

DC Pass, High Power

# Bi-Directional Coupler

MBDA-30-451HP

50Ω 30dB Coupling 200W 225 to 450 MHz

## The Big Deal

- High power handling, up to 200W
- High directivity, 28 dB
- Low insertion loss, 0.15 dB



## Product Overview

Mini-Circuits MBDA-30-451HP high-power bi-directional coupler provides high power handling up to 200W and mainline loss of 0.15 dB. Covering frequencies from 225 to 450 MHz, it supports a wide variety of applications from power amplifiers and antenna feeds to military applications and more. High directivity of 28 dB provides accurate sampling from the coupled port, and 30 dB typical input/output return loss provides excellent matching over full frequency range. The coupler is fabricated using laminated PCB process (1.0 x 1.0 x 0.051") and includes wrap-around terminations for good solderability and easy visual inspection.

## Key Features

| Feature  | Advantages   |
|--|--|
| Low mainline loss, 0.15 dB                           | Provides excellent through-path signal transmission.   |
| High power handling, 200W                            | Usable in systems with a wide range of power requirements. The MBDA-30-451HP power handling capability is verified into a 50Ω load and into open and short with full reflected power, making it suitable for a wide range of transmission monitoring applications. |
| Excellent return loss, 30 dB typ. (input and output) | Provides excellent matching for 50Ω systems.   |
| High directivity, 28 dB                              | High directivity allows accurate signal sampling through the coupled port with minimal measurement error.  |
| DC current passing up to 200W total power.           | Suitable for use in systems requiring DC current at later stages.  |



# DC Pass, High Power Bi-Directional Coupler

## MBDA-30-451HP

50Ω 30dB Coupling 200W 225 to 450 MHz



CASE STYLE: PQ2074

### Maximum Ratings

|                              |                |
|------------------------------|----------------|
| Operating Temperature, case* | -55°C to 105°C |
| Storage Temperature          | -55°C to 105°C |
| DC+RF power                  | 200W           |

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

### Pad Connections\*\*

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

\*\*Model is Bi-directional and all ports are interchangeable, see port function table.

### Features

- high directivity, 28 dB typ.
- excellent return loss, 30 dB typ
- high power, up to 200W
- DC current pass through input to output

### Applications

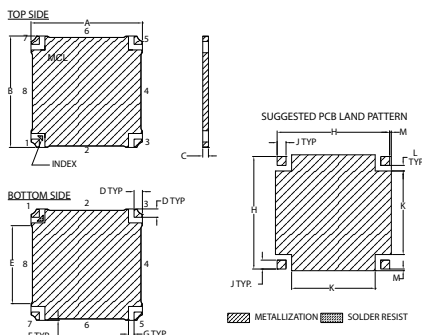
- Power Amplifiers
- Antenna Feeds
- VHF/UHF radios
- Defense and military

### Electrical Specifications @ +25°C

| Parameter                          | Condition (MHz) | Min. | Typ.     | Max. | Units |
|------------------------------------|-----------------|------|----------|------|-------|
| Frequency Range                    |                 | 225  |          | 450  | MHz   |
| Insertion Loss                     | 225 - 450       | —    | 0.15     | 0.25 | dB    |
| Coupling                           | 225 - 450       | —    | 30.5±1.5 | —    | dB    |
| Coupling Flatness (±)              | 225 - 450       | —    | 0.85     | 1.0  | dB    |
| Directivity                        | 225 - 450       | 18   | 28       | —    | dB    |
| Return Loss (Input)                | 225 - 450       | 20   | 30       | —    | dB    |
| Return Loss (Output)               | 225 - 450       | 20   | 30       | —    | dB    |
| Return Loss (Coupling)             | 225 - 450       | 20   | 30       | —    | dB    |
| Input Power (DC+RF) <sup>1,2</sup> | 225 - 450       | —    | —        | 200  | W     |

1. Under all system matching conditions, with base plate maintained at 105°C
2. Verified with 50Ω load, open and short at RF out.

### Outline Drawing



### Outline Dimensions (inch/mm)

| A     | B     | C    | D    | E     | F    | G    |
|-------|-------|------|------|-------|------|------|
| 1.000 | 1.000 | .051 | .075 | .700  | .013 | .050 |
| 24.50 | 24.50 | 1.30 | 1.90 | 17.78 | 0.33 | 1.27 |

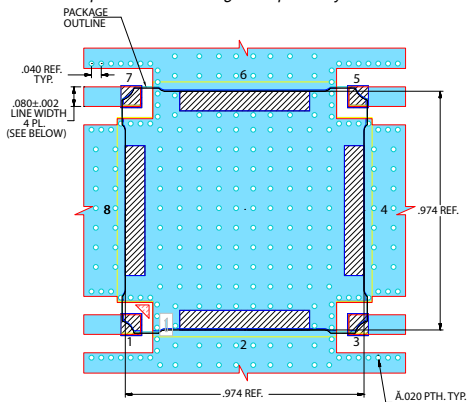
  

| H     | J    | K     | L    | M    | wt.   |
|-------|------|-------|------|------|-------|
| 1.010 | .080 | .750  | .050 | .015 | grams |
| 26.65 | 2.03 | 19.05 | 1.27 | 0.38 | 4.0   |

### Demo Board MCL P/N: TB-861

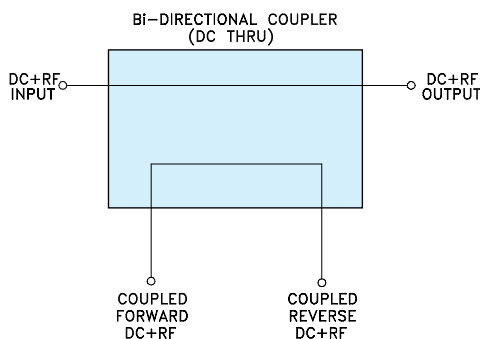
### Suggested PCB Layout (PL-468)\*\*\*

\*\*\* Wraparound solder on ground pins may not be shown



- NOTES:
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020"±.0015". 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.
- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
- DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

### Electrical Schematic



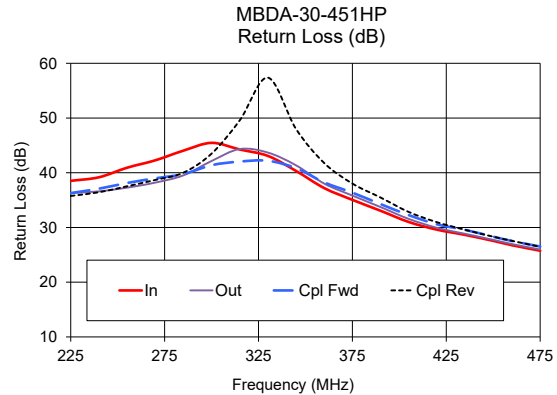
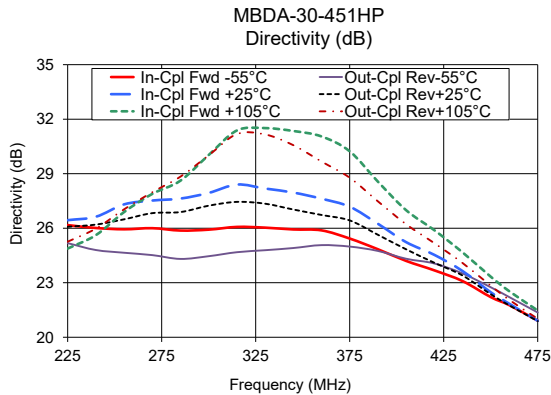
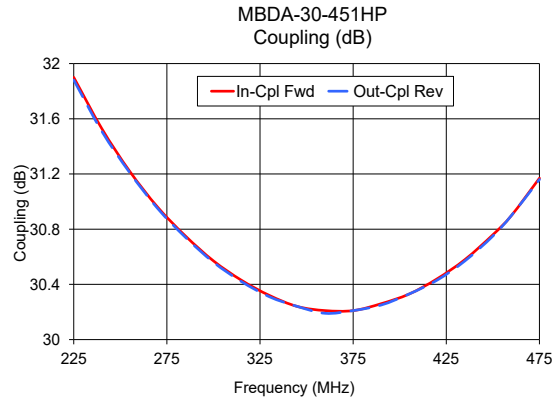
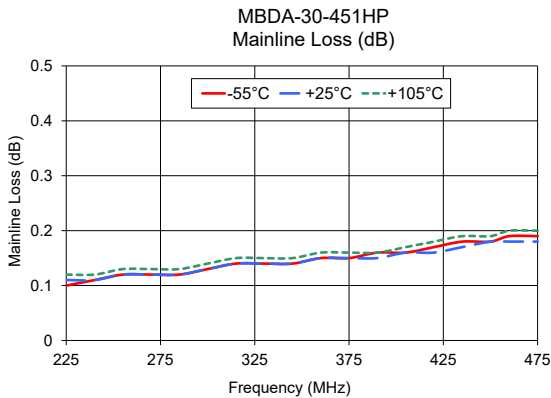
### Port function interchange

| Input | Output | Coupled Forward | Coupled Reverse |
|-------|--------|-----------------|-----------------|
| 1     | 3      | 7               | 5               |
| 3     | 1      | 5               | 7               |
| 5     | 7      | 3               | 1               |
| 7     | 5      | 1               | 3               |

## Typical Performance Data \*

| FREQUENCY (MHz) | Mainline Loss (dB) |       |        | Coupling (dB) |             | Directivity (dB) |       |        |             |       |        | Return Loss (dB) |       |         |         |
|-----------------|--------------------|-------|--------|---------------|-------------|------------------|-------|--------|-------------|-------|--------|------------------|-------|---------|---------|
|                 | In - Out           |       |        | In-Cpl Fwd    | Out-Cpl Rev | In-Cpl Fwd       |       |        | Out-Cpl Rev |       |        | In               | Out   | Cpl Fwd | Cpl Rev |
|                 | -55°C              | +25°C | +105°C |               |             | -55°C            | +25°C | +105°C | -55°C       | +25°C | +105°C |                  |       |         |         |
| 225.00          | 0.10               | 0.11  | 0.12   | 31.90         | 31.88       | 26.17            | 26.44 | 24.88  | 25.18       | 26.08 | 25.26  | 38.52            | 36.29 | 36.29   | 35.76   |
| 240.00          | 0.11               | 0.11  | 0.12   | 31.53         | 31.51       | 26.01            | 26.63 | 25.62  | 24.80       | 26.20 | 25.98  | 39.17            | 36.60 | 37.09   | 36.43   |
| 255.00          | 0.12               | 0.12  | 0.13   | 31.22         | 31.21       | 25.94            | 27.31 | 26.89  | 24.65       | 26.49 | 27.04  | 40.92            | 37.28 | 38.13   | 37.53   |
| 270.00          | 0.12               | 0.12  | 0.13   | 30.96         | 30.95       | 26.00            | 27.52 | 27.89  | 24.52       | 26.83 | 27.98  | 42.27            | 38.20 | 38.98   | 38.68   |
| 285.00          | 0.12               | 0.12  | 0.13   | 30.75         | 30.74       | 25.87            | 27.63 | 28.62  | 24.31       | 26.89 | 28.84  | 44.04            | 39.53 | 39.76   | 40.01   |
| 300.00          | 0.13               | 0.13  | 0.14   | 30.57         | 30.56       | 25.92            | 27.94 | 30.03  | 24.46       | 27.24 | 30.01  | 45.46            | 42.15 | 41.38   | 43.49   |
| 315.00          | 0.14               | 0.14  | 0.15   | 30.43         | 30.42       | 26.07            | 28.40 | 31.38  | 24.68       | 27.45 | 31.18  | 44.25            | 44.34 | 42.04   | 49.57   |
| 330.00          | 0.14               | 0.14  | 0.15   | 30.32         | 30.31       | 26.03            | 28.18 | 31.51  | 24.79       | 27.35 | 31.16  | 43.07            | 43.69 | 42.19   | 57.38   |
| 345.00          | 0.14               | 0.14  | 0.15   | 30.24         | 30.24       | 25.93            | 27.96 | 31.35  | 24.91       | 27.03 | 30.57  | 40.32            | 41.36 | 40.82   | 47.99   |
| 360.00          | 0.15               | 0.15  | 0.16   | 30.21         | 30.19       | 25.88            | 27.62 | 31.05  | 25.07       | 26.73 | 29.67  | 37.19            | 38.02 | 38.24   | 41.77   |
| 375.00          | 0.15               | 0.15  | 0.16   | 30.21         | 30.21       | 25.43            | 27.18 | 30.23  | 24.99       | 26.43 | 28.78  | 35.04            | 35.83 | 36.36   | 38.02   |
| 390.00          | 0.16               | 0.15  | 0.16   | 30.26         | 30.25       | 24.84            | 26.24 | 28.56  | 24.75       | 25.64 | 27.48  | 33.05            | 33.73 | 34.27   | 35.47   |
| 405.00          | 0.16               | 0.16  | 0.17   | 30.33         | 30.33       | 24.20            | 25.23 | 26.99  | 24.32       | 24.84 | 26.22  | 31.00            | 31.56 | 32.26   | 32.83   |
| 420.00          | 0.17               | 0.16  | 0.18   | 30.44         | 30.43       | 23.68            | 24.53 | 25.89  | 24.06       | 24.10 | 25.18  | 29.60            | 29.94 | 30.58   | 30.96   |
| 435.00          | 0.18               | 0.17  | 0.19   | 30.58         | 30.57       | 23.09            | 23.64 | 24.67  | 23.51       | 23.40 | 24.09  | 28.64            | 28.84 | 29.57   | 29.57   |
| 450.00          | 0.18               | 0.18  | 0.19   | 30.76         | 30.75       | 22.21            | 22.47 | 23.33  | 22.75       | 22.37 | 22.84  | 27.55            | 27.73 | 28.32   | 28.31   |
| 460.00          | 0.19               | 0.18  | 0.20   | 30.90         | 30.90       | 21.76            | 21.83 | 22.52  | 22.20       | 21.75 | 22.05  | 26.75            | 26.96 | 27.53   | 27.55   |
| 475.00          | 0.19               | 0.18  | 0.20   | 31.17         | 31.16       | 20.91            | 20.90 | 21.47  | 21.36       | 20.89 | 21.02  | 25.75            | 25.97 | 26.52   | 26.46   |

\* Data at +25°C unless specified otherwise.



### Additional 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.
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