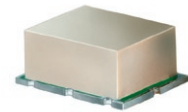


# Surface Mount Attenuator/Switch

50Ω Bi-Phase 2 to 400 MHz

SYAS-1+  
SYAS-1



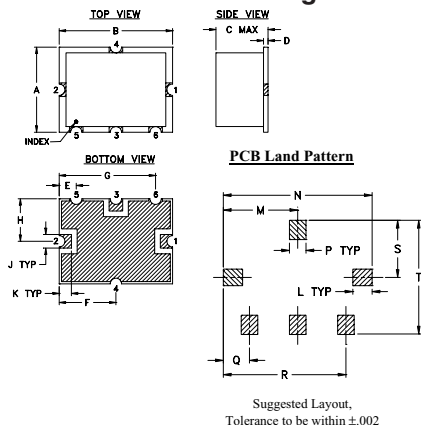
## Maximum Ratings

|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| 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 |

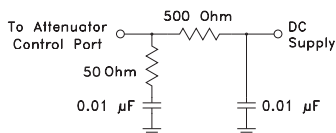
## Outline Drawing



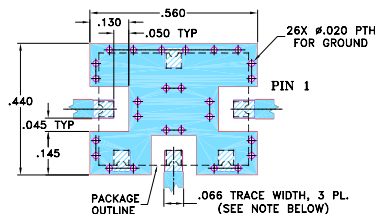
## Outline Dimensions (inch)

| 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: 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. GROUND PAD SHALL BE FREE OF SOLDER MASK IF REQUIRED FOR SOLDERING. 3. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE. 4. DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER), SEE NOTE 2. 5. DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

## Features

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

## Applications

- electronic attenuator

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

+ RoHS compliant in accordance  
with EU Directive (2002/95/EC)

The +Suffix identifies RoHS Compliance. See our web site  
for RoHS Compliance methodologies and qualifications.

## Attenuator/Switch Electrical Specifications

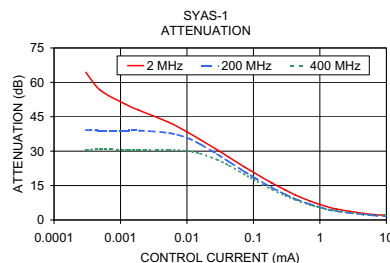
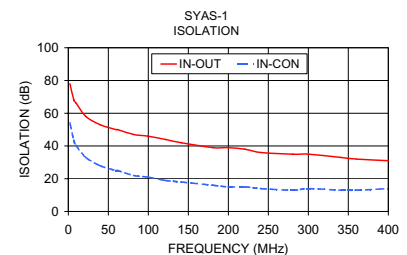
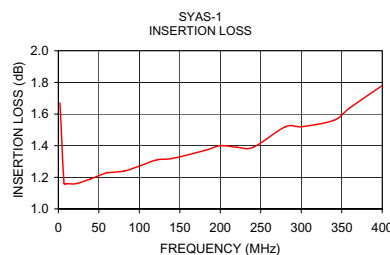
| FREQUENCY<br>(MHz)             | CON     | INSERTION LOSS<br>(dB) |                | MAX. INPUT<br>PWR<br>(dBm) |              | IN-OUT<br>ISOLATION<br>(dB) |           | BI-PHASE X<br>(±20 mA) Typ. |                                        |
|--------------------------------|---------|------------------------|----------------|----------------------------|-----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

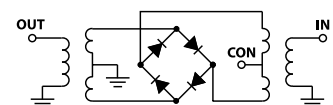
Performance specifications apply for input power up to 10 dB below stated 1 dB compression.

## Typical Performance Data

| Freq.<br>(MHz) | I. Loss<br>(dB) | ±Control<br>ΔAMP<br>(dB) | 20mA<br>ΔPhase<br>(deg.) | Isolation (dB)<br>(in-out) | Input<br>R. Loss<br>(dB) | Control<br>Current<br>(mA) | Attenuation (dB) |            |            | Phase Δ ref at 15mA Ctrl |            |            | Input VSWR |            |            |
|----------------|-----------------|--------------------------|--------------------------|----------------------------|--------------------------|----------------------------|------------------|------------|------------|--------------------------|------------|------------|------------|------------|------------|
|                |                 |                          |                          |                            |                          |                            | 2<br>MHz         | 200<br>MHz | 400<br>MHz | 2<br>MHz                 | 200<br>MHz | 400<br>MHz | 2<br>MHz   | 200<br>MHz | 400<br>MHz |
|                | X               | σ                        | X                        | X                          | X                        | 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        |
| 7.0            | 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        |
| 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        |
| 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        |
| 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        |
| 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        |
| 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        |
| 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        |
| 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        |
| 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        |
| 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        |
| 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        |
| 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        |
| 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        |
| 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        |
| 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        |
| 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        |
| 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        |
| 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        |
| 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        |



## electrical schematic



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