



Mini-Circuits

SURFACE MOUNT 

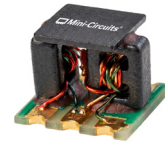
Power Splitter/Combiner

TCP2-182HI75X+

75Ω (2 Way-0°) 5 to 1800 MHz

KEY FEATURES

- Wideband 5 to 1800 MHz
- Low Insertion Loss 2.0 dB Typ.
- External Resistor, Capacitors, Inductors Required
- High Isolation 43 dB Typ. at 100 - 850 MHz

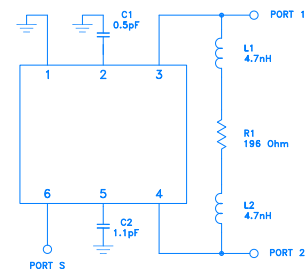


Generic photo used for illustration purposes only

APPLICATIONS

- DOCSIS® 4.0 Systems
- VHF/UHF
- CATV

FUNCTIONAL DIAGRAM



PRODUCT OVERVIEW

Mini-Circuits' TCP2-182HI75X+ is a 75Ω 2-way 0° surface-mount power splitter/combiner covering the 5 to 1800 MHz frequency range, supporting bandwidth requirements for DOCSIS® 4.0 systems and equipment, as well as other broadband applications. This model can handle up to 0.5W RF input power as a splitter, and provides low insertion loss and low phase and amplitude unbalance. It features core and wire construction mounted on a 6-pad printed laminate base with gold over nickel termination finish. The unit measures .166" x .166" x .140" with Mini-Circuits' TopHat® feature to improve speed and accuracy of pick and place assembly. This design requires external capacitors, resistor and inductors for impedance matching and cycling isolation between the output signals (refer to electrical schematic).

ELECTRICAL SPECIFICATIONS¹ AT +25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Frequency Range		5		1800	MHz
Insertion Loss (above 3 dB)	5 - 1800	—	1.8	2.5	dB
Isolation	5 - 108	20	23	—	dB
	108 - 834	40	43	—	
	834 - 1800	11	16	—	
Phase Unbalance (±)	5 - 1800	—	4	6	Degree
Amplitude Unbalance (±)	5 - 1800	—	0.7	1.0	dB

 Mini-Circuits

www.minicircuits.com P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 sales@minicircuits.com

 REV. OR
 ECO-030186
 TCP2-182HI75X+
 EDU5350
 MCINU
 260626

PAGE 1 OF 5



Mini-Circuits

SURFACE MOUNT 

Power Splitter/Combiner

TCP2-182HI75X+

75Ω (2 Way-0°) 5 to 1800 MHz

ELECTRICAL SPECIFICATIONS¹ AT +25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Return Loss (Port S)	5 - 1000	18	23	—	dB
	1000 - 1600	13	18	—	
	1600 - 1800	10	13	—	
Return Loss (Port 1)	5 - 50	16	19	—	dB
	50 - 1218	16	18	—	
	1218 - 1800	10	14	—	
Return Loss (Port 2)	5 - 50	16	19	—	dB
	50 - 1218	16	18	—	
	1218 - 1800	10	14	—	

1. Bi-directional can function as a splitter or as a combiner. Refer to S-Parameters for actual performance.

ABSOLUTE MAXIMUM RATINGS²

Operating Case Temperature		-40°C to +85°C
Storage Temperature		-55°C to +100°C
Input Power	as splitter	0.5 W
	as combiner per port	0.25 W

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





Mini-Circuits

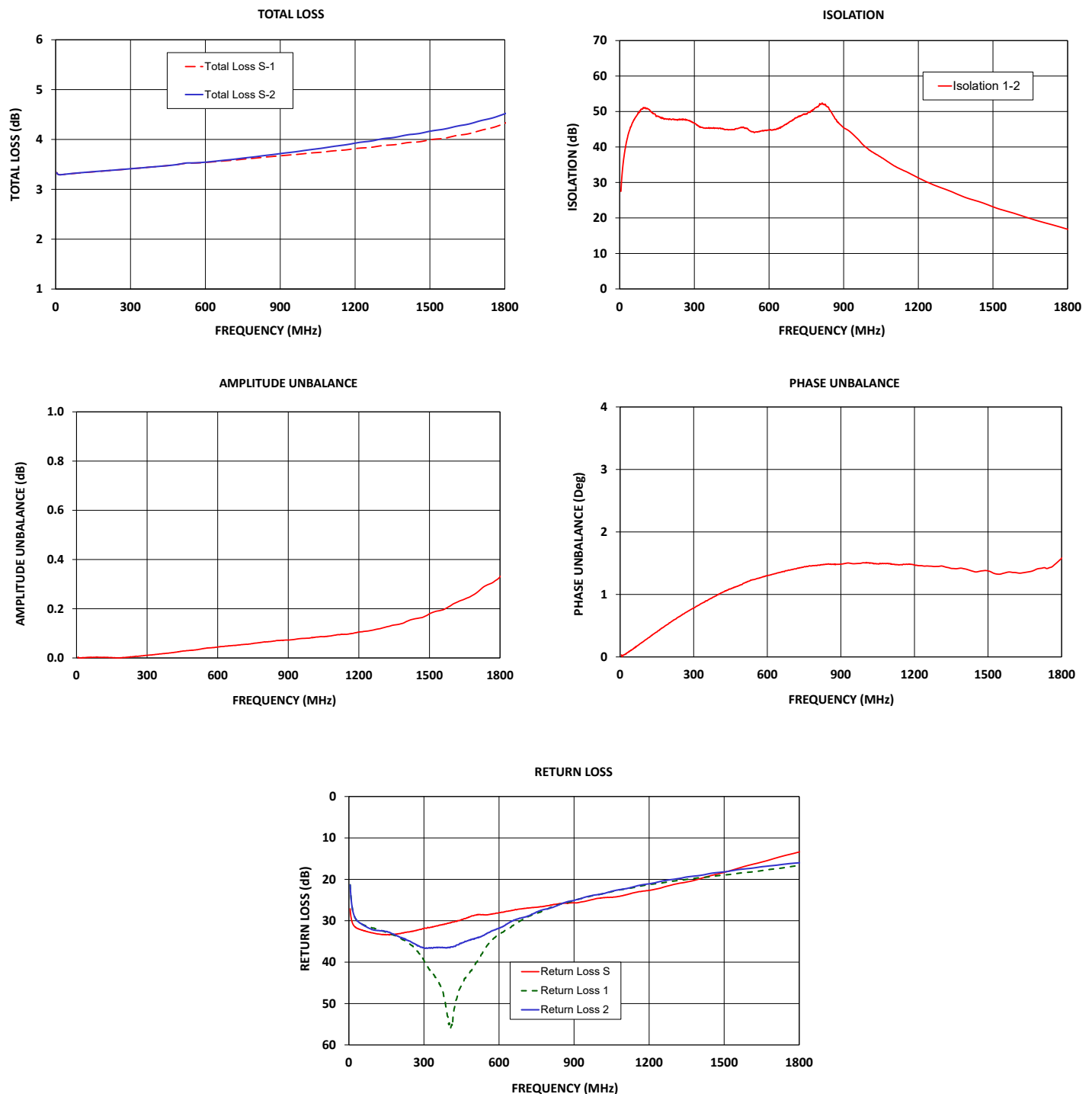
SURFACE MOUNT 

Power Splitter/Combiner

TCP2-182HI75X+

75Ω (2 Way-0°) 5 to 1800 MHz

TYPICAL PERFORMANCE GRAPHS AT +25°C





Mini-Circuits

SURFACE MOUNT 

Power Splitter/Combiner

TCP2-182HI75X+

75Ω (2 Way-0°) 5 to 1800 MHz

FUNCTIONAL DIAGRAM

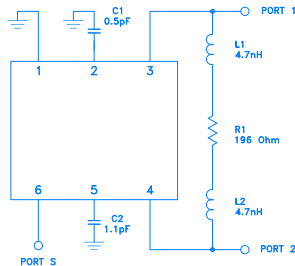
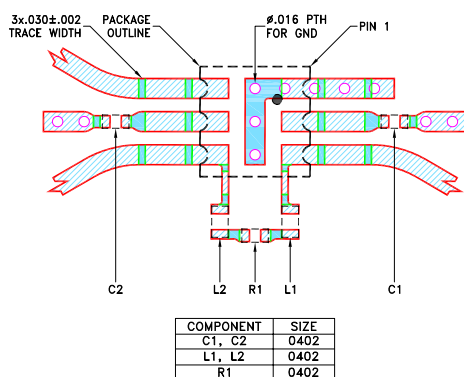


Figure 1. TCP2-182HI75X+ Functional Diagram

PAD DESCRIPTION

Function	Pad Number	Description
Sum Port	6	Connects to Sum Port
Port 1	3	Connects to 1 Port
Port 2	4	Connects to 2 Port
GROUND	1	Connects to GND
EXT. CAPACITOR 0.5 pF	2	2 TO GROUND
EXT. CAPACITOR 1.1 pF	5	5 TO GROUND
EXT. COMPONENTS (INDUCTOR 4.7nH, RESISTOR 196Ω, INDUCTOR 4.7nH IN SERIES)	3,4	—

SUGGESTED PCB LAYOUT (PL-802)



NOTES:

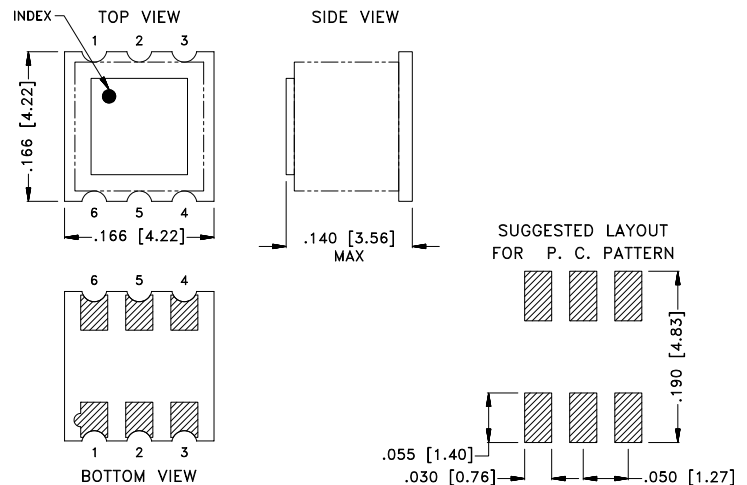
- TRACE WIDTH IS SHOWN FOR ROGERS (R04350B) WITH DIELECTRIC THICKNESS .030±.002 COPPER: 1/2 Oz ON EACH SIDE.
FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
- CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE. FOR COMPONENT VALUES REFER TO TB-1300/ TB-1300-1.
- BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

 DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK.

Figure 2. Suggested PCB Layout PL-864

CASE STYLE DRAWING



Weight: .1 grams

Dimensions are in inches[mm]. Tolerances: 2Pl.±.01; 3Pl.±.005

PRODUCT MARKING*: ZM

*Marking may contain other features or characters for internal lot control.



Mini-Circuits

SURFACE MOUNT



Power Splitter/Combiner

TCP2-182HI75X+

75Ω (2 Way-0°) 5 to 1800 MHz

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD

[CLICK HERE](#)

Performance Data & Graphs	Data Graphs S-Parameter (S3P Files) Data Set (.zip file) De-embedded to device pads
Case Style	TT3651 Lead Finish: Gold over Nickel Plate
RoHS Status	Compliant
Tape and Reel	F017
Suggested Layout for PCB Design	PL-802
Evaluation Board	TBTCP2182HI75X+ Gerber File
Environmental Rating	ENV02T1

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/terms/viewterm.html



2 Way-0° Power Splitter/Combiner

TCP2-182HI75X+

Typical Performance Data

FREQ. (MHz)	TOTAL LOSS ¹		AMPLITUDE UNBALANCE	ISOLATION	PHASE UNBALANCE	RETURN LOSS		
	(dB)		(dB)	(dB)	(deg.)	(dB)		
	S-1	S-2		1-2		S	1	2
5	3.34	3.33	0.00	27.49	0.03	27.13	21.32	21.35
10	3.30	3.30	0.00	32.67	0.02	29.62	25.36	25.38
15	3.29	3.29	0.00	36.08	0.03	30.67	27.42	27.41
16	3.29	3.29	0.00	36.65	0.04	30.82	27.73	27.71
20	3.29	3.29	0.00	38.58	0.04	31.20	28.62	28.59
50	3.31	3.31	0.00	46.62	0.12	32.22	30.75	30.74
108	3.33	3.34	0.00	50.87	0.28	33.12	31.94	32.33
120	3.34	3.34	0.00	50.49	0.31	33.22	32.20	32.37
150	3.35	3.35	0.00	48.74	0.40	33.39	32.83	32.58
200	3.37	3.37	0.00	47.96	0.54	33.16	34.06	33.86
256	3.39	3.39	0.01	47.81	0.68	32.59	36.17	35.38
300	3.41	3.41	0.01	46.77	0.78	31.87	39.50	36.55
350	3.43	3.43	0.02	45.32	0.90	31.26	44.01	36.45
400	3.45	3.45	0.02	45.29	1.00	30.55	55.11	36.45
450	3.48	3.48	0.03	44.93	1.09	29.72	45.36	35.36
500	3.51	3.51	0.03	45.36	1.17	28.74	41.04	34.49
550	3.53	3.53	0.04	44.24	1.24	28.59	36.22	33.19
600	3.54	3.54	0.04	44.81	1.30	28.04	33.35	31.78
684	3.57	3.59	0.05	47.18	1.38	27.15	30.10	29.39
700	3.58	3.59	0.05	47.77	1.40	27.08	29.46	29.16
750	3.60	3.63	0.06	49.33	1.44	26.75	28.26	27.88
800	3.63	3.65	0.07	51.68	1.46	26.35	26.97	27.00
834	3.64	3.68	0.07	51.35	1.48	25.97	26.18	26.24
900	3.67	3.72	0.07	45.43	1.48	25.67	25.20	25.10
950	3.69	3.75	0.08	42.71	1.49	25.23	24.29	24.21
1000	3.72	3.78	0.08	39.35	1.50	24.57	23.68	23.63
1050	3.74	3.81	0.09	37.13	1.49	24.34	22.98	22.91
1100	3.76	3.85	0.09	34.80	1.49	23.87	22.37	22.32
1150	3.79	3.88	0.10	33.10	1.47	23.12	21.86	21.61
1200	3.82	3.93	0.11	31.29	1.47	22.67	21.25	21.08
1218	3.83	3.94	0.11	30.69	1.46	22.49	21.11	20.89
1300	3.87	4.00	0.12	28.30	1.45	21.21	20.41	19.98
1320	3.88	4.02	0.13	27.78	1.45	20.96	20.26	19.80
1340	3.89	4.03	0.13	27.22	1.43	20.77	20.11	19.56
1360	3.90	4.04	0.14	26.60	1.41	20.53	19.94	19.36
1380	3.91	4.06	0.14	26.02	1.42	20.26	19.77	19.22
1400	3.93	4.08	0.15	25.52	1.41	19.92	19.63	19.09
1420	3.94	4.10	0.15	25.10	1.39	19.56	19.53	18.90
1440	3.95	4.11	0.16	24.69	1.37	19.21	19.40	18.64
1460	3.95	4.12	0.16	24.22	1.37	18.91	19.23	18.45
1480	3.97	4.14	0.17	23.70	1.38	18.62	19.09	18.33
1500	3.99	4.17	0.18	23.16	1.38	18.32	18.96	18.21
1510	4.00	4.17	0.18	22.88	1.36	18.15	18.90	18.13
1520	4.01	4.18	0.19	22.64	1.34	17.99	18.84	18.03
1530	4.01	4.19	0.19	22.41	1.33	17.80	18.77	17.92
1540	4.01	4.19	0.19	22.22	1.32	17.63	18.68	17.83
1550	4.02	4.20	0.19	22.01	1.32	17.45	18.60	17.70
1560	4.03	4.21	0.20	21.81	1.34	17.26	18.52	17.63
1570	4.04	4.22	0.20	21.61	1.35	17.08	18.44	17.55
1580	4.05	4.23	0.21	21.42	1.36	16.90	18.38	17.50
1590	4.06	4.25	0.21	21.20	1.36	16.74	18.32	17.43
1600	4.07	4.26	0.22	20.97	1.35	16.58	18.27	17.39
1620	4.09	4.28	0.23	20.51	1.34	16.28	18.15	17.23
1640	4.10	4.29	0.24	20.05	1.35	15.99	18.00	17.05
1660	4.12	4.31	0.24	19.61	1.36	15.68	17.81	16.90
1680	4.15	4.34	0.25	19.20	1.37	15.34	17.63	16.77
1700	4.18	4.37	0.26	18.81	1.41	14.97	17.50	16.65
1720	4.20	4.40	0.28	18.42	1.42	14.62	17.36	16.50
1740	4.23	4.42	0.29	18.05	1.41	14.30	17.18	16.35
1760	4.25	4.45	0.30	17.64	1.44	14.00	16.99	16.21
1780	4.28	4.48	0.31	17.24	1.51	13.71	16.81	16.10
1800	4.32	4.52	0.33	16.82	1.58	13.40	16.65	16.00

¹Total Loss = Insertion Loss + 3dB Splitter Loss



ISO 9001 ISO 14001 AS 9100 CERTIFIED



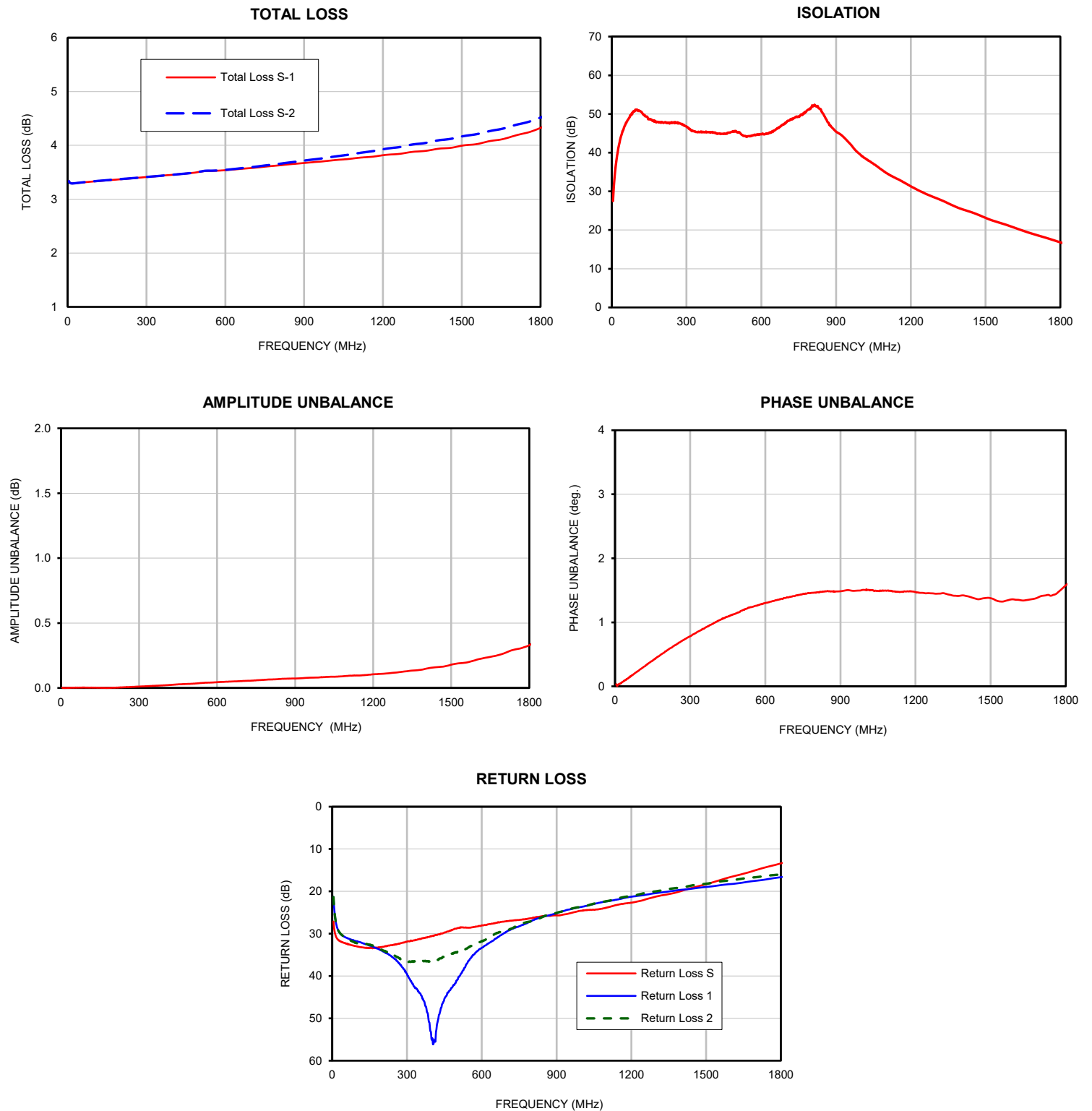
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 • Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site
The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com



IF/RF MICROWAVE COMPONENTS

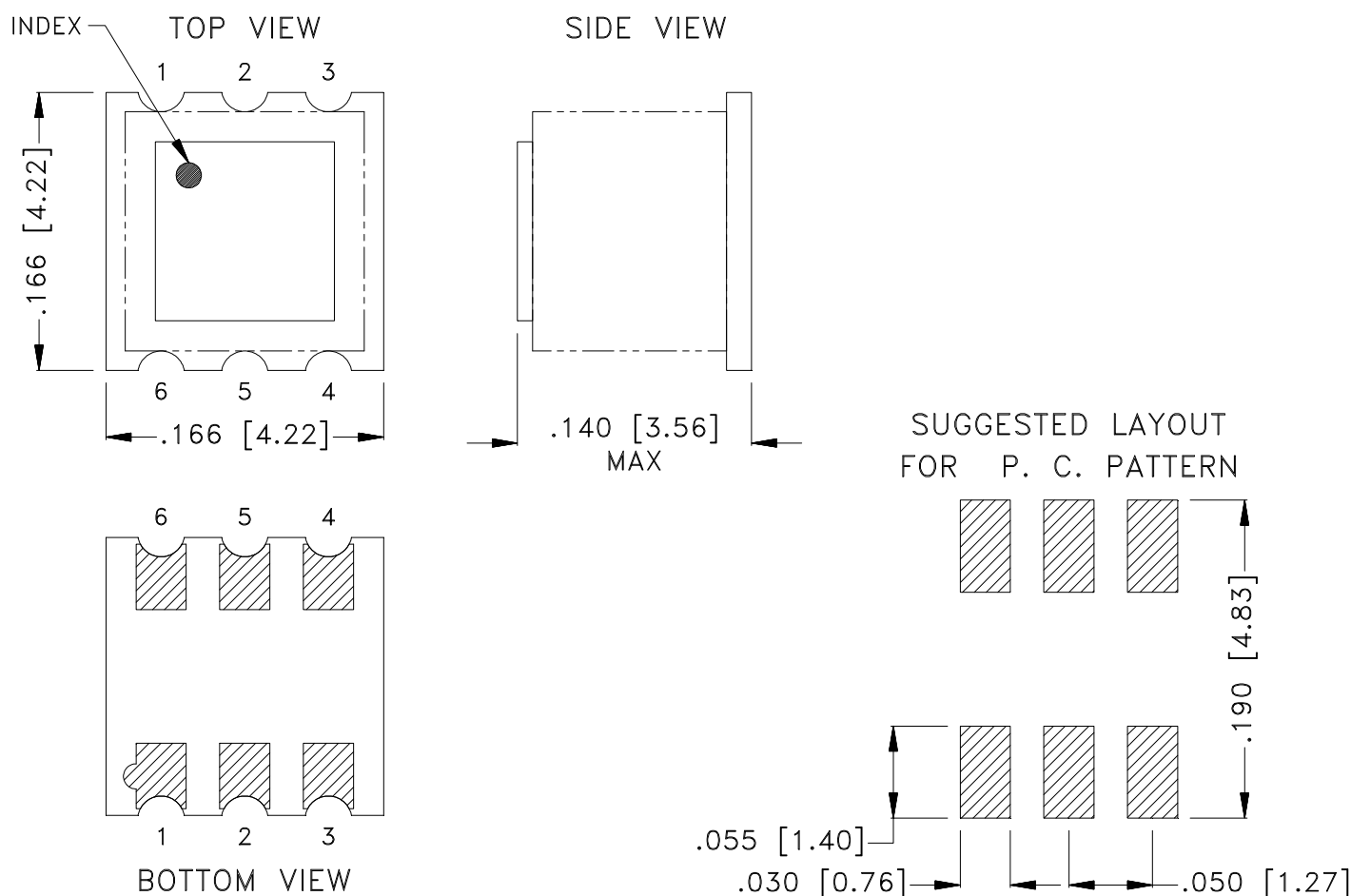
REV. OR
TCP2-182HI75X+
260618
Page 1 of 1

Typical Performance Curves



Outline Dimensions

TT3651



Weight: .1 grams.

Dimensions are in inches (mm).

Tolerances: 2Pl. $\pm$.01 (.254); 3Pl. $\pm$.005 (.127)

Notes:

1. Open style, Base material: Printed wiring laminate.
2. Termination finish: 3-5 μ inch (.08-.13 microns) Gold over 120-240 μ inch (3.05-6.10 microns) Nickel plate
All models, (+) suffix.
3. Orientation dot on top hat & orientation feature on substrate correspondence to pin #1
4. Top-Hat total thickness: .013 inches MAX.



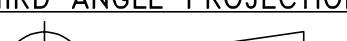
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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

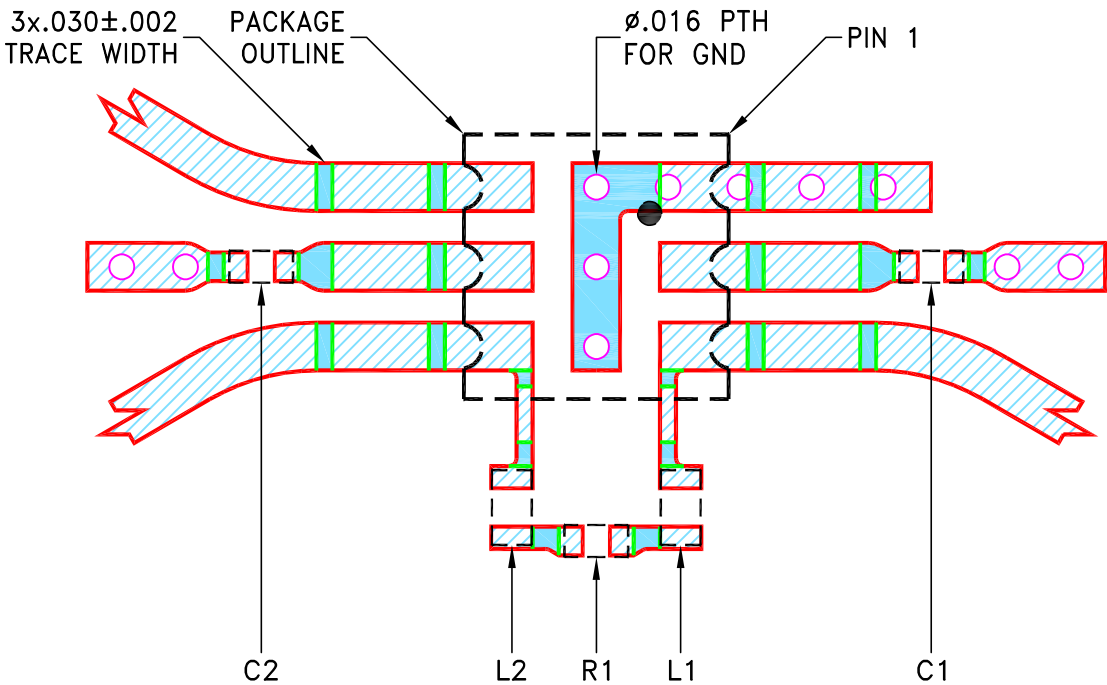
RF/IF MICROWAVE COMPONENTS



THIRD ANGLE PROJECTION	
	

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-023596	NEW RELEASE	NOV 24	DDR	VC
A	NPO-006224	TB-1300-1 ADDED	MAY 26	SKH	VR

SUGGESTED MOUNTING CONFIGURATION
FOR TT3651 CASE STYLE

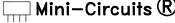


COMPONENT	SIZE
C1, C2	0402
L1, L2	0402
R1	0402

- NOTES:
- TRACE WIDTH IS SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .030±.002
COPPER: 1/2 Oz ON EACH SIDE.
FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
 - CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE. FOR COMPONENT VALUES REFER
TO TB-1300/ TB-1300-1.
 - BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

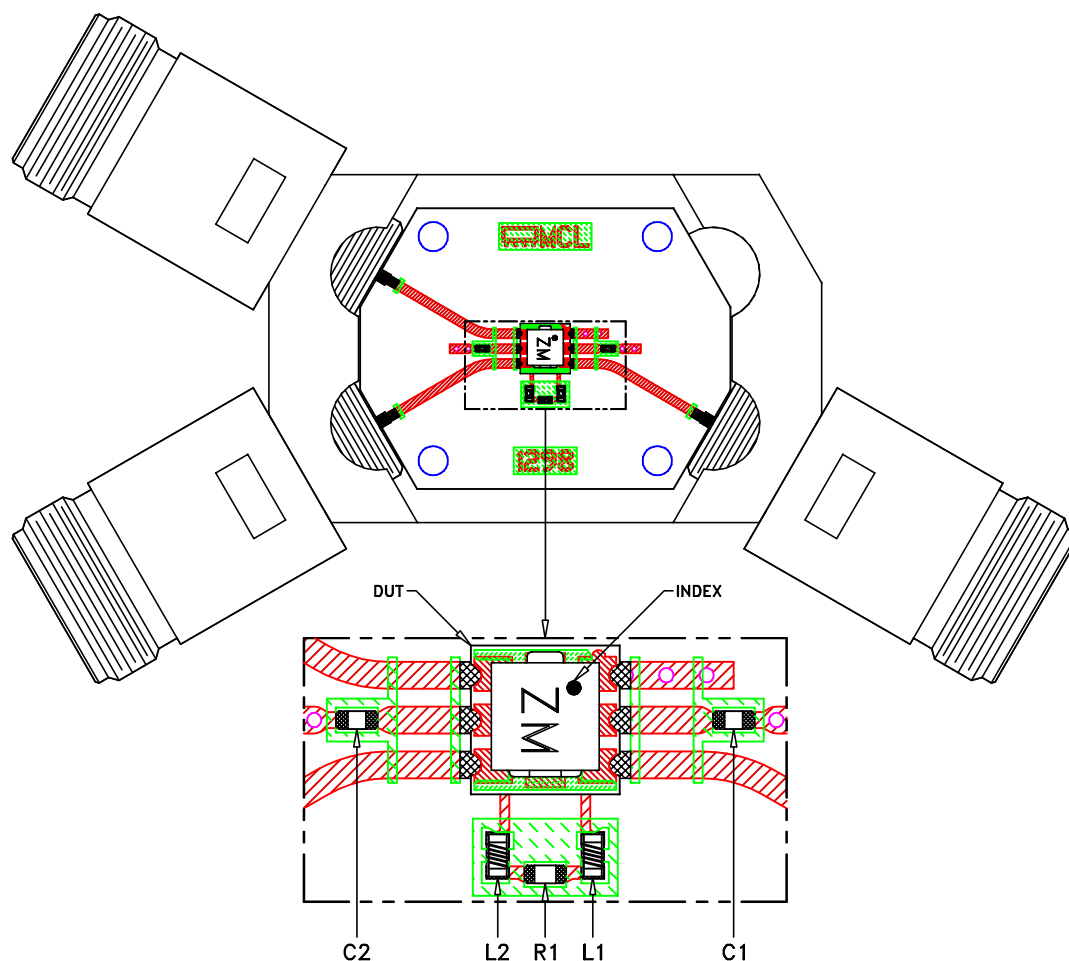
 DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).

 DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK.

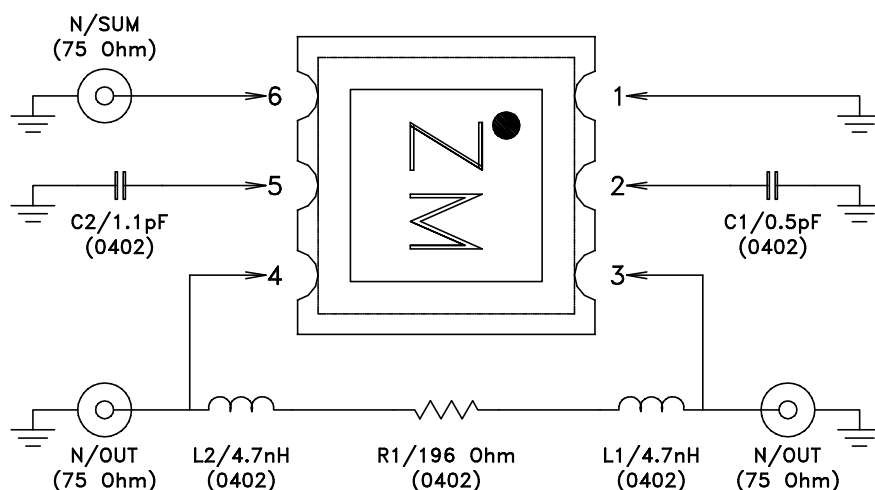
UNLESS OTHERWISE SPECIFIED		INITIALS	DATE	 Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235		
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ±	DRAWN	DDR	11 NOV 24			
	CHECKED	MKS	11 NOV 24			
	APPROVED	ASJ	11 NOV 24			
 Mini-Circuits® THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE, MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.				PL, 75, TT3651, TB-1300		
SIZE A		CODE IDENT 15542		DRAWING NO: 98-PL-802		REV: A
FILE: 98-PL-802		SCALE: 8:1		SHEET: 1 OF 1		

Evaluation Board and Circuit

TB-TCP2182H75X



Schematic diagram



Notes:

1. PCB Material: ROGERS (R04350B) OR Equivalent, Dielectric Constant=3.48
Thickness=.030±.002 inch
2. 75 Ohm N Female Connectors.

 **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