

TCM3-1TX+

 $50\Omega$  2 to 500 MHz

## **The Big Deal**

- Low amplitude unbalance, 0.3 dB typ.
- Excellent phase unbalance, 2 deg. typ.
- Small size, 0.16 x 0.15 x 0.16"





CASE STYLE: DB1627

## **Product Overview**

TCM3-1TX+ is a  $50\Omega$  surface-mount, DC-isolated transformer with a secondary center tap, covering the 2 to 500 MHz band. This model provides a 3:1 secondary/primary impedance ratio and is capable of handling up to 0.25W RF input power. It provides 0.3 dB typ. amplitude unbalance and 2° phase unbalance. Featuring core and wire construction mounted on a 6-lead plastic base with tin over nickel termination finish, the unit measures 0.16 x 0.15 x 0.16" to accommodate dense circuit board layouts. It also incorporates Mini-Circuits' Top Hat® feature for faster, more accurate pick-and-place assembly.

## **Key Features**

Feature	Advantages
Low unbalance: - 0.3 dB typ. amplitude unbalance - 2° phase unbalance	Low unbalance improves a system's electromagnetic compatibility by rejecting unwanted commonmode noise.
DC isolation Provides DC isolation between circuits and efficient AC transmission, eliminating the need external DC biasing components.	
Secondary center tap	Allows DC feed up to 30 mA and DC bias without adding bias tees into the signal chain.
Small footprint (0.16 x 0.15 x 0.16")	Accommodates tight space requirements for dense PCB layouts.
Top Hat <sup>®</sup> feature	Improves speed and accuracy of pick and place assembly and provides clear device marking for visual inspection.

#### 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-Circuit 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

## TCM3-1TX+

#### 2 to 500 MHz $50\Omega$





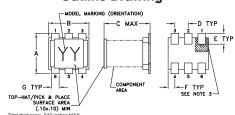
#### **Maximum Ratings**

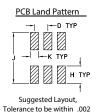
Operating Temperature	-20°C to 85°C		
Storage Temperature	-55°C to 100°C		
RF Power	0.25W		
DC Current	30mA		
Permanent damage may occur if any of these limits are exceeded.			

#### **Pin Connections**

PRIMARY DOT	6
PRIMARY	4
SECONDARY DOT	1
SECONDARY	3
SECONDARY CT	2
NOT USED	5

#### **Outline Drawing**

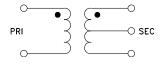




## Outline Dimensions (inch)

Α	В	С	D	Ε	F
.160	.150	.160	.050	.040	.025
4.06	3.81	4.06	1.27	1.02	0.64
G	Н	J	K		wt
G .028	H .065	J .190	.030		wt grams

#### Config. A



#### **Features**

- Excellent amplitude unbalance. 0.3 dB typ.
- Excellent phase unbalance, 2 deg. typ. in 1 dB bandwidth
- Plastic base with solder plated leads
- · Aqueous washable

#### **Applications**

Impedance matching

		4
4		4

CASE STYLE: DB1627

#### +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

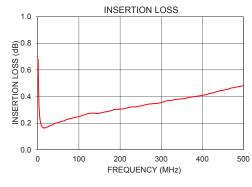
#### Electrical Specifications at 25°C

Parameter	Frequency (MHz)	Min.	Тур.	Max.	Unit
Impedance Ratio (Secondary/Primary)	-	-	3	-	Ω
Frequency Range	-	2	-	500	MHz
Insertion Loss	2-500	-	0.4	2	٩D
Insertion Loss	5-300	-	0.3	1	dB

<sup>\*</sup> Insertion Loss is referenced to mid-band loss, 0.5 dB typ.

#### **Typical Performance Data**

FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT R. LOSS (dB)	
1	0.68	15.11	
2	0.44	18.06	
3	0.34	19.73	
5	0.24	21.64	
10	0.17	23.62	
100	0.25	24.61	
125	0.27	24.27	
150	0.28	24.36	
175	0.29	24.00	
200	0.31	23.71	
225	0.32	23.34	
250	0.33	22.89	
275	0.34	22.50	
300	0.36	22.23	
325	0.37	21.81	
350	0.38	21.40	
375	0.40	21.05	
400	0.41	20.74	
450	0.45	19.97	
500	0.48	19.35	





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RF Transformer TCM3-1TX+

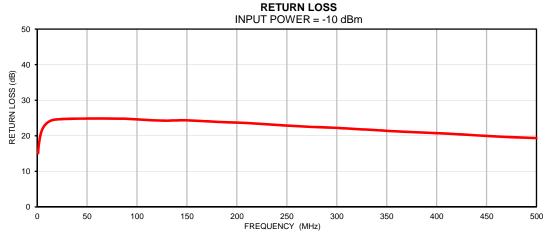
## Typical Performance Data

FREQ.	INSERTION LOSS	RETURN LOSS
(MHz)	(dB)	(dB)
1	0.68	15.11
2	0.44	18.06
3	0.34	19.73
5	0.24	21.64
10	0.17	23.62
25	0.17	24.71
50	0.21	24.84
75	0.23	24.85
100	0.25	24.61
125	0.27	24.27
150	0.28	24.36
175	0.29	24.00
200	0.31	23.71
225	0.32	23.34
250	0.33	22.89
275	0.34	22.50
300	0.36	22.23
325	0.37	21.81
350	0.38	21.40
375	0.40	21.05
400	0.41	20.74
425	0.43	20.39
450	0.45	19.97
475	0.47	19.61
500	0.48	19.35

RF Transformer TCM3-1TX+

## Typical Performance Curves





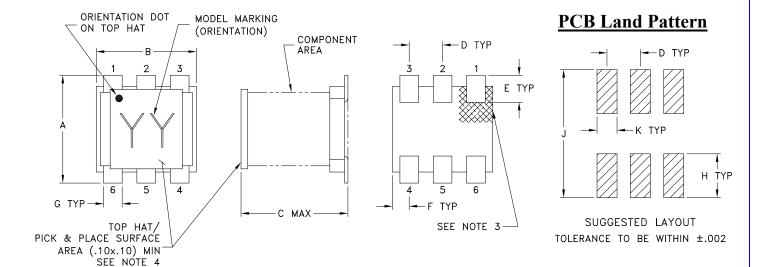


## Case Style



**DB1627** 

### **Outline Dimensions**



CASE#	A	В	C	D	Е	F	G	Н	J	K	WT. GRAM
DB1627	.160	.150	.160	.050	.040	.025	.028	.065	.190	.030	15
DB1027	(4.06)	(3.81)	(4.06)	(1.27)	(1.02)	(0.64)	(0.71)	(1.65)	(4.83)	(0.76)	.13

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

#### **Notes:**

- 1. Case material: Plastic.
- 2. Termination finish:

For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.

For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

- 3 Orientation dot on top hat & orientation feature on substrate correspondence to pin #1.
- 4 Top-Hat total thickness: .013 inches MAX.





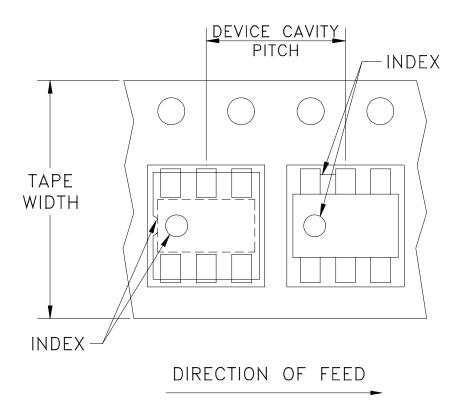
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site

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

RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F47

#### DEVICE ORIENTATION IN T&R



Tape Width,	<b>Device Cavity</b>	Reel Size,	Devices per Reel
mm	Pitch, mm	inches	see note
12	8	13	1000, 2000
		7	20, 50, 100, 200, 500

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



INTERNET http://www.minicircuits.com

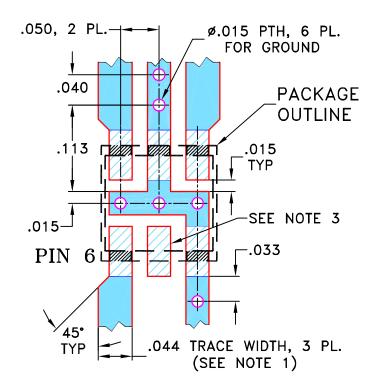
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THIRD ANG	LE PROJECTION
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		REVISIONS			
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M106563	NEW RELEASE	08/23/06	AV	IG

# 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.

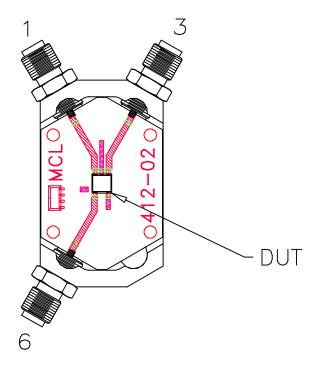
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

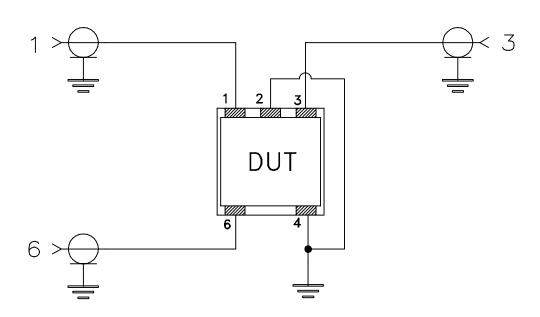
UNLESS OTHERWISE SPECIFIED	INITIALS		DATE		7.5.		• 4 ®	
DIMENSIONS ARE IN INCHES	DRAWN	AV	07/28/06		⊥ Mını	i-Circu	1ts 13 Neptu	ne Avenue
TOLERANCES ON: 2 PL DECIMALS ±	CHECKED	IL	08/23/06		П		Brooklyn	CGSII IN
3 PL DECIMALS ± .005	APPROVED	IG	08/23/06					
FRACTIONS ± $\nabla$ PL, gs/ha/hd, AT224/DB714, TC/TCM, TB-					TB-145			
Mini-Circuits ®					677	,	, , ,	
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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, III Mini-Circuits® Dielectric Constant=3.5, Thickness=.020"



#### **Environmental Specifications**

ENV02

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.

Test/Inspection Condition	Reference/Spec
-20° to 85°C Ambient Environment	Individual Model Data Sheet
-55° to 100° C Ambient Environment	Individual Model Data Sheet
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
-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
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
10X Magnification	J-STD-002, 95% Coverage
20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
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
	-20° to 85°C Ambient Environment  -55° to 100° C Ambient Environment  90 to 95% RH, 240 hours, 50°C  -55° to 100°C, 100 cycles  Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak  10X Magnification  20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)  50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes  Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether +

ENV02 Rev: A

02/25/11

M130240 File: ENV02.pdf

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