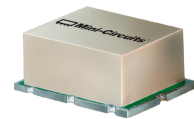


# Surface Mount Attenuator/Switch

50Ω Bi-Phase 2 to 400 MHz

**SYAS-1+**  
**SYAS-1**



CASE STYLE: TTT167  
PRICE: \$9.95 ea. QTY. (1-9)

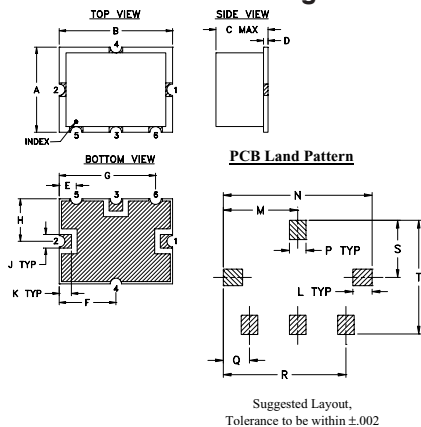
## Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Control Current	30mA
Permanent damage may occur if any of these limits are exceeded.	

## Pin Connections

INPUT	1
OUTPUT	2
CONTROL	3
GROUND	4,5,6

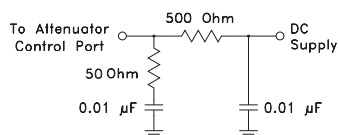
## Outline Drawing



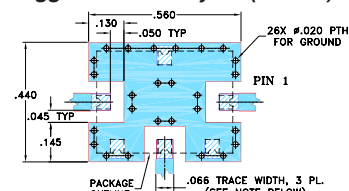
## Outline Dimensions (inch)

A	B	C	D	E	F	G	H	J	K
.38	.50	.23	.020	.075	.250	.425	.187	.050	.050
9.65	12.70	5.84	0.51	1.91	6.35	10.80	4.75	1.27	1.27
L	M	N	P	Q	R	S	T	wt.	
.070	.270	.540	.060	.095	.445	.208	.415	grams	
1.78	6.86	13.72	1.52	2.41	11.30	5.28	10.54	0.8	

## suggested control port biasing configuration



## Demo Board MCL P/N: TB-12 Suggested PCB Layout (PL-079)



### NOTE:

- 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.
  - THE USE OF SOLDER MASK OVER THE GROUND AREA UNDER THE UNIT AS SHOWN IS RECOMMENDED TO PREVENT POTENTIAL SHORTING. IF USER CHOOSES TO EXPOSE METAL UNDER THE ENTIRE UNIT GROUND PAD FOR IMPROVED GROUNDING, IT IS RECOMMENDED A SOLDER MASK DAM BE APPLIED AROUND EACH GROUND PAD TO ENSURE TILLET AND CONNECTION AT GROUND PADS.
  - BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER), SEE NOTE 2.

### 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)

## Features

- low conversion loss, 1.6 dB typ.
- excellent amplitude and phase unbalance

## Applications

- electronic attenuator

## Attenuator/Switch Electrical Specifications

FREQUENCY (MHz)		INSERTION LOSS (dB) ±20 mA				MAX. INPUT PWR (dBm) ±20 mA		IN-OUT ISOLATION (dB) 0 mA						BI-PHASE X (±20 mA) Typ.			
IN	CON	Mid-Band m		Total Range		1 dB compr.	no damage	L		M		U		Δ AMP (dB)	Phase (deg.) deviation from 180°		
f <sub>L</sub> -f <sub>U</sub>		Typ.	Max.	Typ.	Max.			Typ.	Min.	Typ.	Min.	Typ.	Min.	m	Total Range	m	Total Range
2-400	DC-0.05	1.4	2.0	1.6	3.0	20*	25	65	45	45	33	35	25	0.1	0.1	1.0	2.0

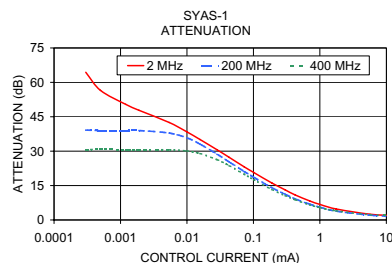
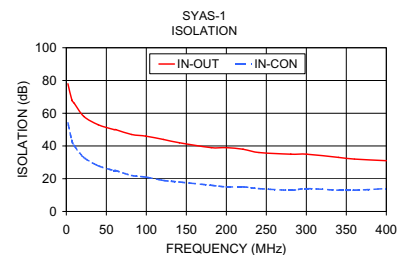
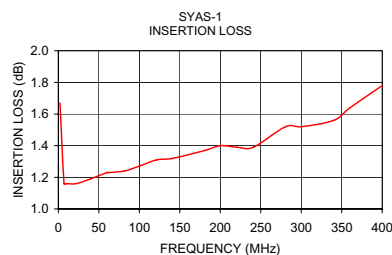
L = low range [f<sub>L</sub> to 10 f<sub>L</sub>] M = mid range [10 f<sub>L</sub> to f<sub>U</sub>/2] U = upper range [f<sub>U</sub>/2 to f<sub>U</sub>] m = [2 f<sub>L</sub> to f<sub>U</sub>/2]

\* 15 dBm from 2-10 MHz.

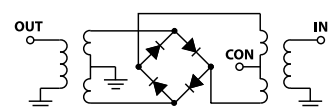
Performance specifications apply for input power up to 10 dB below stated 1 dB compression.

## Typical Performance Data

Freq. (MHz)	I. Loss (dB) at 20mA		±Control ΔAMP (dB)	20mA ΔPhase (deg.)	Isolation (dB)		Input R. Loss (dB)	Control Current (mA)	Attenuation (dB)			Phase Δ ref at 15mA Ctrl			Input VSWR		
					(in-out)	(in-con)			2 MHz	200 MHz	400 MHz	2 MHz	200 MHz	400 MHz	2 MHz	200 MHz	400 MHz
	$\bar{X}$	$\sigma$	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$					deg.	deg.	deg.			
2.0	1.67	0.000	0.01	179.9	78	54	18.1	0.0000	72.7	39.0	30.6	27.2	-87.7	-95.3	7.7	7.2	4.4
7.0	1.16	0.001	0.00	180.0	68	43	15.4	0.0003	64.4	39.2	30.7	22.2	-86.0	-94.6	7.7	7.2	4.4
10.0	1.16	0.001	0.00	180.0	66	40	27.6	0.0005	56.5	39.0	30.8	28.6	-84.3	-93.7	7.6	7.2	4.4
21.9	1.16	0.001	0.00	180.0	58	33	31.0	0.0012	50.4	39.0	30.7	17.6	-80.5	-92.0	7.6	7.2	4.4
39.8	1.19	0.001	0.00	180.1	53	28	31.9	0.0019	47.8	39.0	30.7	14.1	-77.4	-90.3	7.5	7.2	4.4
59.7	1.23	0.001	0.00	180.1	50	25	32.1	0.0054	42.5	37.9	30.6	8.2	-56.2	-79.9	7.4	7.0	4.3
61.7	1.23	0.001	0.00	180.1	50	25	32.1	0.0100	38.4	35.8	30.1	7.6	-37.3	-67.6	7.2	6.9	4.3
81.6	1.24	0.001	0.00	180.2	47	22	32.2	0.0157	35.1	33.1	29.0	8.8	-25.3	-55.1	7.1	6.7	4.2
99.5	1.27	0.001	0.00	180.2	46	21	32.3	0.0284	30.6	28.7	26.3	8.8	-12.8	-37.6	6.7	6.3	4.0
121.4	1.31	0.001	0.01	180.3	44	19	32.4	0.0433	27.3	25.3	23.7	9.2	-7.2	-26.9	6.3	5.9	3.8
141.3	1.32	0.001	0.01	180.4	42	18	32.4	0.0722	23.2	21.2	20.0	9.3	-3.1	-17.7	5.6	5.3	3.5
181.1	1.37	0.001	0.01	180.6	39	16	32.2	0.1012	20.7	18.6	17.6	9.0	-1.4	-13.2	5.2	4.9	3.3
200.0	1.40	0.001	0.01	180.6	39	15	32.0	0.1898	16.1	14.1	13.3	8.2	0.4	-8.0	4.1	3.9	2.8
220.9	1.39	0.001	0.01	180.8	38	15	31.6	0.3008	13.1	11.2	10.6	7.4	0.9	-5.5	3.4	3.2	2.4
240.8	1.39	0.001	0.01	180.9	36	14	30.3	0.4259	10.9	9.2	8.8	6.7	1.1	-4.2	2.9	2.7	2.1
280.6	1.52	0.001	0.05	181.1	35	13	26.6	0.7017	8.3	6.9	6.6	5.4	1.1	-2.8	2.2	2.1	1.7
300.5	1.52	0.001	0.04	181.1	35	14	24.8	0.9968	6.8	5.6	5.4	4.4	0.9	-2.1	1.9	1.8	1.5
340.3	1.56	0.001	0.03	181.4	33	13	21.4	1.7486	4.8	3.9	4.0	3.0	0.7	-1.3	1.5	1.5	1.3
360.2	1.64	0.002	0.06	181.6	32	13	19.8	5.6920	2.5	2.1	2.3	0.9	0.2	-0.3	1.2	1.1	1.2
400.0	1.78	0.003	0.09	181.7	31	14	17.1	15.1258	1.8	1.5	1.8	0.0	0.0	0.1	1.3	1.1	1.3



## electrical schematic



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REV. B  
M112207  
SYAS-1  
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