

# Wideband, DC Pass Directional Coupler

## ZCDC20-01203-S+

50Ω    20dB    Up to 20W    1 to 20 GHz

### The Big Deal

- Wideband, 1 to 20 GHz
- Excellent Coupling Flatness,  $\pm 0.26$  dB typ.
- Power Handling up to 20W



CASE STYLE: HT2679-N

### Product Overview

The Mini-Circuits ZCDC20-01203-S+ wideband directional coupler offers exceptional performance operating over 1 to 20 GHz. This coupler has excellent coupling flatness, good directivity, and power handling. It is ideal for lab testing applications as well as for power monitoring over wide bands, among other applications.

### Key Features

| Feature                                                  | Advantages                                                                                                                                                                       |
|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wide bandwidth                                           | With a bandwidth spanning 1 to 20 GHz, ZCDC20-01203-S+ coupler is ideal for most lab testing applications, avoiding the need to switch components for different frequency bands. |
| Excellent Directivity<br>• 19 dB typ. up to 20 GHz       | High directivity allows sampling of input powers with minimal detrimental effects due to input mismatches.                                                                       |
| Excellent coupling flatness, $\pm 0.26$ dB typ           | Excellent coupling flatness over the entire frequency range minimizes the need for compensation circuits in most cases.                                                          |
| Good Return Loss (In & Out)<br>• 21 dB typ. up to 20 GHz | Good return loss over 1 to 20 GHz minimizes undesired reflections and resulting amplitude ripple.                                                                                |

#### 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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## Maximum Ratings

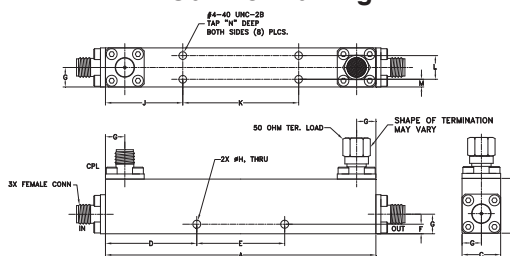
|                       |                |
|-----------------------|----------------|
| Operating Temperature | -55°C to 100°C |
| Storage Temperature   | -55°C to 100°C |
| Supplied Termination* | 1W             |
| DC Current            | 0.63A          |

Permanent damage may occur if any of these limits are exceeded  
\* up to 25°C, derates linearly to 325mW at 100°C.

## Coaxial Connections

|                            |     |
|----------------------------|-----|
| INPUT                      | IN  |
| OUTPUT                     | OUT |
| COUPLED                    | CPL |
| TERMINATION (50Ω) INCLUDED | —   |

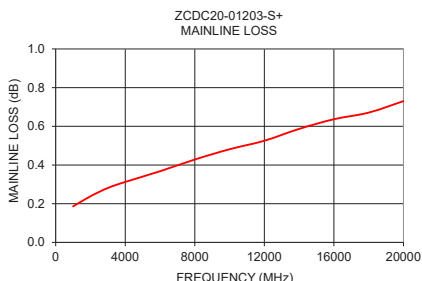
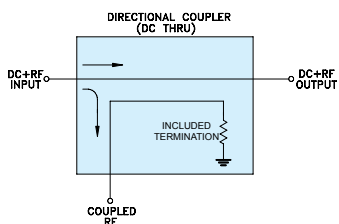
## Outline Drawing



## Outline Dimensions (inch)

| A     | B     | C     | D     | E     | F     | G     |
|-------|-------|-------|-------|-------|-------|-------|
| 3.50  | 0.70  | 0.50  | 1.181 | 1.138 | 0.122 | 0.25  |
| 88.90 | 17.78 | 12.70 | 30.00 | 28.91 | 3.10  | 6.35  |
| H     | J     | K     | L     | M     | N     | wt    |
| 0.102 | 1.00  | 1.50  | 0.303 | 0.098 | 0.2   | grams |
| 2.59  | 25.40 | 38.10 | 7.70  | 2.5   | 5.08  | 80    |

## Electrical Schematic



## Features

- Wide frequency range, 1 to 20 GHz
- Good coupling flatness,  $\pm 0.26$  dB typ.
- Good directivity, 19 dB typ. up to 20 GHz
- Good return loss, 21 dB typ. up to 20 GHz
- DC current pass through input to output

## Applications

- 5G
- Mobile
- Fixed satellite
- Lab use

## Electrical Specifications at 25°C

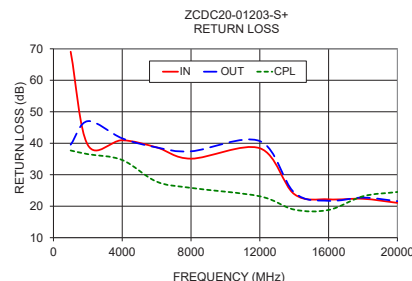
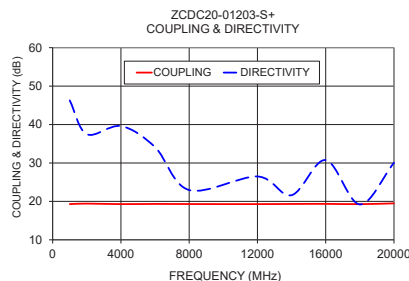
| Parameter                   | Frequency (GHz) | Min. | Typ.          | Max.       | Units |
|-----------------------------|-----------------|------|---------------|------------|-------|
| Operating Frequency         |                 | 1    |               | 20         | GHz   |
| Nominal Coupling            | 1 - 20          | -    | 20 $\pm$ 1.35 | -          | dB    |
| Coupling Flatness ( $\pm$ ) | 1 - 20          | -    | $\pm 0.26$    | $\pm 0.35$ | dB    |
| Mainline Loss <sup>1</sup>  | 1 - 8           | -    | 0.3           | 0.7        | dB    |
|                             | 8 - 20          | -    | 0.6           | 1.0        | dB    |
| Directivity                 | 1 - 8           | 17   | 33            | -          | dB    |
|                             | 8 - 20          | 14   | 25            | -          | dB    |
| Return Loss (In & Out)      | 1 - 8           | 17.6 | 38            | -          | dB    |
|                             | 8 - 20          | 16.5 | 29            | -          | dB    |
| Return Loss (Coupling)      | 1 - 8           | 17.6 | 33            | -          | dB    |
|                             | 8 - 20          | 16.5 | 26            | -          | dB    |
| Input Power <sup>2</sup>    | 1 - 20          | -    | -             | 20         | W     |

1. Mainline loss includes coupling loss  
2. up to 25°C, derates linearly to 18W at 100°C.

## Typical Performance Data

| Frequency (MHz) | Mainline Loss <sup>1</sup> (dB) In-Out | Coupling (dB) In-Cpl | Directivity (dB) | Return Loss (dB) In | Return Loss (dB) Out | Cpl   |
|-----------------|----------------------------------------|----------------------|------------------|---------------------|----------------------|-------|
| 1000            | 0.19                                   | 19.29                | 46.27            | 69.07               | 39.54                | 37.70 |
| 2000            | 0.24                                   | 19.42                | 37.49            | 39.42               | 47.03                | 36.53 |
| 4000            | 0.31                                   | 19.29                | 39.59            | 40.95               | 41.55                | 34.67 |
| 6000            | 0.37                                   | 19.34                | 34.12            | 38.68               | 38.68                | 27.80 |
| 8000            | 0.43                                   | 19.31                | 22.95            | 35.10               | 37.44                | 25.82 |
| 12000           | 0.53                                   | 19.29                | 26.49            | 38.40               | 40.68                | 23.15 |
| 14000           | 0.59                                   | 19.33                | 21.62            | 23.84               | 24.34                | 18.92 |
| 16000           | 0.64                                   | 19.36                | 30.76            | 22.19               | 21.71                | 18.81 |
| 18000           | 0.67                                   | 19.28                | 19.21            | 22.36               | 22.73                | 23.16 |
| 20000           | 0.73                                   | 19.49                | 30.04            | 21.06               | 21.60                | 24.52 |

1. Mainline loss includes coupling loss



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Generic photo used for illustration purposes only

CASE STYLE: HT2679-N

| Connectors | Model           |
|------------|-----------------|
| SMA Female | ZCDC20-01203-S+ |

+RoHS Compliant

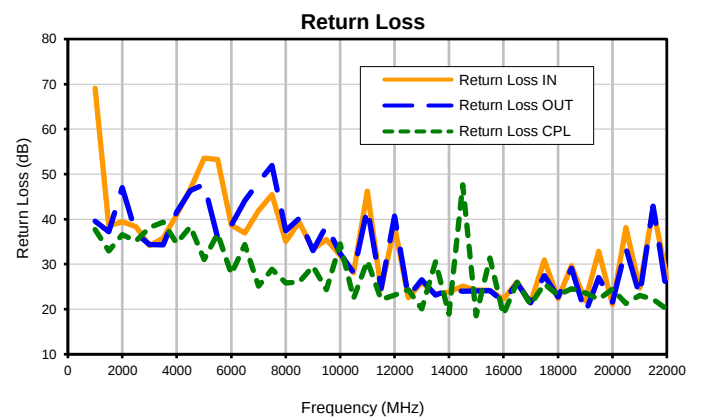
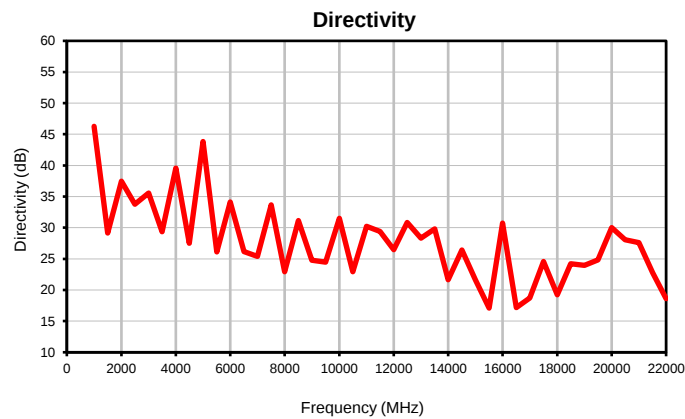
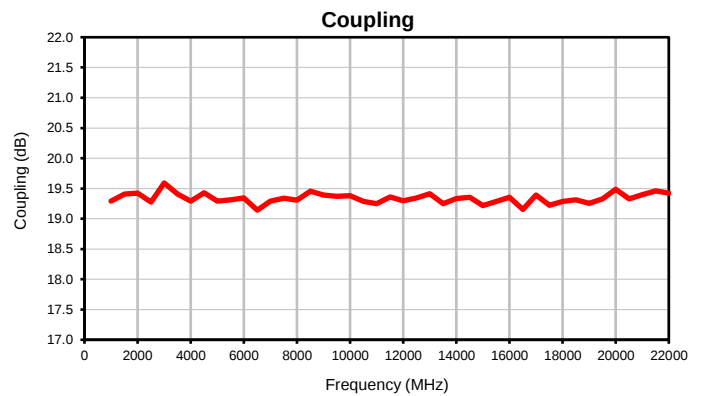
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

## Typical Performance Data

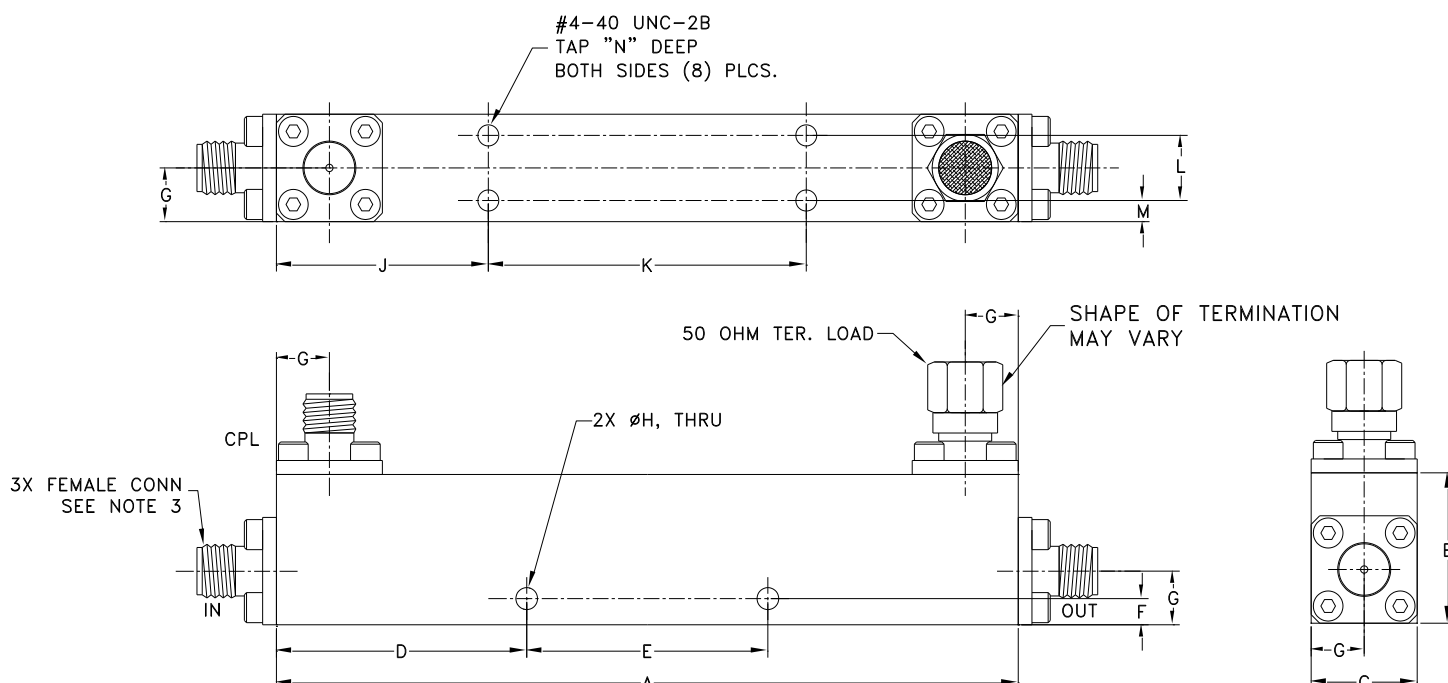
| FREQ.<br>(MHz) | INSERTION LOSS <sup>(1)</sup><br>(dB) | COUPLING<br>(dB) | DIRECTIVITY<br>(dB) | RETURN LOSS<br>(dB) |       |       |
|----------------|---------------------------------------|------------------|---------------------|---------------------|-------|-------|
|                |                                       |                  |                     | IN                  | OUT   | CPL   |
| 1000           | 0.19                                  | 19.29            | 46.27               | 69.07               | 39.54 | 37.70 |
| 1500           | 0.21                                  | 19.41            | 29.15               | 38.54               | 37.22 | 32.92 |
| 2000           | 0.24                                  | 19.42            | 37.49               | 39.42               | 47.03 | 36.53 |
| 2500           | 0.26                                  | 19.27            | 33.76               | 38.37               | 36.86 | 35.14 |
| 3000           | 0.28                                  | 19.59            | 35.56               | 34.18               | 34.40 | 38.11 |
| 3500           | 0.30                                  | 19.41            | 29.37               | 35.78               | 34.28 | 39.35 |
| 4000           | 0.31                                  | 19.29            | 39.59               | 40.95               | 41.55 | 34.67 |
| 4500           | 0.32                                  | 19.43            | 27.50               | 46.75               | 46.39 | 38.35 |
| 5000           | 0.34                                  | 19.29            | 43.85               | 53.52               | 47.74 | 31.03 |
| 5500           | 0.35                                  | 19.31            | 26.09               | 53.26               | 35.95 | 36.80 |
| 6000           | 0.37                                  | 19.34            | 34.12               | 38.68               | 38.68 | 27.80 |
| 6500           | 0.38                                  | 19.14            | 26.15               | 36.89               | 44.08 | 34.39 |
| 7000           | 0.40                                  | 19.29            | 25.38               | 41.90               | 48.20 | 25.09 |
| 7500           | 0.41                                  | 19.34            | 33.68               | 45.45               | 51.92 | 28.89 |
| 8000           | 0.43                                  | 19.31            | 22.95               | 35.10               | 37.44 | 25.82 |
| 8500           | 0.44                                  | 19.45            | 31.17               | 39.35               | 40.18 | 26.08 |
| 9000           | 0.46                                  | 19.39            | 24.78               | 33.27               | 32.99 | 29.54 |
| 9500           | 0.47                                  | 19.37            | 24.47               | 35.49               | 38.57 | 24.37 |
| 10000          | 0.48                                  | 19.38            | 31.51               | 31.96               | 32.39 | 34.51 |
| 10500          | 0.50                                  | 19.29            | 22.92               | 28.11               | 28.12 | 22.45 |
| 11000          | 0.50                                  | 19.25            | 30.20               | 46.22               | 42.40 | 30.74 |
| 11500          | 0.53                                  | 19.36            | 29.43               | 24.43               | 24.63 | 22.16 |
| 12000          | 0.53                                  | 19.29            | 26.49               | 38.40               | 40.68 | 23.15 |
| 12500          | 0.56                                  | 19.34            | 30.82               | 22.57               | 22.75 | 24.31 |
| 13000          | 0.55                                  | 19.42            | 28.34               | 25.99               | 26.55 | 20.10 |
| 13500          | 0.58                                  | 19.25            | 29.83               | 23.31               | 23.14 | 30.53 |
| 14000          | 0.59                                  | 19.33            | 21.62               | 23.84               | 24.34 | 18.92 |
| 14500          | 0.59                                  | 19.35            | 26.44               | 25.16               | 23.99 | 47.63 |
| 15000          | 0.61                                  | 19.22            | 21.66               | 24.24               | 24.05 | 18.54 |
| 15500          | 0.62                                  | 19.29            | 17.09               | 24.21               | 24.14 | 31.39 |
| 16000          | 0.64                                  | 19.36            | 30.76               | 22.19               | 21.71 | 18.81 |
| 16500          | 0.63                                  | 19.16            | 17.17               | 26.04               | 25.78 | 26.01 |
| 17000          | 0.66                                  | 19.39            | 18.74               | 21.45               | 21.42 | 20.98 |
| 17500          | 0.64                                  | 19.22            | 24.59               | 30.95               | 27.46 | 25.63 |
| 18000          | 0.67                                  | 19.28            | 19.21               | 22.36               | 22.73 | 23.16 |
| 18500          | 0.64                                  | 19.31            | 24.23               | 29.69               | 29.08 | 24.58 |
| 19000          | 0.63                                  | 19.25            | 23.98               | 21.82               | 19.17 | 23.65 |
| 19500          | 0.65                                  | 19.33            | 24.85               | 32.87               | 27.03 | 22.24 |
| 20000          | 0.73                                  | 19.49            | 30.04               | 21.06               | 21.60 | 24.52 |
| 20500          | 0.72                                  | 19.33            | 28.07               | 38.13               | 33.61 | 21.26 |
| 21000          | 0.75                                  | 19.40            | 27.60               | 24.73               | 22.99 | 23.07 |
| 21500          | 0.75                                  | 19.46            | 22.78               | 42.40               | 42.90 | 22.20 |
| 22000          | 0.77                                  | 19.43            | 18.59               | 26.96               | 23.52 | 20.02 |

<sup>(1)</sup> Mainline loss includes coupling loss

## Typical Performance Curves



### Outline Dimensions



| CASE #   | A               | B              | C              | D                | E                | F              | G             | H              | J                | K                |
|----------|-----------------|----------------|----------------|------------------|------------------|----------------|---------------|----------------|------------------|------------------|
| HT2679-N | 3.50<br>(88.90) | .70<br>(17.78) | .50<br>(12.70) | 1.181<br>(30.00) | 1.138<br>(28.90) | .122<br>(3.10) | .25<br>(6.35) | .102<br>(2.60) | 1.000<br>(25.40) | 1.500<br>(38.10) |

| CASE #   | L               | M               | N              | WT. GRAM |
|----------|-----------------|-----------------|----------------|----------|
| HT2679-N | .0303<br>(7.70) | 0.098<br>(2.50) | 0.20<br>(5.08) | 80       |

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

### Notes:

1. Case material: Aluminum alloy.
2. Case finish: Nickel Plating.
3. Refer to the individual model data sheet for the type of connectors available.



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The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

| Specification              | Test/Inspection Condition                                                           | Reference/Spec                                                       |
|----------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Operating Temperature      | -55° to 100°C<br>Ambient Environment                                                | Individual Model Data Sheet                                          |
| Storage Temperature        | -55° to 100° C<br>Ambient Environment                                               | Individual Model Data Sheet                                          |
| Thermal Shock              | -55° to 100°C, 25 cycles                                                            | MIL-STD-202, Method 107, Condition A-1 except +100°C instead of 85°C |
| 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                                 |
| Connector Durability       | 500 mating/unmating cycles                                                          | MIL-PRF-39012E, PARAGRAPH 4.6.12                                     |