

# High Power Bi-Directional Coupler

50Ω 16dB Coupling DC Pass 1400 to 1750 MHz

SYBD-16-172HP+



CASE STYLE: JB1233

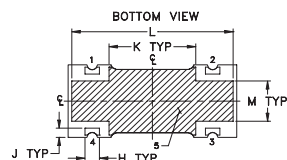
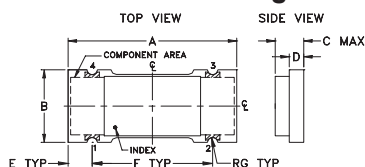
## Maximum Ratings

|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| Operating Temperature                                           | -55°C to 100°C |
| Storage Temperature                                             | -55°C to 100°C |
| DC Current                                                      | 2A             |
| Permanent damage may occur if any of these limits are exceeded. |                |

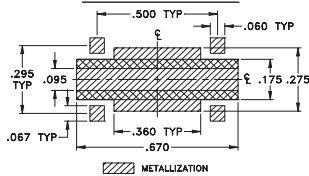
## Pin Connections

|                   |   |
|-------------------|---|
| INPUT             | 1 |
| OUTPUT            | 2 |
| COUPLED (forward) | 4 |
| COUPLED (reverse) | 3 |
| GROUND            | 5 |

## Outline Drawing



## PCB Land Pattern

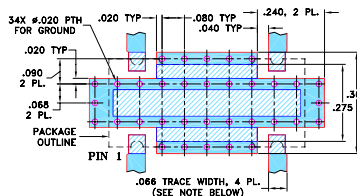


Suggested Layout,  
Tolerance to be within  $\pm 0.02$

## Outline Dimensions (inch/mm)

| A     | B    | C    | D     | E    | F     | G     |
|-------|------|------|-------|------|-------|-------|
| .70   | .32  | .13  | .060  | .100 | .500  | .022  |
| 17.78 | 8.13 | 3.30 | 1.52  | 2.54 | 12.70 | 0.56  |
| H     | J    | K    | L     | M    |       | wt    |
| .060  | .040 | .360 | .670  | .175 |       | grams |
| 1.52  | 1.02 | 9.14 | 17.02 | 4.45 |       | 0.68  |

## Demo Board MCL P/N: TB-398 Suggested PCB Layout (PL-260)



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030"  $\pm$  .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

## 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-Circuit's 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-Circuit's website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)

## Features

- high power handling, 50 watts max.
- low mainline loss, 0.22 dB typ.
- excellent VSWR, 1.10:1 typ.
- excellent directivity, 23 dB typ.
- wideband frequency, 1400 to 1750 MHz

## Applications

- GPS
- instrumentation
- defense communications

## Bi-Directional Coupler Electrical Specifications

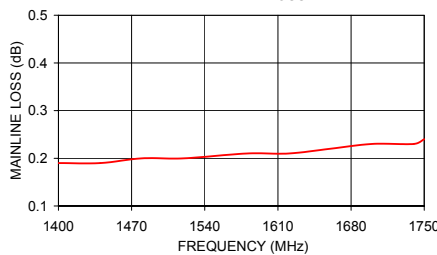
| FREQ.<br>(MHz) | COUPLING<br>(dB) |           | MAINLINE LOSS <sup>1</sup><br>(dB) |      | DIRECTIVITY<br>(dB) |      | VSWR<br>(:1) | POWER<br>INPUT<br>(W) |
|----------------|------------------|-----------|------------------------------------|------|---------------------|------|--------------|-----------------------|
|                | Nom.             | Flatness  | Typ.                               | Max. | Typ.                | Min. |              |                       |
| $f_L$ - $f_U$  |                  |           |                                    |      |                     |      |              |                       |
| 1400-1750      |                  |           | 0.22                               | 0.5  | 23                  | 18   | 1.10         |                       |
| 1400-1580      | 17.0 $\pm$ 0.7   | $\pm$ 0.7 | 0.20                               | 0.45 | 23                  | 18   | 1.10         | 50                    |
| 1580-1750      | 16.0 $\pm$ 0.7   | $\pm$ 0.6 | 0.22                               | 0.50 | 23                  | 17   | 1.10         | 25                    |

1. Mainline loss includes theoretical power loss at coupled port.

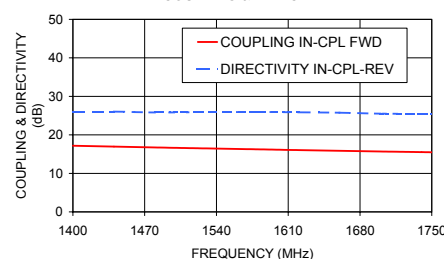
## Typical Performance Data

| Frequency<br>(MHz) | Mainline Loss<br>(dB) | Coupling<br>(dB) |             | Directivity<br>(dB) |            | Return Loss<br>(dB) |       |         |         |
|--------------------|-----------------------|------------------|-------------|---------------------|------------|---------------------|-------|---------|---------|
|                    | In-Out                | In-Cpl Fwd       | Out-Cpl Rev | Out-Cpl Fwd         | In-Cpl Rev | In                  | Out   | Cpl Fwd | Cpl Rev |
| 1400.00            | 0.19                  | 17.18            | 17.13       | 24.96               | 26.06      | 29.33               | 26.82 | 32.71   | 33.70   |
| 1440.00            | 0.19                  | 16.96            | 16.90       | 24.98               | 26.04      | 30.09               | 27.42 | 33.65   | 34.76   |
| 1480.00            | 0.20                  | 16.74            | 16.69       | 25.00               | 25.82      | 31.14               | 28.29 | 35.49   | 37.02   |
| 1520.00            | 0.20                  | 16.54            | 16.49       | 25.14               | 25.87      | 32.58               | 29.43 | 37.65   | 40.00   |
| 1580.00            | 0.21                  | 16.24            | 16.19       | 25.05               | 25.94      | 34.80               | 31.26 | 42.49   | 45.85   |
| 1620.00            | 0.21                  | 16.04            | 15.99       | 25.20               | 25.85      | 36.75               | 33.41 | 44.47   | 44.86   |
| 1660.00            | 0.22                  | 15.86            | 15.81       | 25.10               | 25.75      | 37.67               | 35.64 | 43.01   | 42.20   |
| 1700.00            | 0.23                  | 15.69            | 15.64       | 24.79               | 25.51      | 37.14               | 38.63 | 40.47   | 39.42   |
| 1740.00            | 0.23                  | 15.52            | 15.47       | 24.88               | 25.47      | 34.91               | 42.40 | 36.76   | 35.45   |
| 1750.00            | 0.24                  | 15.48            | 15.44       | 24.90               | 25.49      | 34.46               | 42.66 | 36.15   | 34.86   |

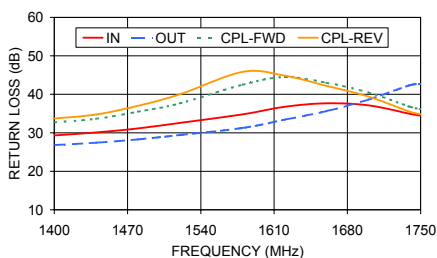
SYBD-16-172HP+  
MAINLINE LOSS



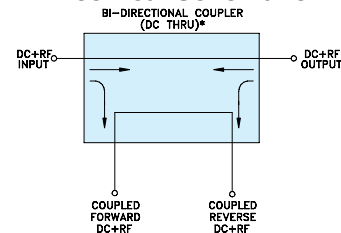
SYBD-16-172HP+  
COUPLING & DIRECTIVITY



SYBD-16-172HP+  
RETURN LOSS



## Electrical Schematic



\* ELECTRICAL SCHEMATIC IS FOR BI-DIRECTIONAL COUPLER WITHOUT INTERNAL TRANSFORMERS AND RESISTORS.



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1510105