SURFACE MOUNT HIGH POWER

# Bi-Directional Coupler SYBDC-15-52VHP+

50Ω 15 dB Coupling 10 to 520 MHz 30 Watt

## THE BIG DEAL

- High power handling, 30W
- Very low mainline loss, 0.5 dB typ.
- Excellent VSWR, 1.06:1 typ.

*Generic photo used for illustration purposes only*

CASE STYLE: PD1647-1**

***This model is not intended for pick & place use. Please contact Applications Dept. for assistance*

**+RoHS Compliant**
The +Suffix identifies RoHS Compliance.
See our website for methodologies and qualifications

## APPLICATIONS

- Military mobile

## PRODUCT OVERVIEW

Mini-Circuits' SYBDC-15-52VHP+ surface mount bi-directional coupler provides exceptionally high power handling up to 30W and low mainline loss of 0.5 dB for applications from 10 to 520 MHz. This model features a unique heat sinking design that enables reliable operation at high power without overheating, making it an ideal choice for systems where high power capability and small size are desired. The coupler features core and wire construction mounted on an 8 -lead printed laminate base with wraparound terminations for excellent solderability. The unit measures 0.75 x 0.52 x 0.49", accommodating dense circuit board layouts.

| Feature | Advantages |
|---|---|
| High power handling, 30W | Usable in many systems with high-power requirements |
| Low mainline loss, 0.5 dB | Provides excellent through-path signal power transmission. |
| Good directivity, 19 dB typ. | High directivity allows accurate signal sampling through the coupled port with minimal measurement error. |
| Excellent return loss, 30 dB typ. (input/output/coupling) | Provides excellent matching in 50Ω systems with minimal signal reflection. |
| Small size, 0.75 x 0.52 x 0.43" | Provides high power capability while saving space in systems with tight layouts. |

REV. A
ECO-015468
ED-19061801
SYBDC-15-52VHP+
WP/CP/AM
230829

SURFACE MOUNT HIGH POWER

# Bi-Directional Coupler SYBDC-15-52VHP+

50Ω 15 dB Coupling 10 to 520 MHz 30 Watt

## ELECTRICAL SPECIFICATIONS AT 25°C

| Parameter | Frequency (MHz) | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Frequency Range | | 10 | — | 520 | MHz |
| Mainline Loss (include theoretical 0.14 dB) | 10-520 | — | 0.5 | 0.7 | |
| Coupling | 10-520 | — | 15±0.4 | — | dB |
| Coupling Flatness(±) | 10-520 | — | 0.2 | 0.5 | dB |
| Directivity (Out-Cpl Fwd) | 10-350 | 17 | 23 | — | dB |
| | 350-520 | 14 | 20 | — | |
| Directivity (In-Cpl Rev) | 10-350 | 14 | 18 | — | dB |
| | 350-520 | 11 | 15 | — | |
| Return Loss (Input) | 10-520 | 20 | 28 | — | dB |
| Return Loss (Output) | 10-520 | 20 | 28 | — | dB |
| Return Loss (Coupling) | 10-520 | 20 | 30 | — | dB |
| Input Power[1,2] | 10-520 | — | — | 30 | W |

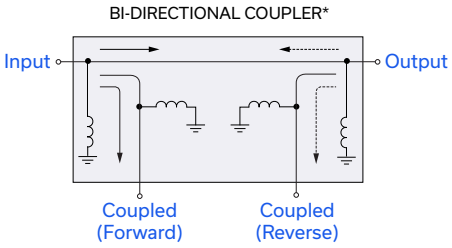
1. The user must provide adequate means of heat removal to limit the temperature of ground connections under the PCB to 65°C, in order to ensure proper performance. At 25°C ambient temperature this requires thermal resistance of the user's PC board heat sink to be 3.5°C/W.
2. At 25°C. Derate to 20W linearly at 65°C case temperature.

## MAXIMUM RATINGS

| Parameter | Ratings |
|---|---|
| Operating temperature | -40°C to 85°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.

## ELECTRICAL SCHEMATIC




*Electrical schematic is for Bi-Directional coupler with internal transformer(s) that routes DC from all ports to ground

SURFACE MOUNT HIGH POWER

# Bi-Directional Coupler SYBDC-15-52VHP+

50Ω 15 dB Coupling 10 to 520 MHz 30 Watt

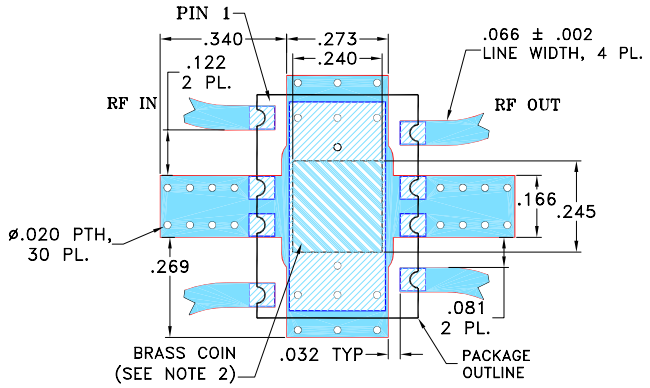
## PAD CONNECTIONS

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

***PRODUCT MARKING:** SYBDC-15-52VHP

*Marking may contain other features or characters for internal lot control

**DEMO BOARD MCL P/N:** TB-630+
**SUGGESTED PCB LAYOUT** (PL-351)
REFER TO APPLICATION NOTE: AN-00-017



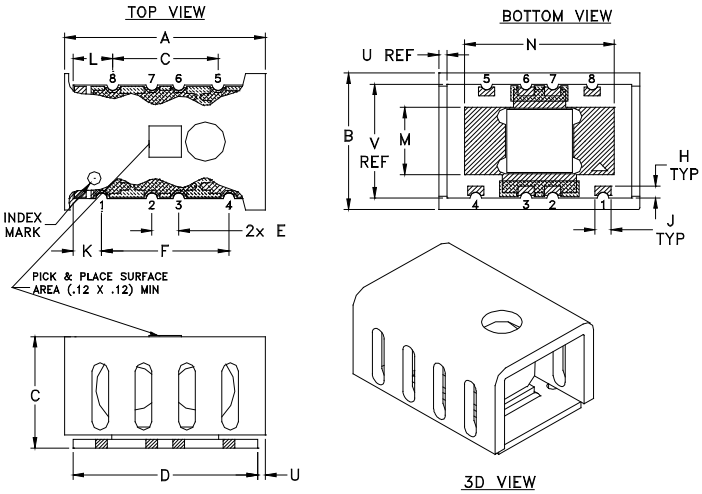

NOTES:
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. SUGGEST TO PROVIDE BRASS COIN FOR BETTER HEAT TRANSFER FROM THE UNIT. OTHERWISE PROVIDE ARRAY OF THERMAL VIAS ADEQUATE TO LIMIT 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)

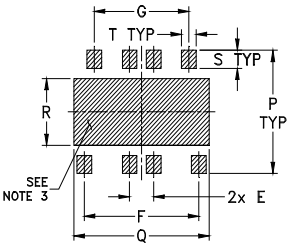
DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

DENOTES BRASS COIN.

## OUTLINE DRAWING




## PCB Land Pattern




Suggested Layout,
Tolerance to be within ±.002

## OUTLINE DIMENSIONS (Inches / mm)

| A | B | C | D | E | F | G | H | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|
| .750 | .520 | .43 | .690 | .100 | .476 | .394 | .045 | .060 | .276 | .194 |
| 19.05 | 13.21 | 10.92 | 17.53 | 2.54 | 12.09 | 10.01 | 1.14 | 1.52 | 7.01 | 4.93 |

| M | N | P | Q | R | S | T | U | V | wt |
|---|---|---|---|---|---|---|---|---|---|
| .257 | .560 | .475 | .561 | .258 | .069 | .061 | .03 | .433 | grams |
| 6.53 | 14.22 | 12.07 | 14.25 | 6.55 | 1.75 | 1.55 | 0.76 | 11.00 | 2.80 |

**TAPE & REEL INFORMATION: F115**

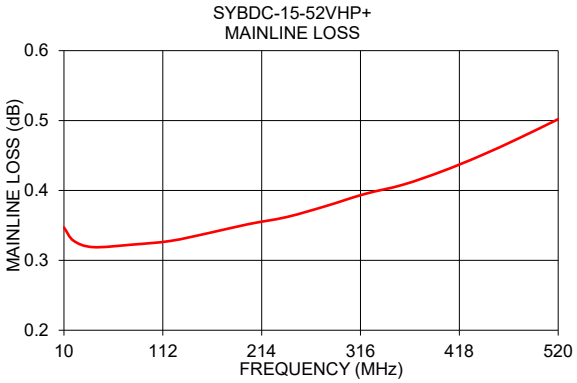
SURFACE MOUNT HIGH POWER

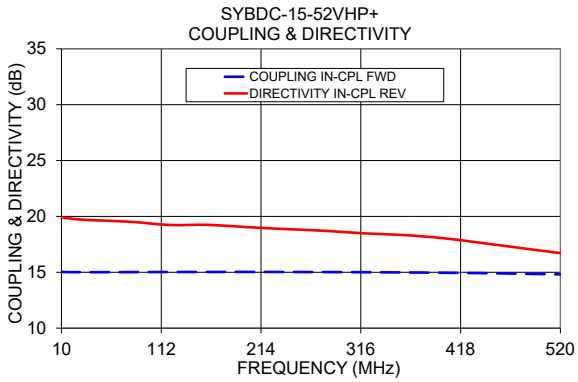
# Bi-Directional Coupler SYBDC-15-52VHP+

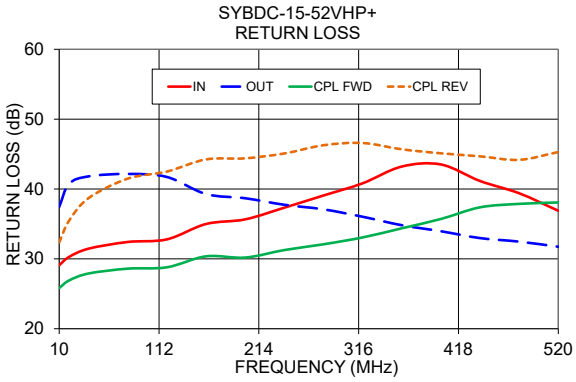
50Ω 15 dB Coupling 10 to 520 MHz 30 Watt

## 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 |
| 10.0 | 0.35 | 15.03 | 14.99 | 23.17 | 19.93 | 29.09 | 37.43 | 25.82 | 32.35 |
| 20.0 | 0.33 | 15.01 | 14.97 | 23.18 | 19.80 | 30.27 | 40.73 | 26.90 | 35.45 |
| 40.0 | 0.32 | 15.00 | 14.97 | 23.21 | 19.66 | 31.46 | 41.81 | 27.91 | 38.70 |
| 80.0 | 0.32 | 15.01 | 15.00 | 23.30 | 19.52 | 32.42 | 42.16 | 28.60 | 41.49 |
| 120.0 | 0.33 | 15.02 | 15.02 | 23.54 | 19.23 | 32.79 | 41.73 | 28.79 | 42.50 |
| 160.0 | 0.34 | 15.03 | 15.05 | 23.28 | 19.24 | 34.99 | 39.28 | 30.36 | 44.24 |
| 200.0 | 0.35 | 15.03 | 15.08 | 23.64 | 19.04 | 35.65 | 38.68 | 30.19 | 44.39 |
| 240.0 | 0.36 | 15.02 | 15.11 | 23.67 | 18.86 | 37.33 | 37.75 | 31.26 | 45.09 |
| 280.0 | 0.38 | 15.02 | 15.14 | 23.63 | 18.71 | 39.07 | 37.09 | 32.09 | 46.27 |
| 320.0 | 0.39 | 15.00 | 15.16 | 23.67 | 18.48 | 40.82 | 36.03 | 33.07 | 46.58 |
| 360.0 | 0.41 | 14.98 | 15.18 | 23.58 | 18.33 | 43.22 | 34.82 | 34.38 | 45.69 |
| 400.0 | 0.43 | 14.96 | 15.21 | 23.47 | 18.05 | 43.52 | 33.96 | 35.71 | 45.11 |
| 440.0 | 0.45 | 14.92 | 15.23 | 23.35 | 17.62 | 41.15 | 32.97 | 37.38 | 44.68 |
| 480.0 | 0.48 | 14.87 | 15.26 | 23.49 | 17.16 | 39.39 | 32.47 | 37.87 | 44.18 |
| 520.0 | 0.50 | 14.81 | 15.29 | 23.47 | 16.72 | 36.89 | 31.74 | 38.07 | 45.29 |




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/terms/viewterm.html