

High Power Bi-Directional Coupler

50Ω 20dB Coupling DC Pass 9200 to 10500 MHz

CPL-20-14+



Generic photo used for illustration purposes only

CASE STYLE: MW1654

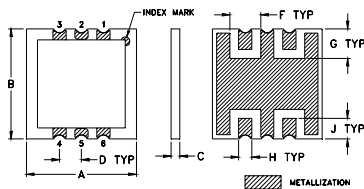
Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
DC Current	0.5A
Permanent damage may occur if any of these limits are exceeded.	

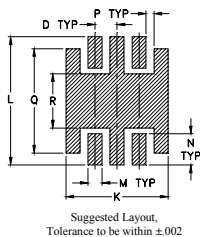
Pad Connections

INPUT	3
OUTPUT	4
COUPLED (forward)	1
COUPLED (reverse)	6
GROUND	2,5

Outline Drawing



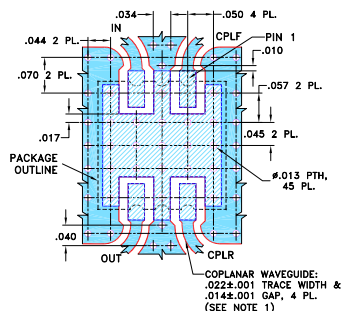
PCB Land Pattern



Outline Dimensions (inch/mm)

A	B	C	D	E	F	G	H	J
.250	.250	.02	.05	.070	.067	.003	.047	
6.35	6.35	0.51	1.27	1.78	1.70	0.76	1.19	
K	L	M	N	P	Q	R		wt
0.232	.291	.032	.071	.018	.237	.123		grams
5.89	7.39	0.81	1.80	0.46	6.02	3.12		0.05

Demo Board MCL P/N: TB-762+ Suggested PCB Layout (PL-420)



- TRACE WIDTH PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010"±.001". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- 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.

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-Circuits' 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/MCLStore/terms.jsp

Features

- four-port coupler
- excellent return loss, all ports
- DC current through input to output 0.5A Max. at 1.0 watt RF input power

Applications

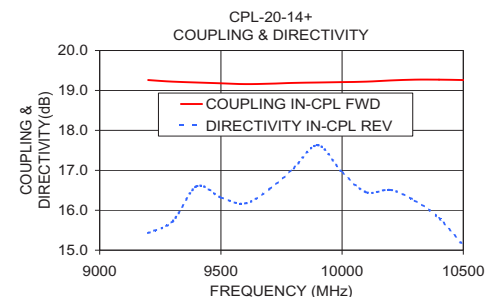
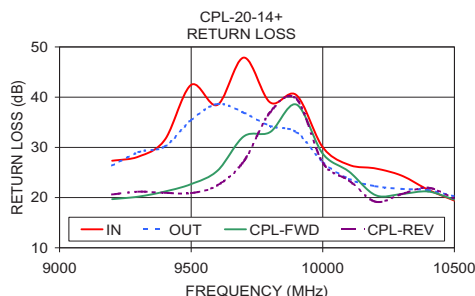
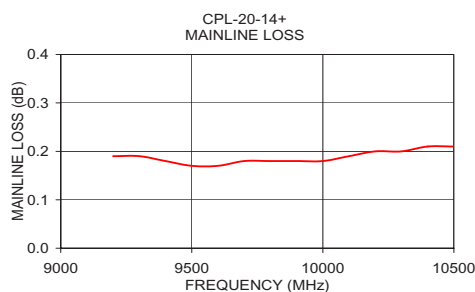
- defense communications
- space science service
- satellite

Electrical Specifications at 25°C

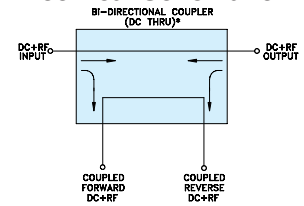
Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Frequency Range		9200		10500	MHz
Coupling	9200-10500	—	19.2±1.5	—	dB
Coupling Flatness(±)	9200-10500	—	0.15	—	dB
Mainline Loss	9200-10500	—	0.2	0.5	dB
Directivity	9200-10500	10	16	—	dB
Return Loss	9200-10500	—	19	—	dB
Input Power	9200-10500	—	16	—	W

Typical Performance Data

Frequency (MHz)	Mainline Loss (dB)		Coupling (dB)		Directivity (dB)		Return Loss (dB)		
	In-Out	In-Cpl Fwd	Out-Cpl Rev	Out-Cpl Fwd	In-Cpl Rev	In	Out	Cpl Fwd	Cpl Rev
9200.00	0.19	19.26	19.17	15.45	15.43	27.34	26.37	19.69	20.62
9300.00	0.19	19.22	19.13	16.24	15.72	28.16	29.06	20.19	21.18
9400.00	0.18	19.20	19.11	17.30	16.60	31.52	30.18	21.20	20.96
9500.00	0.17	19.18	19.09	17.20	16.32	42.44	35.39	22.69	20.89
9600.00	0.17	19.16	19.07	17.10	16.17	38.46	38.63	25.36	22.45
9700.00	0.18	19.17	19.08	17.60	16.53	47.88	36.90	32.19	27.25
9800.00	0.18	19.19	19.10	18.33	17.05	38.96	34.26	33.04	36.99
9900.00	0.18	19.20	19.12	19.31	17.63	40.41	33.03	38.52	39.66
10000.00	0.18	19.21	19.15	18.84	16.95	30.04	27.12	28.74	26.96
10100.00	0.19	19.22	19.19	18.16	16.45	26.51	23.70	25.17	23.38
10200.00	0.20	19.25	19.25	18.10	16.51	25.80	22.27	20.49	19.19
10300.00	0.20	19.27	19.32	18.08	16.24	24.36	21.73	20.71	20.70
10400.00	0.21	19.27	19.36	18.16	15.80	21.57	21.48	21.21	21.96
10500.00	0.21	19.26	19.40	17.60	15.11	19.40	20.28	19.58	19.80



Electrical Schematic



REV. A
M151107
ED-16257
CPL-20-14+
AD/CP/AM
200924

Bi-Directional Coupler

CPL-20-14+

Typical Performance Data

FREQ. (MHz)	INSERTION LOSS (dB)	COUPLING (dB)		DIRECTIVITY (dB)		RETURN LOSS (dB)			
		IN-FWD	OUT-REV	IN-REV	OUT-FWD	IN	OUT	FWD	REV
9000.0	0.21	19.37	19.32	15.33	15.13	25.09	22.32	18.05	17.85
9200.0	0.19	19.26	19.17	15.43	15.45	27.34	26.37	19.69	20.62
9300.0	0.19	19.22	19.13	15.72	16.24	28.16	29.06	20.19	21.18
9400.0	0.18	19.20	19.11	16.60	17.30	31.52	30.18	21.20	20.96
9500.0	0.17	19.18	19.09	16.32	17.20	42.44	35.39	22.69	20.89
9600.0	0.17	19.16	19.07	16.17	17.10	38.46	38.63	25.36	22.45
9700.0	0.18	19.17	19.08	16.53	17.60	47.88	36.90	32.19	27.25
9800.0	0.18	19.19	19.10	17.05	18.33	38.96	34.26	33.04	36.99
9900.0	0.18	19.20	19.12	17.63	19.31	40.41	33.03	38.52	39.66
10000.0	0.18	19.21	19.15	16.95	18.84	30.04	27.12	28.74	26.96
10100.0	0.19	19.22	19.19	16.45	18.16	26.51	23.70	25.17	23.38
10200.0	0.20	19.25	19.25	16.51	18.10	25.80	22.27	20.49	19.19
10300.0	0.20	19.27	19.32	16.24	18.08	24.36	21.73	20.71	20.70
10400.0	0.21	19.27	19.36	15.80	18.16	21.57	21.48	21.21	21.96
10500.0	0.21	19.26	19.40	15.11	17.60	19.40	20.28	19.58	19.80
10650.0	0.21	19.24	19.45	14.59	17.32	19.15	19.61	17.35	17.58
10800.0	0.22	19.24	19.51	14.51	17.37	21.14	18.85	16.36	15.24
10950.0	0.23	19.25	19.57	14.06	17.02	19.68	17.25	15.23	13.68
11100.0	0.23	19.24	19.63	13.00	15.96	17.91	16.58	14.43	13.06



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



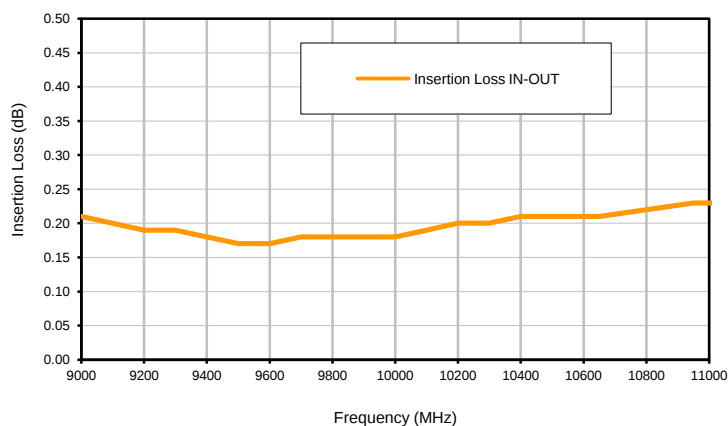
REV. OR
CPL-20-14+
9/11/2014
Page 1 of 1

Bi-Directional Coupler

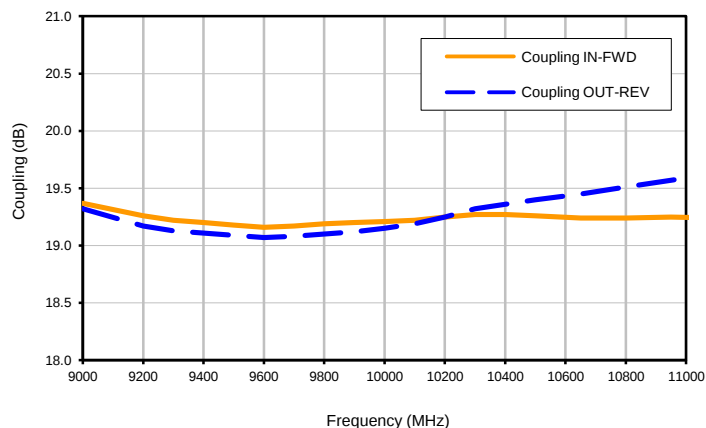
Typical Performance Curves

CPL-20-14+

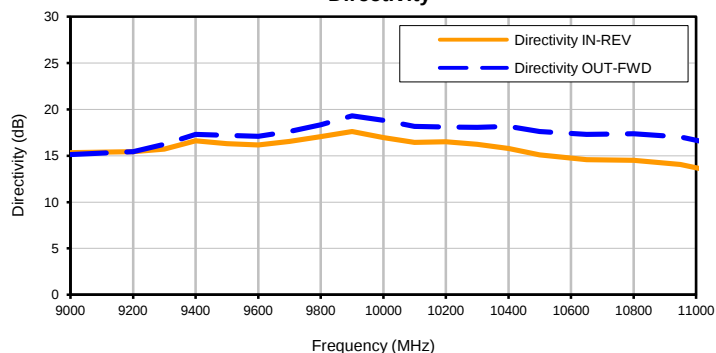
Insertion Loss



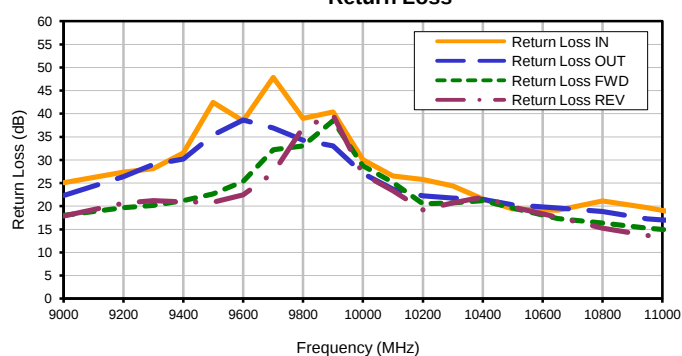
Coupling



Directivity



Return Loss



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



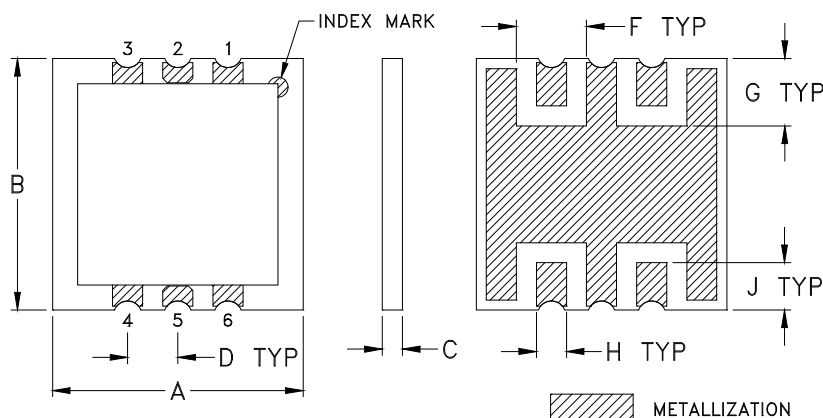
IF/RF MICROWAVE COMPONENTS



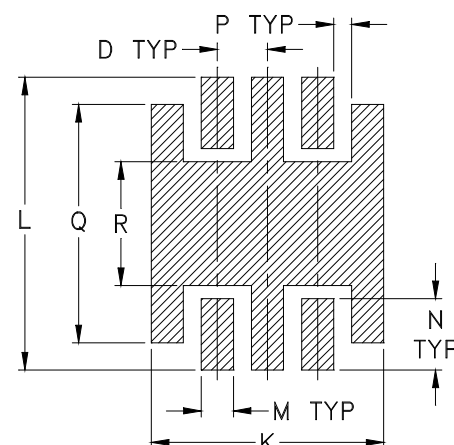
REV. OR
CPL-20-14+
9/11/2014
Page 1 of 1

Outline Dimensions

MW1654



PCB Land Pattern



Suggested Layout,
Tolerance to be within ± 0.002

CASE#	A	B	C	D	E	F	G	H	J	K	L	M
MW1654	.250 (6.35)	.250 (6.35)	.02 (0.51)	.05 (1.27)	- -	.070 (1.78)	.067 (1.70)	.030 (0.76)	.047 (1.19)	.232 (5.89)	.291 (7.39)	.032 (0.81)

CASE#	N	P	Q	R	WT, GRAM
MW1654	.071 (1.80)	.018 (0.46)	.237 (6.02)	.123 (3.12)	0.05

Dimensions are in inches (mm). Tolerances: 3 Pl. $\pm .003$ unless otherwise specified

Notes:

- Case material: Plastic.
- Base Material: 20 mil thk. Laminate.
- Termination finish: For RoHS Case Style: 2-5 μ inch (.05-.13 microns) Gold over 120-240 μ inch (3.05-6.10 microns) Nickel plate. All models, (+) suffix.



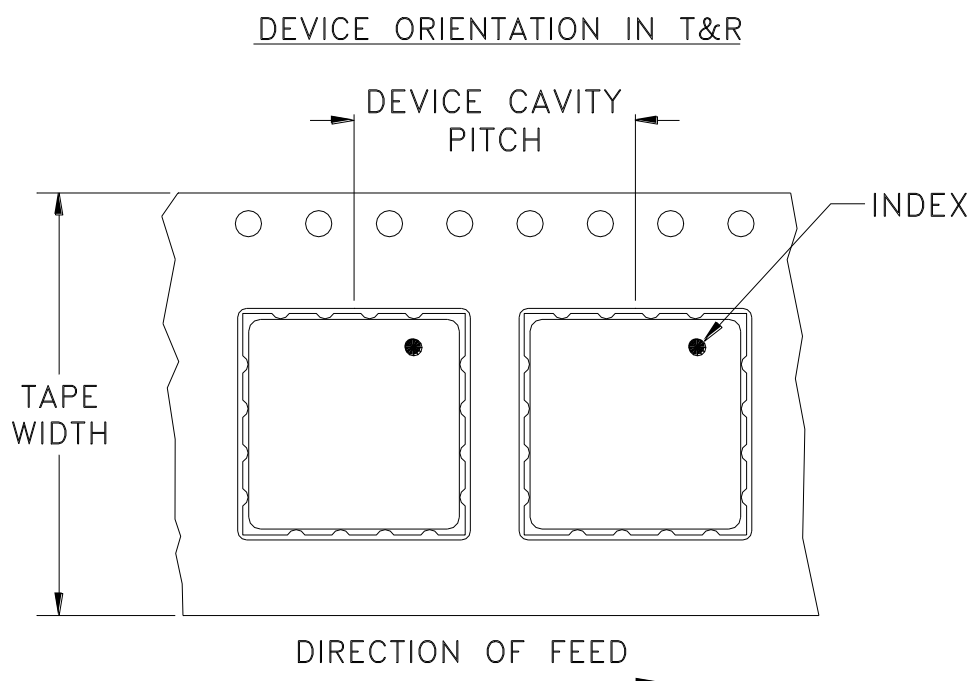
INTERNET <http://www.minicircuits.com>

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

Mini-Circuits ISO 9001 & ISO 14001 Certified

Tape & Reel Packaging TR-F78



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

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

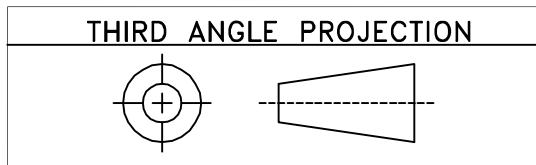


INTERNET <http://www.minicircuits.com>

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

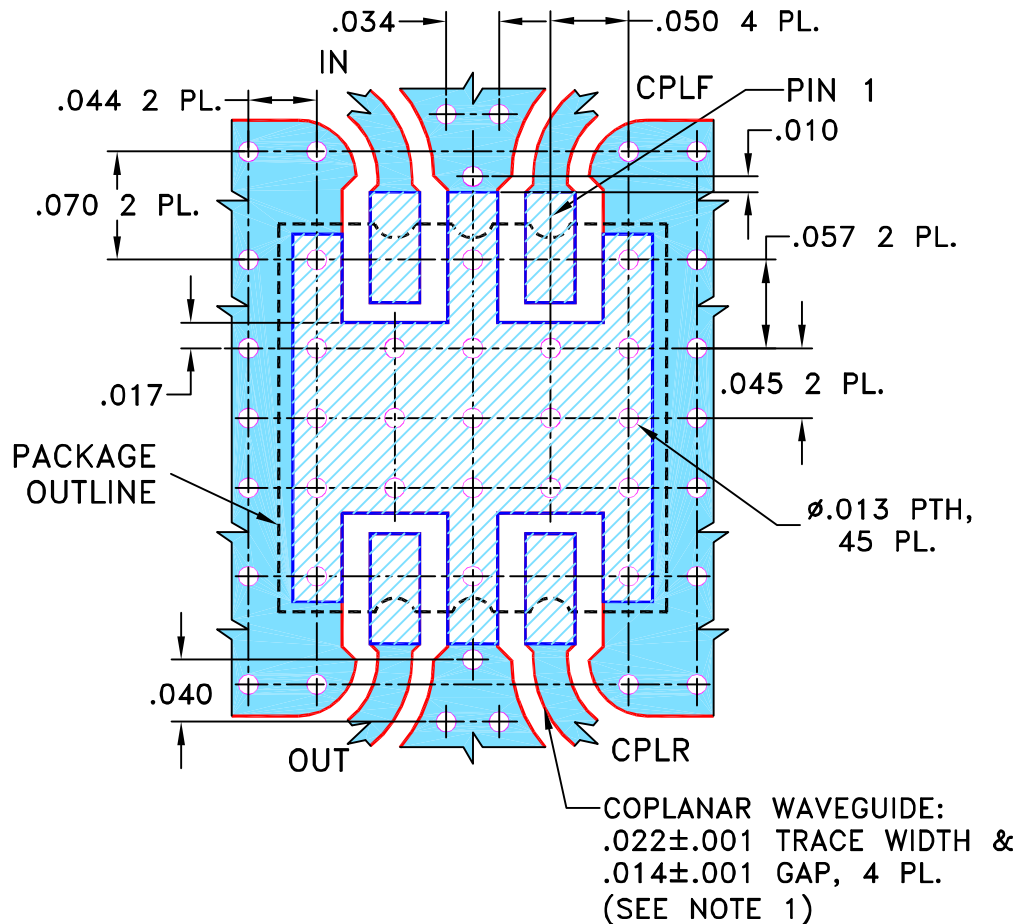
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

Mini-Circuits ISO 9001 & ISO 14001 Certified



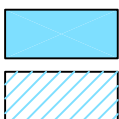
REVISIONS					
REV OR	ECN No.	DESCRIPTION	DATE	DR	AUTH
	M147572	NEW RELEASE	08/07/14	GF	DJ

**SUGGESTED MOUNTING CONFIGURATION
FOR MW1654 CASE STYLE, "06DC11" PIN CODE**



1. TRACE WIDTH PARAMETERS ARE SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS $.010'' \pm .001''$. COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.

3. 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
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS $\pm$ 3 PL DECIMALS $\pm$.005 ANGLES $\pm$ FRACTIONS $\pm$	DRAWN	GF	07/24/14
	CHECKED	IL	08/07/14
	APPROVED	DJ	08/07/14



Mini-Circuits® 13 Neptune Avenue
Brooklyn NY 11235

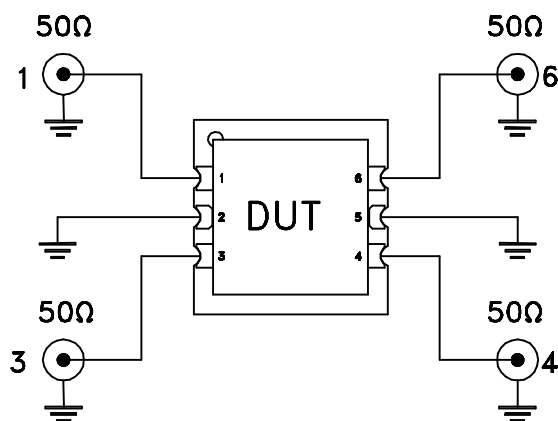
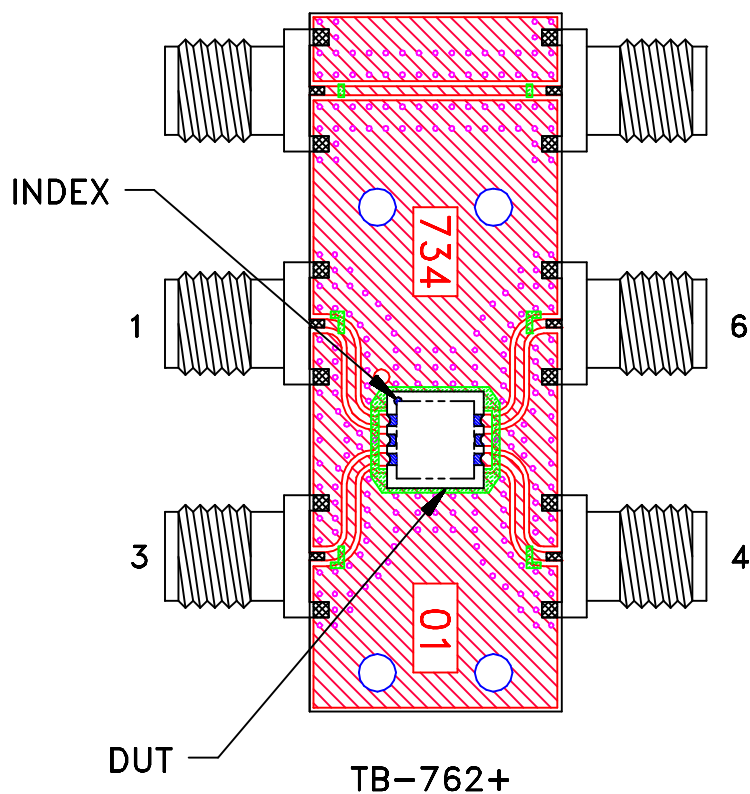
PL, 06DC11, MW1654, TB-762+

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

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-420	OR
FILE:	98PL420	SCALE:	SHEET: 1 OF 1

Evaluation Board and Circuit

For Pin Connections refer to Data Sheet of the DUT



Schematic Diagram

NOTES:

1. SMA Female connectors.
2. PCB material: Rogers R04350 or equivalent,
dielectric constant=3.5,
dielectric thickness=.010 inch.

 **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	-55° to 100°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
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, Para 4.2.5, Test S, 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