

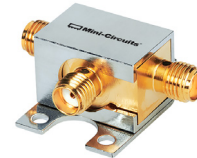
DC Pass

# Power Splitter/Combiner ZX10-2-143M-S+

2 Way-0° 50Ω 4000 to 14000 MHz

## The Big Deal

- Ultra-wideband, 4000 to 14000 MHz
- Low insertion loss, 0.8 dB
- Low amplitude unbalance, 0.1 dB
- Rugged unibody case



CASE STYLE: FL2227

## Product Overview

Mini-Circuits' ZX10-2-143M-S+ is a coaxial, ultra-wideband 2-way 0° splitter combiner providing RF input power handling up to 2.5W as a splitter and 0.8 dB insertion loss for an extremely wide range of applications from 4000 to 14000 MHz. Its outstanding combination of low loss and low unbalance make this model an excellent choice for distributing signals in systems where excellent transmission of signal power is needed. The splitter/combiner comes housed in a rugged, compact case 0.74 x 0.90 x 0.54" with SMA connectors.

## Key Features

| Feature                           | Advantages                                                                                                                                                           |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ultra-wideband, 4000 to 14000 MHz | ZX10-2-143M-S+ supports bandwidth requirements for a wide variety of applications including broadband applications such as instrumentation and defense.              |
| Low insertion loss, 0.8 dB        | Provides excellent transmission of signal power, making this model an excellent candidate for signal distribution applications where low loss is a requirement.      |
| Low amplitude unbalance, 0.1 dB   | Produces nearly equal output signals, ideal for parallel path / multichannel systems.                                                                                |
| DC passing up to 1.2A             | Supports applications where DC power is needed through the RF line.                                                                                                  |
| Rugged, unibody construction      | Mini-Circuits' unibody construction integrates the RF connector into the case body, providing high reliability and excellent survivability in critical applications. |

### Notes

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2 Way-0° 50Ω 4000 to 14000 MHz

## Maximum Ratings

|                                                            |                                |
|------------------------------------------------------------|--------------------------------|
| Operating Temperature                                      | -40°C to 85°C                  |
| Storage Temperature                                        | -55°C to 100°C                 |
| Power Input (as a splitter) 2.5W <sup>1</sup> max. at 25°C |                                |
| Internal Dissipation                                       | 1.7W <sup>2</sup> max. at 25°C |
| DC Current                                                 | 1.2A <sup>3</sup> max. at 25°C |

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

1. Derate linearly to 1.25W at 85°C

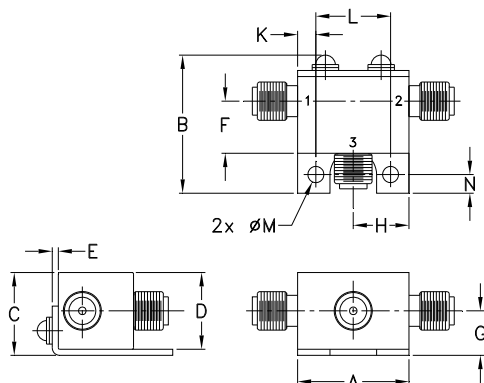
2. Derate linearly to 1.1W at 85°C

3. Derate linearly to 0.6W at 85°C

## Coaxial Connections

|          |   |
|----------|---|
| SUM PORT | S |
| PORT 1   | 1 |
| PORT 2   | 2 |

## Outline Drawing



## Outline Dimensions (inch/mm)

|       |       |       |       |      |      |      |
|-------|-------|-------|-------|------|------|------|
| A     | B     | C     | D     | E    | F    | G    |
| .74   | .90   | .54   | .50   | .04  | .34  | .29  |
| 18.80 | 22.86 | 13.72 | 12.70 | 1.02 | 8.64 | 7.37 |

|      |    |      |       |      |      |       |
|------|----|------|-------|------|------|-------|
| H    | J  | K    | L     | M    | N    | wt    |
| .37  | -- | .122 | .496  | .106 | .122 | grams |
| 9.40 | -- | 3.10 | 12.60 | 2.69 | 3.10 | 20.0  |

## Features

- wide bandwidth, 4000 to 14000 MHz
- excellent amplitude unbalance, 0.1 dB typ.
- small size
- high ESD level\*
- DC passing
- protected under US patent 6,790,049

## Applications

- WIMAX
- ISM
- instrumentation
- radar
- WLAN
- satellite communications
- LTE



Generic photo used for illustration purposes only

CASE STYLE: FL2227

| Connectors | Model          |
|------------|----------------|
| SMA        | ZX10-2-143M-S+ |

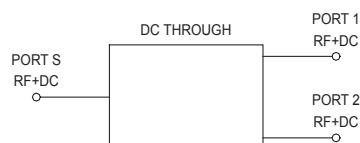
+RoHS Compliant

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

## Electrical Specifications at 25°C

| Parameter                                           | Frequency (MHz) | Min. | Typ. | Max.  | Unit   |
|-----------------------------------------------------|-----------------|------|------|-------|--------|
| <b>Frequency</b>                                    |                 | 4000 |      | 14000 | MHz    |
| <b>Insertion Loss</b><br>(above theoretical 3.0 dB) | 4000 - 6000     | —    | 0.7  | 1.0   | dB     |
|                                                     | 6000 - 10000    | —    | 1.1  | 1.6   |        |
|                                                     | 10000 - 14000   | —    | 1.6  | 2.0   |        |
| <b>Isolation</b>                                    | 4000 - 6000     | 12   | 15   | —     | dB     |
|                                                     | 6000 - 10000    | 17   | 20   | —     |        |
|                                                     | 10000 - 14000   | 14   | 18   | —     |        |
| <b>Phase Unbalance</b>                              | 4000 - 6000     | —    | 1    | 3     | Degree |
|                                                     | 6000 - 10000    | —    | 2    | 4     |        |
|                                                     | 10000 - 14000   | —    | 3    | 6     |        |
| <b>Amplitude Unbalance</b>                          | 4000 - 6000     | —    | 0.1  | 0.3   | dB     |
|                                                     | 6000 - 10000    | —    | 0.1  | 0.4   |        |
|                                                     | 10000 - 14000   | —    | 0.2  | 0.5   |        |
| <b>VSWR (Port S)</b>                                | 4000 - 6000     | —    | 1.4  | —     | :1     |
|                                                     | 6000 - 10000    | —    | 1.5  | —     |        |
|                                                     | 10000 - 14000   | —    | 1.6  | —     |        |
| <b>VSWR (Port 1-2)</b>                              | 4000 - 6000     | —    | 1.5  | —     | :1     |
|                                                     | 6000 - 10000    | —    | 1.5  | —     |        |
|                                                     | 10000 - 14000   | —    | 1.5  | —     |        |

## Electrical Schematic



\* ESD rating

Human body model (HBM): Class 2 (1800 to 4000V) in accordance with ANSI / ESD 5.1-2007.

Machine model (MM): Class M3 (200 to &lt;400V) in accordance with ANSI / ESD 5.2-2009

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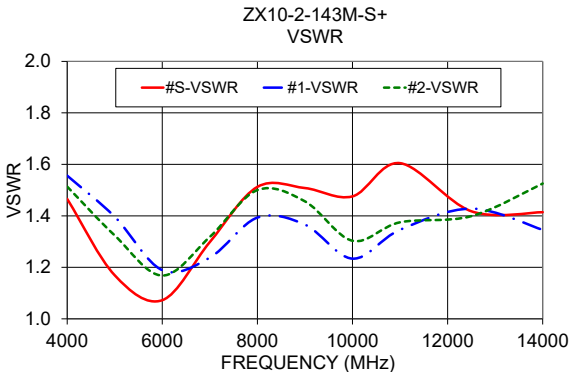
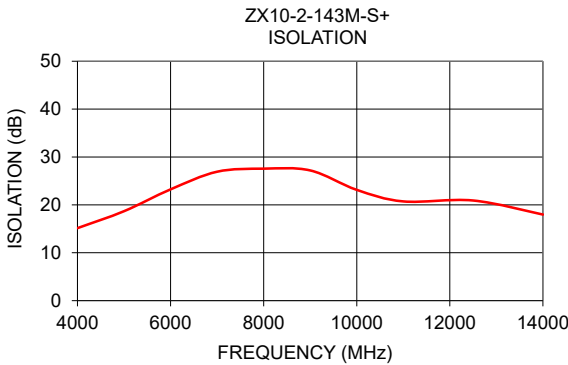
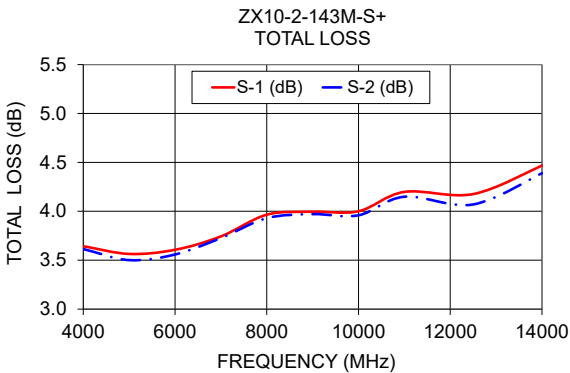
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# ZX10-2-143M-S+

Typical Performance Data

| Frequency<br>(MHz) | Total Loss <sup>1</sup><br>(dB) |      | Amplitude<br>Unbalance<br>(dB) | Isolation<br>(dB) | Phase<br>Unbalance<br>(deg.) | VSWR<br>S | VSWR<br>1 | VSWR<br>2 |
|--------------------|---------------------------------|------|--------------------------------|-------------------|------------------------------|-----------|-----------|-----------|
|                    | S-1                             | S-2  |                                |                   |                              |           |           |           |
| 4000               | 3.64                            | 3.61 | 0.03                           | 15.14             | 0.17                         | 1.47      | 1.56      | 1.51      |
| 5000               | 3.56                            | 3.50 | 0.06                           | 18.68             | 0.54                         | 1.17      | 1.40      | 1.32      |
| 6000               | 3.61                            | 3.56 | 0.05                           | 23.24             | 1.02                         | 1.07      | 1.19      | 1.17      |
| 7000               | 3.74                            | 3.73 | 0.02                           | 26.93             | 1.19                         | 1.30      | 1.24      | 1.32      |
| 8000               | 3.97                            | 3.93 | 0.04                           | 27.56             | 1.28                         | 1.51      | 1.39      | 1.50      |
| 9000               | 4.00                            | 3.97 | 0.03                           | 27.19             | 1.46                         | 1.51      | 1.37      | 1.46      |
| 10000              | 4.00                            | 3.96 | 0.04                           | 23.14             | 1.55                         | 1.48      | 1.23      | 1.30      |
| 11000              | 4.20                            | 4.15 | 0.05                           | 20.72             | 1.70                         | 1.60      | 1.35      | 1.37      |
| 12500              | 4.18                            | 4.07 | 0.11                           | 20.91             | 1.65                         | 1.42      | 1.43      | 1.40      |
| 14000              | 4.47                            | 4.39 | 0.08                           | 17.97             | 2.24                         | 1.41      | 1.35      | 1.53      |

1. Total Loss = Insertion Loss + 3dB splitter loss.



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# 2 Way-0° Power Splitter/Combiner

ZX10-2-143M-S+

## Typical Performance Data

| FREQUENCY<br>(MHz) | TOTAL LOSS <sup>1</sup><br>(dB) |      | AMPLITUDE<br>UNBALANCE<br>(dB) | ISOLATION<br>(dB) | PHASE<br>UNBALANCE<br>(Deg) | FREQUENCY<br>(MHz) | VSWR<br>(:1) |      |      |
|--------------------|---------------------------------|------|--------------------------------|-------------------|-----------------------------|--------------------|--------------|------|------|
|                    | S-1                             | S-2  |                                |                   |                             |                    | S            | 1    | 2    |
| 2000               | 3.78                            | 3.84 | 0.06                           | 8.64              | 0.24                        | 2000               | 1.86         | 1.56 | 1.59 |
| 2200               | 3.78                            | 3.84 | 0.06                           | 9.33              | 0.21                        | 2200               | 1.84         | 1.57 | 1.60 |
| 2400               | 3.77                            | 3.83 | 0.06                           | 10.02             | 0.15                        | 2400               | 1.82         | 1.58 | 1.60 |
| 2600               | 3.77                            | 3.82 | 0.05                           | 10.67             | 0.16                        | 2600               | 1.81         | 1.59 | 1.61 |
| 2800               | 3.76                            | 3.81 | 0.04                           | 11.34             | 0.07                        | 2800               | 1.77         | 1.60 | 1.61 |
| 3000               | 3.74                            | 3.78 | 0.03                           | 11.99             | 0.07                        | 3000               | 1.73         | 1.60 | 1.61 |
| 3200               | 3.73                            | 3.75 | 0.02                           | 12.65             | 0.04                        | 3200               | 1.69         | 1.60 | 1.60 |
| 3400               | 3.71                            | 3.72 | 0.01                           | 13.26             | 0.07                        | 3400               | 1.64         | 1.60 | 1.59 |
| 3600               | 3.69                            | 3.69 | 0.00                           | 13.82             | 0.08                        | 3600               | 1.59         | 1.59 | 1.57 |
| 3800               | 3.67                            | 3.65 | 0.02                           | 14.51             | 0.09                        | 3800               | 1.53         | 1.58 | 1.54 |
| 4000               | 3.64                            | 3.61 | 0.03                           | 15.14             | 0.17                        | 4000               | 1.47         | 1.56 | 1.51 |
| 4200               | 3.62                            | 3.59 | 0.04                           | 15.79             | 0.19                        | 4200               | 1.41         | 1.54 | 1.49 |
| 4400               | 3.61                            | 3.55 | 0.05                           | 16.48             | 0.23                        | 4400               | 1.34         | 1.50 | 1.45 |
| 4600               | 3.59                            | 3.53 | 0.06                           | 17.18             | 0.37                        | 4600               | 1.29         | 1.47 | 1.41 |
| 4800               | 3.58                            | 3.51 | 0.06                           | 17.91             | 0.44                        | 4800               | 1.23         | 1.43 | 1.37 |
| 5000               | 3.56                            | 3.50 | 0.06                           | 18.68             | 0.54                        | 5000               | 1.17         | 1.40 | 1.32 |
| 5200               | 3.56                            | 3.49 | 0.06                           | 19.56             | 0.59                        | 5200               | 1.11         | 1.35 | 1.28 |
| 5400               | 3.57                            | 3.50 | 0.07                           | 20.61             | 0.71                        | 5400               | 1.08         | 1.31 | 1.25 |
| 5600               | 3.58                            | 3.51 | 0.07                           | 21.55             | 0.81                        | 5600               | 1.05         | 1.27 | 1.21 |
| 5800               | 3.59                            | 3.53 | 0.06                           | 22.26             | 0.95                        | 5800               | 1.04         | 1.22 | 1.18 |
| 6000               | 3.61                            | 3.56 | 0.05                           | 23.24             | 1.02                        | 6000               | 1.07         | 1.19 | 1.17 |
| 6200               | 3.62                            | 3.59 | 0.04                           | 24.28             | 1.06                        | 6200               | 1.12         | 1.16 | 1.17 |
| 6400               | 3.65                            | 3.61 | 0.03                           | 25.11             | 1.15                        | 6400               | 1.16         | 1.16 | 1.19 |
| 6600               | 3.68                            | 3.65 | 0.03                           | 25.87             | 1.19                        | 6600               | 1.20         | 1.18 | 1.23 |
| 6800               | 3.71                            | 3.69 | 0.02                           | 26.33             | 1.20                        | 6800               | 1.25         | 1.20 | 1.27 |
| 7000               | 3.74                            | 3.73 | 0.02                           | 26.93             | 1.19                        | 7000               | 1.30         | 1.24 | 1.32 |
| 7200               | 3.79                            | 3.77 | 0.02                           | 27.13             | 1.24                        | 7200               | 1.37         | 1.28 | 1.37 |
| 7400               | 3.82                            | 3.80 | 0.02                           | 27.75             | 1.26                        | 7400               | 1.40         | 1.33 | 1.40 |
| 7600               | 3.87                            | 3.85 | 0.01                           | 27.53             | 1.23                        | 7600               | 1.43         | 1.37 | 1.44 |
| 7800               | 3.92                            | 3.90 | 0.02                           | 27.48             | 1.20                        | 7800               | 1.46         | 1.39 | 1.48 |
| 8000               | 3.97                            | 3.93 | 0.04                           | 27.56             | 1.28                        | 8000               | 1.51         | 1.39 | 1.50 |
| 8200               | 3.99                            | 3.95 | 0.04                           | 27.47             | 1.40                        | 8200               | 1.54         | 1.43 | 1.51 |
| 8400               | 4.00                            | 3.97 | 0.03                           | 27.86             | 1.41                        | 8400               | 1.51         | 1.45 | 1.51 |
| 8600               | 4.00                            | 3.97 | 0.03                           | 27.93             | 1.37                        | 8600               | 1.52         | 1.43 | 1.50 |
| 8800               | 4.01                            | 3.98 | 0.03                           | 28.08             | 1.42                        | 8800               | 1.53         | 1.40 | 1.49 |
| 9000               | 4.00                            | 3.97 | 0.03                           | 27.19             | 1.46                        | 9000               | 1.51         | 1.37 | 1.46 |
| 9200               | 4.00                            | 3.96 | 0.03                           | 26.37             | 1.49                        | 9200               | 1.52         | 1.36 | 1.43 |
| 9400               | 3.97                            | 3.93 | 0.03                           | 26.14             | 1.45                        | 9400               | 1.48         | 1.31 | 1.38 |
| 9600               | 3.96                            | 3.93 | 0.03                           | 25.20             | 1.49                        | 9600               | 1.47         | 1.27 | 1.35 |
| 9800               | 3.98                            | 3.95 | 0.04                           | 24.28             | 1.53                        | 9800               | 1.46         | 1.26 | 1.32 |
| 10000              | 4.00                            | 3.96 | 0.04                           | 23.14             | 1.55                        | 10000              | 1.48         | 1.23 | 1.30 |
| 10200              | 4.03                            | 3.98 | 0.04                           | 22.53             | 1.62                        | 10200              | 1.50         | 1.24 | 1.29 |
| 10400              | 4.05                            | 4.00 | 0.05                           | 22.31             | 1.67                        | 10400              | 1.50         | 1.25 | 1.29 |
| 10600              | 4.11                            | 4.06 | 0.05                           | 21.63             | 1.66                        | 10600              | 1.56         | 1.30 | 1.32 |
| 10800              | 4.15                            | 4.11 | 0.04                           | 21.32             | 1.63                        | 10800              | 1.56         | 1.35 | 1.35 |
| 11000              | 4.20                            | 4.15 | 0.05                           | 20.72             | 1.70                        | 11000              | 1.60         | 1.35 | 1.37 |
| 11200              | 4.23                            | 4.17 | 0.06                           | 20.96             | 1.72                        | 11200              | 1.62         | 1.39 | 1.40 |
| 11400              | 4.24                            | 4.18 | 0.07                           | 21.17             | 1.71                        | 11400              | 1.63         | 1.44 | 1.42 |
| 11600              | 4.29                            | 4.21 | 0.07                           | 20.97             | 1.65                        | 11600              | 1.64         | 1.49 | 1.44 |
| 11800              | 4.28                            | 4.20 | 0.08                           | 20.89             | 1.61                        | 11800              | 1.60         | 1.47 | 1.45 |
| 12000              | 4.24                            | 4.16 | 0.08                           | 20.80             | 1.66                        | 12000              | 1.58         | 1.42 | 1.43 |
| 12200              | 4.22                            | 4.13 | 0.09                           | 21.01             | 1.59                        | 12200              | 1.53         | 1.46 | 1.42 |
| 12400              | 4.19                            | 4.08 | 0.10                           | 21.21             | 1.60                        | 12400              | 1.48         | 1.42 | 1.40 |
| 12600              | 4.15                            | 4.04 | 0.11                           | 20.44             | 1.63                        | 12600              | 1.43         | 1.39 | 1.37 |
| 12800              | 4.14                            | 4.03 | 0.11                           | 20.11             | 1.76                        | 12800              | 1.30         | 1.35 | 1.35 |
| 13000              | 4.12                            | 4.03 | 0.09                           | 19.89             | 1.63                        | 13000              | 1.24         | 1.30 | 1.35 |
| 13200              | 4.17                            | 4.08 | 0.09                           | 19.19             | 1.61                        | 13200              | 1.16         | 1.29 | 1.34 |
| 13400              | 4.21                            | 4.12 | 0.09                           | 19.15             | 1.79                        | 13400              | 1.14         | 1.30 | 1.37 |
| 13600              | 4.29                            | 4.19 | 0.11                           | 18.55             | 1.85                        | 13600              | 1.19         | 1.28 | 1.40 |
| 13800              | 4.37                            | 4.29 | 0.08                           | 18.16             | 2.00                        | 13800              | 1.30         | 1.28 | 1.45 |
| 14000              | 4.47                            | 4.39 | 0.08                           | 17.97             | 2.24                        | 14000              | 1.41         | 1.35 | 1.53 |
| 14500              | 4.71                            | 4.65 | 0.06                           | 18.82             | 2.85                        | 14500              | 1.77         | 1.46 | 1.74 |
| 15000              | 5.03                            | 5.00 | 0.03                           | 19.23             | 3.55                        | 15000              | 2.28         | 1.65 | 1.99 |
| 15500              | 5.19                            | 5.27 | 0.07                           | 19.91             | 3.32                        | 15500              | 2.62         | 1.79 | 2.21 |
| 16000              | 5.41                            | 5.55 | 0.14                           | 19.70             | 2.63                        | 16000              | 2.93         | 2.02 | 2.40 |
| 16500              | 5.61                            | 5.80 | 0.19                           | 18.54             | 1.81                        | 16500              | 2.70         | 2.23 | 2.48 |
| 17000              | 5.69                            | 5.86 | 0.18                           | 17.91             | 1.21                        | 17000              | 2.67         | 2.29 | 2.42 |
| 17500              | 5.41                            | 5.53 | 0.12                           | 17.76             | 1.13                        | 17500              | 2.18         | 2.16 | 2.18 |
| 18000              | 4.99                            | 4.99 | 0.01                           | 18.08             | 0.82                        | 18000              | 1.75         | 1.80 | 1.84 |

<sup>1</sup>Total Loss = Insertion Loss + 3dB Splitter Loss



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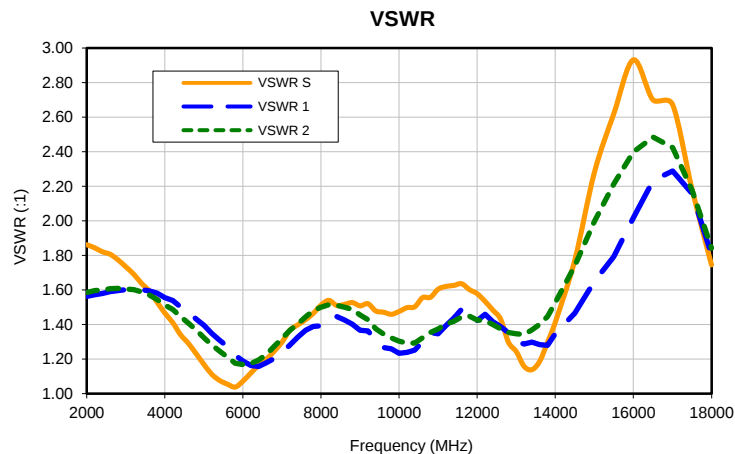
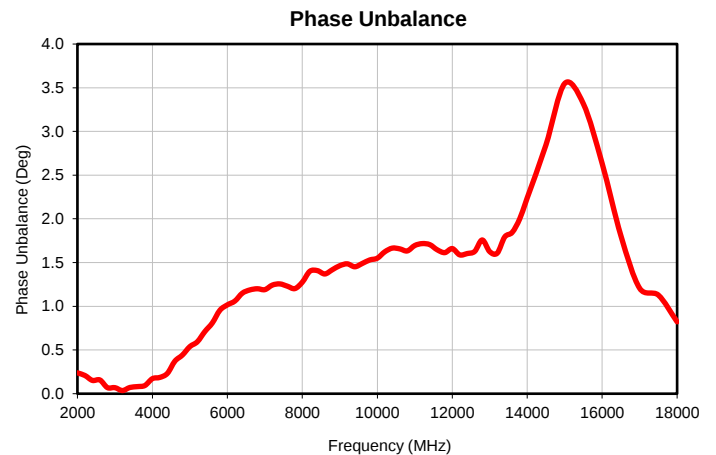
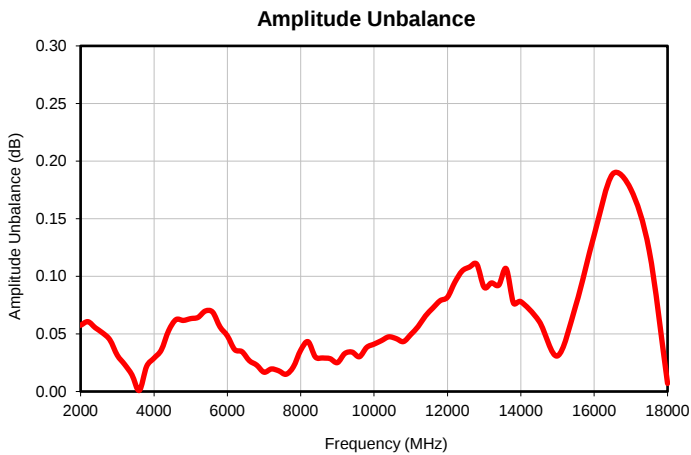
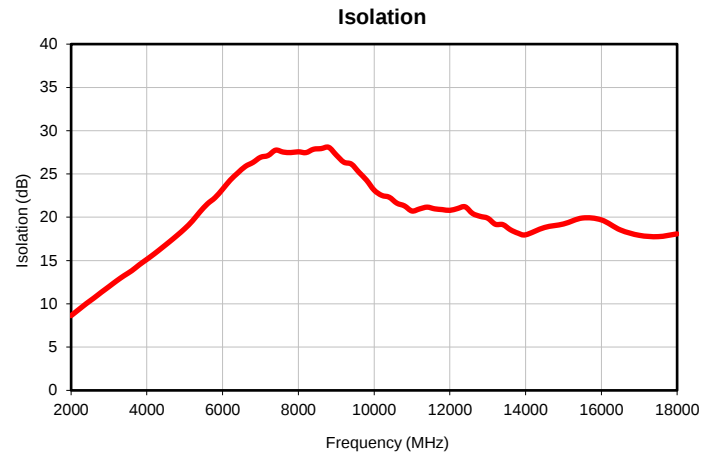
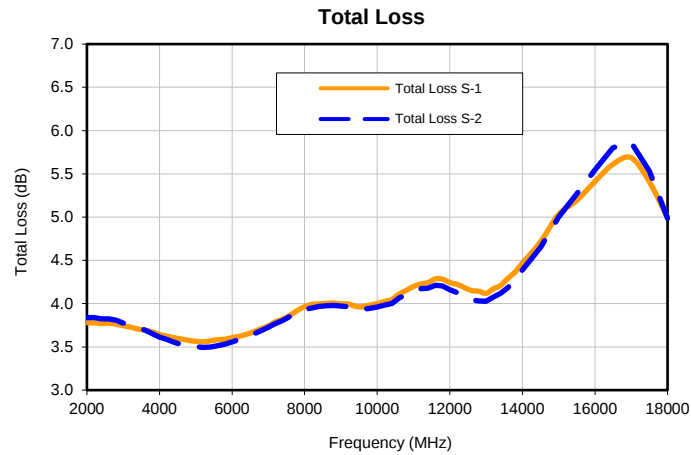
IF/RF MICROWAVE COMPONENTS

REV. A  
ZX10-2-143M-S+  
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Page 1 of 1

# 2 Way-0° Power Splitter/Combiner

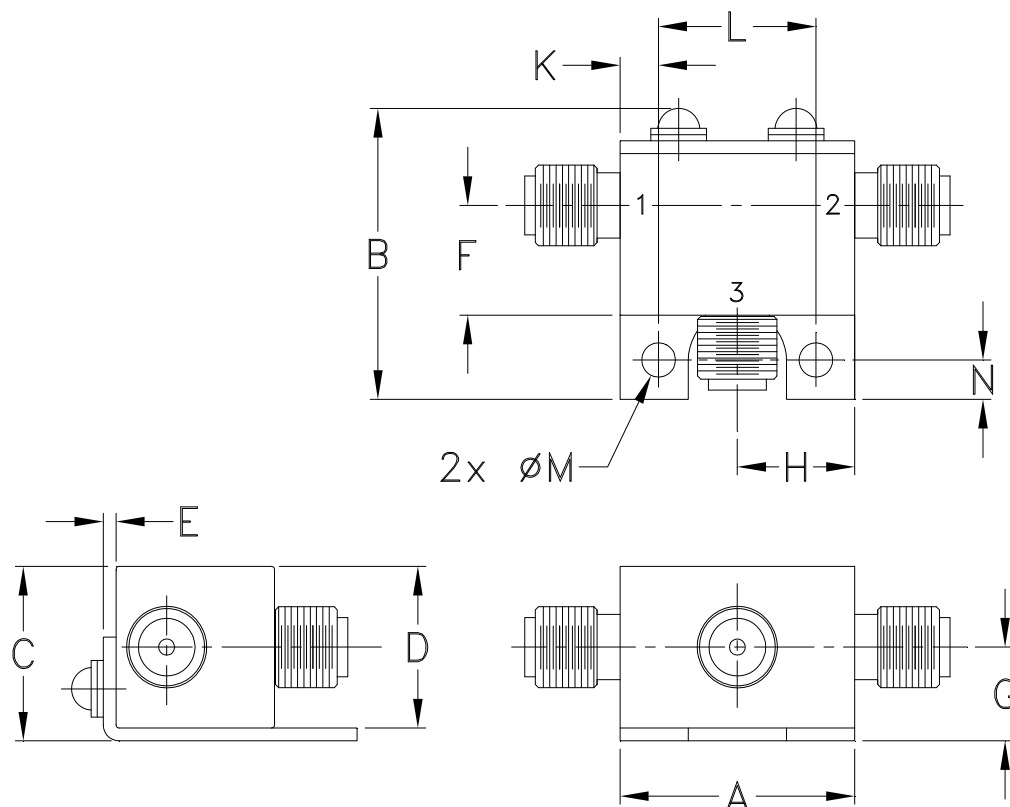
ZX10-2-143M-S+

## Typical Performance Curves



FL2227

## Outline Dimensions



| CASE #. | A              | B              | C              | D              | E             | F             | G             | H             | J | K              | L               | M              | N              | WT,<br>GRAM |
|---------|----------------|----------------|----------------|----------------|---------------|---------------|---------------|---------------|---|----------------|-----------------|----------------|----------------|-------------|
| FL2227  | .74<br>(18.80) | .90<br>(22.86) | .54<br>(13.72) | .50<br>(12.70) | .04<br>(1.02) | .34<br>(8.64) | .29<br>(7.37) | .37<br>(9.40) | - | .122<br>(3.10) | .496<br>(12.60) | .106<br>(2.69) | .122<br>(3.10) | 20.0        |

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

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

### Notes:

- Case material: Brass.
- Case finish: Nickel plate.



INTERNET <http://www.minicircuits.com>

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Mini-Circuits ISO 9001 & ISO 14001 Certified



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      | -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 |