

Surface Mount

# Phase Shifter

## SCPHS-180+

50Ω 360° Voltage Variable 90 to 180 MHz

### The Big Deal

- Low insertion loss, 2.2 dB typ.
- Wide phase shift, 360°
- Low frequency and small size



CASE STYLE: HU1371

### Product Overview

Mini-Circuits' SCPHS-180+ is a voltage variable phase shifter providing 360° phase control from 90 to 180 MHz in a miniature surface mount package. This model has a control bandwidth of DC to 30 kHz and a control voltage range from 0 to +10V. Housed in a shielded, 12-lead package with wrap-around terminations, the unit measures only 0.87 x 0.80 x 0.25", offering a space-efficient, low-cost alternative to larger, expensive connectorized phase shifters typical for low frequency operation.

Feature	Advantages
Low insertion loss, 2.2 dB typ.	Enables good transmission of signal power from input to output and minimizes effect on system noise figure.
Wide phase shift, 360°	In test environments, 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.
Low frequency operation and tiny size, 0.87 x 0.80 x 0.25"	Typically, lower frequency phase shifters are large, connectorized designs. SCPHS-180+ provides low frequency phase shift capability in a tiny surface mount package, saving space and reducing 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](http://www.minicircuits.com/MCLStore/terms.jsp)



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50Ω 360° Voltage Variable 90 to 180 MHz

## SCPHS-180+



Generic photo used for illustration purposes only

CASE STYLE: HU1371

**+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  
13" 200

### Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Input Power	24 dBm max.
Control Voltage	15V
Permanent damage may occur if any of these limits are exceeded.	

### Pin Connections

IN	1
OUT	6
BIAS	10,11 <sup>^</sup>
GROUND	2,3,4,5,7,8,9,12,13,14

<sup>^</sup> proper operation is achieved with pins 10 or 11 or both connected to BIAS.

### Features

- low insertion loss, 2.2 dB typ.
- wide phase shift, 360°
- aqueous washable

### Applications

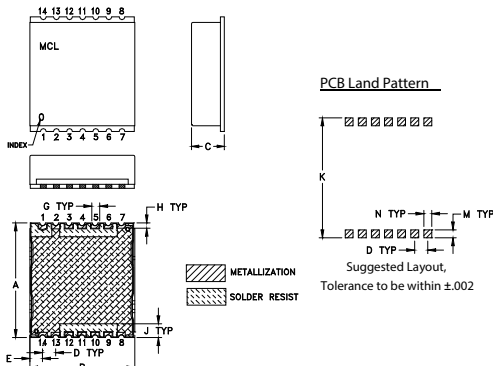
- FM Broadcast
- Aircraft Communication
- VHF

### Electrical Specifications at 25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		90		180	MHz
Phase Range	90-180	360	—	—	Degrees
Insertion Loss	90-180	—	2.2	5	dB
Control Voltage	90-180	—	0-10	—	V
Control Bandwidth	90-180	—	DC-30	—	kHz
VSWR	90-180	—	1.7	—	:1

DC input resistance at Control port: 1460 ohms typ.

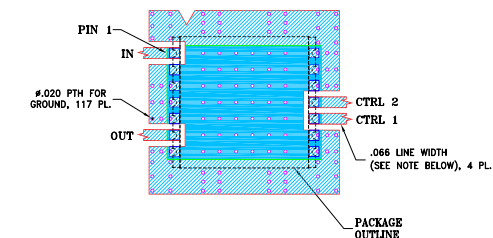
### Outline Drawing



### Outline Dimensions (inch mm)

A	B	C	D	E	F	G	H
.870	.800	.250	.100	.097	-	.060	.040
22.10	20.32	6.35	2.54	2.46	-	1.52	1.02
J	K	L	M	N	P		wt
.105	.910	-	.060	.060	-		grams
2.67	23.11	-	1.52	1.52	-		2.85

Demo Board MCL P/N: TB-1141+  
Suggested PCB Layout (PL-690)

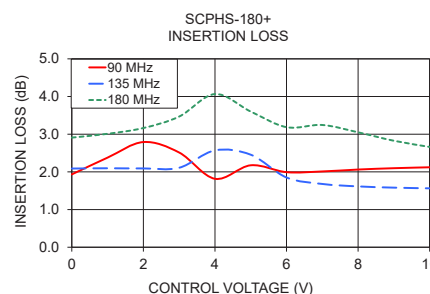
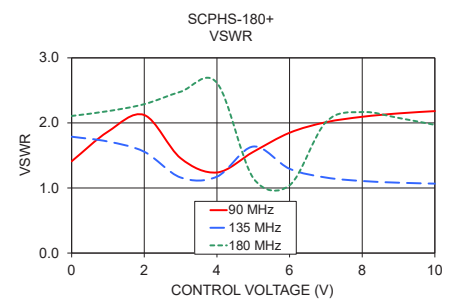
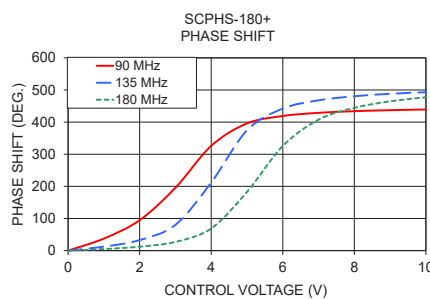


- NOTES:
- TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.002±0.002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
  - BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).  
■ DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

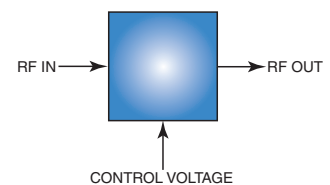
### Typical Performance Data

Control Voltage (V)	Phase Shift* (Degrees)			VSWR (:1)			Insertion Loss (dB)		
	90 MHz	135 MHz	180 MHz	90 MHz	135 MHz	180 MHz	90 MHz	135 MHz	180 MHz
0	0.0	0.0	0.0	1.4	1.8	2.1	1.9	2.1	2.9
1	37.5	12.4	4.9	1.9	1.7	2.2	2.4	2.1	3.0
2	94.8	32.8	12.3	2.1	1.6	2.3	2.8	2.1	3.2
3	195.8	80.3	27.1	1.5	1.2	2.5	2.5	2.1	3.5
4	326.1	212.1	69.0	1.2	1.2	2.6	1.8	2.6	4.1
5	395.9	374.3	182.8	1.6	1.6	1.2	2.2	2.5	3.6
6	419.0	442.1	325.7	1.8	1.3	1.0	2.0	1.9	3.2
7	428.9	467.8	407.7	2.0	1.2	2.0	2.0	1.7	3.2
8	434.1	480.6	444.4	2.1	1.1	2.2	2.1	1.6	3.0
9	437.2	488.2	464.7	2.1	1.1	2.1	2.1	1.6	2.8
10	439.2	493.1	477.3	2.2	1.1	2.0	2.1	1.6	2.7

\* Normalized at control voltage = 0V



### Electrical Schematic



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