

TRS2-1T-75+

**75**O

5 to 1200 MHz

## **The Big Deal**

- Low insertion loss, 1.0 dB typ.
- Good return loss, 20 dB typ.
- Low amplitude unbalance, 0.3 dB
- Power handling up to 0.25W



### **Product Overview**

The TRS2-1T-75+ is a  $75\Omega$  surface mount balanced-to-balanced transformer with a 2:1 secondary/primary impedance ratio covering the 5 to 1200 MHz band, meeting bandwidth requirements for DOCSIS® 3.1 compliant systems and equipment, among other applications. This model handles RF input power up to 0.25W and provides low insertion loss, good return loss and low amplitude unbalance. Measuring only 0.28 x 0.25 x 0.12", the unit features core and wire, all-welded construction with gold over nickel plate wraparound terminations suitable for tin/lead and RoHS solder systems. The unit also includes Mini-Circuits' Top Hat<sup>TM</sup> feature for faster more accurate pick-and-place assembly.

# **Key Features**

Feature	Advantages
Wideband, 5 to 1200 MHz	TRS2-1T-75+ supports a variety of applications including CATV and DOCSIS 3.1 systems and equipment.
Low insertion loss, 1.0 dB	Enables excellent signal power transmission from input to output.
Good return loss, 20 dB typ.	Excellent matching for 75 $\Omega$ systems with minimal signal reflection.
Low amplitude unbalance, 0.3 dB	Low unbalance can improve a system's electromagnetic compatibility by rejecting unwanted common-mode noise.
Small footprint, 0.28 x 0.25"	Accommodates tight space requirements for dense PCB layouts.
Top Hat® feature	Improves speed and accuracy of pick and place assembly and provides clear device marking for visual inspection



# TRS2-1T-75+

### $75\Omega$ 5 to 1200 MHz

#### **Features**

- suitable for tin/lead and RoHS solder systems
- wideband, 5 to 1200 MHz
- balanced transmission line
- good return loss, 20 dB typ. at 1 dB band
- excellent amplitude unbalance, 0.3 dB typ.
- aqueous washable

### **Applications**

- balanced to unbalanced transformation
- push-pull amplifiers
- PCS/DCS
- cable TV
- cellular



Generic photo used for illustration purposes only

CASE STYLE: TT1618

+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"	10, 20, 50, 100, 200
13"	500

### Electrical Specifications at 25°C

Parameter	Frequency (MHz)	Min.	Тур.	Max.	Unit
Impedance Ratio (secondary/primary)			2		
Frequency Range		5		1200	MHz
	5 - 600	_	0.6	1.0	
Insertion Loss*	600 - 1000	_	1.0	1.8	dB
	1000 - 1200	_	1.3	2.2	
	5 - 600	_	0.3	1.0	
Amplitude Unbalance	600 - 1000	_	0.6	1.7	dB
	1000 -1200	_	0.8	1.9	
Phase Unbalance	5 - 50	_	0.8	3	Dograd
Phase Oribalance	50 - 1200	_	5	9	Degree
	5 - 50	17	22	_	
Primary Return Loss (Input)	50 -1000	13	22	_	dB
	1000 - 1200	9	17	_	

<sup>\*</sup> Insertion Loss is referenced to mid-band loss, 0.6 dB typ.

### **Maximum Ratings**

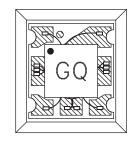
	Ratings -40°C to 85°C -55°C to 100°C		
Parameter	Ratings		
Operating Temperature	-40°C to 85°C		
Storage Temperature	-55°C to 100°C		
RF Power	0.25W		
DC Current	30mA		

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

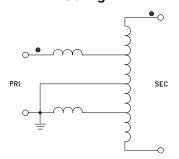
#### **Pin Connections**

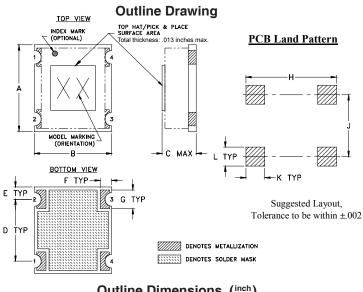
Function	Pin Number
PRIMARY DOT	1
PRIMARY (GROUND)	4
SECONDARY DOT	3
SECONDARY	2

### **Product Marking**

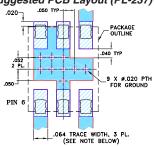


### Config. P1





#### Demo Board MCL P/N: TB-619+ Suggested PCB Layout (PL-237)



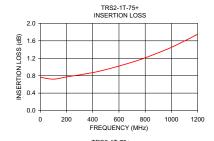
NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO43508 WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 .02; EACH SIDE. FOR O'HER MATERIAS TRACE WIDTH MAY NEED TO BE MODIFIED. 2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE. DENOTES PCB COPPER LAVOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER) DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

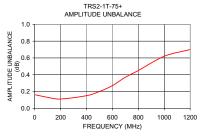
### Outline Dimensions (inch mm)

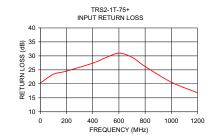
F	Ε	D	C	В	Α
.037	.040	.200	.12	.250	.280
0.94	1.02	5.08	3.05	6.35	7.11
wt.	L	K	J	Н	G
grams	.061	.061	.200	.293	.060
2.8	1.55	1.55	5.08	7.44	1.52

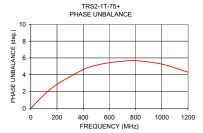
### **Typical Performance Data**

FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT R. LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (Deg.)
5.00	0.76	20.46	0.16	0.07
100.00	0.72	23.43	0.13	1.58
200.00	0.77	24.55	0.11	2.85
400.00	0.87	27.39	0.15	4.61
500.00	0.94	29.37	0.20	5.13
600.00	1.02	30.97	0.27	5.43
700.00	1.11	29.50	0.37	5.60
800.00	1.21	26.22	0.45	5.67
1000.00	1.45	20.59	0.62	5.26
1200.00	1.75	16.81	0.70	4.30









# **RF Transformer**

# TRS2-1T-75+

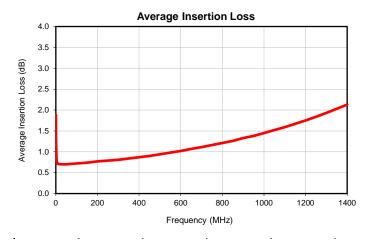
# Typical Performance Data

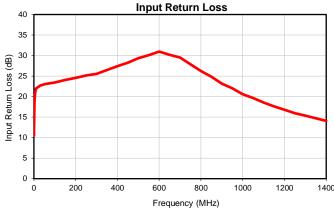
FREQUENCY	AVERAGE INSERTION LOSS	INPUT RETURN LOSS	AMPLITUDE UNBALANCE	PHASE UNBALANCE
	(dB)	(dB)	(dB)	(deg.)
0.5	1.88	10.45	0.15	0.27
0.6	1.70	11.35	0.16	0.21
0.7	1.56	12.12	0.17	0.21
0.8	1.46	12.77	0.16	0.14
1.0	1.31	13.83	0.16	0.09
3.0	0.86	18.67	0.16	0.01
5.0	0.76	20.46	0.16	0.07
7.0	0.73	21.33	0.16	0.13
10	0.71	21.96	0.16	0.18
30	0.70	22.69	0.15	0.53
50	0.70	22.99	0.15	0.86
70	0.71	23.20	0.14	1.17
100	0.72	23.43	0.13	1.58
150	0.74	24.05	0.13	2.23
200	0.77	24.55	0.11	2.85
250	0.79	25.15	0.11	3.39
300	0.81	25.54	0.12	3.84
350	0.84	26.47	0.13	4.24
400	0.87	27.39	0.15	4.61
450	0.90	28.27	0.17	4.88
500	0.94	29.37	0.20	5.13
550	0.98	30.09	0.23	5.28
600	1.02	30.97	0.27	5.43
650	1.07	30.16	0.32	5.52
700	1.11	29.50	0.37	5.60
750	1.16	27.89	0.41	5.72
800	1.21	26.22	0.45	5.67
850	1.26	24.85	0.50	5.66
900	1.33	23.16	0.53	5.56
950	1.38	22.01	0.58	5.42
1000	1.45	20.59	0.62	5.26
1050	1.52	19.63	0.65	5.12
1100	1.59	18.54	0.68	4.86
1150	1.67	17.62	0.69	4.60
1200	1.75	16.81	0.70	4.30
1250	1.84	15.96	0.69	3.87
1300	1.93	15.37	0.68	3.36
1400	2.13	14.08	0.60	2.19

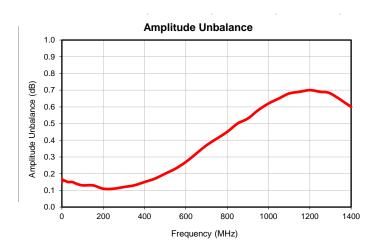


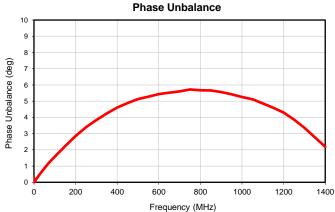


# Typical Performance Data







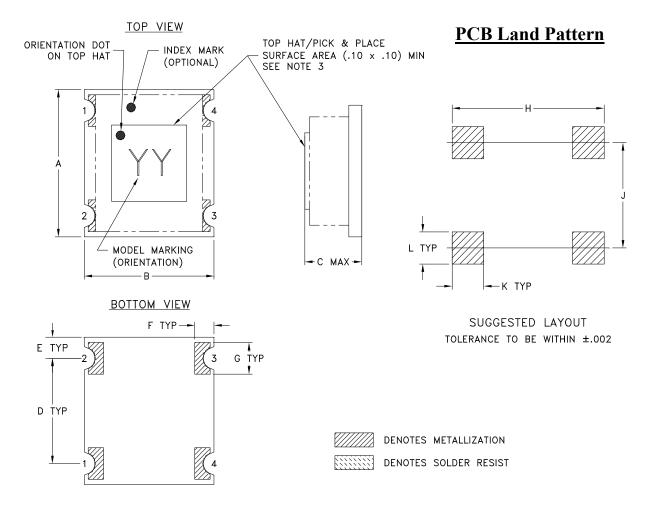


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### **Outline Dimensions**

TT1618



CASE #	A	В	С	D	Е	F	G	Н	J	K	L	WT GRAMS
TT1618	.280 (7.11)	.250 (6.35)	.12 (3.05)	.200 (5.08)	.040 (1.02)	.037 (.94)	.060 (1.52)	.293 (7.44)	.200 (5.08)	.061 (1.55)	.061 (1.55)	2.80

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

#### **Notes:**

- 1. Open style, Base material: Printed wiring laminate.
- 2. Termination finish:  $3-5 \mu$  inch (.08-.13 microns) Gold over 120-240  $\mu$  inch (3.05-6.10 microns) Nickel plate. All models, (+) suffix.
- 3. Top-Hat total thickness: .013 inches MAX.
- 4. Orientation Dot on Top Hat & PCB corresponds to Pin #1.





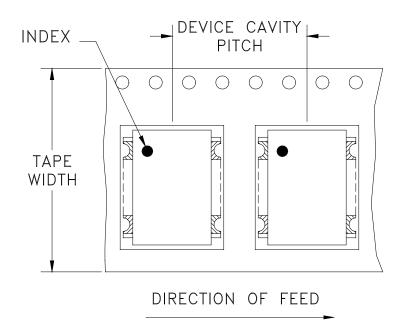
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F2

### DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size,	Devices per Reel
		inches	See note
			10
			20
		7	50
16	12		100
			200
		12	500
		13	1000

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.

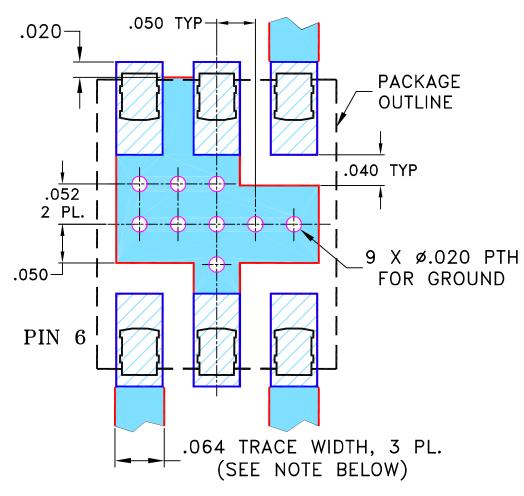
Go to: www.minicircuits.com/pages/pdfs/tape.pdf



# THIRD ANGLE PROJECTION

		REVISIONS			
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M102713	NEW RELEASE	01/18/06	MMG	IL

SUGGESTED MOUNTING CONFIGURATION FOR QQQ569 CASE STYLE, "gn" PIN CONNECTION.



NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.

2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.



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

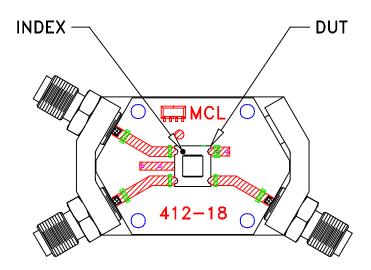


DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

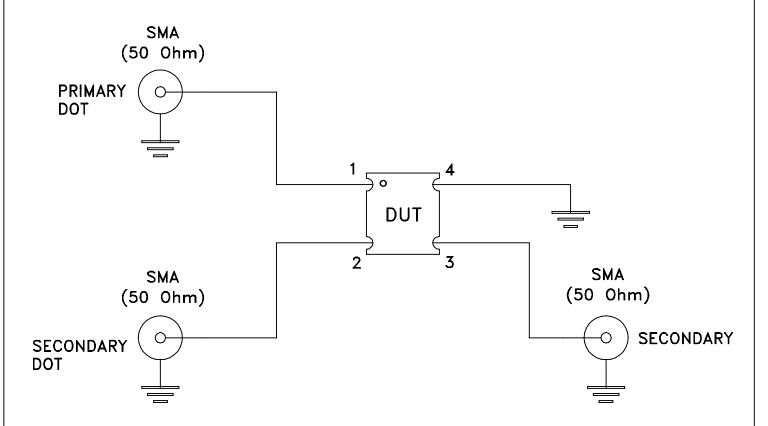
UNLESS OTHERWISE SPECIFIED		INITIALS	DATE		736.	. ~		• 4 ®		
DIMENSIONS ARE IN INCHES	DRAWN	MMG	01/16/06		$\square$ Mini	ı — Ci	ırcu	${f its}$	13 Neptu	ne Avenue NY 11235
TOLERANCES ON:	CHECKED	AV	01/16/06	Brooklyn N					N1 11233	
3 PL DECIMALS ± .005	APPROVED	IL	01/18/06							
FRACTIONS ±				PL.	gn, Q	QQ56	9. LR	PS-J	TI.	3-100
1 1111	Circuits ®	TY OF MINI_CIPCUIT	•		6 , •	•	•			
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			FILE: 9	8PL237	SCALE:	8:1	SHEET:	1	OF 1	

# **Evaluation Board and Circuit**

For Pin Connections refer to Data Sheet of the DUT



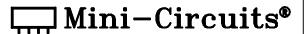
TB-619+



Schematic Diagram

## Notes:

- 1. 50 Ohm SMA Female connectors.
- 2. PCB Material: R04350 or equivalent, Dielectric Constant=3.5, Thickness=.030 inch.





### **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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