

## **SURFACE MOUNT**

# RF Transformer

TC1-15+

50Ω 350 to 1500 MHz

#### **FEATURES**

- Wideband, 350 to 1500 MHz
- Balanced Transmission Line
- Good Return Loss
- Plastic Base with Leads
- · Aqueous Washable



Generic photo used for illustration purposes only

CASE STYLE: AT224-1A

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

#### **APPLICATIONS**

- PCS
- Cellular
- · Impedance Matching
- Balanced Amplifier
- Baluns

#### **ELECTRICAL SPECIFICATIONS AT +25°C**

Parameter	Frequency (MHz)	Min.	Тур.	Max.	Unit
Impedance Ratio			1		
Frequency Range		350		1500	MHz
			3		
Insertion Loss <sup>1</sup>	350-1500		2		dB
	800-1500		1		

<sup>1.</sup> Insertion Loss is referenced to mid-band loss, 0.35 dB typ.

#### **ABSOLUTE MAXIMUM RATINGS**

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

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

#### **CONFIG. G**



REV. E ECO-025303 TC1-15+ MCL NY 250423



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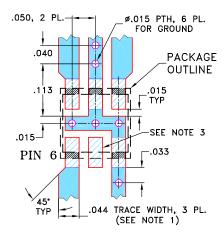
50Ω 350 to 1500 MHz

#### **PIN CONNECTIONS**

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

#### **PRODUCT MARKING: N/A**

#### **DEMOBOARD P/N:** TB-TC1-15+ **SUGGESTED PCB LAYOUT** (PL-244)

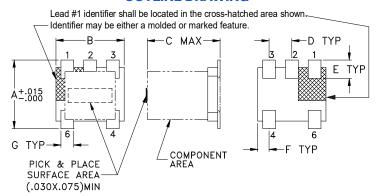


- TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020" ± .0015"; COPPER: 1/2 OZ. ON EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- 2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- 3. THIS PAD IS NOT REQUIRED FOR AT224 CASE STYLE.

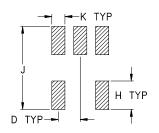
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

#### **OUTLINE DRAWING**



**PCB Land Pattern** 



Suggested Layout, Tolerance to be within±.002

### OUTLINE DIMENSIONS (Inch )

.050			
.030	.160	.150	.150
1.27	4.06	3.81	3.81
K	.1	н	G
• • •	•	• • •	.028
0.76	4.83	1.65	0.71
	1.27 K	J K	H J K

#### **TAPE & REEL INFORMATION: F17**



# RF Transformer

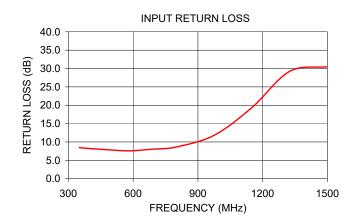
TC1-15+

50Ω 350 to 1500 MHz

#### **TYPICAL PERFORMANCE DATA**

FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT R. LOSS (dB)
350.00	0.46	8.47
360.00	0.56	8.38
470.00	0.71	7.92
580.00	0.86	7.58
690.00	0.59	8.03
800.00	0.60	8.62
975.00	0.48	11.81
1150.00	0.38	19.36
1325.00	0.43	29.22
1500.00	0.50	30.48





#### NOTE

- 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



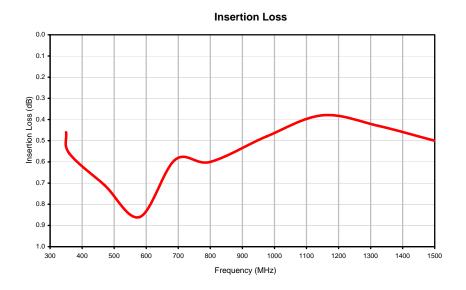
**RF Transformer** TC1-15+

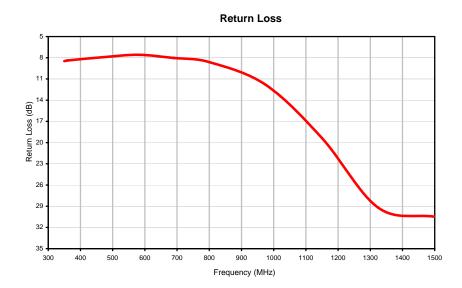
# Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)	RETURN LOSS (dB)
350.00	0.46	8.47
360.00	0.56	8.38
470.00	0.71	7.92
580.00	0.86	7.58
690.00	0.59	8.03
800.00	0.60	8.62
975.00	0.48	11.81
1150.00	0.38	19.36
1325.00	0.43	29.22
1500.00	0.50	30.48

**RF Transformer** TC1-15+

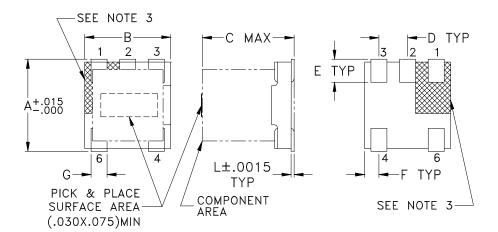
# Typical Performance Curves



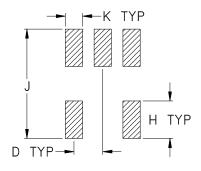


## **Outline Dimensions**

AT224-1



#### **PCB Land Pattern**



Suggested Layout, Tolerance to be within ±.002

CASE #	A	В	C	D	Е	F	G	Н	J	K	L	WT. GRAMS
AT224-1	.150 (3.81)	.150 (3.81)	.160 (4.06)	.050 (1.27)	.040 (1.02)	.025 (0.64)	.028 (0.71)	.065 (1.65)	.190 (4.83)	.030 (0.76)	.007 (0.18)	.15

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

#### **Notes:**

- 1. Case material: Plastic.
- 2. Termination finish: Tin plate over Nickel plate.
- 3. Lead #1 identifier shall be located in the cross-hatched area shown. Identifier may be either a molded or marked feature.



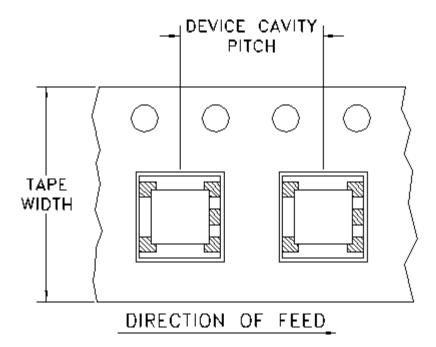


P.O. Box 350186, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site

The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

# 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





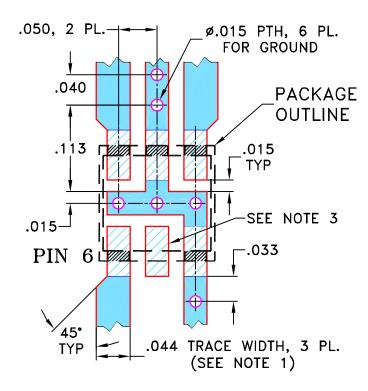
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RF/IF MICROWAVE COMPONENTS

THIRD ANG	LE PROJECTION
<b>(</b>	

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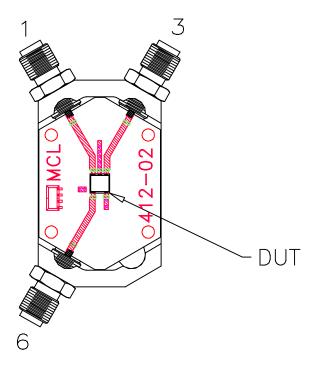
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

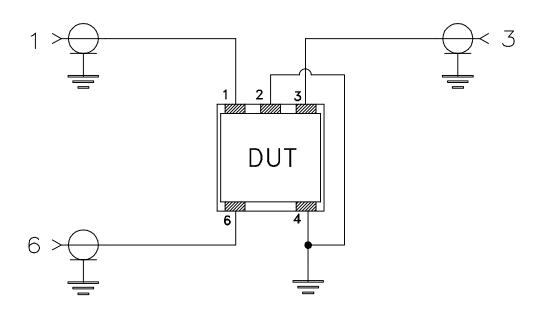
UNLESS OTHERWISE SPECIFIED	)	INITIALS	DATE				•	• 4 ®		
DIMENSIONS ARE IN INCHES	DRAWN	AV	07/28/06		-1 Mini	ı <b>—</b> C	ircu	1ts :	Neptu	ne Avenue NY 11235
TOLERANCES ON:	CHECKED	IL	08/23/06					DI	OOKIYII	N1 11235
3 PL DECIMALS ± .005	APPROVED	IG	08/23/06							
FRACTIONS ±				PL.	gs/ha/hd	. AT2	24/DB71	4. TC/T	CM.	TB-145
∭ Mini−Circuits ®			],	6-77	,	,	-,, -	,		
THIS DOCUMENT AND ITS CONTENTS EXCEPT FOR USE EXPRESSLY GRANTE				SIZE	CODE IDENT	DRAWING	NO.			REV:
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PARIT, IN WHOLE OR IN PART, WITH				FILE:	98PL244	SCALE:	8:1	SHEET:	1	OF 1
	ASHEETA1.	WG REV:A	DATE:01/12/95		COLLAIT		<b>U.1</b>			V1 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, III Mini-Circuits® Dielectric Constant=3.5, Thickness=.020"



#### **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

ENV02T1 Rev: B

02/25/11

M130240 File: ENV02T1.pdf

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