

Wideband, DC Pass

# Directional Coupler

ZCDC10-E2653+

50Ω 10dB Up to 11W 2 to 65 GHz

## The Big Deal

- Ultra-wideband, 2 to 65 GHz
- Excellent Coupling Flatness,  $\pm 0.6$  dB typ.
- Power Handling up to 11W



CASE STYLE: HT2627

## Product Overview

The Mini-Circuits ZCDC10-E2653+ wideband directional coupler offers exceptional performance operating over 2 to 65 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 2 to 65 GHz, ZCDC10-E2653+ coupler is ideal for most lab testing applications, avoiding the need to switch components for different frequency bands. |
| Excellent Directivity<br>• 20 dB typ. up to 40 GHz            | High directivity allows sampling of input powers with minimal detrimental effects due to output mismatches.  |
| Excellent coupling flatness, $\pm 0.6$ dB typ                 | Excellent coupling flatness over the entire frequency range minimizes the need for compensation circuits in most cases.  |
| Excellent Return Loss (In & Out)<br>• 20 dB typ. up to 40 GHz | Excellent return loss over 2 to 65 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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# Wideband, DC Pass Directional Coupler

## ZCDC10-E2653+

50Ω 10dB Up to 11W 2 to 65 GHz



Generic photo used for illustration purposes only

CASE STYLE: HT2627

Connectors Model  
1.85mm Female ZCDC10-E2653+

+RoHS Compliant

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

### Maximum Ratings

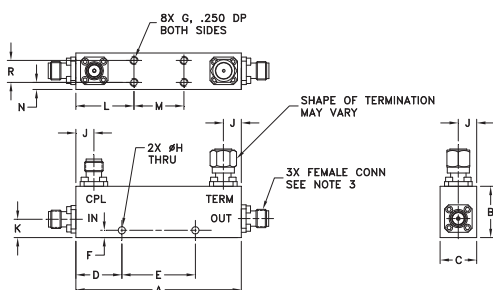
|                       |                |
|-----------------------|----------------|
| Operating Temperature | -55°C to 100°C |
| Storage Temperature   | -55°C to 100°C |
| Supplied Termination* | 1 W            |
| DC Current            | 0.46A          |

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 | —   |

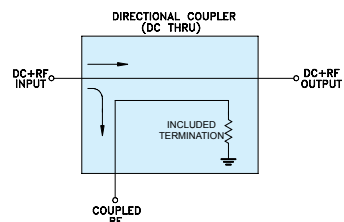
### Outline Drawing



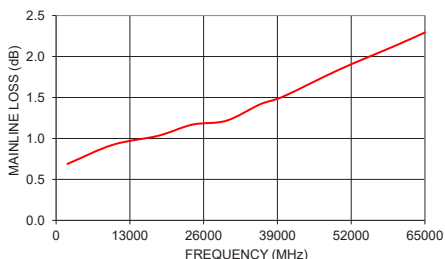
### Outline Dimensions (inch/mm)

| A     | B     | C     | D     | E     | F    | G      | H    |
|-------|-------|-------|-------|-------|------|--------|------|
| 2.25  | 0.7   | 0.50  | 0.63  | 1.00  | 0.10 | #4-40  | 0.1  |
| 57.15 | 17.78 | 12.70 | 16.00 | 25.40 | 2.54 | INC-2B | 2.54 |
| J     | K     | L     | M     | N     | R    | wt     |      |
| 0.25  | 0.25  | 0.79  | 0.68  | 0.1   | 0.3  | grams  |      |
| 6.35  | 6.35  | 20.07 | 17.27 | 2.54  | 7.62 | 80     |      |

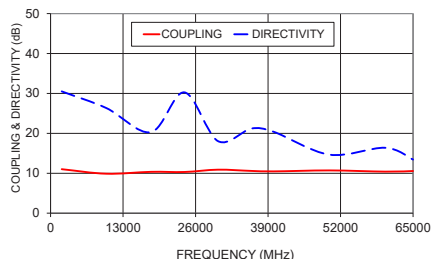
### Electrical Schematic



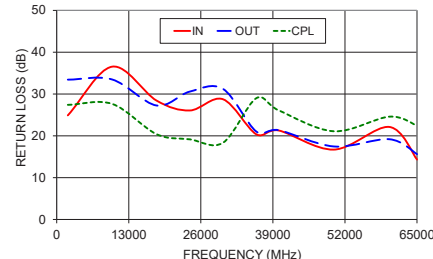
ZCDC10-E2653+ MAINLINE LOSS



ZCDC10-E2653+ COUPLING & DIRECTIVITY



ZCDC10-E2653+ RETURN LOSS



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### Features

- Wide frequency range, 2 to 65 GHz
- Excellent coupling flatness, ±0.6 dB typ.
- Good directivity, 20 dB typ. at 40 GHz
- Excellent return loss, 20 dB typ. at 40 GHz
- DC current pass through input to output

### Applications

- 5G
- Military
- mobile
- fixed satellite
- lab use

### Electrical Specifications at 25°C

| Parameter                  | Frequency (GHz) | Min. | Typ.   | Max. | Units |
|----------------------------|-----------------|------|--------|------|-------|
| Operating Frequency        |                 | 2    |        | 65   | GHz   |
| Nominal Coupling           |                 | -    | 10±2.0 | -    | dB    |
| Coupling Flatness          | 2 - 65          | -    | ±0.6   | ±1.2 | dB    |
| Mainline Loss <sup>1</sup> | 2 - 18          | -    | 0.9    | 1.4  | dB    |
|                            | 18 - 40         | -    | 1.3    | 1.9  |       |
|                            | 40 - 50         | -    | 1.6    | 2.2  |       |
|                            | 50 - 65         | -    | 2.0    | 2.6  |       |
| Directivity                | 2 - 18          | 14   | 29     | -    | dB    |
|                            | 18 - 40         | 10   | 23     | -    |       |
|                            | 40 - 50         | 8    | 21     | -    |       |
|                            | 50 - 65         | 7    | 19     | -    |       |
| Return Loss (In & Out)     | 2 - 18          | 12.7 | 31     | -    | dB    |
|                            | 18 - 40         | 11.7 | 26     | -    |       |
|                            | 40 - 50         | 10.8 | 26     | -    |       |
| Return Loss (Coupling)     | 2 - 18          | 12.7 | 30     | -    | dB    |
|                            | 18 - 40         | 11.7 | 25     | -    |       |
|                            | 40 - 50         | 10.8 | 23     | -    |       |
| Input Power <sup>2</sup>   | 2 - 65          | -    | -      | 11   | W     |

1. Mainline loss includes coupling loss.

2. Up to 25°C, derates linearly to 5W at 100°C.

### Typical Performance Data

| Frequency (MHz) | Mainline Loss (dB) In-Out | Coupling (dB) In-Cpl | Directivity (dB) | Return Loss (dB) |       |       |
|-----------------|---------------------------|----------------------|------------------|------------------|-------|-------|
|                 |                           |                      |                  | In               | Out   | Cpl   |
| 2000            | 0.69                      | 11.02                | 30.51            | 24.89            | 33.43 | 27.41 |
| 10000           | 0.92                      | 9.89                 | 26.34            | 36.54            | 33.48 | 27.63 |
| 18000           | 1.03                      | 10.36                | 20.30            | 28.44            | 27.26 | 20.40 |
| 24000           | 1.17                      | 10.32                | 30.27            | 26.06            | 30.58 | 19.17 |
| 30000           | 1.22                      | 10.90                | 18.07            | 28.75            | 31.22 | 18.35 |
| 36000           | 1.42                      | 10.59                | 21.20            | 20.37            | 21.04 | 29.00 |
| 40000           | 1.51                      | 10.47                | 20.39            | 21.29            | 21.36 | 26.12 |
| 50000           | 1.84                      | 10.72                | 14.66            | 16.71            | 17.45 | 21.09 |
| 60000           | 2.14                      | 10.41                | 16.38            | 22.13            | 19.19 | 24.58 |
| 65000           | 2.29                      | 10.57                | 13.44            | 14.32            | 15.62 | 22.42 |

# Directional Coupler

# ZCDC10-E2653+

## Typical Performance Data

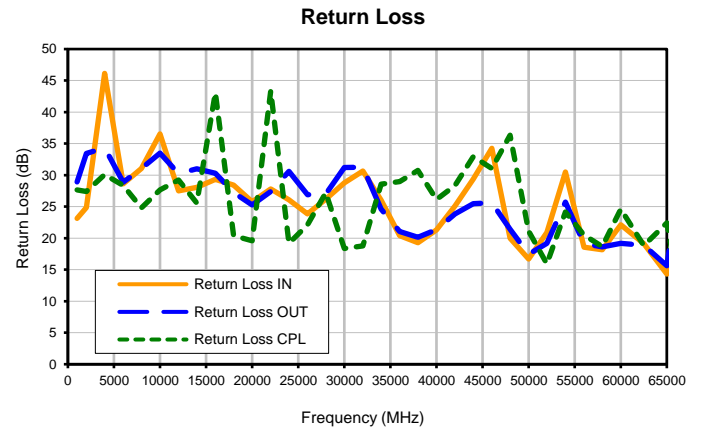
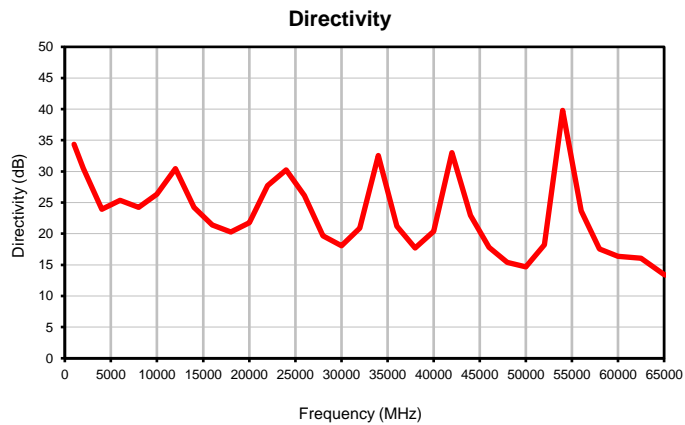
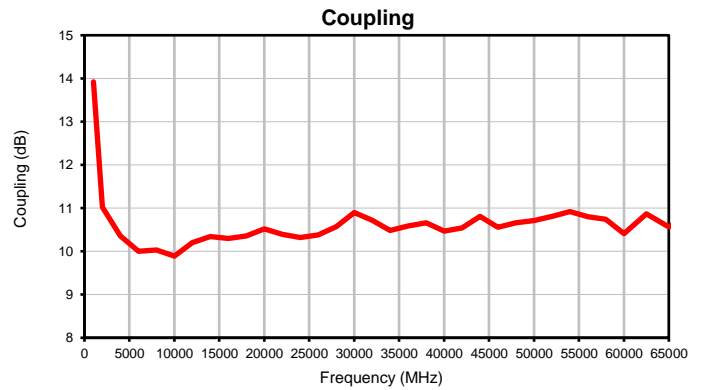
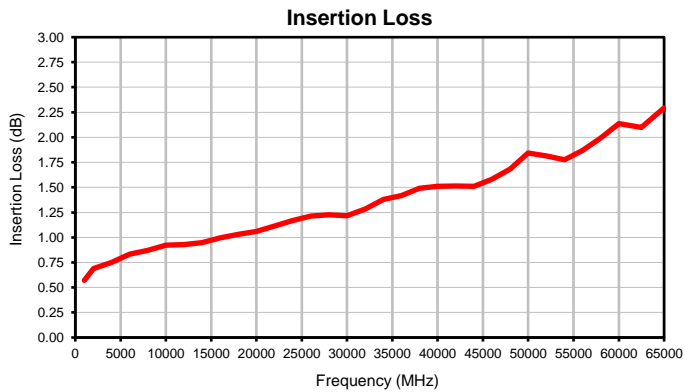
| FREQ.<br>(MHz) | INSERTION<br>LOSS <sup>(1)</sup><br>(dB) | COUPLING<br>(dB) | DIRECTIVITY<br>(dB) | RETURN LOSS<br>(dB) |       |       |
|----------------|--|------------------|---------------------|---------------------|-------|-------|
|                |  |                  |                     | IN                  | OUT   | CPL   |
| 1000           | 0.57                                     | 13.92            | 34.34               | 23.14               | 28.93 | 27.63 |
| 2000           | 0.69                                     | 11.02            | 30.51               | 24.89               | 33.43 | 27.41 |
| 4000           | 0.75                                     | 10.35            | 23.94               | 46.14               | 34.33 | 30.09 |
| 6000           | 0.83                                     | 10.00            | 25.36               | 28.61               | 28.87 | 28.36 |
| 8000           | 0.87                                     | 10.03            | 24.21               | 31.06               | 31.07 | 24.79 |
| 10000          | 0.92                                     | 9.89             | 26.34               | 36.54               | 33.48 | 27.63 |
| 12000          | 0.93                                     | 10.20            | 30.44               | 27.52               | 30.26 | 29.25 |
| 14000          | 0.95                                     | 10.34            | 24.21               | 28.08               | 31.01 | 25.59 |
| 16000          | 1.00                                     | 10.29            | 21.42               | 29.31               | 30.29 | 43.08 |
| 18000          | 1.03                                     | 10.36            | 20.30               | 28.44               | 27.26 | 20.40 |
| 20000          | 1.06                                     | 10.52            | 21.76               | 25.78               | 25.26 | 19.56 |
| 22000          | 1.11                                     | 10.40            | 27.70               | 27.78               | 27.40 | 43.35 |
| 24000          | 1.17                                     | 10.32            | 30.27               | 26.06               | 30.58 | 19.17 |
| 26000          | 1.21                                     | 10.38            | 26.11               | 23.87               | 26.91 | 22.12 |
| 28000          | 1.23                                     | 10.57            | 19.63               | 26.18               | 26.99 | 27.22 |
| 30000          | 1.22                                     | 10.90            | 18.07               | 28.75               | 31.22 | 18.35 |
| 32000          | 1.29                                     | 10.72            | 20.87               | 30.63               | 31.25 | 18.75 |
| 34000          | 1.38                                     | 10.49            | 32.56               | 26.02               | 24.60 | 28.58 |
| 36000          | 1.42                                     | 10.59            | 21.20               | 20.37               | 21.04 | 29.00 |
| 38000          | 1.49                                     | 10.66            | 17.70               | 19.30               | 20.13 | 30.75 |
| 40000          | 1.51                                     | 10.47            | 20.39               | 21.29               | 21.36 | 26.12 |
| 42000          | 1.51                                     | 10.54            | 33.03               | 25.14               | 23.87 | 28.36 |
| 44000          | 1.51                                     | 10.81            | 22.97               | 29.36               | 25.46 | 32.93 |
| 46000          | 1.58                                     | 10.55            | 17.82               | 34.25               | 25.64 | 31.05 |
| 48000          | 1.68                                     | 10.66            | 15.41               | 20.00               | 21.41 | 36.36 |
| 50000          | 1.84                                     | 10.72            | 14.66               | 16.71               | 17.45 | 21.09 |
| 52000          | 1.81                                     | 10.81            | 18.20               | 20.92               | 19.18 | 15.94 |
| 54000          | 1.77                                     | 10.92            | 39.80               | 30.49               | 25.74 | 24.14 |
| 56000          | 1.87                                     | 10.80            | 23.67               | 18.57               | 19.15 | 20.48 |
| 58000          | 1.99                                     | 10.74            | 17.53               | 18.14               | 18.62 | 18.66 |
| 60000          | 2.14                                     | 10.41            | 16.38               | 22.13               | 19.19 | 24.58 |
| 62500          | 2.10                                     | 10.87            | 16.08               | 19.11               | 18.90 | 18.81 |
| 65000          | 2.29                                     | 10.57            | 13.44               | 14.32               | 15.62 | 22.42 |
| 66000          | 2.21                                     | 10.69            | 12.96               | 19.75               | 25.75 | 13.97 |
| 67000          | 2.82                                     | 10.70            | 11.37               | 9.96                | 11.54 | 19.04 |

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

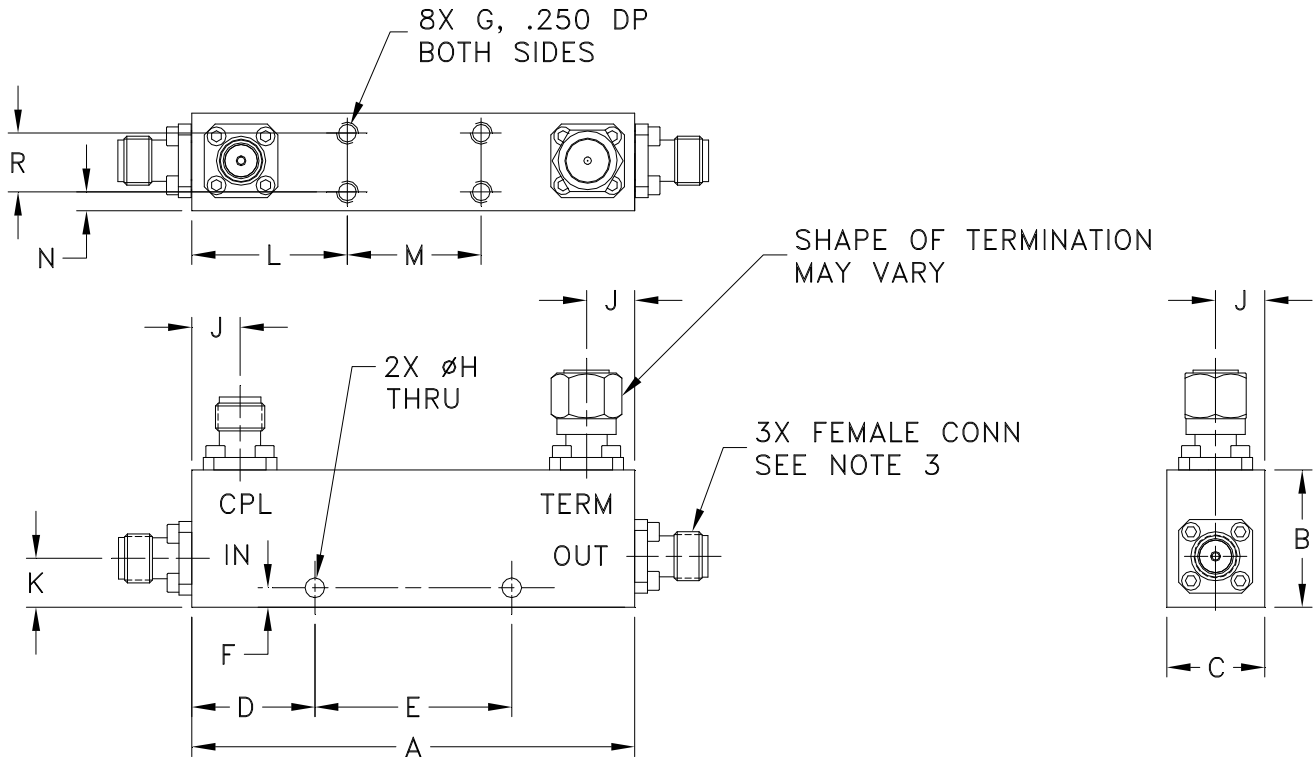
# Directional Coupler

## Typical Performance Curves

# ZCDC10-E2653+



### Outline Dimensions



| CASE # | A               | B              | C              | D              | E               | F             | G               | H             | J             | K             |
|--------|-----------------|----------------|----------------|----------------|-----------------|---------------|-----------------|---------------|---------------|---------------|
| HT2627 | 2.25<br>(57.15) | .70<br>(17.76) | .50<br>(12.70) | .63<br>(16.00) | 1.00<br>(25.40) | .10<br>(2.54) | #4-40<br>UNC-2B | .10<br>(2.54) | .25<br>(6.35) | .25<br>(6.35) |

| CASE # | L              | M              | N             | R             | WT. GRAM |
|--------|----------------|----------------|---------------|---------------|----------|
| HT2627 | .79<br>(20.07) | .68<br>(17.27) | .10<br>(2.54) | .30<br>(7.62) | 80.0     |

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

### Notes:

1. Case material: Aluminum alloy.
2. Case finish: Painting. Color: Blue.
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.

| <b>Specification</b>       | <b>Test/Inspection Condition</b>   | <b>Reference/Spec</b>                |
|----------------------------|--|--------------------------------------|
| 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          |
| 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 |