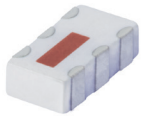
Ceramic Balun

RF Transformer

TCN4-162+

50Ω 720 to 1600 MHz



Generic photo used for illustration purposes only

CASE STYLE: FV1206-1

+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, 500,1000, 3000

Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Input RF Power***	3W

**Derate linearly to 2.5W at 100°C
Permanent damage may occur if any of these limits are exceeded.

Pad Connections

PRIMARY DOT (Unbalanced Port)	5
PRIMARY (GND)	4,6
SECONDARY DOT (Balanced)	3
SECONDARY (Balanced)	1
NO CONNECTION	2

Pads 1,3,4,6 are DC-connected internally

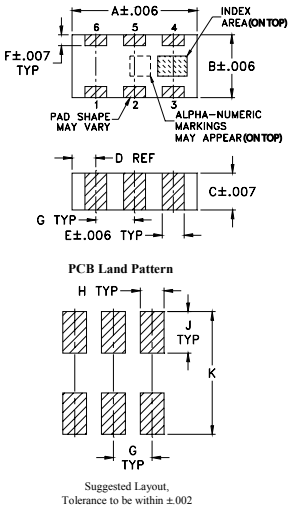
Features

- wideband, 720 to 1600 MHz
- low phase unbalance, 2 deg. typ. and amplitude unbalance, 0.3 dB typ.
- miniature size, 0.12"x.06"x.037"
- LTCC construction
- low cost
- aqueous washable

Applications

- GSM
- WCDMA
- GPS
- ISM

Outline Drawing



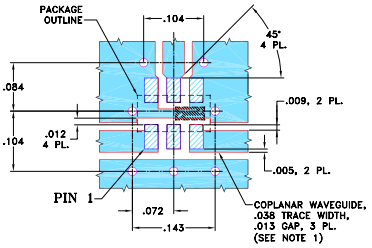
Suggested Layout,
Tolerance to be within ±.002

Outline Dimensions (inch / mm)

A	B	C	D	E	F
.126	.063	.035	.024	.022	.011
3.20	1.60	0.89	0.61	0.56	0.28

G	H	J	K		wt
.039	.024	.042	.123		grams
0.99	0.61	1.07	3.12		.020

Demo Board MCL P/N: TB-417+
Suggested PCB Layout (PL-265)



NOTES:
1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020" ± .0015". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP 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

Electrical Specifications (T_{AMB}=25°C)

Ω RATIO (Secondary/Primary)	FREQUENCY (MHz)	INSERTION* LOSS (dB)	PHASE UNBALANCE† (Deg.) Typ.	AMPLITUDE UNBALANCE (dB) Typ.
4	720-1600	1.0	2.0	0.4

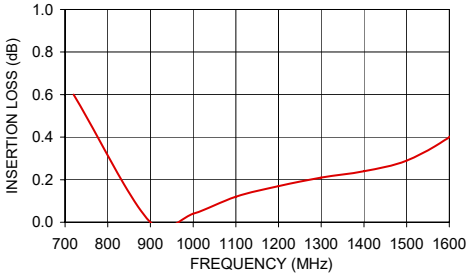
* Insertion Loss is referenced to mid-band loss, 0.7 dB. Reference Demo Board TB-417+
† Relative to 180°

Typical Performance Data at 25°C**

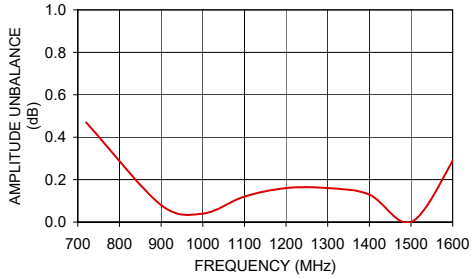
FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT R. LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (Deg.)
720.00	0.60	10.28	0.47	1.21
900.00	0.00	25.18	0.08	2.81
1000.00	0.04	19.64	0.04	3.39
1100.00	0.12	16.88	0.12	3.44
1200.00	0.17	16.38	0.16	3.09
1300.00	0.21	17.28	0.16	2.31
1400.00	0.24	19.25	0.13	1.33
1500.00	0.29	21.00	0.00	0.19
1600.00	0.40	19.65	0.29	1.10

** Measured with Agilent E5071B network analyzer using impedance conversion and port extension.

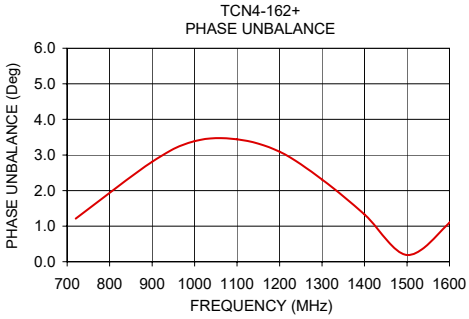
TCN4-162+
INSERTION LOSS



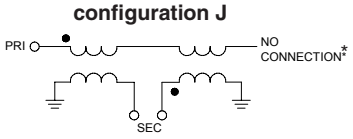
TCN4-162+
AMPLITUDE UNBALANCE



TCN4-162+
PHASE UNBALANCE



configuration J



*Internal open circuit

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-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

RF Transformer TCN4-162+

Typical Performance Data

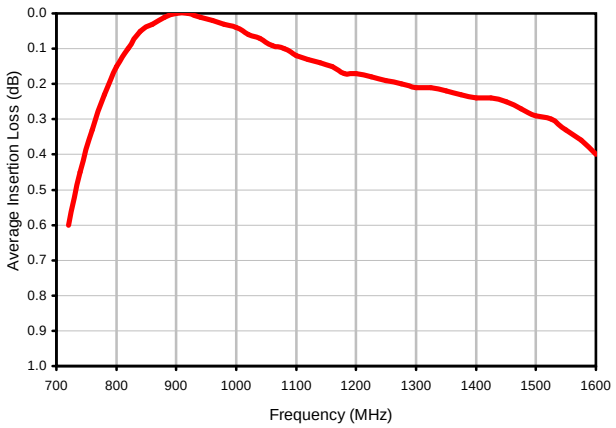
FREQUENCY (MHz)	AVERAGE INSERTION LOSS* (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE** (deg)
720	0.60	10.28	0.47	1.21
740	0.45	11.53	0.41	1.35
760	0.33	12.89	0.36	1.50
780	0.23	14.44	0.32	1.67
800	0.15	16.17	0.27	1.91
820	0.10	18.11	0.23	2.12
840	0.05	20.22	0.19	2.36
860	0.03	22.44	0.14	2.51
880	0.01	24.37	0.11	2.62
900	0.00	25.18	0.08	2.81
920	0.00	24.56	0.05	2.98
940	0.01	23.30	0.02	3.20
960	0.02	21.96	0.01	3.30
980	0.03	20.68	0.02	3.31
1000	0.04	19.64	0.04	3.39
1020	0.06	18.83	0.06	3.47
1040	0.07	18.18	0.07	3.61
1060	0.09	17.66	0.09	3.67
1080	0.10	17.23	0.10	3.51
1100	0.12	16.88	0.12	3.44
1120	0.13	16.63	0.13	3.39
1140	0.14	16.47	0.13	3.51
1160	0.15	16.40	0.14	3.43
1180	0.17	16.37	0.15	3.26
1200	0.17	16.38	0.16	3.09
1225	0.18	16.46	0.16	2.87
1250	0.19	16.65	0.15	2.79
1275	0.20	16.94	0.16	2.60
1300	0.21	17.28	0.16	2.31
1325	0.21	17.64	0.16	1.93
1350	0.22	18.08	0.15	1.70
1375	0.23	18.64	0.15	1.52
1400	0.24	19.25	0.13	1.33
1425	0.24	19.77	0.10	1.02
1450	0.25	20.27	0.08	0.62
1475	0.27	20.70	0.04	0.41
1500	0.29	21.00	0.00	0.19
1525	0.30	20.96	0.05	0.19
1550	0.33	20.74	0.11	0.59
1575	0.36	20.31	0.19	0.85
1600	0.40	19.65	0.29	1.10

* Insertion Loss is referenced to mid-band loss , 0.7 dB.

**Phase Unbalance is relative to 180˚

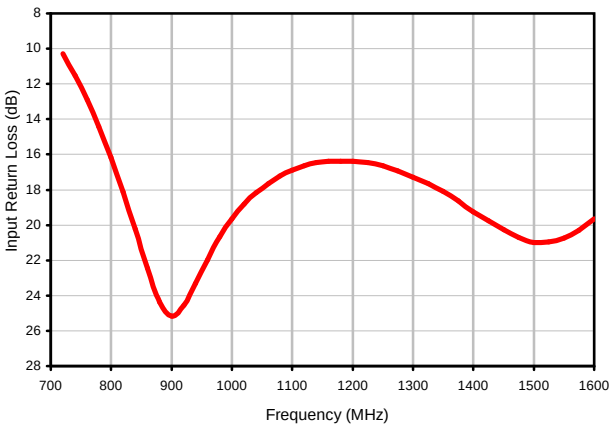
Typical Performance Curves

Average Insertion Loss*

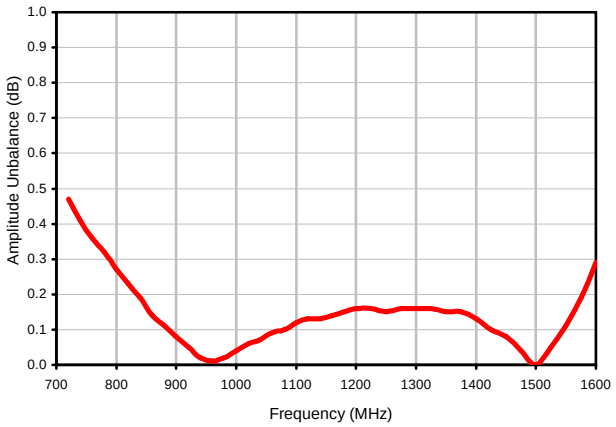


* Insertion Loss is referenced to mid-band loss , 0.7 dB.

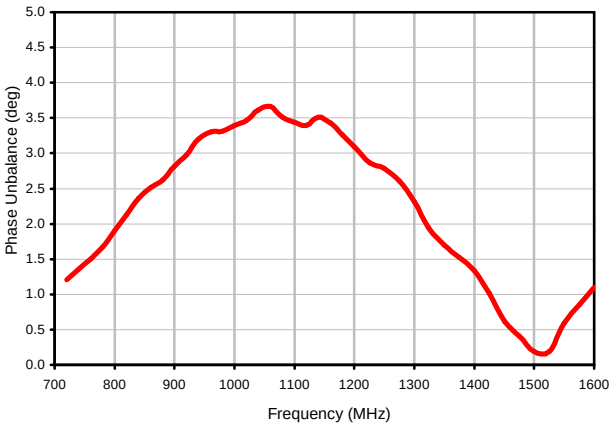
Input Return Loss



Amplitude Unbalance



Phase Unbalance**

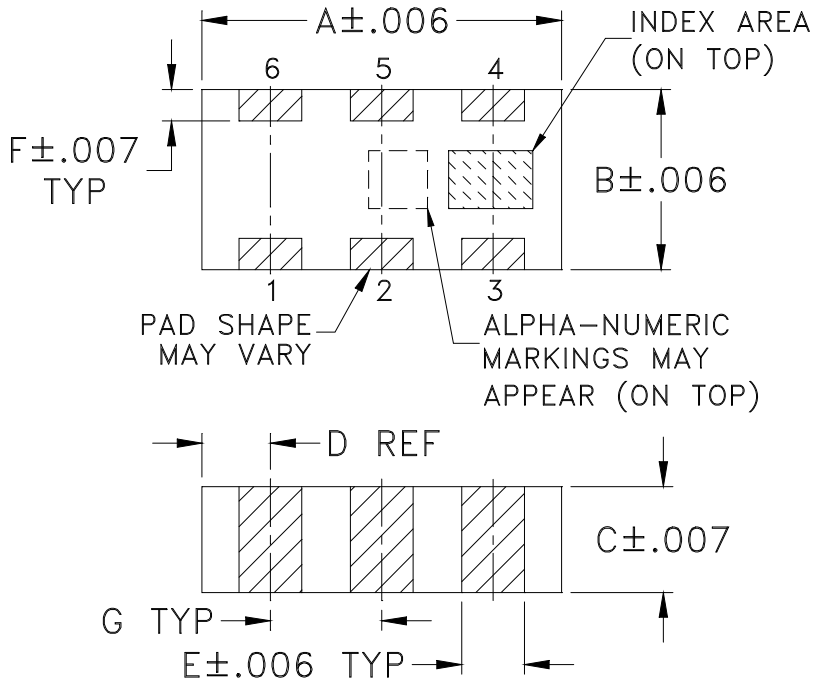


**Phase Unbalance is relative to 180˚

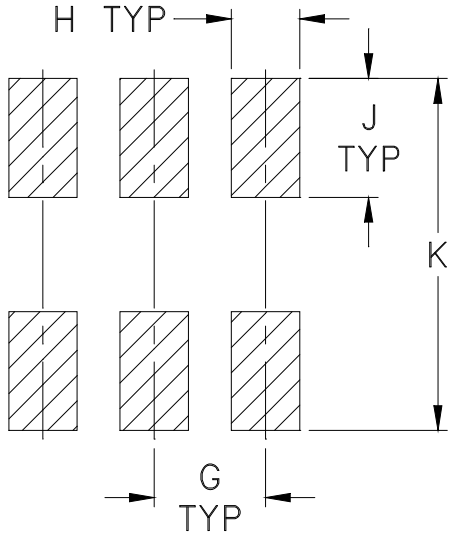
Case Style FV

FV1206-1

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE #	A	B	C	D	E	F	G	H	J	K	L	M	N	P	WT. GRAM
FV1206-1	.126 (3.20)	.063 (1.60)	.035 (0.89)	.024 (0.61)	.022 (0.56)	.011 (0.28)	.039 (0.99)	.024 (0.61)	.042 (1.07)	.123 (3.12)	-- --	-- --	-- --	-- --	.020

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

Notes:

1. Open style, ceramic base.
2. Termination finish: **as shown below or indicated on Data Sheet.**
   For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
   For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

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Tape & Reel Packaging TR-F75

DEVICE ORIENTATION IN T&R

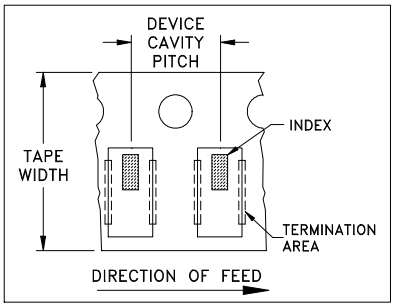


ILLUSTRATION 1

Applicable Case Styles
FV1206-1
FV1206-3

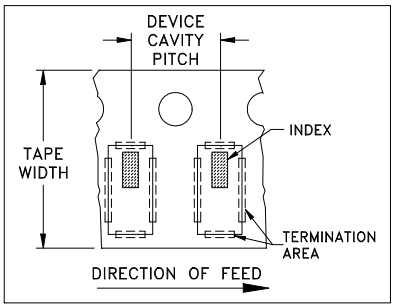


ILLUSTRATION 2

Applicable Case Styles
FV1206-4
FV1206-5
FV1206-6
FV1206-7
FV1206-9

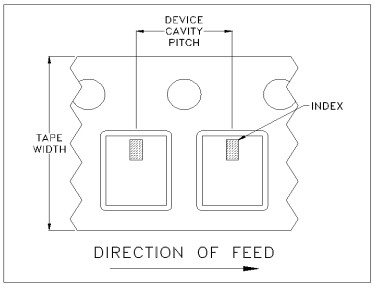


ILLUSTRATION 3

Applicable Case Styles
FV1206-11
FV1206-12
GE0805C-18
NL1008C-6
NL1008C-7
NL1008C-9
NL1008C-10
NL1008C-12

Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
8	4	7	Small quantity standards (see note)	20
				50
				100
				200
				500
				1000
			Standard	3000

Note: Please consult individual model data sheet to determine device per reel availability.

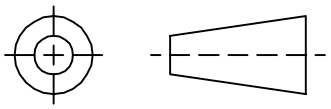
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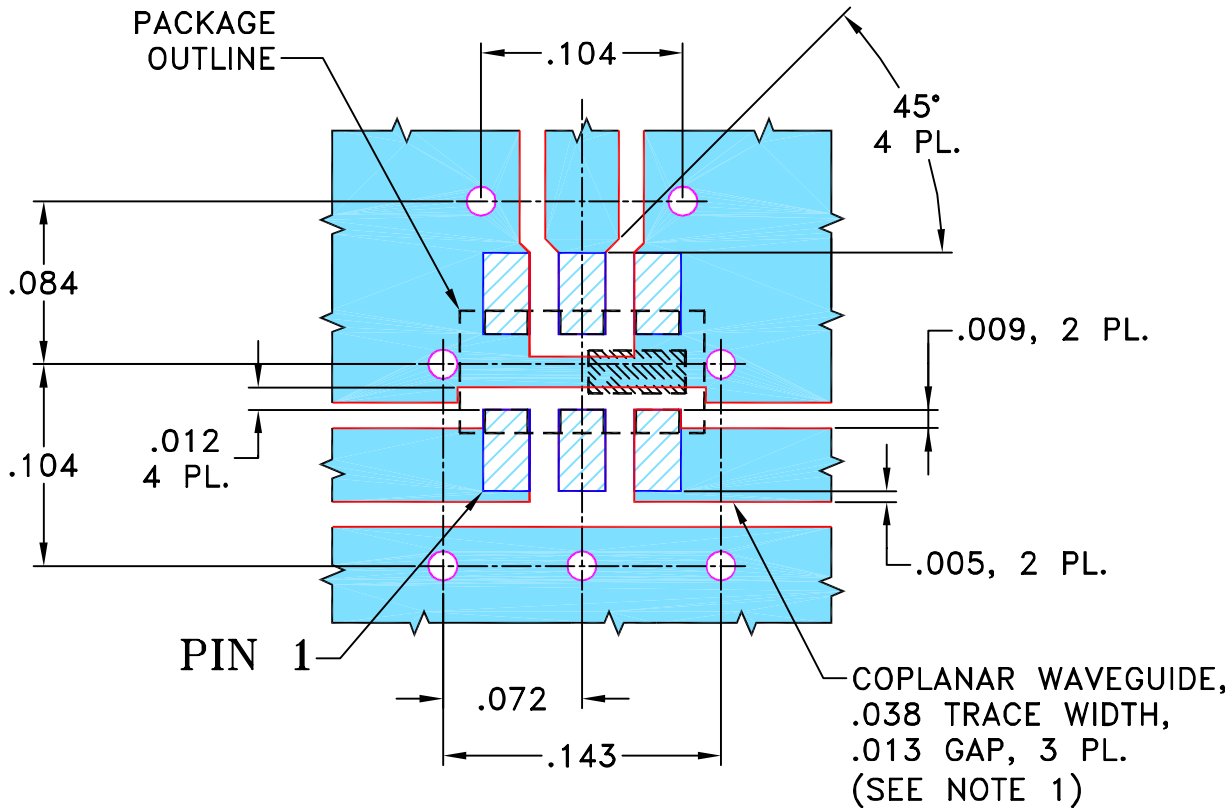
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M109527	NEW RELEASE	01/31/07	PW	DJ

SUGGESTED MOUNTING CONFIGURATION FOR FV1206-1 CASE STYLE, "sa" PIN CONNECTION.



NOTES:

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020" ± .0015". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP 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
DIMENSIONS ARE IN INCHES	DRAWN	PW	01/29/07
TOLERANCES ON:	CHECKED	IL	01/31/07
2 PL DECIMALS ±	APPROVED	DJ	01/31/07
3 PL DECIMALS ± .005			
ANGLES ± 1°			
FRACTIONS ±			

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

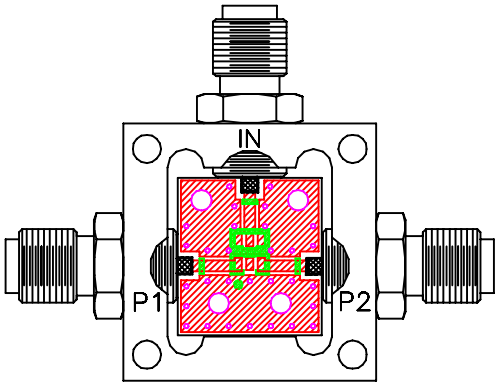
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, sa, FV1206-1, TCN, TB-417+

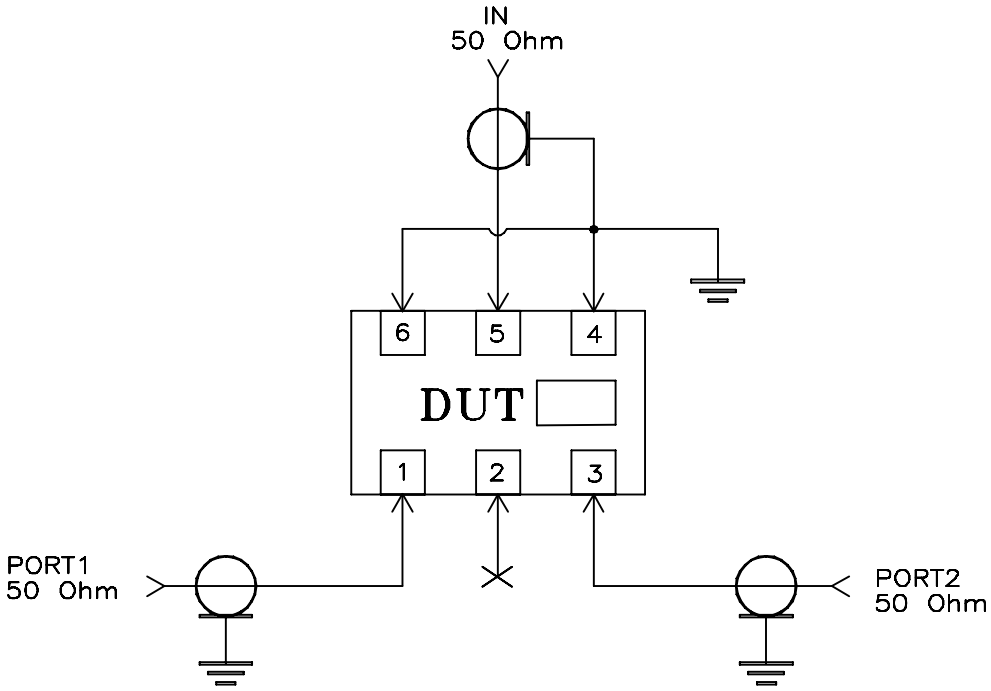
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-265	OR

FILE:	SCALE:	SHEET:
98PL265	10:1	1 OF 1

Evaluation Board and Circuit



TB-417+



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.010 inch.

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Environmental Specifications ENV06T2

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, 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

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