*Coaxial*

# Power Splitter/Combiner

## ZB4PD1-500+

4 Way-0° 50Ω 5 to 500 MHz

*SMA version shown*

CASE STYLE: UU188

| Connectors | Model |
|---|---|
| **BNC** | ZB4PD1-500+ |
| **SMA** | ZB4PD1-500-S+ |
| **N-TYPE** | ZB4PD1-500-N+ |

***+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 |
| Power Input (as a splitter) | 1W max. |
| Internal Dissipation | 0.250W max. |

Permanent damage may occur if any of these limits are exceeded.

### Coaxial Connections

| | |
|---|---|
| SUM PORT | S |
| PORT 1 | 1 |
| PORT 2 | 2 |
| PORT 3 | 3 |
| PORT 4 | 4 |

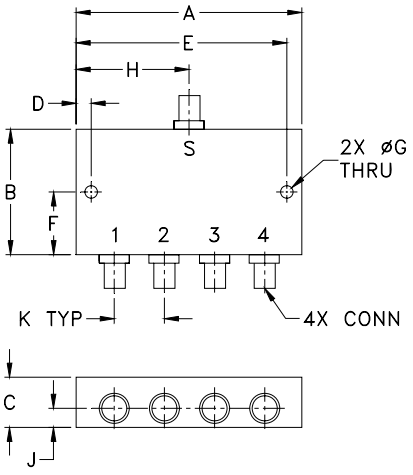
### Features

- wideband, 5 to 500 MHz
- high isolation, 34 dB typ.
- rugged, shielded case

### Applications

- VHF/UHF
- receivers/transmitters

### Outline Drawing




### Outline Dimensions (inch / mm)

| A | B | C | D | E | F |
|---|---|---|---|---|---|
| 3.50 | 2.13 | .88 | .150 | 3.350 | 1.06 |
| 88.90 | 54.10 | 22.35 | 3.81 | 85.09 | 26.92 |

| G | H | J | K | | wt |
|---|---|---|---|---|---|
| .125 | 1.75 | .44 | .89 | | grams |
| 3.18 | 44.45 | 11.18 | 22.61 | | 260 |

### Electrical Specifications

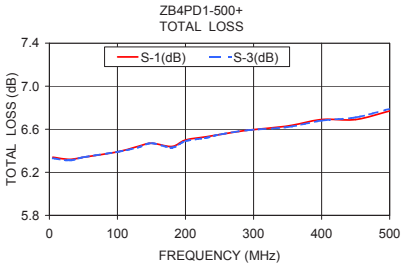
| FREQ. RANGE (MHz) | ISOLATION (dB) | | | | | | INSERTION LOSS (dB) ABOVE 6.0 dB | | | | | | PHASE UNBALANCE (Degrees) | | | AMPLITUDE UNBALANCE (dB) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | | M | | U | | L | | M | | U | | L | M | U | L | M | U |
| $f_L$-$f_U$ | Typ. | Min. | Typ. | Min. | Typ. | Min. | Typ. | Max. | Typ. | Max. | Typ. | Max. | Max. | Max. | Max. | Max. | Max. | Max. |
| 5-500 | 34 | 20 | 34 | 20 | 28 | 20 | 0.4 | 1.0 | 0.5 | 0.9 | 0.9 | 1.5 | 1 | 3 | 6 | 0.2 | 0.2 | 0.4 |

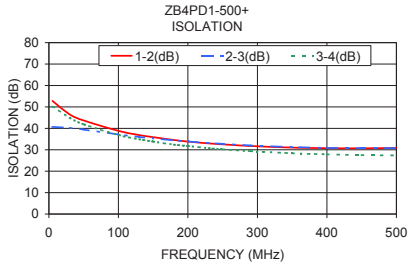
L = low range [$f_L$ to 10 $f_L$] M = mid range [10 $f_L$ to $f_U$/2] U = upper range [$f_U$/2 to $f_U$]

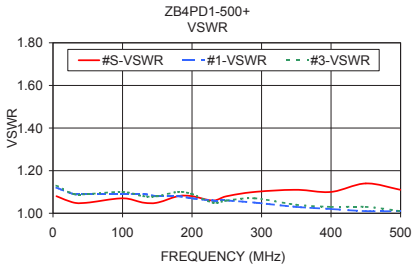
### Typical Performance Data

| Freq. (MHz) | Total Loss[1] (dB) | | | | Amp. Unbal. (dB) | Isolation (dB) | | | VSWR S | VSWR 1 | VSWR 2 | VSWR 3 | VSWR 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S-1 | S-2 | S-3 | S-4 | | 1-2 | 2-3 | 3-4 | | | | | |
| 5.00 | 6.34 | 6.35 | 6.33 | 6.33 | 0.01 | 52.83 | 40.68 | 50.23 | 1.08 | 1.12 | 1.12 | 1.13 | 1.13 |
| 30.00 | 6.32 | 6.32 | 6.31 | 6.32 | 0.01 | 46.48 | 40.23 | 44.89 | 1.05 | 1.09 | 1.09 | 1.09 | 1.09 |
| 50.00 | 6.34 | 6.34 | 6.34 | 6.35 | 0.01 | 43.68 | 39.45 | 41.92 | 1.05 | 1.09 | 1.09 | 1.09 | 1.10 |
| 100.00 | 6.39 | 6.39 | 6.39 | 6.38 | 0.01 | 38.83 | 37.13 | 36.88 | 1.07 | 1.09 | 1.10 | 1.10 | 1.10 |
| 130.00 | 6.44 | 6.43 | 6.43 | 6.43 | 0.01 | 36.86 | 35.97 | 34.90 | 1.05 | 1.09 | 1.08 | 1.08 | 1.08 |
| 150.00 | 6.47 | 6.46 | 6.47 | 6.46 | 0.01 | 35.87 | 35.35 | 33.83 | 1.05 | 1.08 | 1.08 | 1.08 | 1.08 |
| 180.00 | 6.44 | 6.44 | 6.43 | 6.43 | 0.01 | 34.55 | 34.35 | 32.40 | 1.08 | 1.08 | 1.09 | 1.10 | 1.10 |
| 200.00 | 6.50 | 6.51 | 6.49 | 6.48 | 0.03 | 33.82 | 33.88 | 31.75 | 1.08 | 1.07 | 1.07 | 1.09 | 1.09 |
| 230.00 | 6.53 | 6.54 | 6.52 | 6.51 | 0.03 | 32.96 | 33.12 | 30.74 | 1.06 | 1.06 | 1.04 | 1.05 | 1.05 |
| 250.00 | 6.55 | 6.56 | 6.55 | 6.53 | 0.03 | 32.54 | 32.76 | 30.22 | 1.08 | 1.06 | 1.06 | 1.06 | 1.06 |
| 290.00 | 6.59 | 6.59 | 6.59 | 6.58 | 0.02 | 31.75 | 32.00 | 29.34 | 1.10 | 1.05 | 1.05 | 1.07 | 1.07 |
| 350.00 | 6.63 | 6.64 | 6.62 | 6.60 | 0.04 | 31.02 | 31.24 | 28.37 | 1.11 | 1.03 | 1.04 | 1.04 | 1.04 |
| 400.00 | 6.69 | 6.72 | 6.68 | 6.67 | 0.05 | 30.73 | 30.84 | 27.85 | 1.10 | 1.02 | 1.01 | 1.03 | 1.03 |
| 450.00 | 6.69 | 6.72 | 6.71 | 6.67 | 0.05 | 30.66 | 30.70 | 27.53 | 1.14 | 1.01 | 1.01 | 1.03 | 1.03 |
| 500.00 | 6.77 | 6.81 | 6.79 | 6.75 | 0.06 | 30.85 | 30.77 | 27.37 | 1.11 | 1.01 | 1.02 | 1.01 | 1.02 |

1. Total Loss = Insertion Loss + 6dB splitter loss.




### electrical schematic


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/MCLStore/terms.jsp

# 4 Way-0° Power Splitter/Combiner ZB4PD1-500+

## *Typical Performance Data*

| FREQ. (MHz) | TOTAL LOSS[1] (dB) | | | | AMP. UNBAL. (dB) | ISOLATION (dB) | | | PHASE UNBAL. (deg.) |
|---|---|---|---|---|---|---|---|---|---|
| | S-1 | S-2 | S-3 | S-4 | | 1-2 | 2-3 | 3-4 | |
| 5.0 | 6.34 | 6.35 | 6.33 | 6.33 | 0.01 | 52.83 | 40.68 | 50.23 | 0.02 |
| 10.0 | 6.32 | 6.31 | 6.33 | 6.32 | 0.02 | 50.46 | 41.11 | 48.69 | 0.05 |
| 15.0 | 6.31 | 6.31 | 6.30 | 6.30 | 0.01 | 49.13 | 40.95 | 47.42 | 0.06 |
| 20.0 | 6.32 | 6.31 | 6.31 | 6.31 | 0.01 | 48.05 | 40.83 | 46.65 | 0.06 |
| 25.0 | 6.33 | 6.32 | 6.31 | 6.32 | 0.01 | 47.46 | 40.53 | 45.61 | 0.09 |
| 30.0 | 6.32 | 6.32 | 6.31 | 6.32 | 0.01 | 46.48 | 40.23 | 44.89 | 0.05 |
| 35.0 | 6.33 | 6.33 | 6.32 | 6.33 | 0.01 | 45.58 | 40.13 | 43.90 | 0.15 |
| 40.0 | 6.32 | 6.33 | 6.32 | 6.33 | 0.00 | 44.91 | 39.88 | 43.27 | 0.11 |
| 45.0 | 6.33 | 6.33 | 6.33 | 6.33 | 0.01 | 44.22 | 39.64 | 42.55 | 0.10 |
| 50.0 | 6.34 | 6.34 | 6.34 | 6.35 | 0.01 | 43.68 | 39.45 | 41.92 | 0.13 |
| 60.0 | 6.37 | 6.37 | 6.36 | 6.37 | 0.01 | 42.53 | 38.98 | 40.68 | 0.14 |
| 70.0 | 6.37 | 6.38 | 6.37 | 6.37 | 0.01 | 41.43 | 38.50 | 39.59 | 0.23 |
| 80.0 | 6.38 | 6.38 | 6.36 | 6.37 | 0.01 | 40.50 | 38.01 | 38.65 | 0.14 |
| 90.0 | 6.39 | 6.39 | 6.38 | 6.37 | 0.02 | 39.61 | 37.56 | 37.72 | 0.21 |
| 100.0 | 6.39 | 6.39 | 6.39 | 6.38 | 0.01 | 38.83 | 37.13 | 36.88 | 0.21 |
| 110.0 | 6.40 | 6.41 | 6.40 | 6.40 | 0.01 | 38.14 | 36.76 | 36.16 | 0.27 |
| 120.0 | 6.42 | 6.42 | 6.42 | 6.42 | 0.00 | 37.44 | 36.36 | 35.49 | 0.32 |
| 130.0 | 6.44 | 6.43 | 6.43 | 6.43 | 0.01 | 36.86 | 35.97 | 34.90 | 0.33 |
| 140.0 | 6.45 | 6.46 | 6.45 | 6.45 | 0.01 | 36.33 | 35.64 | 34.36 | 0.31 |
| 150.0 | 6.47 | 6.46 | 6.47 | 6.46 | 0.01 | 35.87 | 35.35 | 33.83 | 0.43 |
| 160.0 | 6.46 | 6.46 | 6.46 | 6.46 | 0.00 | 35.33 | 34.96 | 33.34 | 0.38 |
| 170.0 | 6.44 | 6.45 | 6.45 | 6.44 | 0.02 | 34.92 | 34.63 | 32.85 | 0.38 |
| 180.0 | 6.44 | 6.44 | 6.43 | 6.43 | 0.01 | 34.55 | 34.35 | 32.40 | 0.33 |
| 190.0 | 6.46 | 6.46 | 6.45 | 6.46 | 0.01 | 34.13 | 34.09 | 32.03 | 0.28 |
| 200.0 | 6.50 | 6.51 | 6.49 | 6.48 | 0.03 | 33.82 | 33.88 | 31.75 | 0.34 |
| 210.0 | 6.51 | 6.51 | 6.51 | 6.50 | 0.01 | 33.49 | 33.61 | 31.39 | 0.44 |
| 220.0 | 6.51 | 6.52 | 6.51 | 6.50 | 0.02 | 33.23 | 33.33 | 31.07 | 0.48 |
| 230.0 | 6.53 | 6.54 | 6.52 | 6.51 | 0.03 | 32.96 | 33.12 | 30.74 | 0.59 |
| 240.0 | 6.55 | 6.56 | 6.54 | 6.53 | 0.02 | 32.72 | 32.95 | 30.51 | 0.59 |
| 250.0 | 6.55 | 6.56 | 6.55 | 6.53 | 0.03 | 32.54 | 32.76 | 30.22 | 0.48 |
| 270.0 | 6.50 | 6.51 | 6.50 | 6.49 | 0.03 | 32.02 | 32.27 | 29.70 | 0.59 |
| 290.0 | 6.59 | 6.59 | 6.59 | 6.58 | 0.02 | 31.75 | 32.00 | 29.34 | 0.61 |
| 310.0 | 6.59 | 6.61 | 6.59 | 6.59 | 0.02 | 31.41 | 31.72 | 28.95 | 0.76 |
| 330.0 | 6.62 | 6.64 | 6.62 | 6.60 | 0.04 | 31.19 | 31.48 | 28.65 | 0.75 |
| 350.0 | 6.63 | 6.64 | 6.62 | 6.60 | 0.04 | 31.02 | 31.24 | 28.37 | 0.78 |
| 375.0 | 6.64 | 6.67 | 6.65 | 6.62 | 0.05 | 30.81 | 31.06 | 28.08 | 0.84 |
| 400.0 | 6.69 | 6.72 | 6.68 | 6.67 | 0.05 | 30.73 | 30.84 | 27.85 | 0.95 |
| 425.0 | 6.71 | 6.74 | 6.71 | 6.69 | 0.05 | 30.69 | 30.76 | 27.67 | 0.99 |
| 450.0 | 6.69 | 6.72 | 6.71 | 6.67 | 0.05 | 30.66 | 30.70 | 27.53 | 0.95 |
| 475.0 | 6.77 | 6.81 | 6.78 | 6.75 | 0.06 | 30.75 | 30.75 | 27.45 | 1.08 |
| 500.0 | 6.77 | 6.81 | 6.79 | 6.75 | 0.06 | 30.85 | 30.77 | 27.37 | 1.10 |

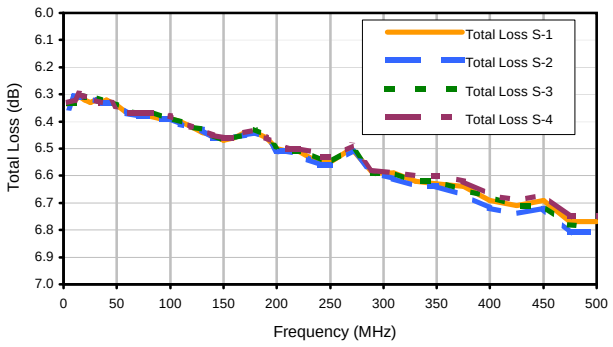
| FREQ. (MHz) | VSWR (:1) | | | | |
|---|---|---|---|---|---|
| | S | 1 | 2 | 3 | 4 |
| 5.0 | 1.08 | 1.12 | 1.12 | 1.13 | 1.13 |
| 10.0 | 1.07 | 1.10 | 1.10 | 1.10 | 1.10 |
| 15.0 | 1.06 | 1.10 | 1.10 | 1.10 | 1.10 |
| 20.0 | 1.06 | 1.09 | 1.09 | 1.10 | 1.10 |
| 25.0 | 1.05 | 1.09 | 1.09 | 1.09 | 1.09 |
| 30.0 | 1.05 | 1.09 | 1.09 | 1.09 | 1.09 |
| 35.0 | 1.05 | 1.09 | 1.09 | 1.09 | 1.09 |
| 40.0 | 1.05 | 1.09 | 1.09 | 1.10 | 1.10 |
| 45.0 | 1.05 | 1.09 | 1.09 | 1.10 | 1.10 |
| 50.0 | 1.05 | 1.09 | 1.09 | 1.09 | 1.10 |
| 60.0 | 1.05 | 1.09 | 1.09 | 1.10 | 1.10 |
| 70.0 | 1.05 | 1.09 | 1.10 | 1.10 | 1.10 |
| 80.0 | 1.06 | 1.09 | 1.10 | 1.10 | 1.10 |
| 90.0 | 1.07 | 1.09 | 1.10 | 1.10 | 1.10 |
| 100.0 | 1.07 | 1.09 | 1.10 | 1.10 | 1.10 |
| 110.0 | 1.06 | 1.09 | 1.09 | 1.10 | 1.10 |
| 120.0 | 1.06 | 1.09 | 1.08 | 1.09 | 1.09 |
| 130.0 | 1.05 | 1.09 | 1.08 | 1.08 | 1.08 |
| 140.0 | 1.05 | 1.08 | 1.08 | 1.08 | 1.08 |
| 150.0 | 1.05 | 1.08 | 1.08 | 1.08 | 1.08 |
| 160.0 | 1.06 | 1.08 | 1.08 | 1.09 | 1.09 |
| 170.0 | 1.07 | 1.08 | 1.09 | 1.09 | 1.09 |
| 180.0 | 1.08 | 1.08 | 1.09 | 1.10 | 1.10 |
| 190.0 | 1.08 | 1.07 | 1.08 | 1.09 | 1.09 |
| 200.0 | 1.08 | 1.07 | 1.07 | 1.09 | 1.09 |
| 210.0 | 1.07 | 1.07 | 1.06 | 1.07 | 1.07 |
| 220.0 | 1.06 | 1.07 | 1.05 | 1.06 | 1.06 |
| 230.0 | 1.06 | 1.06 | 1.04 | 1.05 | 1.05 |
| 240.0 | 1.07 | 1.06 | 1.05 | 1.05 | 1.05 |
| 250.0 | 1.08 | 1.06 | 1.06 | 1.06 | 1.06 |
| 270.0 | 1.10 | 1.05 | 1.06 | 1.07 | 1.07 |
| 290.0 | 1.10 | 1.05 | 1.05 | 1.07 | 1.07 |
| 310.0 | 1.08 | 1.04 | 1.02 | 1.04 | 1.04 |
| 330.0 | 1.09 | 1.03 | 1.02 | 1.03 | 1.02 |
| 350.0 | 1.11 | 1.03 | 1.04 | 1.04 | 1.04 |
| 375.0 | 1.12 | 1.02 | 1.03 | 1.05 | 1.05 |
| 400.0 | 1.10 | 1.02 | 1.01 | 1.03 | 1.03 |
| 425.0 | 1.11 | 1.01 | 1.02 | 1.01 | 1.01 |
| 450.0 | 1.14 | 1.01 | 1.01 | 1.03 | 1.03 |
| 475.0 | 1.12 | 1.01 | 1.01 | 1.03 | 1.04 |
| 500.0 | 1.11 | 1.01 | 1.02 | 1.01 | 1.02 |

[1] Total Loss = Insertion Loss+ 6dB Splitter Loss

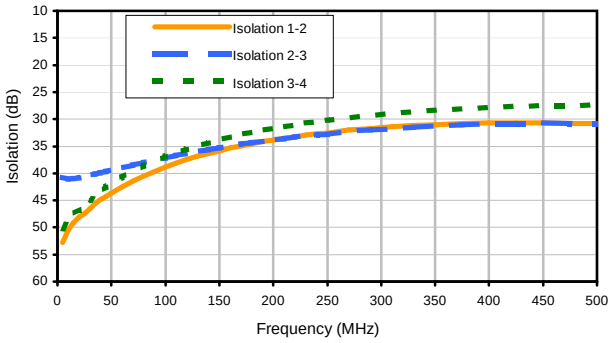
# 4 Way-0° Power Splitter/Combiner ZB4PD1-500+

*Typical Performance Curves*

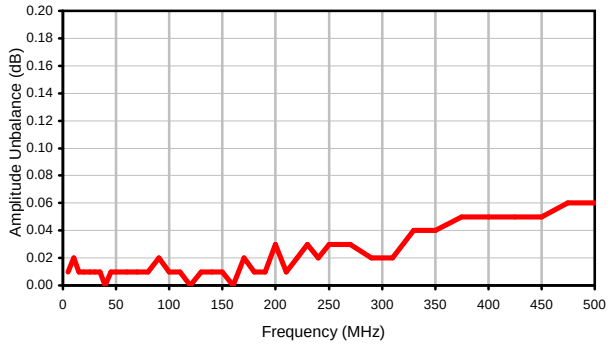
**Total Loss**



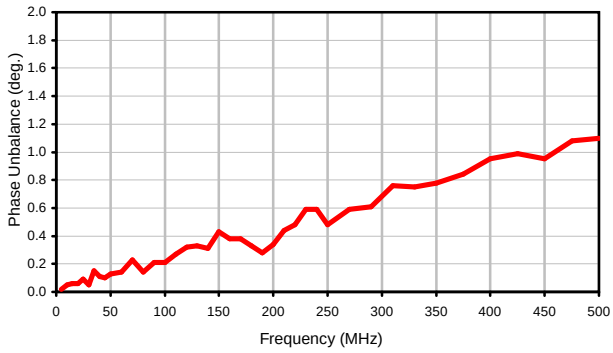

**Isolation**



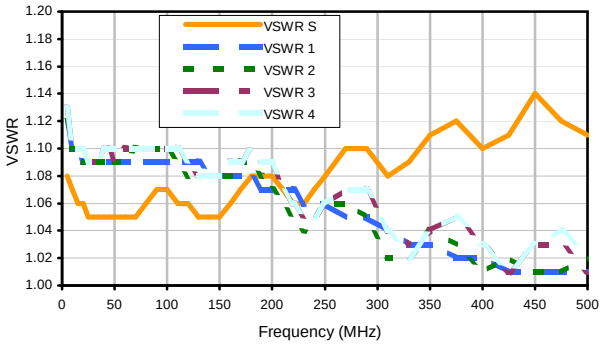

**Amplitude Unbalance**




**Phase Unbalance**

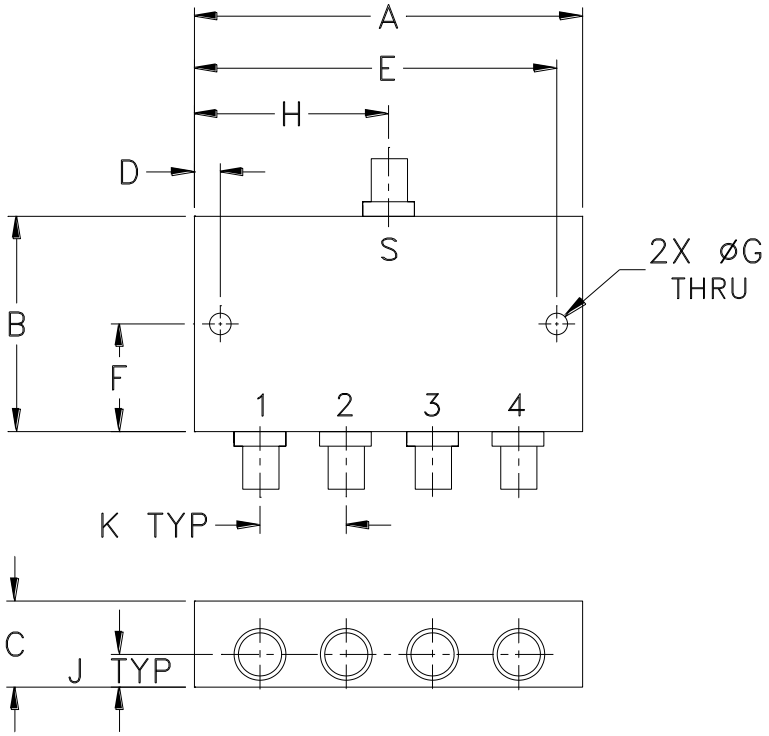



**VSWR**



# Case Style UU

## Outline Dimensions UU188




| CASE# | A | B | C | D | E | F | G | H | J | K | WT. GRAMS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| UU188 | 3.50 (88.90) | 2.13 (54.10) | .88 (22.35) | .150 (3.81) | 3.350 (85.09) | 1.06 (26.92) | .125 (3.18) | 1.75 (44.45) | .44 (11.18) | .89 (22.61) | 260 |

**Dimensions are in inches (mm). Tolerances: 2 Pl. ± .03; 3 Pl. ± .015**

### Notes:

1. Case material: Aluminum alloy.
2. Case finish:
   For RoHS Case Styles: Clear chemical conversion coating, non-chrome or trivalent chrome based.
3. Refer to the individual model data sheet for the type of connectors available.

Mini-Circuits

# Environmental Specifications ENV28

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 |
| 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 |