

Surface Mount

Phase Shifter

SPHSA-152+

50Ω 360° Voltage Variable 800 to 1500 MHz

The Big Deal

- Wideband
- Excellent VSWR, 1.2:1 typ.
- Wide phase shift, 360°



CASE STYLE: JW1441

Product Overview

Mini-Circuits' SPHSA-152+ is a surface mount voltage variable phase shifter providing precise 360° phase control from 800 to 1500 MHz, supporting many popular cellular and communications application bands. This model achieves low insertion loss of 2.8 dB and good VSWR of 1.2:1. It has a control bandwidth of DC to 50 kHz and a control voltage range of 0 to +15V. Housed in a shielded, 12-lead package with wrap-around terminations, the unit measures only 0.44 x 0.74 x 0.19", offering a space-efficient, low-cost alternative to larger connectorized phase shifters.

Feature	Advantages
Low insertion loss, 2.8 dB typ.	Enables good transmission of signal power from input to output and minimizes effect on system noise figure.
Good VSWR, 1.2:1 typ.	SPHSA-152+ provides good input/output matching for 50Ω systems.
Wide Phase Shift, 360°	In test environments, full 360° phase control allows the user to experiment with various incident phases. This can be used to test residual phase noise of amplifiers and to determine the influence of phase between two mismatched components in a system.
Miniature Size: 0.44 x 0.74 x 0.19"	Saves PCB space and system cost.

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



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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

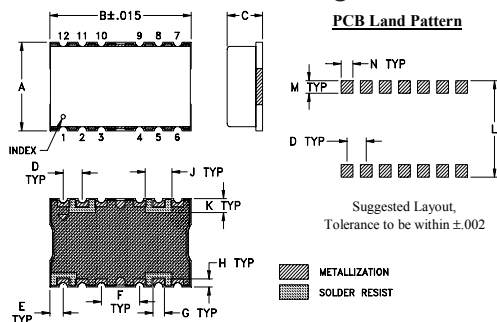
Permanent damage may occur if any of these limits are exceeded.

Pin Connections

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

[^] proper operation is achieved with pins 8 or 12 or both connected to BIAS.

Outline Drawing

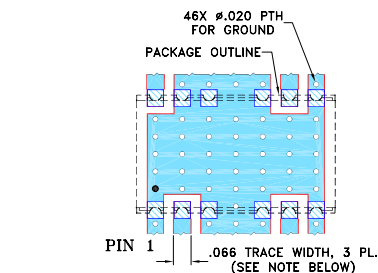


Outline Dimensions (inch mm)

A	B	C	D	E	F	G	H
.440	.740	.19	.100	.070	.200	.060	.040
11.18	18.80	4.83	2.54	1.78	5.08	1.52	1.02

J	K	L	M	N	P	wt
.140	.070	.480	.063	.061	--	grams
3.56	1.78	12.19	1.60	1.55	--	grams

Demo Board MCL P/N: TB-524+ Suggested PCB Layout (PL-408)



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350 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.
3. DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
4. DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

Features

- low insertion loss, 2.8 dB typ.
- good VSWR, 1.2:1 typ.
- wide phase shift, 360°
- aqueous washable

Applications

- cellular
- communication

Electrical Specifications at 25°C

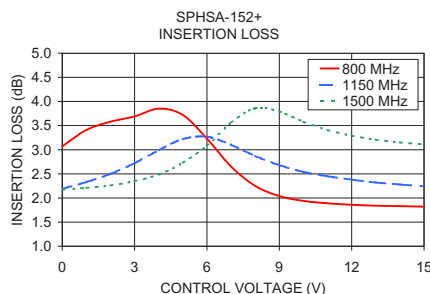
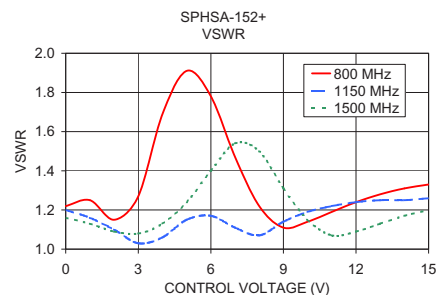
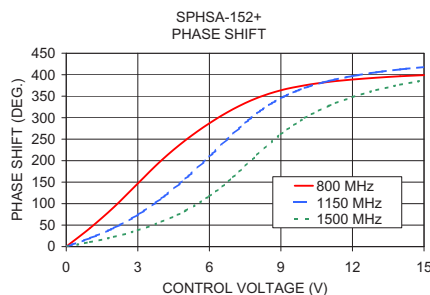
Parameter	Condition (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		800		1500	MHz
Phase Range	800 - 1500	360	—	—	Degrees
Insertion Loss	800 - 1500	—	2.8	4.5	dB
Control Voltage	800 - 1500	—	0-15	—	V
Control Bandwidth	800 - 1500	—	DC-50	—	kHz
VSWR	800 - 1500	—	1.2	2.2	:1

DC input resistance at Control port: 2000 ohms typ.

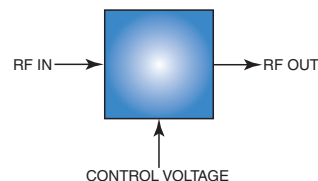
Typical Performance Data

Control Voltage (V)	Phase Shift* (Degrees)			VSWR (:1)			Insertion Loss (dB)		
	800 MHz	1150 MHz	1500 MHz	800 MHz	1150 MHz	1500 MHz	800 MHz	1150 MHz	1500 MHz
0.0	0.01	0.00	0.01	1.22	1.20	1.16	3.07	2.19	2.17
1.0	43.39	20.01	10.59	1.25	1.16	1.13	3.41	2.33	2.21
2.0	91.98	43.59	22.68	1.15	1.10	1.09	3.58	2.50	2.26
3.0	146.94	73.94	38.05	1.27	1.03	1.08	3.69	2.72	2.35
4.0	201.09	112.39	57.90	1.69	1.15	1.13	3.85	2.90	2.49
5.0	247.66	158.14	83.54	1.91	1.06	1.24	3.72	3.22	2.73
6.0	286.91	209.47	117.36	1.78	1.17	1.40	3.23	3.27	3.09
7.0	320.04	262.81	161.73	1.47	1.11	1.54	2.65	3.10	3.56
8.0	345.88	310.38	213.44	1.22	1.07	1.50	2.25	2.87	3.86
9.0	363.68	345.50	261.60	1.11	1.14	1.51	2.04	2.68	3.79
10.0	375.33	369.18	299.37	1.14	1.19	1.15	1.94	2.54	3.58
11.0	383.21	389.33	327.30	1.19	1.22	1.07	1.89	2.45	3.41
12.0	388.83	396.88	348.09	1.24	1.24	1.09	1.86	2.38	3.29
13.0	393.06	405.57	364.07	1.28	1.25	1.13	1.84	2.32	3.21
14.0	396.39	412.37	376.66	1.31	1.25	1.17	1.83	2.28	3.15
15.0	399.09	417.88	386.92	1.33	1.26	1.20	1.82	2.24	3.11

* Normalized at control voltage = 0V



electrical schematic



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