

# RF Transformer

## TC1-182T-75X+

75Ω 5 to 1800 MHz

### THE BIG DEAL

- Very wide band balun, with excellent performance from 5 MHz to 1800 MHz
- Excellent amplitude unbalance, 0.4 dB typ and phase unbalance, 5°typ.
- Good return loss, 20 dB typ.

*Generic photo used for illustration purposes only*

CASE STYLE: AT1521

### APPLICATIONS

- Balanced to unbalanced transmission
- Push-pull amplifiers
- PCS/DCS
- Cable TV
- Cellular
- Docsis 3.1

#### +RoHS Compliant

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

### PRODUCT OVERVIEW

The TC1-182T-75X+ is a balanced-to-unbalanced 75Ω transmission line transformer. This rugged, wire welded, rectangular core with top hat design is rated for up to 0.25W maximum power, in an aqueous washable case suitable for both RoHS and tin/lead solder systems.

### KEY FEATURES

Feature	Advantages
Very wide bandwidth	5-1800 MHz bandwidth covers CATV (forward & return), medical wireless and D2A/A2D, and other communications applications
Excellent amplitude and phase unbalance	0.4 dB amplitude and 5° phase unbalance aid rejection of even harmonics (in push-pull amplifiers) and common mode signals (when used as a balun)
Good return loss	Provides excellent matching for 75Ω circuitry
Low and flat insertion loss	Consistently low signal loss, ±0.2dB across all 100-1218 MHz CATV bands
Top Hat® feature	Improves speed and accuracy of pick and place assembly and provides clear device marking for visual inspection.



### ELECTRICAL SPECIFICATIONS AT 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Impedance Ratio			1		
Frequency Range		5	—	1800	MHz
Insertion Loss <sup>1</sup>	5 - 1800	—	1.2	2.5	dB
Amplitude Unbalance	5 - 1200	—	0.4	1.0	dB
	1200 - 1800	—	1.3	2.1	
Phase Unbalance	5 - 1800	—	5	10	Degree

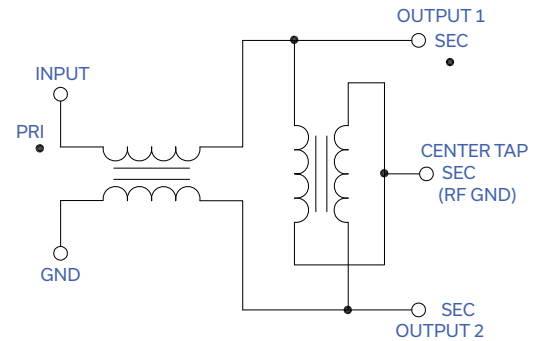
1. Insertion Loss is referenced to mid-band loss, 1.0 dB typ. Measured in 75Ω system.

### 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.

### CONFIGURATION M1





Mini-Circuits



BALANCED TO UNBALANCED

# RF Transformer

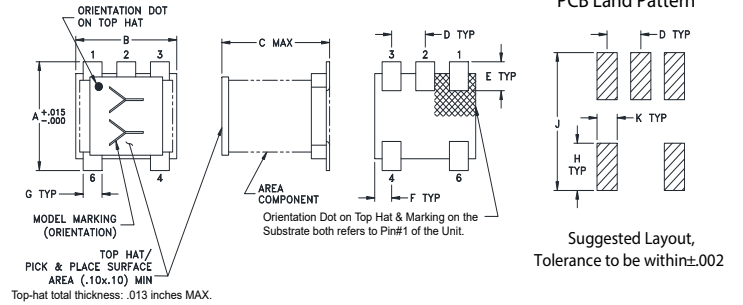
## TC1-182T-75X+

### PIN CONNECTIONS

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

**PRODUCT MARKING: YG**

### OUTLINE DRAWING

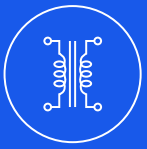


### OUTLINE DIMENSIONS (Inches/mm)

A	B	C	D	E	F	G	H	J	K	wt
.150	.150	.160	.050	.040	.025	.028	.065	.190	.030	grams
3.81	3.81	4.06	1.27	1.02	0.64	0.71	1.65	4.83	0.76	0.15

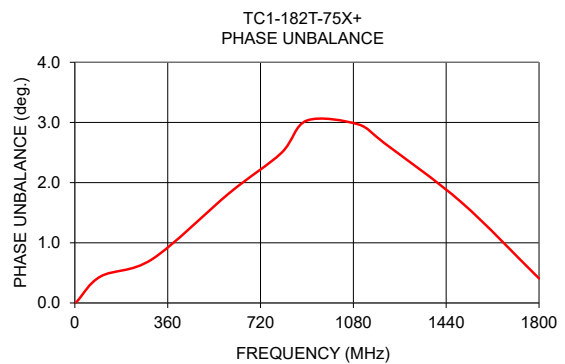
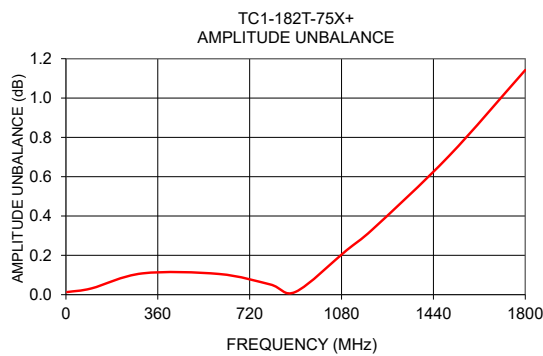
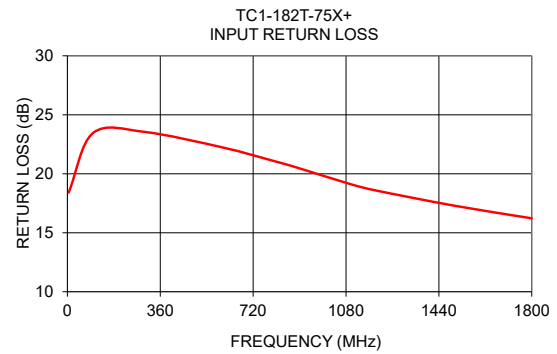
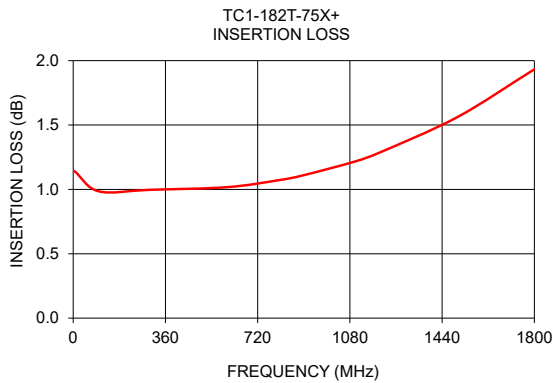
### TAPE & REEL INFORMATION: F17





### TYPICAL PERFORMANCE DATA

Frequency (MHz)	Insertion Loss (dB)	Input Return Loss (dB)	Amplitude Unbalance (dB)	Phase Unbalance (Deg.)
5	1.14	18.41	0.01	0.01
60	0.98	23.25	0.02	0.44
100	0.98	23.46	0.03	0.73
300	1.00	23.54	0.11	1.83
500	1.00	22.81	0.13	2.49
700	1.04	21.67	0.08	3.03
1000	1.16	19.76	0.11	2.97
1200	1.29	18.56	0.33	2.66
1500	1.56	17.29	0.70	1.67
1800	1.93	16.22	1.14	0.41



- 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.
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# RF Transformer

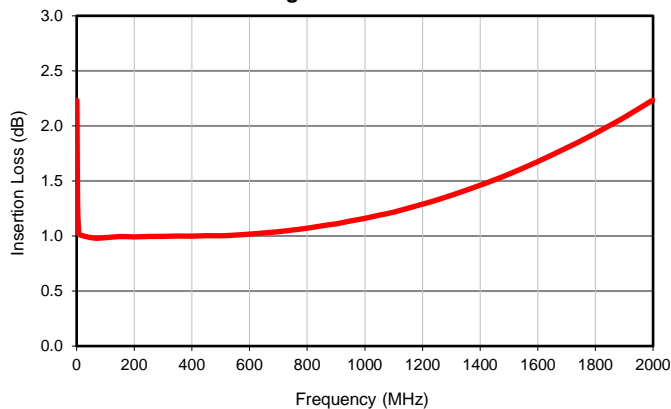
# TC1-182T-75X+

## Typical Performance Data

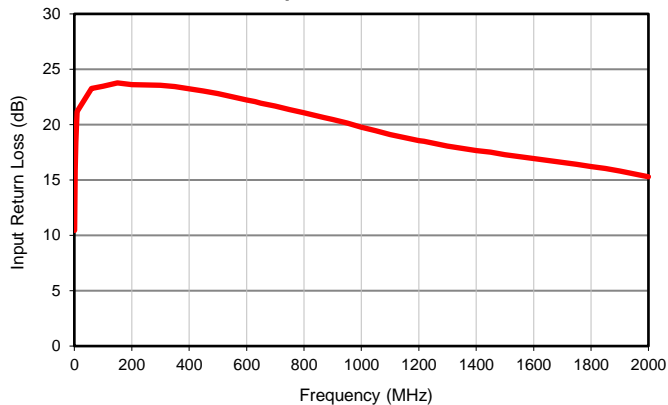
FREQUENCY (MHz)	AVERAGE INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (deg.)
1	2.23	10.45	0.03	0.02
3	1.35	15.87	0.02	0.00
5	1.14	18.41	0.01	0.01
7	1.06	19.90	0.01	0.03
10	1.01	21.18	0.02	0.08
60	0.98	23.25	0.02	0.44
100	0.98	23.46	0.03	0.73
150	0.99	23.77	0.06	1.14
200	0.99	23.61	0.06	1.38
250	1.00	23.60	0.08	1.61
300	1.00	23.54	0.11	1.83
350	1.00	23.44	0.12	2.00
400	1.00	23.23	0.12	2.15
450	1.00	23.04	0.13	2.32
500	1.00	22.81	0.13	2.49
550	1.01	22.53	0.11	2.64
600	1.02	22.24	0.11	2.79
630	1.02	22.08	0.10	2.85
650	1.03	21.93	0.10	2.90
700	1.04	21.67	0.08	3.03
750	1.05	21.37	0.07	3.13
800	1.07	21.08	0.05	3.18
870	1.10	20.63	0.01	3.09
900	1.11	20.46	0.01	3.10
950	1.14	20.14	0.06	3.04
1000	1.16	19.76	0.11	2.97
1050	1.19	19.45	0.16	2.93
1100	1.22	19.10	0.23	2.88
1200	1.29	18.56	0.33	2.66
1218	1.30	18.48	0.35	2.60
1300	1.37	18.07	0.46	2.40
1400	1.46	17.67	0.58	2.06
1450	1.51	17.52	0.64	1.89
1500	1.56	17.29	0.70	1.67
1600	1.68	16.94	0.84	1.24
1700	1.80	16.60	0.98	0.81
1750	1.86	16.42	1.06	0.64
1800	1.93	16.22	1.14	0.41
1850	2.00	16.03	1.21	0.23
1900	2.08	15.80	1.29	0.03
2000	2.24	15.29	1.44	0.50

## Typical Performance Data

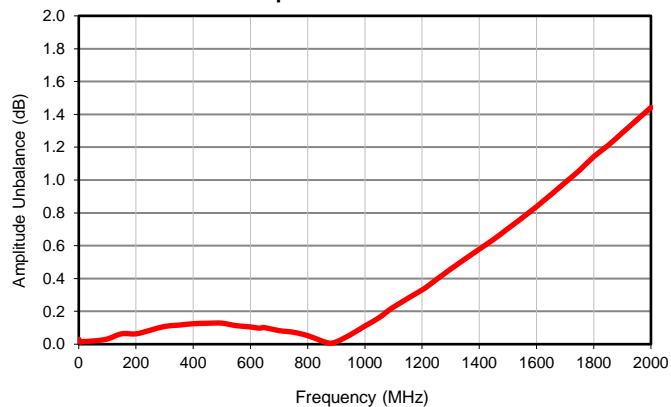
### Average Insertion Loss



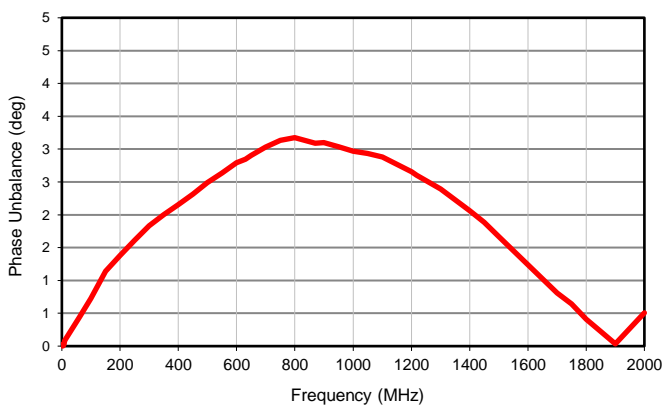
### Input Return Loss



### Amplitude Unbalance

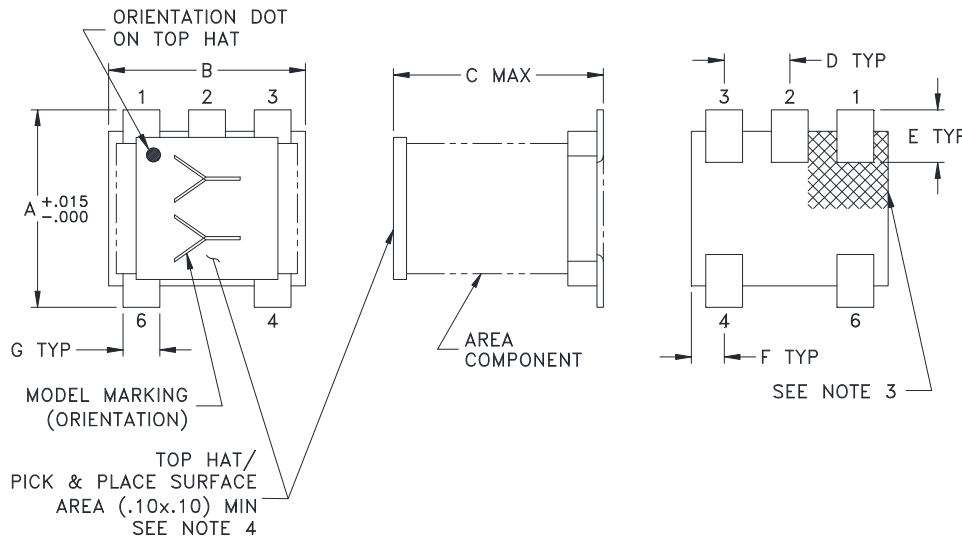


### Phase Unbalance

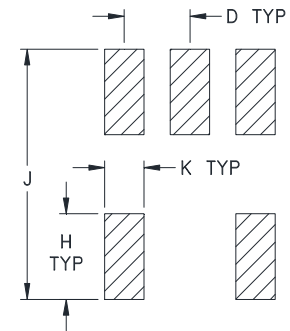


## Outline Dimensions

AT1521



## PCB Land Pattern



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

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.  $\pm .01$ ; 3 Pl.  $\pm .005$

### 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.



P.O. Box 350186, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site

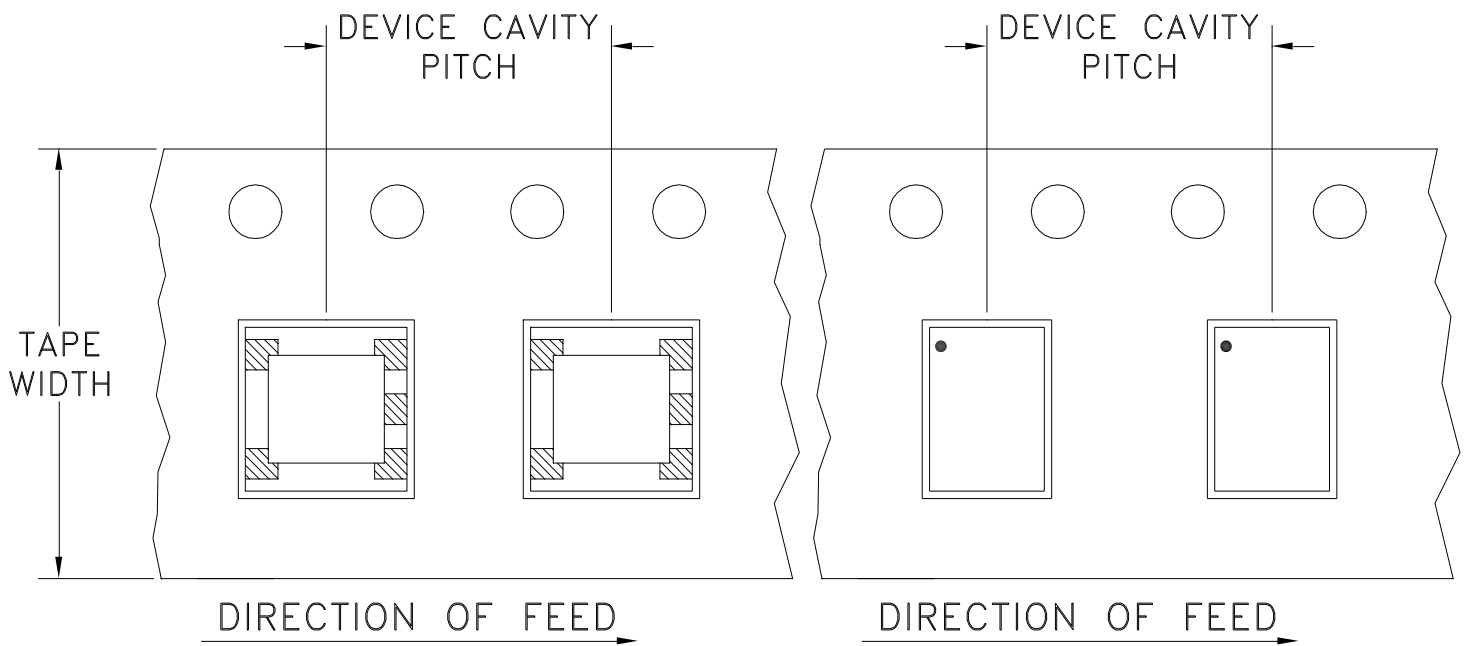


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RF/IF MICROWAVE COMPONENTS

# 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](http://www.minicircuits.com/pages/pdfs/tape.pdf)



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site

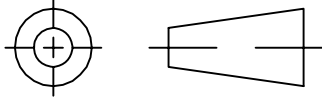


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RF/IF MICROWAVE COMPONENTS



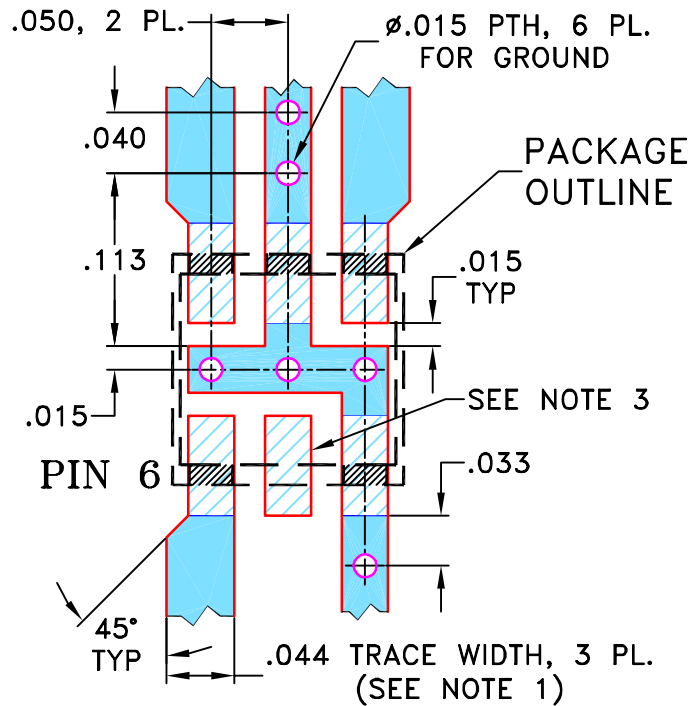
THIRD ANGLE PROJECTION



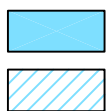
REVISIONS

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:**
- 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.
  - BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
  - THIS PAD IS NOT REQUIRED FOR AT224 CASE STYLE.



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

UNLESS OTHERWISE SPECIFIED

INITIALS      DATE

DIMENSIONS ARE IN INCHES  
TOLERANCES ON:  
2 PL DECIMALS ±  
3 PL DECIMALS ± .005  
ANGLES ±  
FRACTIONS ±

DRAWN	AV	07/28/06
CHECKED	IL	08/23/06
APPROVED	IG	08/23/06



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13 Neptune Avenue  
Brooklyn NY 11235

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

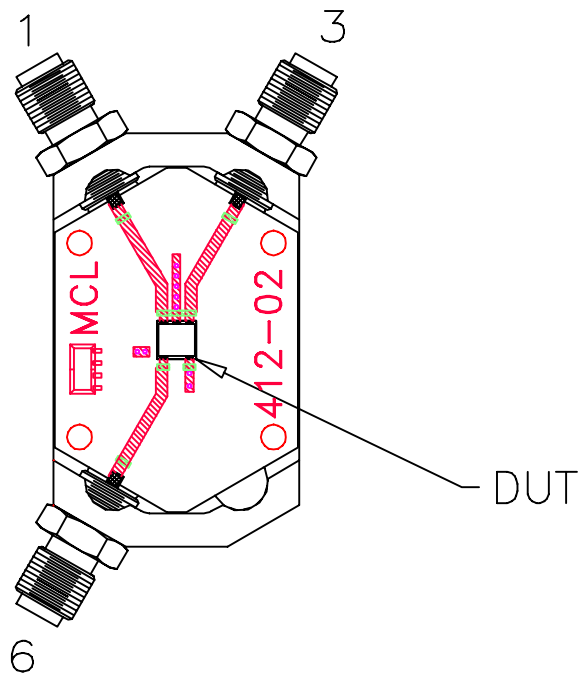
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SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-244	REV: OR
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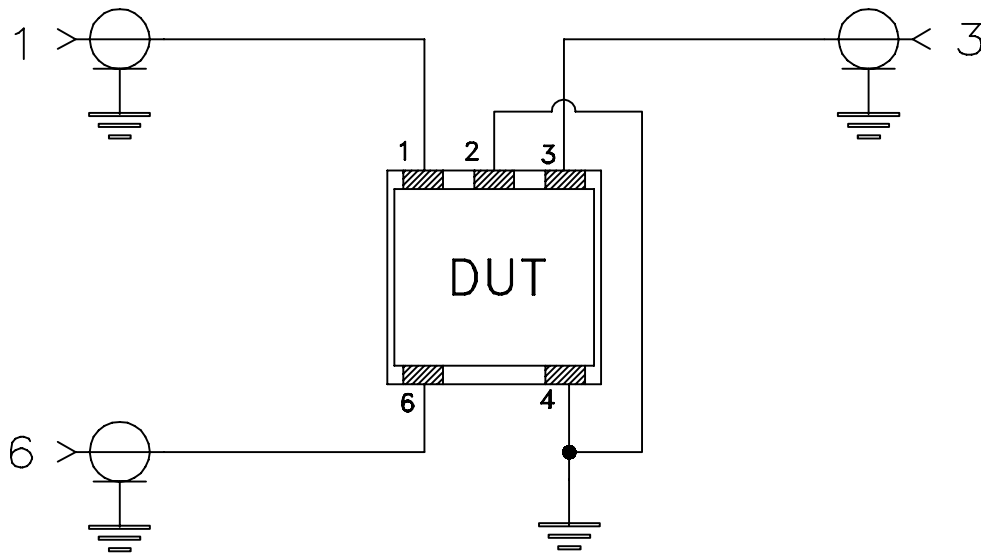
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# Evaluation Board and Circuit

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®**

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