

Phase Shifter

JSPHS-446

50Ω 180° Voltage Variable 366 to 446 MHz

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

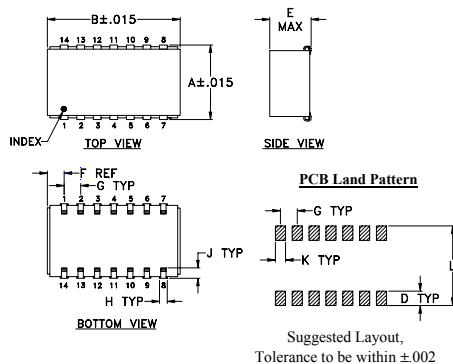
Permanent damage may occur if any of these limits are exceeded.

Pin Connections

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

[^] proper operation is achieved with pins 1 or 7 or both connected to BIAS.

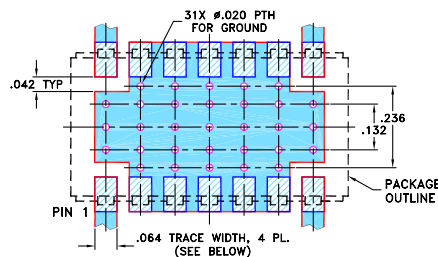
Outline Drawing



Outline Dimensions (inch mm)

A	B	C	D	E	F	G
.450	.803	--	.100	.250	.102	.100
11.43	20.40	--	2.54	6.35	2.59	2.54

H	J	K	L	wt
.047	.065	.065	.470	grams
1.19	1.65	1.65	11.94	3.0

Demo Board MCL P/N: TB-152+
Suggested PCB Layout (PL-214)

NOTE: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .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

Notes

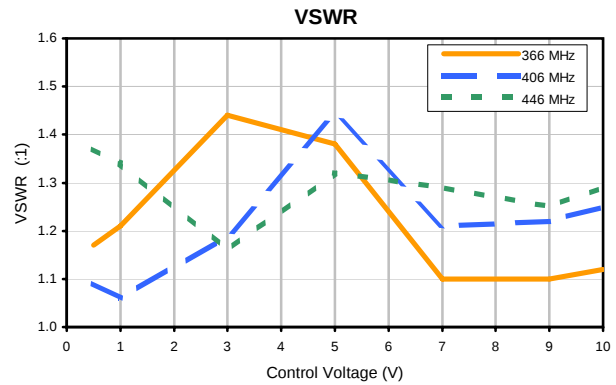
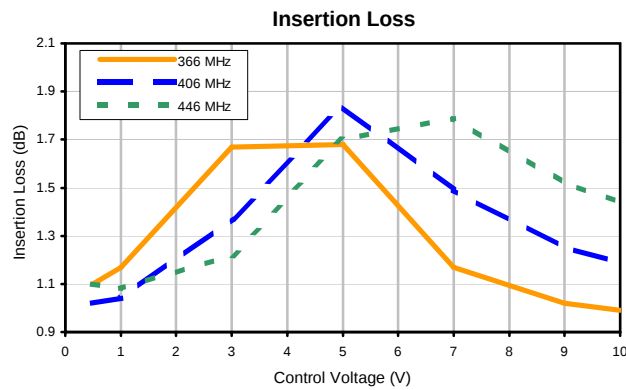
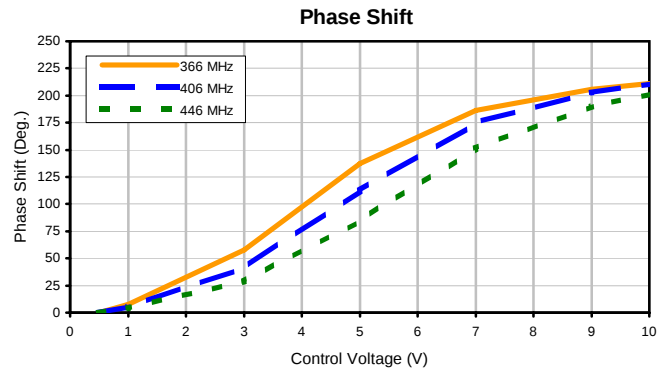
- A. Performance and quality attributes and conditions not expressly stated in this specification document

Typical Performance Data

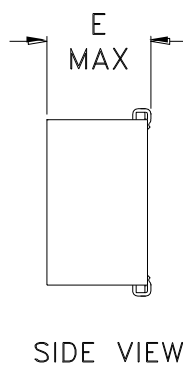
CONTROL VOLTAGE (V)	PHASE SHIFT*			VSWR			INSERTION LOSS		
	(Deg.)			(:1)			(dB)		
	366 MHz	406 MHz	446 MHz	366 MHz	406 MHz	446 MHz	366 MHz	406 MHz	446 MHz
0.5	0.05	0.03	0.01	1.17	1.09	1.37	1.10	1.02	1.10
1.0	7.65	5.43	4.14	1.21	1.06	1.34	1.17	1.04	1.08
3.0	57.73	41.01	29.01	1.44	1.19	1.16	1.67	1.37	1.22
5.0	137.57	112.81	84.75	1.38	1.44	1.32	1.68	1.84	1.70
7.0	186.22	174.91	151.47	1.10	1.21	1.29	1.17	1.49	1.79
9.0	205.93	203.06	189.91	1.10	1.22	1.25	1.02	1.25	1.52
10.0	211.22	210.59	200.96	1.12	1.25	1.29	0.99	1.19	1.44

*Normalized at control voltage = 0.5V

Typical Performance Curves



Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within $\pm .002$

CASE #	A	B	C	D	E	F	G	H	J	K	L	WT. GRAM
BK276	.450 (11.43)	.803 (20.40)	-- --	.100 (2.54)	.250 (6.35)	.102 (2.59)	.100 (2.54)	.047 (1.19)	.065 (1.65)	.065 (1.65)	.470 (11.94)	2.0 MAX.

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

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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Tape & Reel Packaging TR-F5



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
32	16	13	500

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



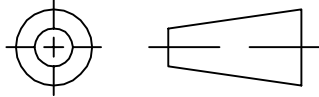
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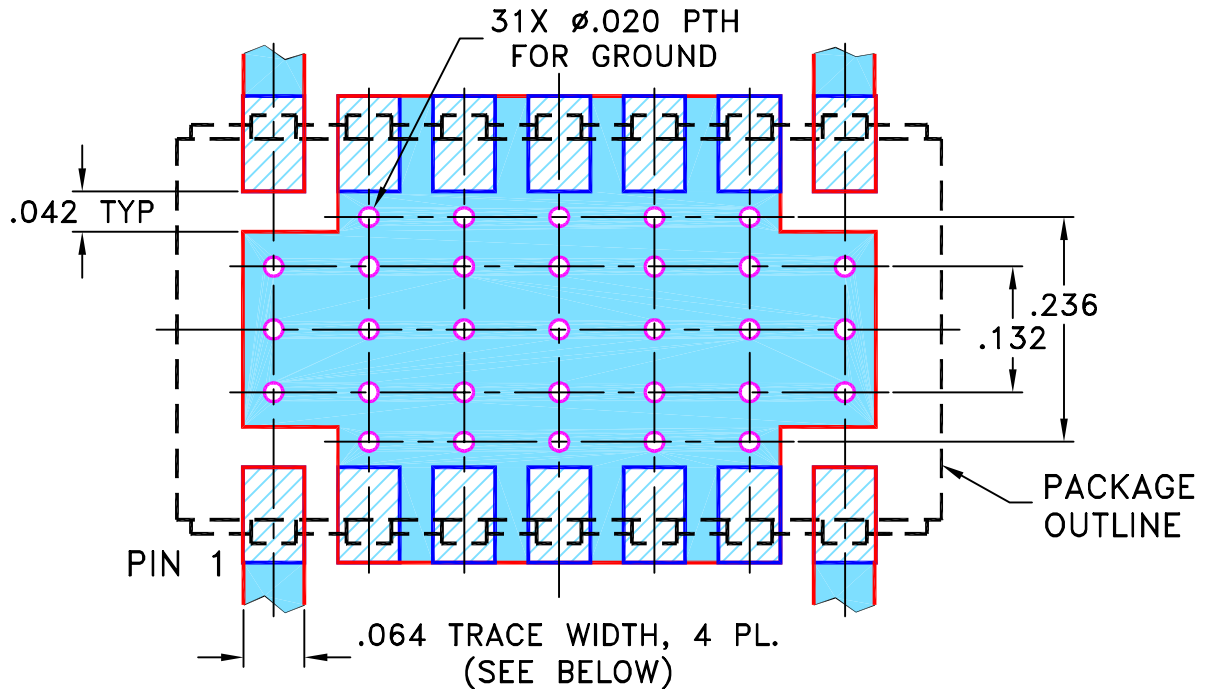
THIRD ANGLE PROJECTION



REVISIONS

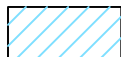
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M100827	NEW RELEASE	09/21/05	MMG	DJ
A	M102713	ADDED "...WITH SMOBC"	01/13/06	GT	IL

**SUGGESTED MOUNTING CONFIGURATION
FOR BK276 CASE STYLE, "jb" PIN CONNECTION**



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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

MMG

09/20/05

TOLERANCES ON:

CHECKED

IL

09/21/05

2 PL DECIMALS $\pm$

APPROVED

DJ

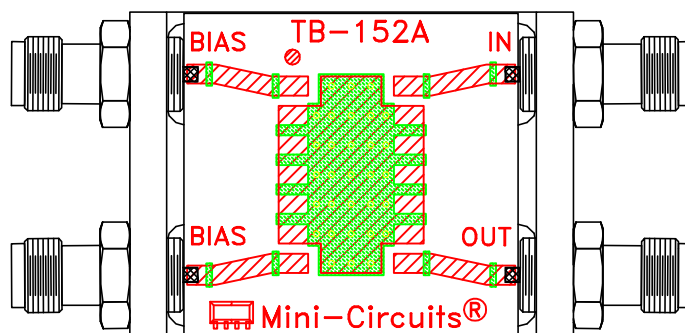
09/21/05

3 PL DECIMALS $\pm$.005ANGLES $\pm$ FRACTIONS $\pm$
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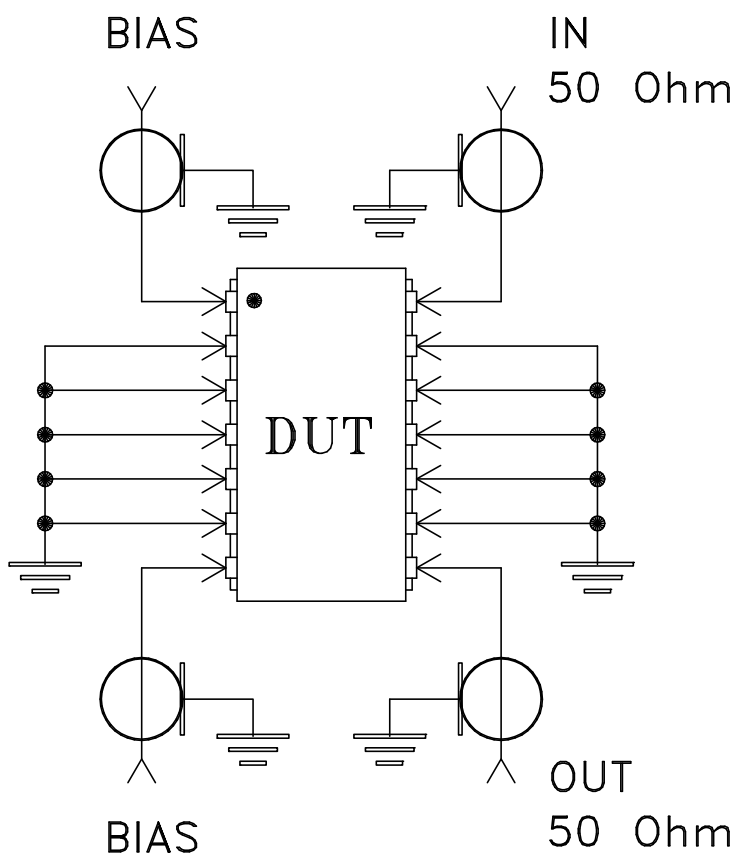
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ASHEETA1.DWG REV:A DATE:01/12/95

Evaluation Board and Circuit



TB-152+



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	-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