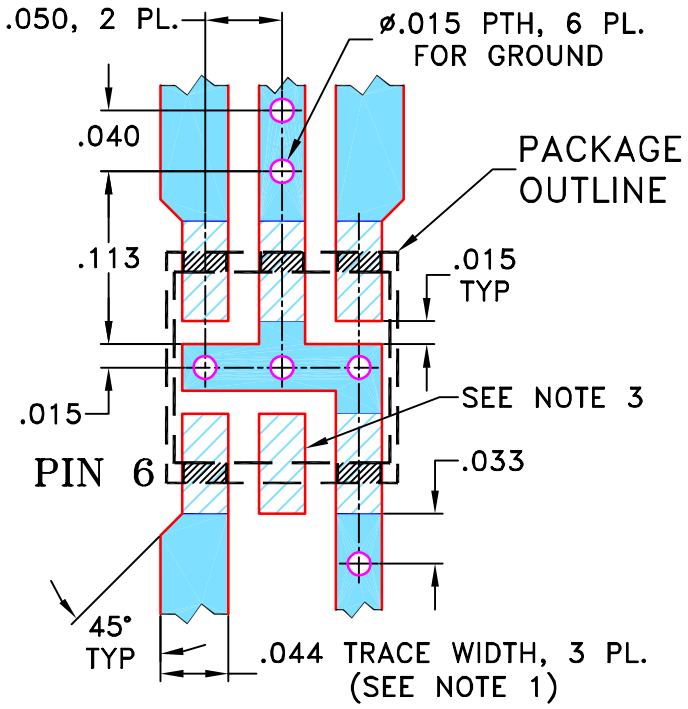
Go to: www.minicircuits.com/pages/pdfs/tape.pdf

This document and its contents are the property of Mini-Circuits.

THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M106563	NEW RELEASE	08/23/06	AV	IG

SUGGESTED MOUNTING CONFIGURATION FOR AT224/DB714 CASE STYLE, "gs/ha/hd" PIN CONNECTIONS (FOR SINGLE ENDED TO BALANCED APPLICATION)



NOTES:
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020" ± .0015"; COPPER: 1/2 OZ. ON EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
3. THIS PAD IS NOT REQUIRED FOR AT224 CASE STYLE.

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	07/28/06
TOLERANCES ON:	CHECKED	IL	08/23/06
2 PL DECIMALS ±	APPROVED	IG	08/23/06
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

Mini-Circuits®
THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE , MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.

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

Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

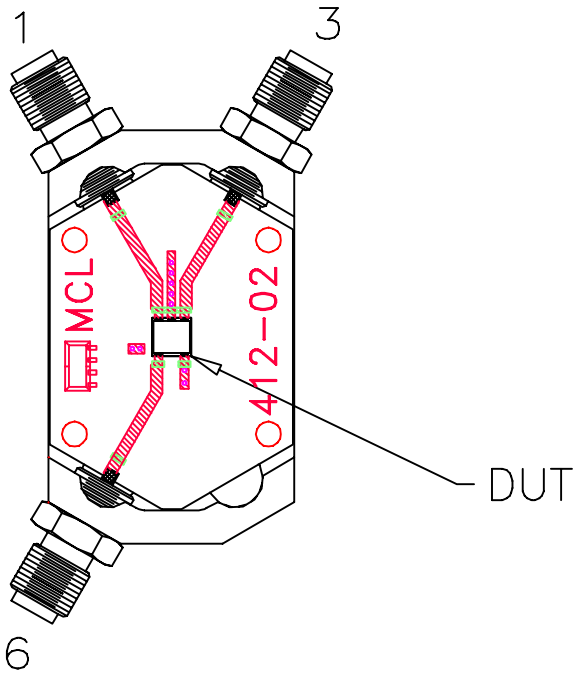
PL, gs/ha/hd, AT224/DB714, TC/TCM, TB-145

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-244	OR

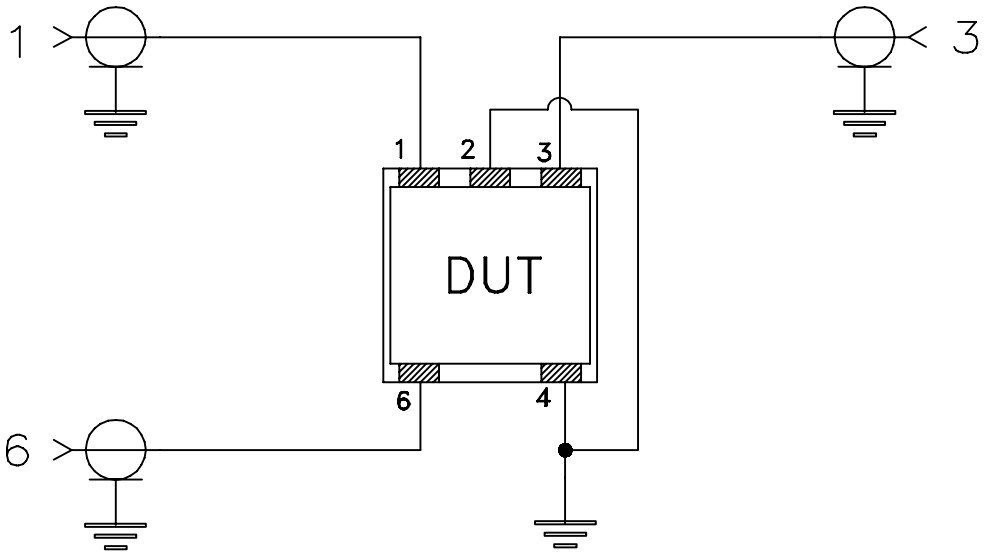
FILE:	SCALE:	SHEET:
98PL244	8:1	1 OF 1

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"

Mini-Circuits®

THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF 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

This document and its contents are the property of Mini-Circuits.