

# 20 dB Bi-Directional Coupler ZX30-20-462HP+

50Ω 2600 to 4600 MHz

## The Big Deal

- High Power, 40 Watt
- Low insertion loss 0.3 dB typ.
- Miniature case size 1.0 x 0.8 inch
- Pass DC current



CASE STYLE: GW1052

## Product Overview

The ZX30-20-462HP+ is a 20 dB high power bi-directional coupler that can pass up to 2A DC from input to output ports. Internally, low loss dielectric material in a micro strip configuration utilizing ADS design software allow for low insertion loss, 0.3 dB, and excellent VSWR of 1.1 to 1 typical. Packaged in a miniature Unibody case allows for excellent grounding and heat transfer.

## Key Features

| Feature                                    | Advantages                                                                                                  |
|--------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| High Power Handling, 40W                   | Useful in applications for low power and high power requirements, including reliability destructive testing |
| Wide Frequency coverage, 2600 to 4600 MHz  | Useful in many applications including WiMax                                                                 |
| Excellent insertion loss and port matching | Provides signal sampling for high power transmitters with a minimum of signal loss and disturbance          |
| Very flat coupling                         | Allows for accurate monitoring of signal power level                                                        |
| Miniature package                          | Allows for compact system packaging and provides highest maximum power / volume figure-of-merit             |

### 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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# Bi-Directional Coupler

50Ω, 20dB Coupling, 40W 2600 to 4600 MHz

ZX30-20-462HP+



Generic photo used for illustration purposes only

CASE STYLE: GW1052

Connectors Model  
SMA ZX30-20-462HP+

**+RoHS Compliant**

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

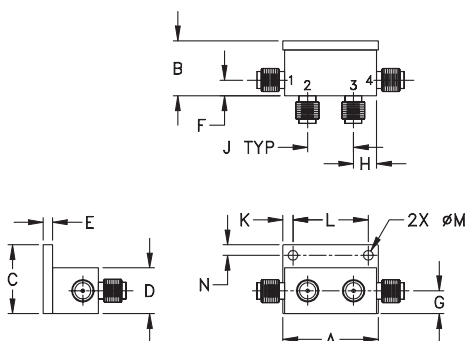
## Maximum Ratings

|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| Operating Temperature                                           | -40°C to 85°C  |
| Storage Temperature                                             | -55°C to 100°C |
| DC Current                                                      | 2.0A           |
| Permanent damage may occur if any of these limits are exceeded. |                |

## Coaxial Connections

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

## Outline Drawing



## Outline Dimensions (inch/mm)

| A     | B     | C     | D     | E    | F    | G     |
|-------|-------|-------|-------|------|------|-------|
| 1.04  | .60   | .75   | .50   | .10  | .17  | .25   |
| 26.42 | 15.24 | 19.05 | 12.70 | 2.54 | 4.32 | 6.35  |
| H     | J     | K     | L     | M    | N    | wt.   |
| .25   | .50   | .11   | .820  | .106 | .12  | grams |
| 6.35  | 12.70 | 2.79  | 20.83 | 2.69 | 3.05 | 21.0  |

## Features

- wideband, usable from 2 to 5.2 GHz
- low mainline loss, 0.3 dB typ.
- high power, 40 watt.
- DC Current through input to output 2.0A Max. at 10 Watt RF input power.
- protected by US patent, 6,790,049
- low cost

## Applications

- WiMax
- defense communications
- PCS/DCS
- cellular
- DECT
- Lab test

## Electrical Specifications

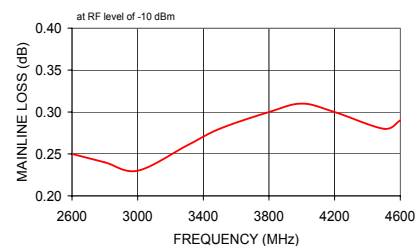
| Parameter                  | Frequency (MHz) | Min. | Typ.     | Max. | Units |
|----------------------------|-----------------|------|----------|------|-------|
| Frequency Range            |                 | 2600 | —        | 4600 | MHz   |
| Coupling                   | 2600-4600       | —    | 19.3±0.8 | —    | dB    |
|                            | 3000-4200       | —    | 19.3±0.8 | —    |       |
| Coupling Flatness          | 2600-4600       | —    | —        | ±0.6 | dB    |
|                            | 3000-4200       | —    | —        | ±0.4 |       |
| Mainline Loss <sup>1</sup> | 2600-4600       | —    | 0.35     | 0.6  | dB    |
|                            | 3000-4200       | —    | 0.35     | 0.6  |       |
| Directivity                | 2600-4600       | 12   | 20       | —    | dB    |
|                            | 3000-4200       | 14   | 25       | —    |       |
| VSWR                       | 2600-4600       | —    | 1.2      | —    | :1    |
|                            | 3000-4200       | —    | 1.2      | —    |       |
| Input Power                | 2600-4600       | —    | —        | 40   | W     |
|                            | 3000-4200       | —    | —        | 40   |       |

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

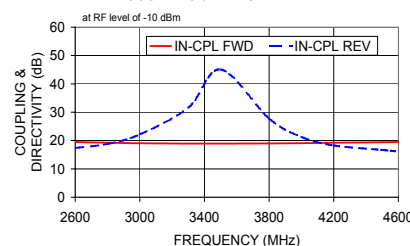
## Typical Performance Data

| Frequency (MHz) | Mainline Loss (dB)<br>In-Out | Coupling (dB) |             | Directivity (dB) |            | Return Loss (dB) |       |         |         |
|-----------------|------------------------------|---------------|-------------|------------------|------------|------------------|-------|---------|---------|
|                 |                              | In-Cpl Fwd    | Out-Cpl Rev | Out-Cpl Fwd      | In-Cpl Rev | In               | Out   | Cpl Fwd | Cpl Rev |
| 2600.00         | 0.25                         | 19.48         | 19.43       | 17.70            | 17.38      | 20.48            | 20.32 | 16.57   | 16.66   |
| 2800.00         | 0.24                         | 19.24         | 19.21       | 19.31            | 18.83      | 25.39            | 25.24 | 17.34   | 17.46   |
| 3000.00         | 0.23                         | 19.06         | 19.03       | 22.71            | 22.18      | 38.65            | 34.44 | 18.51   | 18.50   |
| 3300.00         | 0.26                         | 18.93         | 18.87       | 32.80            | 31.58      | 28.54            | 26.31 | 21.09   | 20.97   |
| 3500.00         | 0.28                         | 18.94         | 18.90       | 37.88            | 45.08      | 23.42            | 22.71 | 23.91   | 23.57   |
| 3800.00         | 0.30                         | 19.01         | 18.99       | 26.13            | 27.76      | 20.93            | 20.59 | 33.06   | 33.55   |
| 4000.00         | 0.31                         | 19.09         | 19.10       | 20.76            | 21.28      | 20.88            | 20.46 | 36.04   | 40.31   |
| 4200.00         | 0.30                         | 19.23         | 19.18       | 18.35            | 18.29      | 22.37            | 22.10 | 26.56   | 27.56   |
| 4500.00         | 0.28                         | 19.42         | 19.39       | 17.09            | 16.69      | 29.02            | 29.59 | 20.05   | 20.46   |
| 4600.00         | 0.29                         | 19.52         | 19.47       | 17.13            | 16.11      | 33.27            | 37.32 | 18.77   | 19.22   |

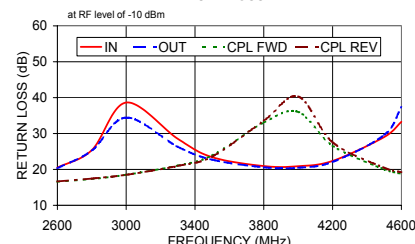
ZX30-20-462HP+  
MAINLINE LOSS



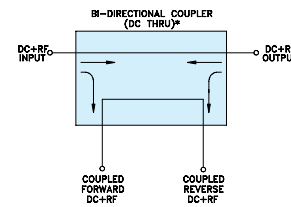
ZX30-20-462HP+  
COUPLING & DIRECTIVITY



ZX30-20-462HP+  
RETURN LOSS



## Electrical Schematic



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

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ZX30-20-462HP+  
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# Bi-Directional Coupler

## ZX30-20-462HP+

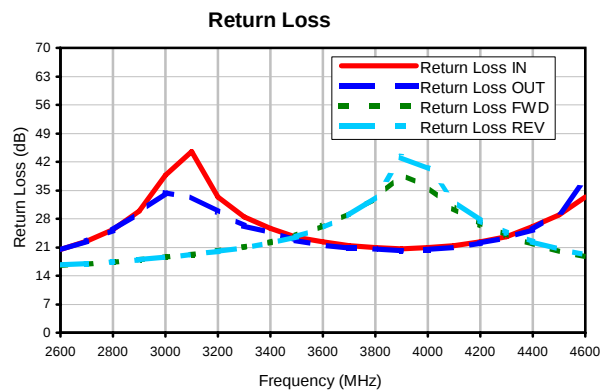
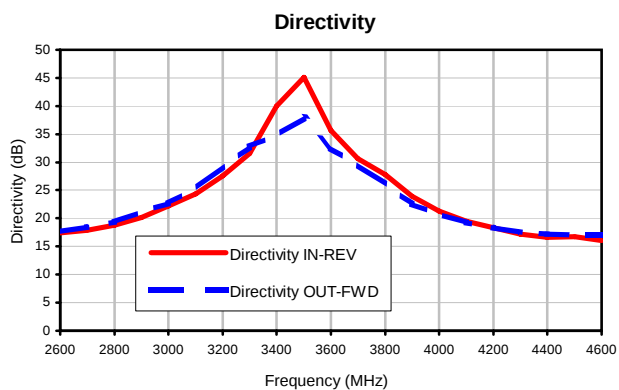
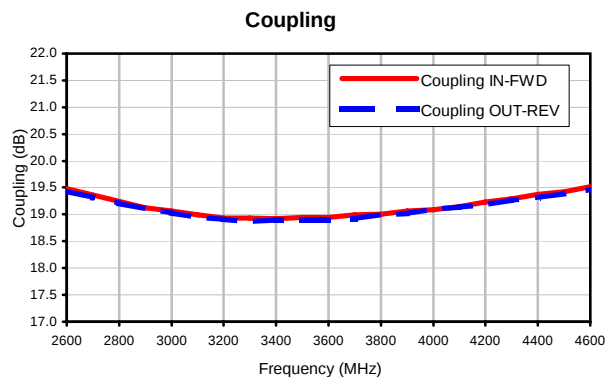
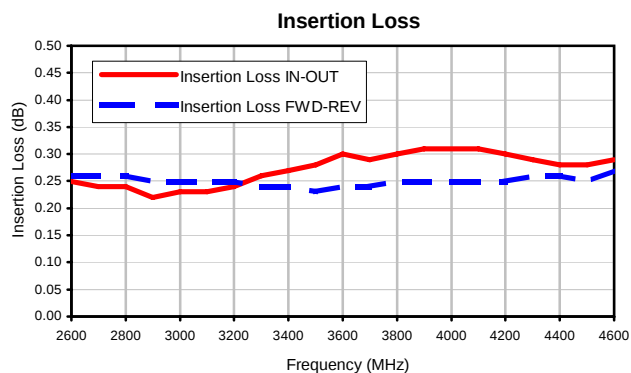
### Typical Performance Data

| FREQUENCY<br>(MHz) | INSERTION LOSS<br>(dB) |         | COUPLING<br>(dB) |         | DIRECTIVITY<br>(dB) |         | RETURN LOSS<br>(dB) |       |       |       |
|--------------------|------------------------|---------|------------------|---------|---------------------|---------|---------------------|-------|-------|-------|
|                    | IN-OUT                 | FWD-REV | IN-FWD           | OUT-REV | IN-REV              | OUT-FWD | IN                  | OUT   | FWD   | REV   |
| 2600.0             | 0.25                   | 0.26    | 19.48            | 19.43   | 17.38               | 17.70   | 20.48               | 20.32 | 16.57 | 16.66 |
| 2700.0             | 0.24                   | 0.26    | 19.36            | 19.31   | 17.90               | 18.43   | 22.55               | 22.49 | 16.87 | 16.99 |
| 2800.0             | 0.24                   | 0.26    | 19.24            | 19.21   | 18.83               | 19.31   | 25.39               | 25.24 | 17.34 | 17.46 |
| 2900.0             | 0.22                   | 0.25    | 19.13            | 19.10   | 20.16               | 21.23   | 29.92               | 29.50 | 17.91 | 17.95 |
| 3000.0             | 0.23                   | 0.25    | 19.06            | 19.03   | 22.18               | 22.71   | 38.65               | 34.44 | 18.51 | 18.50 |
| 3100.0             | 0.23                   | 0.25    | 18.99            | 18.95   | 24.43               | 25.26   | 44.45               | 33.27 | 19.23 | 19.13 |
| 3200.0             | 0.24                   | 0.25    | 18.93            | 18.91   | 27.60               | 29.28   | 33.38               | 29.75 | 20.06 | 19.97 |
| 3300.0             | 0.26                   | 0.24    | 18.93            | 18.87   | 31.58               | 32.80   | 28.54               | 26.31 | 21.09 | 20.97 |
| 3400.0             | 0.27                   | 0.24    | 18.92            | 18.90   | 40.03               | 34.75   | 25.62               | 24.73 | 22.25 | 22.06 |
| 3500.0             | 0.28                   | 0.23    | 18.94            | 18.90   | 45.08               | 37.88   | 23.42               | 22.71 | 23.91 | 23.57 |
| 3600.0             | 0.30                   | 0.24    | 18.94            | 18.90   | 35.61               | 32.61   | 22.34               | 21.58 | 26.21 | 25.84 |
| 3700.0             | 0.29                   | 0.24    | 18.99            | 18.92   | 30.69               | 29.66   | 21.37               | 20.83 | 29.20 | 28.81 |
| 3800.0             | 0.30                   | 0.25    | 19.01            | 18.99   | 27.76               | 26.13   | 20.93               | 20.59 | 33.06 | 33.55 |
| 3900.0             | 0.31                   | 0.25    | 19.06            | 19.02   | 23.94               | 22.57   | 20.65               | 20.16 | 38.79 | 43.04 |
| 4000.0             | 0.31                   | 0.25    | 19.09            | 19.10   | 21.28               | 20.76   | 20.88               | 20.46 | 36.04 | 40.31 |
| 4100.0             | 0.31                   | 0.25    | 19.15            | 19.14   | 19.50               | 19.26   | 21.38               | 20.85 | 30.51 | 32.55 |
| 4200.0             | 0.30                   | 0.25    | 19.23            | 19.18   | 18.29               | 18.35   | 22.37               | 22.10 | 26.56 | 27.56 |
| 4300.0             | 0.29                   | 0.26    | 19.29            | 19.27   | 17.19               | 17.50   | 23.61               | 23.34 | 23.84 | 24.56 |
| 4400.0             | 0.28                   | 0.26    | 19.38            | 19.31   | 16.60               | 17.16   | 26.13               | 25.28 | 21.74 | 22.30 |
| 4500.0             | 0.28                   | 0.25    | 19.42            | 19.39   | 16.69               | 17.09   | 29.02               | 29.59 | 20.05 | 20.46 |
| 4600.0             | 0.29                   | 0.27    | 19.52            | 19.47   | 16.11               | 17.13   | 33.27               | 37.32 | 18.77 | 19.22 |

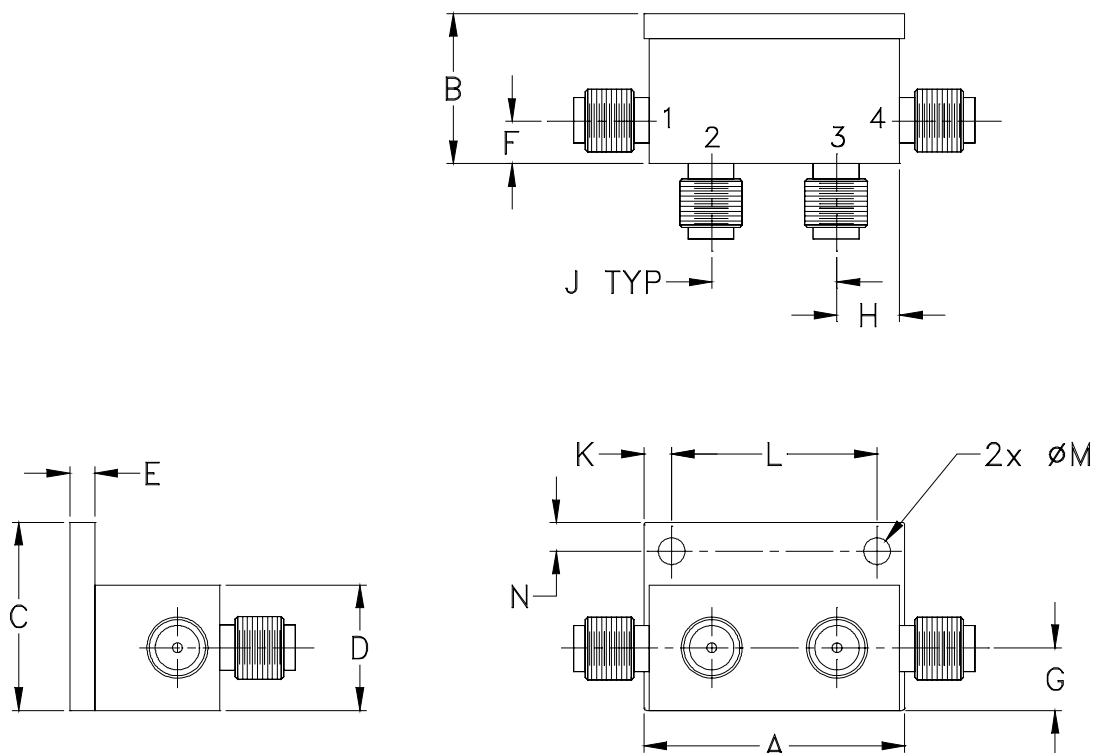
# Bi-Directional Coupler

## Typical Performance Curves

**ZX30-20-462HP+**



### Outline Dimensions



| CASE#  | A               | B              | C              | D              | E             | F             | G             | H             | J              | K             | L               | M              | N             | WT. GRAM |
|--------|-----------------|----------------|----------------|----------------|---------------|---------------|---------------|---------------|----------------|---------------|-----------------|----------------|---------------|----------|
| GW1052 | 1.04<br>(26.42) | .60<br>(15.24) | .75<br>(19.05) | .50<br>(12.70) | .10<br>(2.54) | .17<br>(4.32) | .25<br>(6.35) | .25<br>(6.35) | .50<br>(12.70) | .11<br>(2.79) | .820<br>(20.83) | .106<br>(2.69) | .12<br>(3.05) | 21.0     |

Dimensions are in inches (mm). Tolerances: 2Pl.  $\pm .03$ ; 3Pl.  $\pm .015$ .

Tolerance on hole size and interaxes dimensions to be  $\pm .005$ .

#### Notes:

1. Case material: Brass.
2. Case finish: Nickel plate.



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| Specification              | Test/Inspection Condition                                                              | Reference/Spec                       |
|----------------------------|----------------------------------------------------------------------------------------|--------------------------------------|
| Operating Temperature      | -40° to 85°C                                                                           | Individual Model Data Sheet          |
| Storage Temperature        | -55° to 100° C<br>Ambient Environment                                                  | Individual Model Data Sheet          |
| Barometric Pressure        | 100,000 Feet                                                                           | MIL-STD-202, Method 105, Condition D |
| Humidity                   | 90% RH, 65°C<br>Units may require bake-out after humidity to restore full performance. | MIL-STD-202, Method 103              |
| Thermal Shock              | -65° to 125°C, 5 cycles                                                                | MIL-STD-202, Method 107, Condition B |
| Vibration (High Frequency) | 20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)    | MIL-STD-202, Method 204, Condition D |
| Mechanical Shock           | 100g, 6ms sawtooth, 3 shocks each direction 3 axes (total 18)                          | MIL-STD-202, Method 213, Condition I |