

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

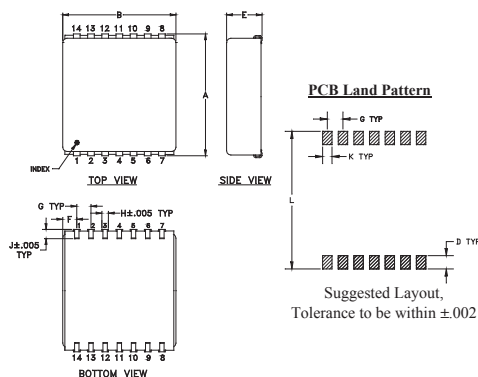
Features

- 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

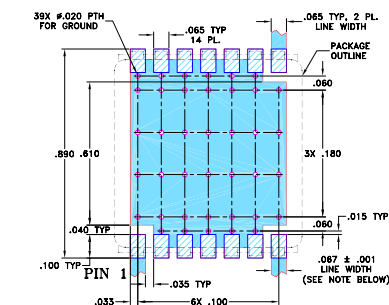
Outline Drawing



Outline Dimensions (inch)

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: 1. 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.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
3. DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
4. DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

Phase Shifter Electrical Specifications

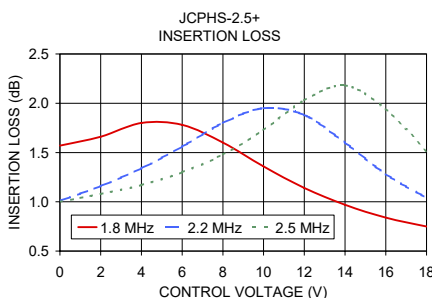
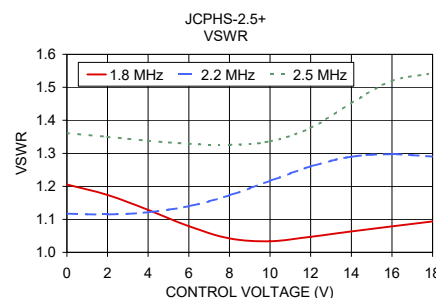
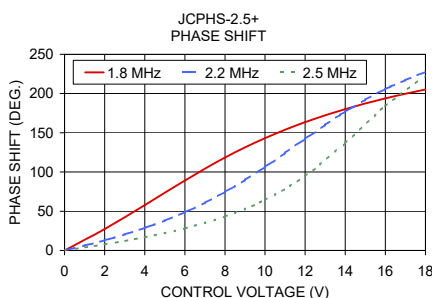
FREQUENCY (MHz)	PHASE RANGE (Degrees)	INSERTION LOSS (dB)		CONTROL VOLTAGE (V)	CONTROL BANDWIDTH (kHz)	VSWR (:1)	
		Typ.	Max.			Typ.	Max.
1.8-2.5	180	0.9	2.7	0-18	DC-50	1.2	1.8

Maximum operating power, 0 dBm

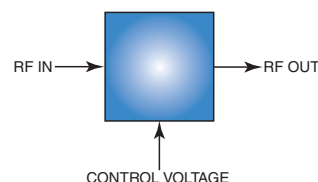
Typical Performance Data

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



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.
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PHASE SHIFTER

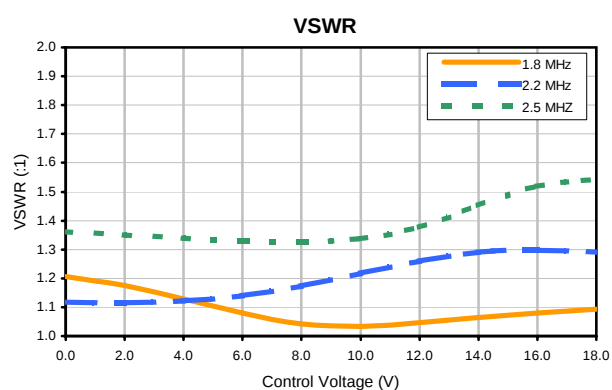
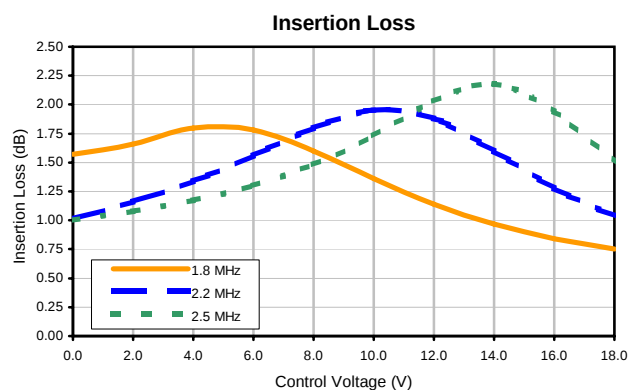
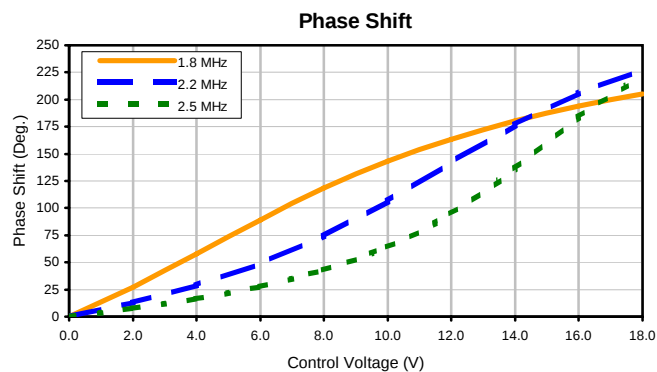
JCPHS-2.5+

Typical Performance Data

CONTROL VOLTAGE (V)	PHASE SHIFT*			VSWR			INSERTION LOSS		
	(Deg.)			(:1)			(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

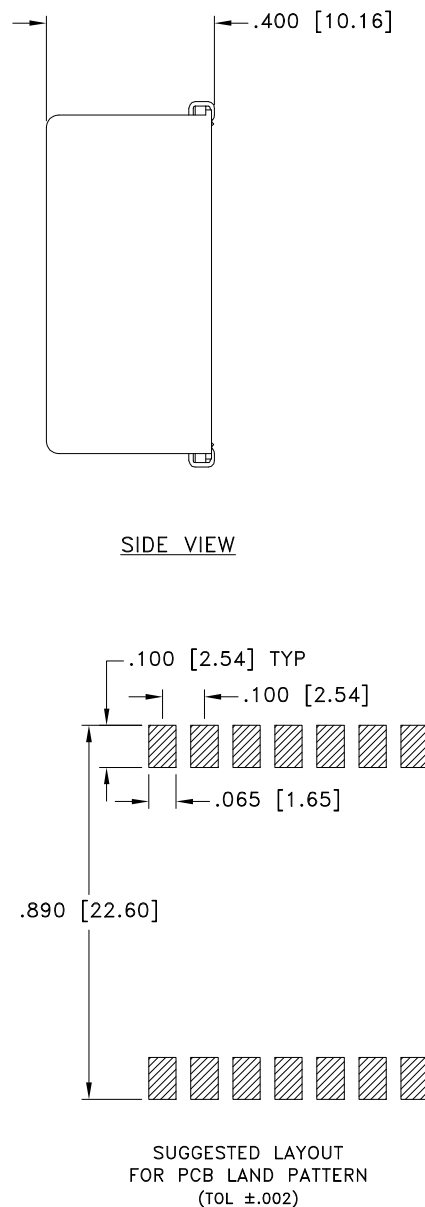
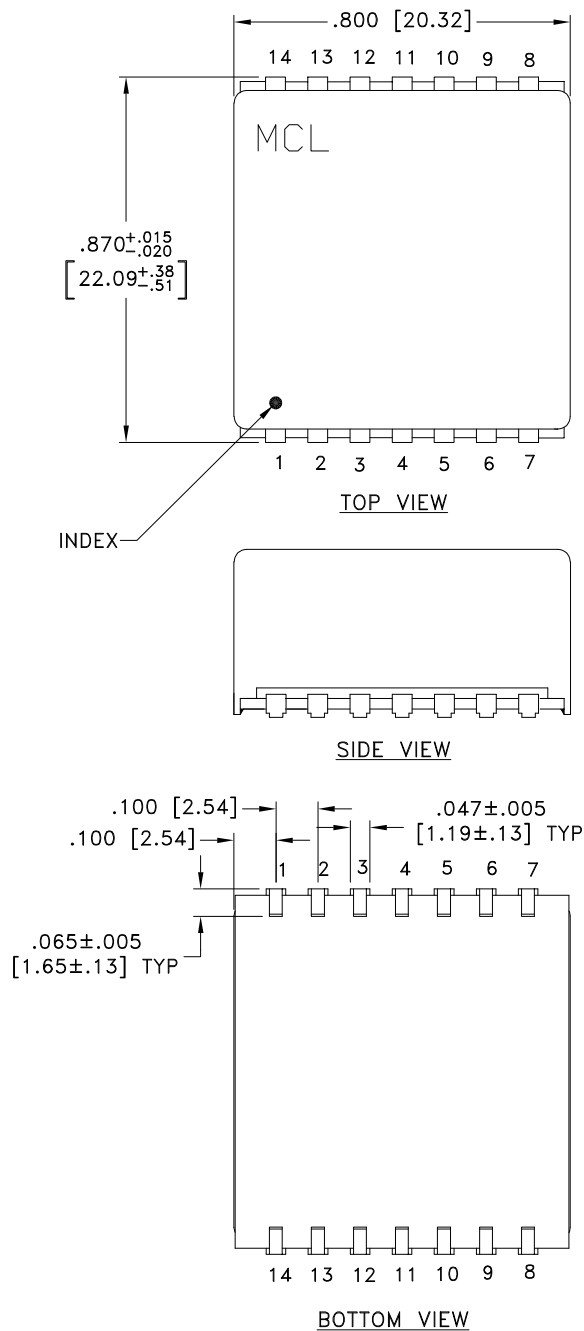
*Normalized at control voltage = 0V

Typical Performance Curves



Outline Dimensions

BG419



DENOTES METALLIZATION

Weight: 4 gram

Dimensions are in inches[mm]. Tolerances: 2PL $\pm$ 0.03[0.76]; 3 PL $\pm$ 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.

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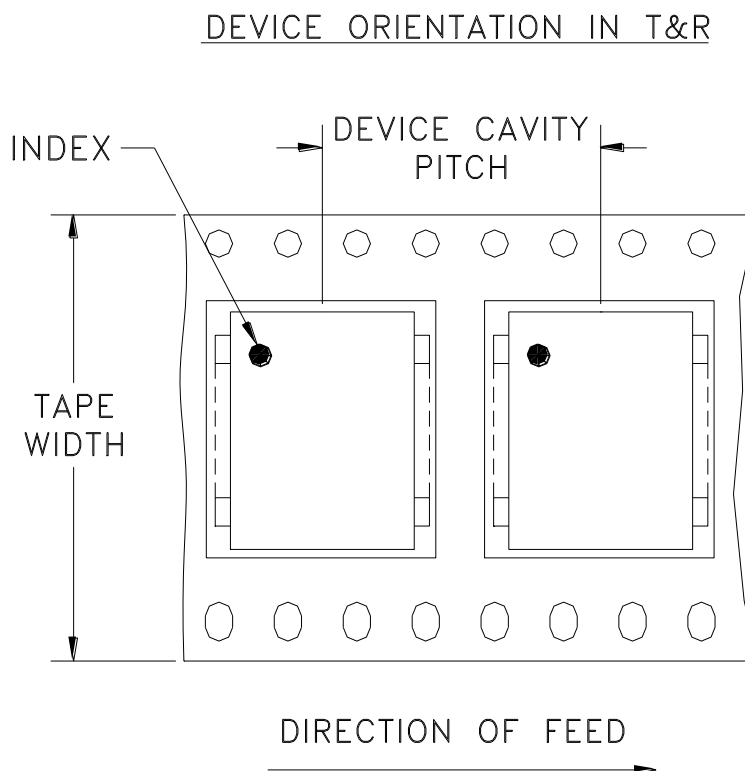
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RF/IF MICROWAVE COMPONENTS

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.

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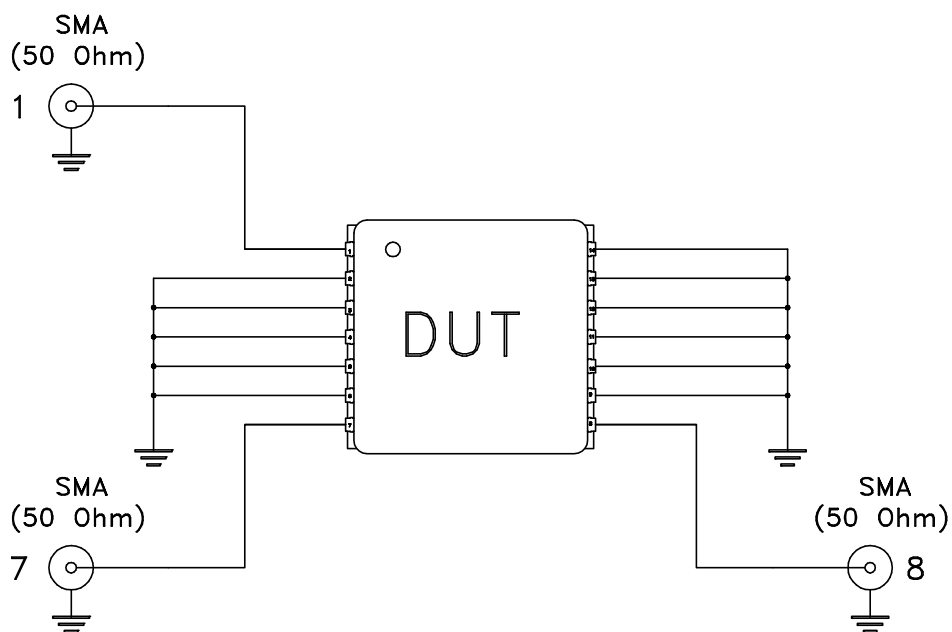
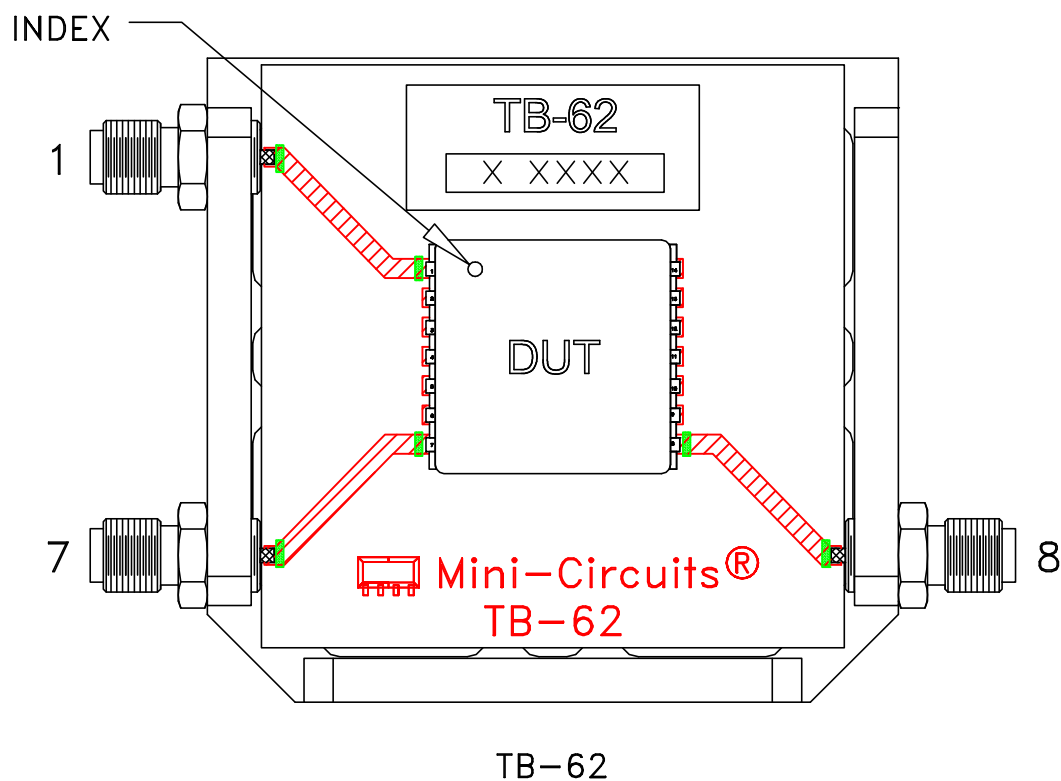
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Evaluation Board and Circuit

For Pin Connection 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, 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