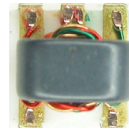


Surface Mount RF Transformer

TC2-1TG2+

50Ω

3 to 300 MHz



CASE STYLE: AT224-3

+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

Maximum Ratings

Operating Temperature	-20°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

PRIMARY DOT	6
PRIMARY	4
SECONDARY DOT	1
SECONDARY	3
SECONDARY CT	2

Features

- suitable for tin/lead and RoHS solder systems
- good return loss
- excellent amplitude unbalance, (0.5 dB typ.) and phase unbalance, (4 deg. typ.) in 1 dB bandwidth
- aqueous washable

Applications

- impedance matching
- balanced to unbalanced transformation
- push-pull amplifiers

Electrical Specifications

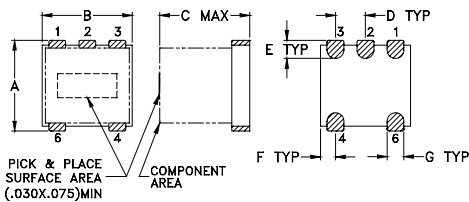
Ω RATIO (Secondary/Primary)	FREQUENCY (MHz)	INSERTION LOSS*			PHASE UNBALANCE (Deg.) Typ.		AMPLITUDE UNBALANCE (dB) Typ.	
		3 dB MHz	2 dB MHz	1 dB MHz	1 dB bandwidth	2 dB bandwidth	1 dB bandwidth	2 dB bandwidth
2	3-300	—	—	3-300	4	—	0.5	—

* Insertion Loss is referenced to mid-band loss, .4 dB typ.

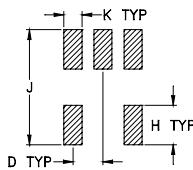
Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT R. LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (Deg.)
3.00	0.38	21.63	0.05	0.54
5.00	0.33	20.24	0.04	0.57
10.00	0.34	19.32	0.02	0.45
50.00	0.37	19.41	0.03	0.56
70.00	0.40	19.34	0.04	0.64
100.00	0.44	19.00	0.07	0.86
150.00	0.52	18.11	0.14	1.30
200.00	0.60	17.06	0.25	1.68
300.00	0.80	15.00	0.53	2.44

Outline Drawing AT224-3



PCB Land Pattern

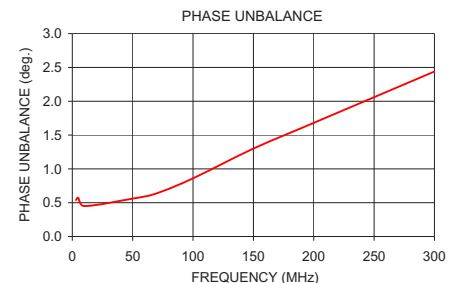
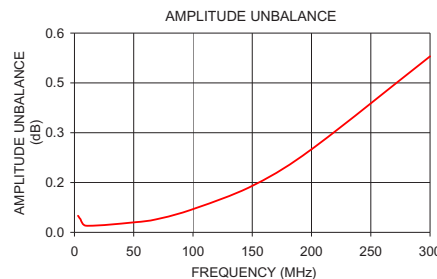
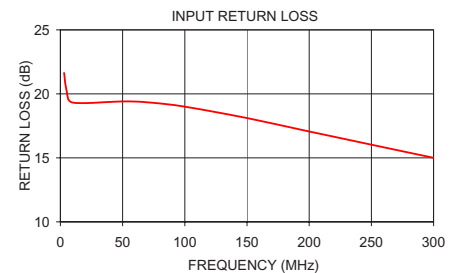
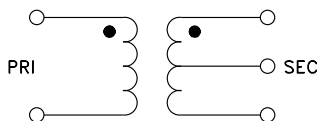


Suggested Layout,
Tolerance to be within ±.002

Outline Dimensions (inch/mm)

A	B	C	D	E	F	
.150	.150	.150	.050	.030	.025	
3.81	3.81	3.81	1.27	0.76	0.64	
G	H	J	K			wt
.028	.065	.190	.030			grams
0.71	1.65	4.83	0.76			0.10

Config. A



Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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

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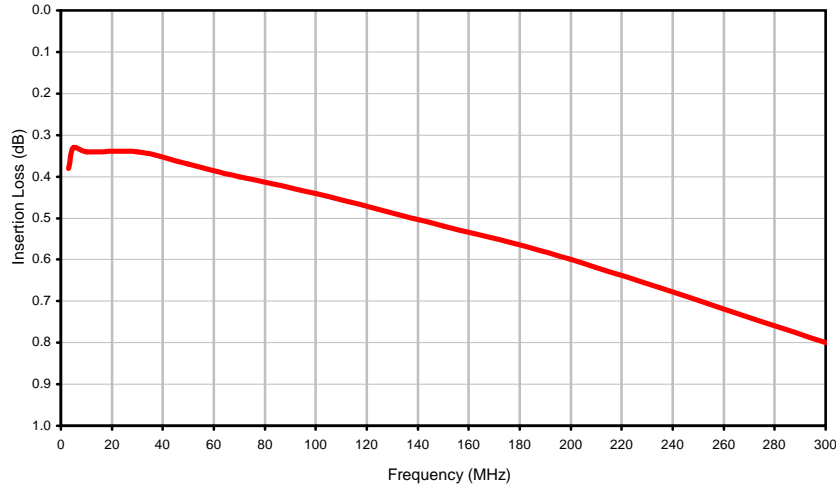
REV. A
M151107
TC2-1TG2+
ED-6119
IG/TD/CP/AM
170919
Page 1 of 1

Typical Performance Data

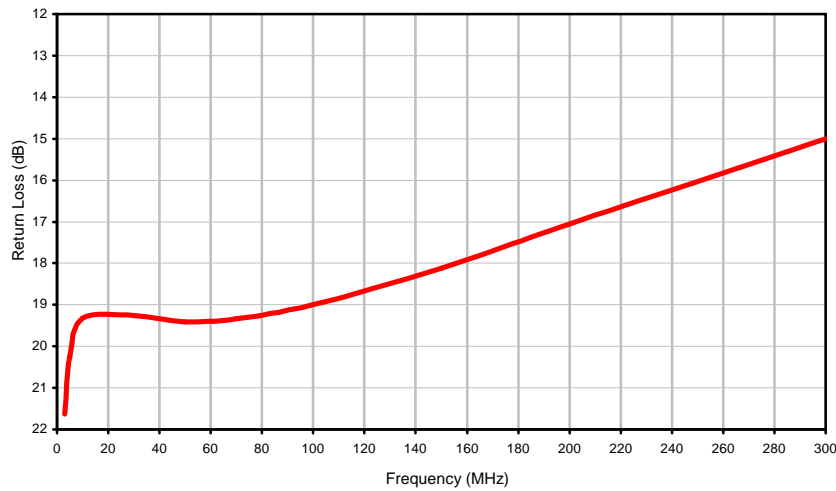
FREQUENCY (MHz)	INSERTION LOSS (dB)	RETURN LOSS (dB)
3.00	0.38	21.63
5.00	0.33	20.24
10.00	0.34	19.32
30.00	0.34	19.26
50.00	0.37	19.41
70.00	0.40	19.34
100.00	0.44	19.00
150.00	0.52	18.11
200.00	0.60	17.06
300.00	0.80	15.00

Typical Performance Curves

Insertion Loss



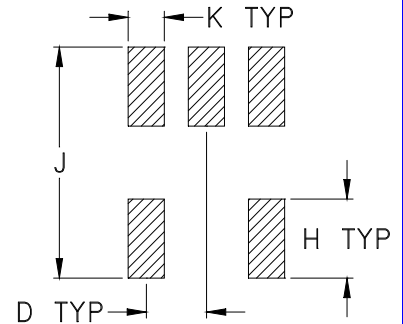
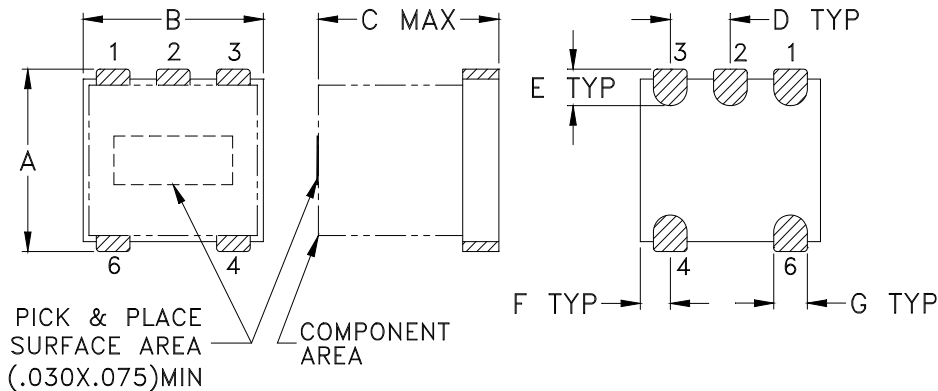
Return Loss



Outline Dimensions

AT224-3

PCB Land Pattern



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

CASE #	A	B	C	D	E	F	G	H	J	K	L	WT. GRAMS
AT224-3	.150 (3.81)	.150 (3.81)	.150 (3.81)	.050 (1.27)	.030 (0.76)	.025 (0.64)	.028 (0.71)	.065 (1.65)	.190 (4.83)	.030 (0.76)	-- --	.10

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

Notes:

- Open style, ceramic base.
- Termination finish: 3.15-5.12 μ inch (.08-.130 microns) Gold over 78-236 μ inch (1.98-6.0 microns) Nickel plate.



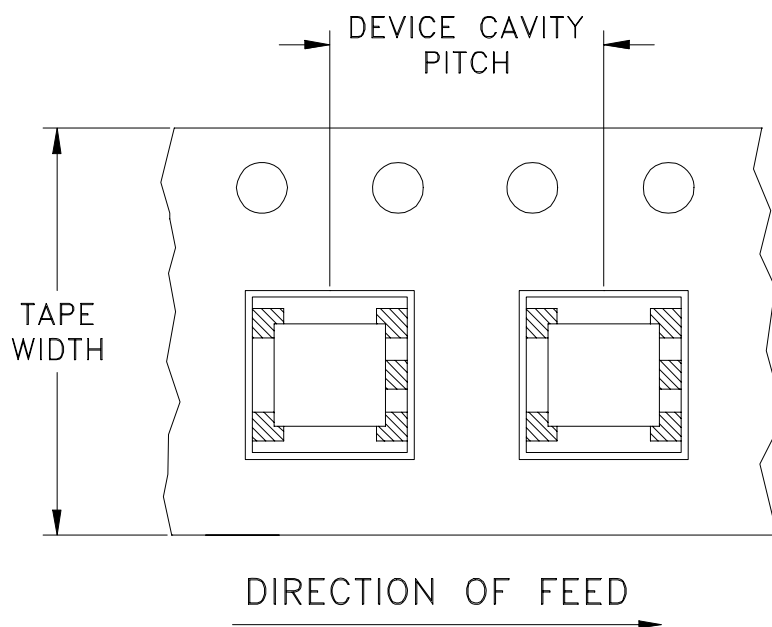
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Tape & Reel Packaging TR-F17

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



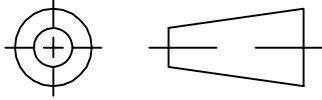
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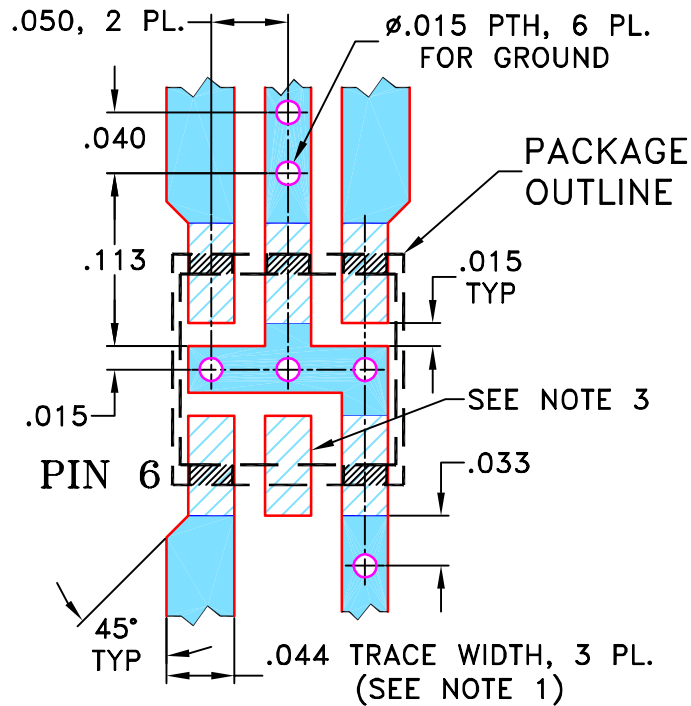
THIRD ANGLE PROJECTION



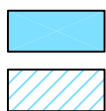
REVISIONS

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.



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 ± .005

APPROVED

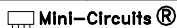
IG

08/23/06

3 PL DECIMALS ± .005

ANGLES ±

FRACTIONS ±



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



Mini-Circuits®

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 Brooklyn NY 11235

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

SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-244	REV: OR
FILE: 98PL244	SCALE: 8:1	SHEET: 1 OF 1	



Environmental Specifications ENV02

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications for any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference
Operating Temperature	-20° to 85°C Ambient Environment	Individual Model Data
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 2008 and end-point electric
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 2008 +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
Solderability	10X Magnification	J-STD-002, 95% Cov
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 2008
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 2008
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 2008

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