

# Surface Mount Bi-Directional Coupler

50Ω 19 dB Coupling 30 to 512 MHz 50 Watt

## SYDC-19-52HP+



### Maximum Ratings

Operating Temperature -40°C to 65°C Case\*

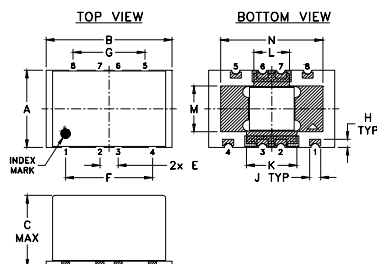
Storage Temperature -55°C to 100°C

\* Case temperature is defined as temperature on ground leads.  
Permanent damage may occur if any of these limits are exceeded.

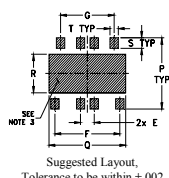
### Pad Connections

|                   |         |
|-------------------|---------|
| INPUT             | 1       |
| OUTPUT            | 8       |
| COUPLED (FORWARD) | 4       |
| COUPLED (REVERSE) | 5       |
| GROUND            | 2,3,6,7 |

### Outline Drawing



PCB Land Pattern

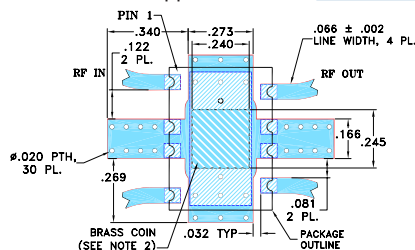


### Outline Dimensions (inch mm)

| A     | B     | C     | E     | F     | G     | H    | J    | K     |
|-------|-------|-------|-------|-------|-------|------|------|-------|
| .433  | .690  | .415  | .100  | .476  | .394  | .045 | .060 | .276  |
| 11.00 | 17.53 | 10.54 | 2.54  | 12.09 | 10.01 | 1.14 | 1.52 | 7.01  |
| L     | M     | N     | P     | Q     | R     | S    | T    | wt    |
| .194  | .257  | .560  | .475  | .561  | .258  | .069 | .061 | grams |
| 4.93  | 6.53  | 14.22 | 12.07 | 14.25 | 6.55  | 1.75 | 1.55 | 2.80  |

### Demo Board MCL P/N: TB-630+ Suggested PCB Layout (PL-351)

Refer to Application Note: [AN-00-017](#)



- NOTES: 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. SUGGEST TO PROVIDE BRASS COIN FOR BETTER HEAT TRANSFER FROM THE UNIT, OTHERWISE PROVIDE ARRAY OF THERMAL VIAS ADEQUATE TO LIMIT TEMPERATURE OF GROUND CONNECTIONS UNDER THE UNIT TO 65°C.  
3. 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  
DENOTES BRASS COIN.

### 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, 50W max. with output load VSWR 2.0 max
- high power, 20W max. with output open or short
- low mainline loss, 0.3 dB typ.
- good VSWR, 1.05 typ.

### Applications

- military mobile

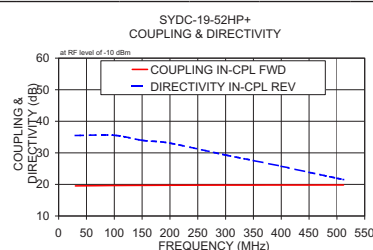
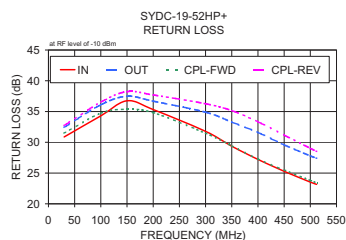
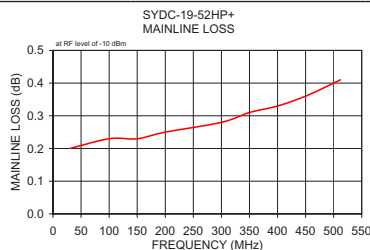
### Electrical Specifications at 25°C

| Parameter                                  | Condition (MHz) | Min. | Typ. | Max. | Unit |
|--------------------------------------------|-----------------|------|------|------|------|
| Frequency Range                            |                 | 30   | —    | 512  | MHz  |
| Mainline Loss¹ (above theoretical 0.05 dB) | 30              |      | 0.2  | 0.4  | dB   |
|                                            | 450             |      | 0.35 | 0.6  |      |
|                                            | 512             |      | 0.4  | 0.6  |      |
| Coupling                                   | 30-512          |      | 19.5 |      | dB   |
|                                            | 30              | 19   | 19.5 | 20   |      |
|                                            | 450             | 19   | 19.9 | 20.8 |      |
|                                            | 512             | 19   | 20.0 | 21   |      |
| Coupling Flatness(±)                       | 30-512          |      | 0.4  | 0.6  | dB   |
| Directivity                                | 30              | 22   | 35   | —    | dB   |
|                                            | 450             | 18   | 25   | —    |      |
|                                            | 512             | 16   | 22   | —    |      |
| Return Loss (Input)                        | 30              | 20   | 30   | —    | dB   |
|                                            | 450             | 20   | 23   | —    |      |
|                                            | 512             | 17   | 22   | —    |      |
| Return Loss (Output)                       | 30              | 26   | 31   | —    | dB   |
|                                            | 450             | 23   | 26   | —    |      |
|                                            | 512             | 18   | 24   | —    |      |
| Return Loss (Coupling)                     | 30              | 20   | 30   | —    | dB   |
|                                            | 450             | 20   | 25   | —    |      |
|                                            | 512             | 17   | 22   | —    |      |
| Input Power¹                               | 30-100          | —    | —    | 30   | W    |
|                                            | 100-450         | —    | —    | 50   |      |
|                                            | 450-512         | —    | —    | 40   |      |

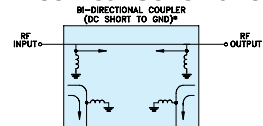
1. The user must provide adequate means of heat removal to limit the temperature of ground connections under the PCB to 65°C, in order to ensure proper performance. At 25°C ambient temperature this requires thermal resistance of the user's PC board heat sink to be 10°C/W.

### Typical Performance Data

| Frequency (MHz) | Mainline Loss (dB) |            | Coupling (dB) |             | Directivity (dB) |       | Return Loss (dB) |         |         |
|-----------------|--------------------|------------|---------------|-------------|------------------|-------|------------------|---------|---------|
|                 | In-Out             | In-Cpl Fwd | Out-Cpl Rev   | Out-Cpl Fwd | In-Cpl Rev       | In    | Out              | Cpl Fwd | Cpl Rev |
| 30.00           | 0.20               | 19.53      | 19.39         | 35.44       | 35.50            | 30.87 | 32.42            | 31.49   | 32.72   |
| 100.00          | 0.23               | 19.66      | 19.57         | 35.65       | 35.56            | 34.30 | 36.09            | 34.74   | 36.52   |
| 150.00          | 0.23               | 19.70      | 19.66         | 34.87       | 33.97            | 36.74 | 37.48            | 35.35   | 38.24   |
| 200.00          | 0.25               | 19.73      | 19.73         | 33.09       | 33.07            | 35.32 | 36.68            | 34.82   | 37.69   |
| 300.00          | 0.28               | 19.77      | 19.86         | 29.46       | 29.31            | 31.78 | 34.90            | 31.48   | 36.27   |
| 350.00          | 0.31               | 19.79      | 19.91         | 27.51       | 27.57            | 29.37 | 33.28            | 29.43   | 35.15   |
| 400.00          | 0.33               | 19.80      | 19.93         | 25.71       | 25.76            | 27.22 | 31.60            | 27.29   | 33.32   |
| 450.00          | 0.36               | 19.81      | 19.94         | 23.69       | 23.83            | 25.29 | 29.58            | 25.50   | 31.16   |
| 500.00          | 0.40               | 19.82      | 19.91         | 21.89       | 21.95            | 23.53 | 27.79            | 23.80   | 29.02   |
| 512.00          | 0.41               | 19.82      | 19.90         | 21.51       | 21.52            | 23.16 | 27.41            | 23.40   | 28.52   |



### Electrical Schematic



\* ELECTRICAL SCHEMATIC IN FIGURE IS FOR BI-DIRECTIONAL COUPLER WITH INTERNAL TRANSFORMER THAT ROUTES DC FROM RF POWER TO GROUND.



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