

Narrow Band Phase Shifter

50Ω 180° Voltage Variable 1.8 to 2.5 MHz

JCPHS-2.5+



Generic photo used for illustration purposes only

CASE STYLE: BG419

+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Maximum Ratings

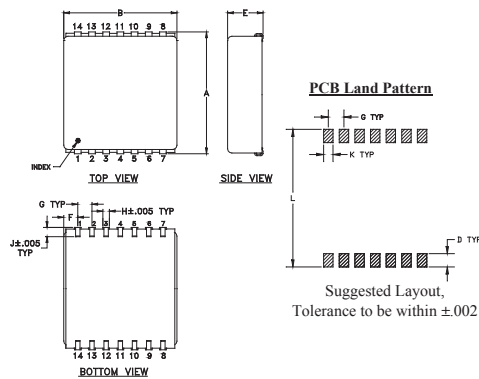
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Input Power	20 dBm max.
Control Voltage	20V

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

Pin Connections

IN	1
OUT	7
BIAS	8
GROUND	2,3,4,5,6,9,10,11,12,13,14

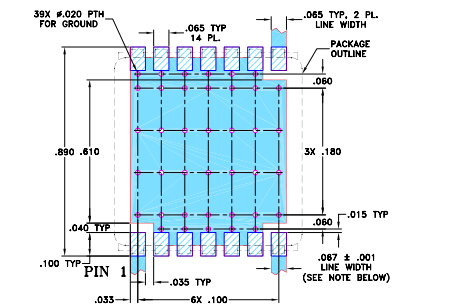
Outline Drawing



Outline Dimensions (inch mm)

A	B	C	D	E	F
.870	.800	--	.100	.400	.100
22.098	20.32	--	2.54	10.16	2.54
G	H	J	K	L	wt
.100	.047	.065	.065	.890	grams
2.54	1.1938	1.651	1.651	22.606	6.4

Demo Board MCL P/N: TB-62 Suggested PCB Layout (PL-011)



- NOTES:
- TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.030 ± 0.002 ; 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

- 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-Circuits' 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/MCLStore/terms.jsp

Features

- low insertion loss, 0.9 dB typ.
- good VSWR, 1.2:1 typ.
- solder-plated J-leads for excellent solderability and strain relief
- aqueous washable

Applications

- radio location
- maritime mobile

Phase Shifter Electrical Specifications

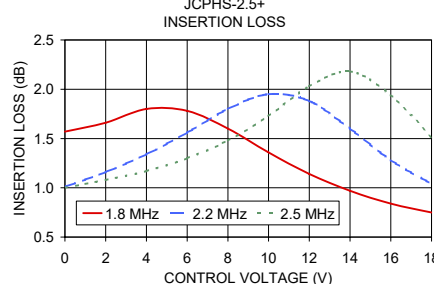
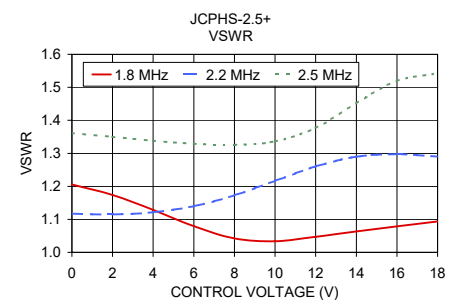
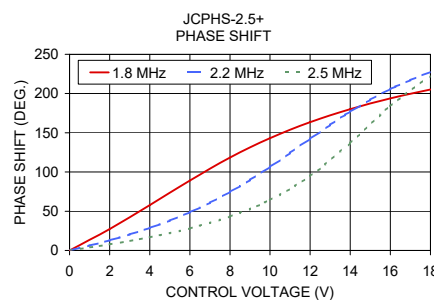
FREQUENCY (MHz)	PHASE RANGE (Degrees)	INSERTION LOSS (dB)		CONTROL VOLTAGE (V)	CONTROL BANDWIDTH (kHz)	VSWR (:1)	
		Typ.	Max.			Typ.	Max.
1.8-2.5	180	0.9	2.7	0-18	DC-50	1.2	1.8

Maximum operating power, 0 dBm

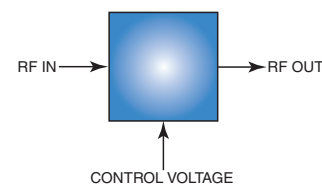
Typical Performance Data

Control Voltage (V)	Phase Shift* (Degrees)			VSWR (:1)			Insertion Loss (dB)		
	1.8 MHz	2.2 MHz	2.5 MHz	1.8 MHz	2.2 MHz	2.5 MHz	1.8 MHz	2.2 MHz	2.5 MHz
0.0	0.00	0.00	0.00	1.21	1.12	1.36	1.57	1.01	1.00
2.0	27.36	12.96	7.66	1.17	1.12	1.35	1.66	1.16	1.08
4.0	57.85	28.73	16.68	1.13	1.12	1.34	1.80	1.34	1.17
6.0	89.17	48.73	28.00	1.08	1.14	1.33	1.78	1.56	1.30
8.0	118.37	74.58	43.16	1.04	1.17	1.33	1.60	1.80	1.48
10.0	143.18	106.54	64.34	1.03	1.22	1.34	1.36	1.95	1.73
12.0	163.56	142.37	95.00	1.05	1.26	1.38	1.14	1.88	2.03
14.0	180.16	176.76	137.06	1.06	1.29	1.45	0.97	1.60	2.18
16.0	193.88	205.68	184.07	1.08	1.30	1.52	0.84	1.28	1.94
18.0	205.05	227.58	222.53	1.09	1.29	1.54	0.75	1.04	1.51

* Normalized at control voltage = 0V



electrical schematic



PHASE SHIFTER

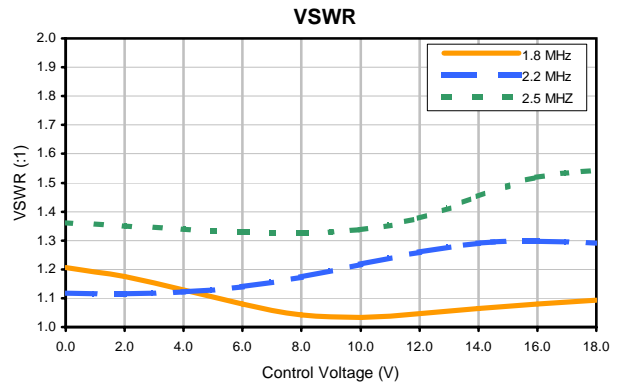
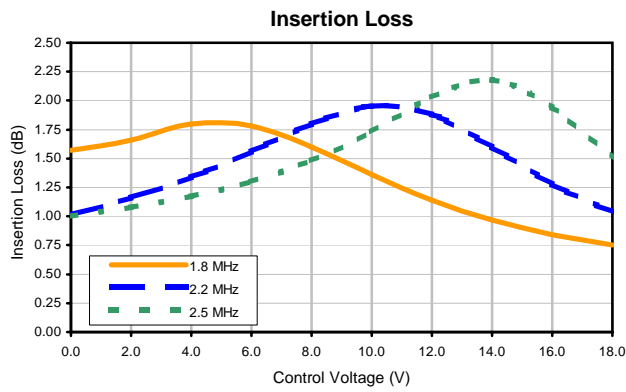
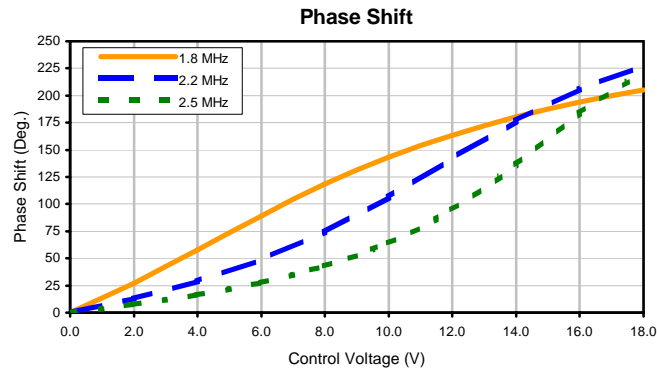
JCPHS-2.5+

Typical Performance Data

CONTROL VOLTAGE (V)	PHASE SHIFT* (Deg.)			VSWR (:1)			INSERTION LOSS (dB)		
	1.8 MHz	2.2 MHz	2.5 MHz	1.8 MHz	2.2 MHz	2.5 MHz	1.8 MHz	2.2 MHz	2.5 MHz
0.0	0.00	0.00	0.00	1.21	1.12	1.36	1.57	1.01	1.00
2.0	27.36	12.96	7.66	1.17	1.12	1.35	1.66	1.16	1.08
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6.0	89.17	48.73	28.00	1.08	1.14	1.33	1.78	1.56	1.30
8.0	118.37	74.58	43.16	1.04	1.17	1.33	1.60	1.80	1.48
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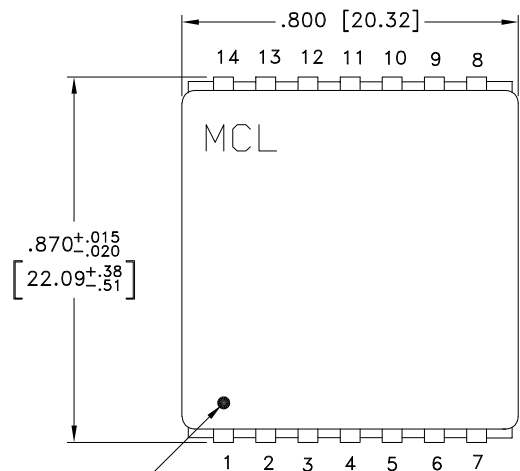
*Normalized at control voltage = 0V

Typical Performance Curves

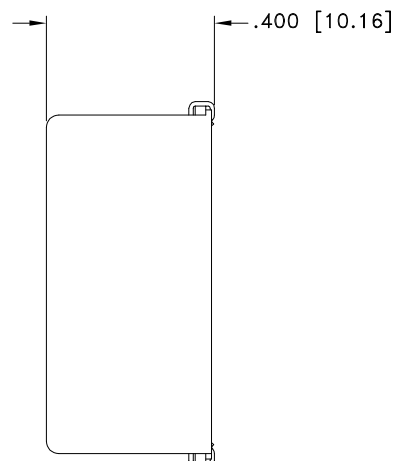


Outline Dimensions

BG419

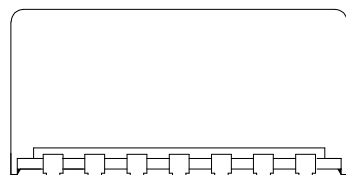


TOP VIEW

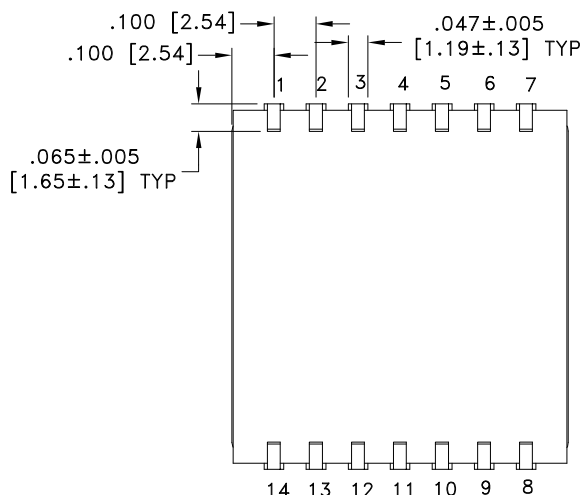


SIDE VIEW

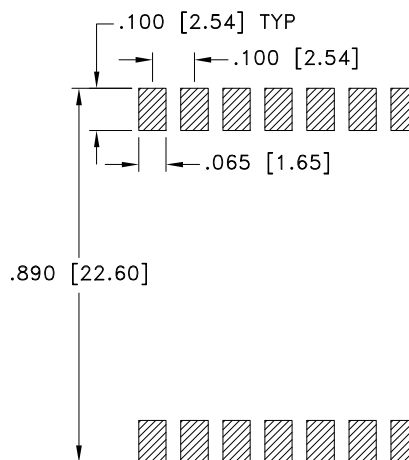
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SIDE VIEW



BOTTOM VIEW



SUGGESTED LAYOUT FOR PCB LAND PATTERN (TOL ±.002)

 DENOTES METALLIZATION

Weight: 4 gram

Dimensions are in inches[mm]. Tolerances: 2PL±0.03[0.76]; 3 PL±0.015 [0.381] inches[mm], unless otherwise specified

Notes:

1. Case material: Copper-Nickel alloy.
2. Base material: Printed wiring laminate.
3. 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.



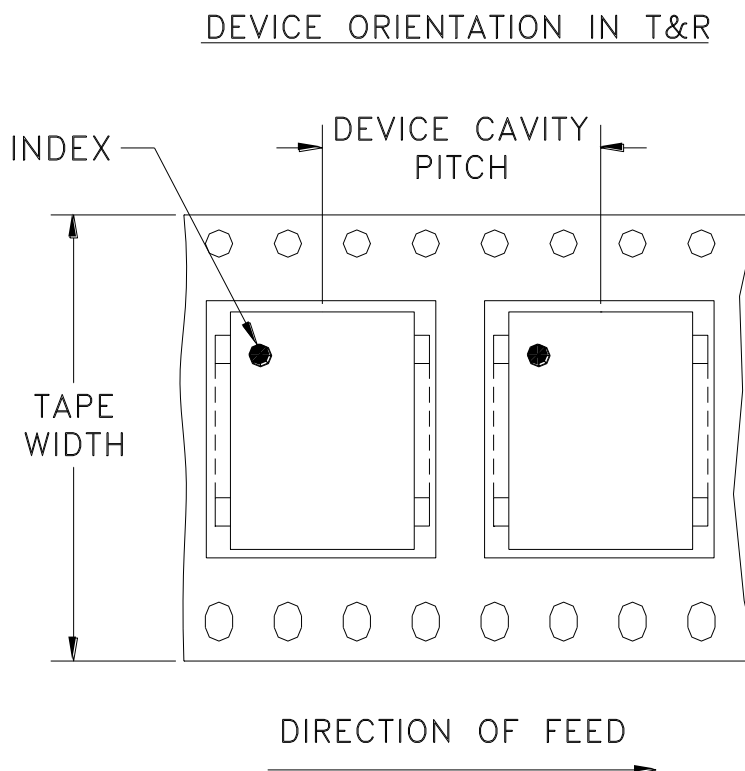
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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

RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F25



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
44	32	13	Small quantity standards (see note)	20
				50
				100
			Standard	125

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



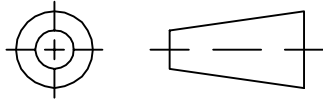
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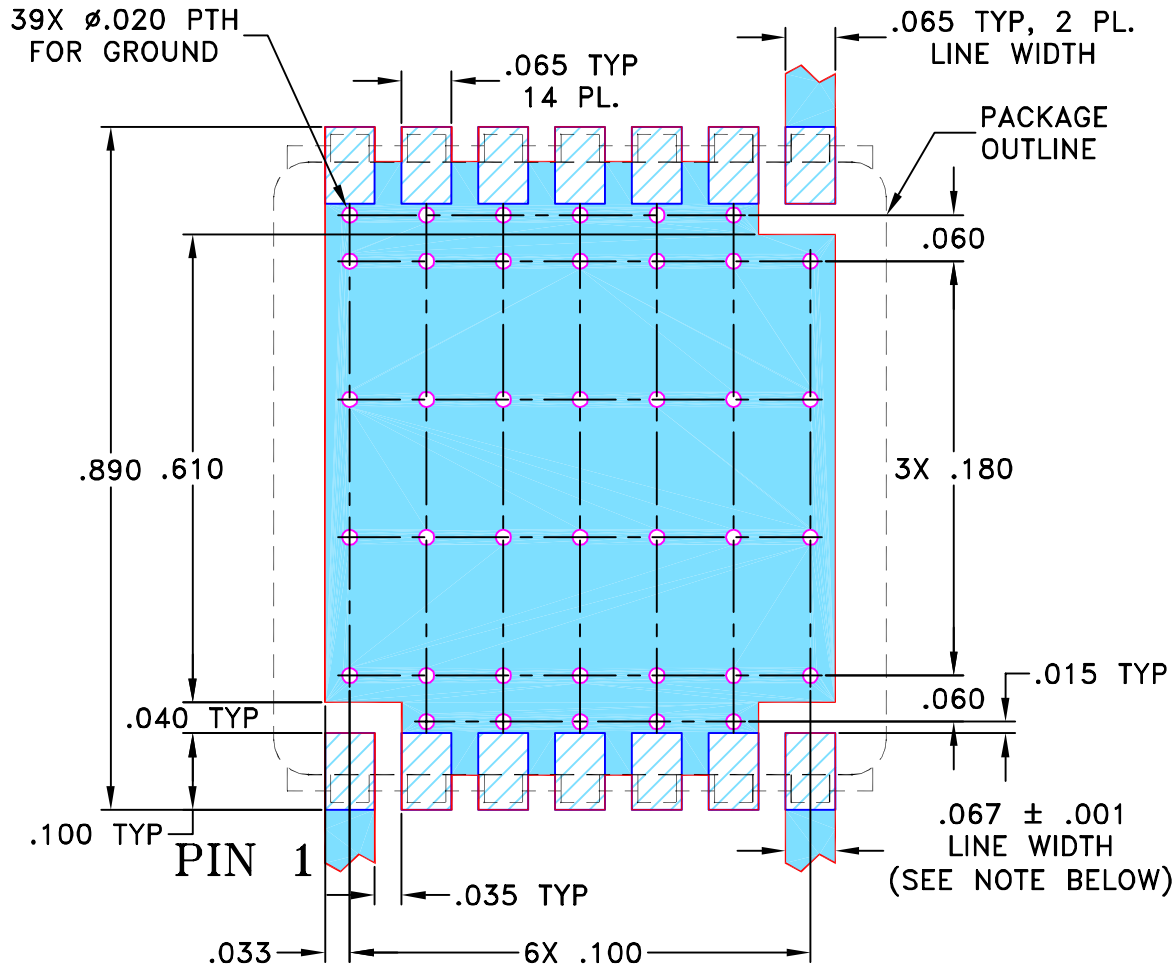
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
A	M75893	REDRAWN	03/01	GF	DB
B	M76077	UPDATED DRAWING	04/01	GF	MM
C	M82575	UPDATED DRAWING	08/08/02	AV	MM
D	M102713	UPDATED NOTES	01/12/06	GF	IL

SUGGESTED MOUNTING CONFIGURATION FOR BG419 CASE STYLE, "jd" PIN CONNECTION

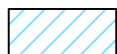


NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS 0.030" ± 0.002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.

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

DIMENSIONS ARE IN INCHES

DRAWN

AV

08/07/00

TOLERANCES ON:
2 PL DECIMALS ±
3 PL DECIMALS ± .005
ANGLES ±
FRACTIONS ±

CHECKED

SK

08/08/00

APPROVED

DB

08/08/00



Mini-Circuits®

13 Neptune Avenue
Brooklyn NY 11235

PL, jd, BG419, JCOS, TB-62

SIZE

CODE IDENT

DRAWING NO:

REV:

A

15542

98-PL-011

D

FILE: 98PL011

SCALE: 4:1

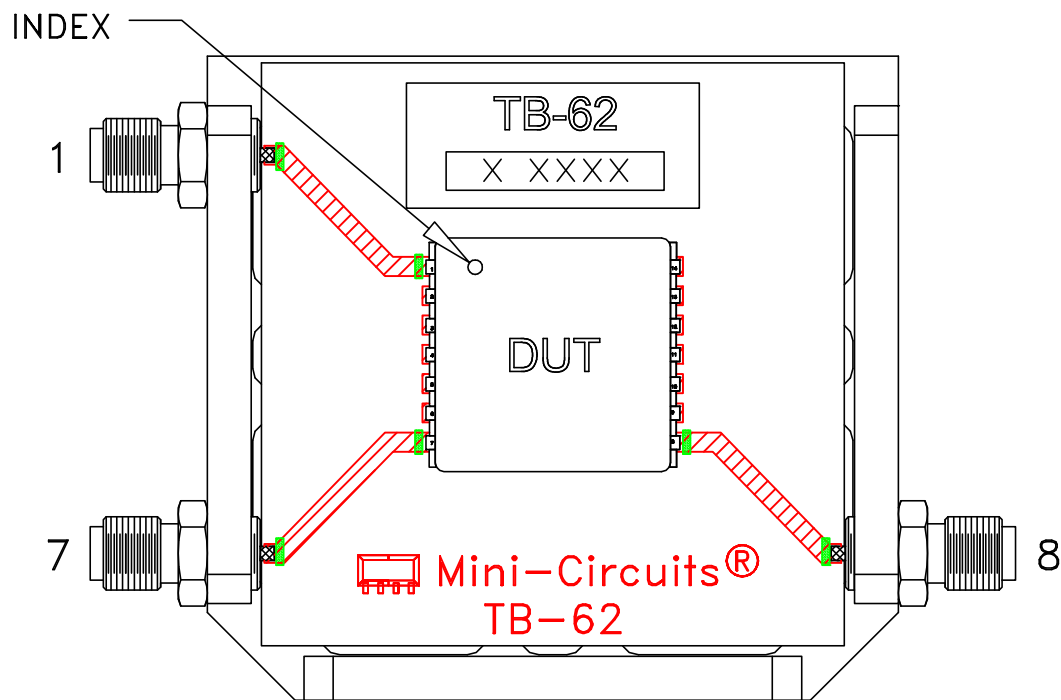
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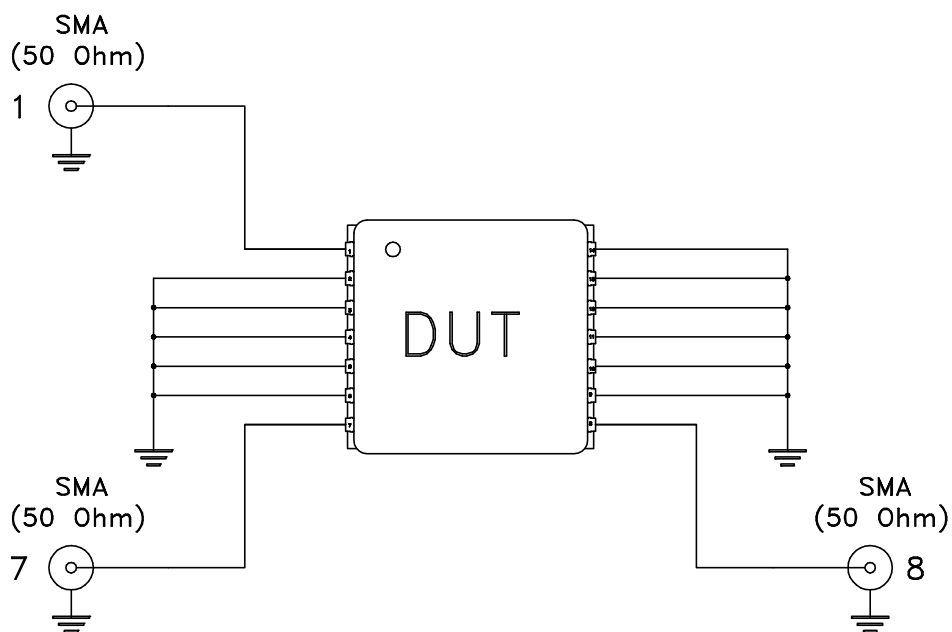
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Evaluation Board and Circuit

For Pin Connection Refer to
Data Sheet of the DUT



TB-62



Schematic Diagram

Notes:

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

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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 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
HAST	130°C, 85% RH, 96 hours	JESD22-A110
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 Eutectic Process: 225°C peak Pb-Free Process, 245°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, 20-2000 Hz, 4 times in each of three axes (total 12)	MIL-STD-883, Method 2007.3, Condition A
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