

## Engineering Development Model

# Power Splitter/Combiner

# ZFSC-ED13413/1

## 8 Way-0°

### Important Note

This model has been designed, built and tested in our engineering department. Performance data represents model capability. At present it is a non-catalog model. On request, we can supply a final specification sheet, part number and price/delivery information.

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CASE STYLE : JN1359

### ELECTRICAL SPECIFICATIONS 50Ω @ +25°C

| Parameter                   |               | Min. | Typ. | Max. | Units |
|-----------------------------|---------------|------|------|------|-------|
| Frequency                   |               | 450  |      | 5200 | MHz   |
| Isolation                   | 450 -5200 MHz |      | 30   |      | dB    |
| Insertion Loss Above 9.0 dB | 450 -5200 MHz |      | 1.10 |      | dB    |
| Phase Unbalance             | 450 -5200 MHz |      | 3.45 |      | deg.  |
| Amplitude Unbalance         | 450 -5200 MHz |      | 0.15 |      | dB    |
| VSWR                        | SUM Port      |      | 1.22 |      | (:1)  |
|                             | OUT Ports     |      | 1.13 |      | (:1)  |

### MAXIMUM RATINGS

|                       |                |
|-----------------------|----------------|
| Operating Temperature | -55°C to 100°C |
| Storage Temperature   | -55°C to 100°C |

### COAXIAL CONNECTIONS

|          |   |
|----------|---|
| SUM PORT | 5 |
| PORT 1   | 1 |
| PORT 2   | 2 |
| PORT 3   | 3 |
| PORT 4   | 4 |
| PORT 5   | 6 |
| PORT 6   | 7 |
| PORT 7   | 8 |
| PORT 8   | 9 |

### electrical schematic



P.O. Box 350188, Brooklyn, New York 11235-0000 (718) 934-4500 Fax (718) 332-4851 For detailed performance specs & shopping online see Mini-Circuits web site



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IF/RF MICROWAVE COMPONENTS



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# 8 Way-0° Power Splitter/Combiner

ZFSC-ED13413/1

## Typical Performance Data

| FREQ.<br>(MHz) | TOTAL LOSS <sup>1</sup> |       |       |       |       |       | AMP.<br>UNBAL.<br>(dB) | ISOLATION |       |       |       | PHASE<br>UNBAL.<br>(deg.) | FREQ.<br>(MHz) | VSWR |      |      |
|----------------|-------------------------|-------|-------|-------|-------|-------|------------------------|-----------|-------|-------|-------|---------------------------|----------------|------|------|------|
|                | S-1                     | S-2   | S-3   | S-4   | S-6   | S-8   |                        | 1-2       | 1-8   | 3-4   | 6-8   |                           |                | S    | 1    | 8    |
| 450.0          | 9.36                    | 9.30  | 9.30  | 9.28  | 9.29  | 9.35  | 0.10                   | 18.16     | 30.87 | 18.40 | 19.75 | 0.79                      | 450.0          | 1.19 | 1.06 | 1.07 |
| 475.0          | 9.35                    | 9.30  | 9.30  | 9.28  | 9.31  | 9.35  | 0.10                   | 20.40     | 32.20 | 20.63 | 20.49 | 0.74                      | 475.0          | 1.16 | 1.06 | 1.06 |
| 500.0          | 9.37                    | 9.32  | 9.31  | 9.31  | 9.33  | 9.36  | 0.10                   | 23.03     | 33.74 | 23.18 | 21.23 | 0.76                      | 500.0          | 1.19 | 1.06 | 1.05 |
| 550.0          | 9.42                    | 9.37  | 9.38  | 9.36  | 9.40  | 9.41  | 0.10                   | 29.40     | 37.65 | 29.05 | 22.85 | 0.75                      | 550.0          | 1.27 | 1.05 | 1.03 |
| 600.0          | 9.43                    | 9.39  | 9.41  | 9.39  | 9.41  | 9.41  | 0.10                   | 41.34     | 43.93 | 38.44 | 24.88 | 0.67                      | 600.0          | 1.24 | 1.05 | 1.03 |
| 650.0          | 9.45                    | 9.42  | 9.45  | 9.42  | 9.43  | 9.42  | 0.09                   | 34.47     | 60.01 | 36.65 | 27.69 | 0.70                      | 650.0          | 1.14 | 1.06 | 1.03 |
| 700.0          | 9.52                    | 9.49  | 9.53  | 9.53  | 9.53  | 9.49  | 0.11                   | 26.74     | 45.66 | 27.32 | 31.81 | 0.76                      | 700.0          | 1.14 | 1.08 | 1.04 |
| 750.0          | 9.62                    | 9.60  | 9.64  | 9.65  | 9.63  | 9.59  | 0.11                   | 23.58     | 40.59 | 23.98 | 36.24 | 0.79                      | 750.0          | 1.28 | 1.08 | 1.07 |
| 800.0          | 9.65                    | 9.62  | 9.65  | 9.65  | 9.65  | 9.62  | 0.10                   | 22.70     | 38.34 | 23.08 | 34.35 | 0.91                      | 800.0          | 1.34 | 1.08 | 1.08 |
| 850.0          | 9.58                    | 9.55  | 9.58  | 9.58  | 9.58  | 9.56  | 0.10                   | 23.15     | 36.98 | 23.55 | 30.97 | 1.10                      | 850.0          | 1.28 | 1.07 | 1.09 |
| 900.0          | 9.50                    | 9.47  | 9.51  | 9.51  | 9.50  | 9.49  | 0.11                   | 23.75     | 36.42 | 23.81 | 29.05 | 0.99                      | 900.0          | 1.10 | 1.07 | 1.09 |
| 950.0          | 9.47                    | 9.44  | 9.50  | 9.50  | 9.50  | 9.47  | 0.12                   | 23.38     | 36.51 | 22.90 | 28.23 | 1.14                      | 950.0          | 1.09 | 1.08 | 1.11 |
| 1000.0         | 9.55                    | 9.52  | 9.57  | 9.57  | 9.55  | 9.53  | 0.10                   | 22.73     | 37.01 | 22.07 | 28.00 | 1.06                      | 1000.0         | 1.25 | 1.11 | 1.14 |
| 1100.0         | 9.61                    | 9.56  | 9.61  | 9.61  | 9.60  | 9.56  | 0.11                   | 24.36     | 39.58 | 23.68 | 27.33 | 1.16                      | 1100.0         | 1.26 | 1.13 | 1.17 |
| 1200.0         | 9.63                    | 9.60  | 9.60  | 9.58  | 9.62  | 9.60  | 0.09                   | 28.43     | 45.00 | 28.98 | 25.66 | 1.44                      | 1200.0         | 1.13 | 1.11 | 1.11 |
| 1300.0         | 9.71                    | 9.69  | 9.64  | 9.62  | 9.66  | 9.68  | 0.11                   | 25.20     | 50.86 | 27.23 | 25.08 | 1.57                      | 1300.0         | 1.22 | 1.10 | 1.06 |
| 1400.0         | 9.79                    | 9.76  | 9.72  | 9.70  | 9.73  | 9.75  | 0.09                   | 21.30     | 42.93 | 22.75 | 26.96 | 1.72                      | 1400.0         | 1.38 | 1.15 | 1.12 |
| 1500.0         | 9.82                    | 9.82  | 9.79  | 9.78  | 9.80  | 9.83  | 0.08                   | 21.44     | 39.23 | 23.34 | 32.58 | 1.85                      | 1500.0         | 1.46 | 1.17 | 1.18 |
| 1600.0         | 9.71                    | 9.70  | 9.70  | 9.69  | 9.70  | 9.71  | 0.07                   | 28.13     | 38.05 | 33.35 | 36.25 | 2.07                      | 1600.0         | 1.05 | 1.07 | 1.10 |
| 1700.0         | 9.87                    | 9.85  | 9.89  | 9.88  | 9.88  | 9.86  | 0.08                   | 38.82     | 38.98 | 29.79 | 32.21 | 2.01                      | 1700.0         | 1.41 | 1.07 | 1.13 |
| 1800.0         | 9.84                    | 9.83  | 9.88  | 9.89  | 9.88  | 9.84  | 0.10                   | 33.71     | 41.51 | 28.54 | 33.00 | 2.14                      | 1800.0         | 1.39 | 1.09 | 1.16 |
| 1900.0         | 9.75                    | 9.74  | 9.80  | 9.78  | 9.77  | 9.74  | 0.08                   | 29.47     | 45.05 | 29.34 | 41.25 | 2.35                      | 1900.0         | 1.06 | 1.06 | 1.12 |
| 2000.0         | 9.82                    | 9.79  | 9.85  | 9.86  | 9.86  | 9.80  | 0.10                   | 28.63     | 44.31 | 27.57 | 39.00 | 2.41                      | 2000.0         | 1.12 | 1.11 | 1.16 |
| 2100.0         | 9.87                    | 9.87  | 9.93  | 9.94  | 9.94  | 9.86  | 0.12                   | 26.74     | 40.87 | 23.92 | 32.80 | 2.36                      | 2100.0         | 1.16 | 1.12 | 1.17 |
| 2200.0         | 10.02                   | 10.00 | 10.09 | 10.10 | 10.08 | 9.97  | 0.16                   | 26.32     | 39.08 | 23.26 | 32.31 | 2.47                      | 2200.0         | 1.36 | 1.15 | 1.20 |
| 2300.0         | 9.94                    | 9.94  | 10.02 | 10.03 | 10.00 | 9.89  | 0.15                   | 31.97     | 38.74 | 26.23 | 32.91 | 2.85                      | 2300.0         | 1.14 | 1.12 | 1.14 |
| 2400.0         | 10.02                   | 10.02 | 10.09 | 10.08 | 10.08 | 10.01 | 0.11                   | 30.82     | 40.05 | 28.18 | 31.66 | 3.19                      | 2400.0         | 1.36 | 1.10 | 1.15 |
| 2500.0         | 9.99                    | 10.00 | 10.04 | 10.03 | 10.06 | 10.05 | 0.12                   | 28.89     | 43.64 | 30.61 | 31.03 | 2.98                      | 2500.0         | 1.28 | 1.15 | 1.24 |
| 2600.0         | 9.99                    | 10.00 | 10.02 | 10.00 | 10.02 | 10.03 | 0.09                   | 29.33     | 53.66 | 33.25 | 32.54 | 2.83                      | 2600.0         | 1.14 | 1.20 | 1.27 |
| 2700.0         | 10.02                   | 10.01 | 10.02 | 10.01 | 10.01 | 10.02 | 0.07                   | 30.69     | 48.98 | 28.39 | 35.43 | 3.32                      | 2700.0         | 1.14 | 1.18 | 1.19 |
| 2800.0         | 10.05                   | 10.05 | 10.08 | 10.07 | 10.08 | 10.06 | 0.06                   | 25.21     | 42.14 | 22.62 | 35.69 | 3.50                      | 2800.0         | 1.24 | 1.05 | 1.06 |
| 2900.0         | 10.11                   | 10.10 | 10.18 | 10.18 | 10.17 | 10.10 | 0.09                   | 22.24     | 39.74 | 20.81 | 35.53 | 3.29                      | 2900.0         | 1.35 | 1.10 | 1.15 |
| 3000.0         | 10.14                   | 10.13 | 10.19 | 10.17 | 10.15 | 10.11 | 0.09                   | 21.85     | 39.44 | 21.46 | 36.58 | 3.63                      | 3000.0         | 1.27 | 1.19 | 1.22 |
| 3100.0         | 10.22                   | 10.22 | 10.23 | 10.20 | 10.21 | 10.22 | 0.04                   | 23.23     | 40.79 | 24.33 | 35.13 | 4.04                      | 3100.0         | 1.39 | 1.21 | 1.24 |
| 3200.0         | 10.13                   | 10.12 | 10.06 | 10.07 | 10.09 | 10.17 | 0.15                   | 26.23     | 44.17 | 30.33 | 33.60 | 4.17                      | 3200.0         | 1.11 | 1.18 | 1.22 |
| 3300.0         | 10.17                   | 10.17 | 10.10 | 10.11 | 10.12 | 10.20 | 0.14                   | 27.36     | 47.27 | 32.66 | 35.38 | 3.86                      | 3300.0         | 1.20 | 1.17 | 1.19 |
| 3400.0         | 10.16                   | 10.16 | 10.11 | 10.14 | 10.13 | 10.18 | 0.11                   | 26.36     | 42.81 | 29.73 | 38.50 | 4.02                      | 3400.0         | 1.12 | 1.09 | 1.06 |
| 3500.0         | 10.24                   | 10.24 | 10.22 | 10.22 | 10.26 | 10.27 | 0.09                   | 23.63     | 39.13 | 25.46 | 33.26 | 4.14                      | 3500.0         | 1.32 | 1.06 | 1.13 |
| 3600.0         | 10.24                   | 10.24 | 10.20 | 10.21 | 10.25 | 10.26 | 0.09                   | 22.77     | 37.31 | 25.12 | 30.16 | 4.00                      | 3600.0         | 1.26 | 1.16 | 1.22 |
| 3700.0         | 10.27                   | 10.27 | 10.19 | 10.19 | 10.20 | 10.25 | 0.09                   | 22.52     | 36.94 | 26.01 | 30.31 | 4.32                      | 3700.0         | 1.15 | 1.21 | 1.23 |
| 3800.0         | 10.41                   | 10.41 | 10.29 | 10.32 | 10.35 | 10.40 | 0.14                   | 24.41     | 38.02 | 30.62 | 33.94 | 4.76                      | 3800.0         | 1.37 | 1.22 | 1.21 |
| 3900.0         | 10.27                   | 10.28 | 10.24 | 10.26 | 10.31 | 10.31 | 0.10                   | 33.54     | 40.93 | 37.39 | 38.65 | 4.95                      | 3900.0         | 1.09 | 1.11 | 1.09 |
| 4000.0         | 10.33                   | 10.33 | 10.36 | 10.40 | 10.42 | 10.35 | 0.09                   | 35.73     | 48.34 | 29.12 | 34.85 | 4.92                      | 4000.0         | 1.27 | 1.05 | 1.12 |
| 4100.0         | 10.31                   | 10.32 | 10.40 | 10.39 | 10.44 | 10.36 | 0.14                   | 35.91     | 53.78 | 34.77 | 32.39 | 5.01                      | 4100.0         | 1.21 | 1.08 | 1.14 |
| 4200.0         | 10.31                   | 10.33 | 10.39 | 10.38 | 10.43 | 10.36 | 0.12                   | 28.27     | 44.08 | 33.44 | 31.70 | 5.09                      | 4200.0         | 1.04 | 1.10 | 1.16 |
| 4300.0         | 10.36                   | 10.38 | 10.44 | 10.42 | 10.47 | 10.42 | 0.11                   | 25.63     | 40.65 | 26.18 | 31.83 | 5.13                      | 4300.0         | 1.11 | 1.16 | 1.21 |
| 4400.0         | 10.41                   | 10.42 | 10.48 | 10.49 | 10.57 | 10.46 | 0.16                   | 28.57     | 39.90 | 26.43 | 33.40 | 5.35                      | 4400.0         | 1.21 | 1.21 | 1.21 |
| 4500.0         | 10.42                   | 10.41 | 10.55 | 10.56 | 10.60 | 10.43 | 0.20                   | 35.12     | 40.48 | 26.59 | 37.44 | 5.58                      | 4500.0         | 1.13 | 1.15 | 1.10 |
| 4600.0         | 10.46                   | 10.45 | 10.64 | 10.63 | 10.69 | 10.50 | 0.24                   | 21.84     | 40.71 | 21.15 | 33.24 | 5.89                      | 4600.0         | 1.21 | 1.01 | 1.08 |
| 4650.0         | 10.53                   | 10.51 | 10.70 | 10.70 | 10.76 | 10.59 | 0.25                   | 20.48     | 40.74 | 20.46 | 30.00 | 5.93                      | 4650.0         | 1.33 | 1.07 | 1.15 |
| 4700.0         | 10.56                   | 10.54 | 10.72 | 10.73 | 10.76 | 10.63 | 0.22                   | 20.89     | 39.69 | 21.42 | 27.67 | 5.94                      | 4700.0         | 1.35 | 1.11 | 1.18 |
| 4750.0         | 10.53                   | 10.51 | 10.67 | 10.72 | 10.71 | 10.63 | 0.21                   | 22.79     | 38.00 | 24.39 | 26.10 | 5.88                      | 4750.0         | 1.28 | 1.12 | 1.17 |
| 4800.0         | 10.52                   | 10.51 | 10.62 | 10.69 | 10.67 | 10.62 | 0.19                   | 24.87     | 36.87 | 31.48 | 25.15 | 5.76                      | 4800.0         | 1.18 | 1.11 | 1.14 |
| 4850.0         | 10.54                   | 10.53 | 10.64 | 10.69 | 10.70 | 10.64 | 0.16                   | 24.94     | 35.57 | 38.22 | 24.73 | 5.78                      | 4850.0         | 1.20 | 1.08 | 1.10 |
| 4900.0         | 10.55                   | 10.54 | 10.65 | 10.69 | 10.74 | 10.66 | 0.20                   | 24.20     | 34.87 | 28.40 | 24.74 | 5.66                      | 4900.0         | 1.18 | 1.09 | 1.10 |
| 4950.0         | 10.54                   | 10.55 | 10.67 | 10.69 | 10.80 | 10.64 | 0.26                   | 24.32     | 34.34 | 24.98 | 25.02 | 6.04                      | 4950.0         | 1.14 | 1.10 | 1.09 |
| 5000.0         | 10.53                   | 10.54 | 10.67 | 10.70 | 10.83 | 10.60 | 0.30                   | 26.11     | 34.12 | 23.36 | 25.39 | 6.47                      | 5000.0         | 1.06 | 1.13 | 1.09 |
| 5050.0         | 10.54                   | 10.54 | 10.72 | 10.77 | 10.89 | 10.60 | 0.35                   | 30.14     | 34.23 | 22.60 | 25.72 | 6.56                      | 5050.0         | 1.15 | 1.14 | 1.07 |
| 5100.0         | 10.57                   | 10.57 | 10.78 | 10.82 | 10.92 | 10.61 | 0.35                   | 34.15     | 34.92 | 22.26 | 26.00 | 6.18                      | 5100.0         | 1.22 | 1.15 | 1.08 |
| 5150.0         | 10.58                   | 10.58 | 10.77 | 10.84 | 10.91 | 10.60 | 0.33                   | 26.04     | 36.13 | 21.53 | 26.51 | 5.96                      | 5150.0         | 1.18 | 1.14 | 1.06 |
| 5200.0         | 10.62                   | 10.62 | 10.76 | 10.84 | 10.90 | 10.63 | 0.28                   | 20.06     | 38.57 | 19.78 | 27.67 | 6.04                      | 5200.0         | 1.13 | 1.10 | 1.07 |

<sup>1</sup>Total Loss = Insertion Loss + 9dB Splitter Loss



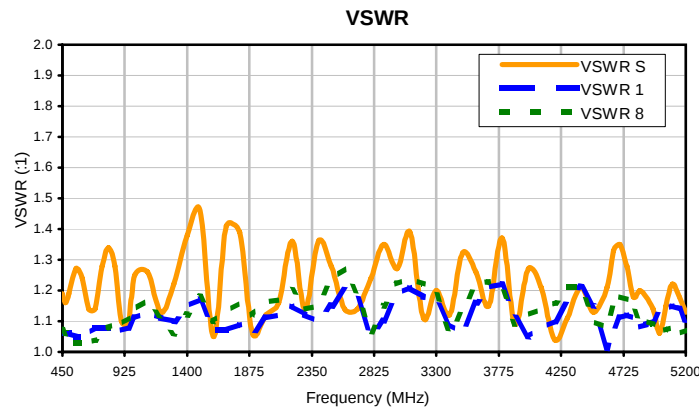
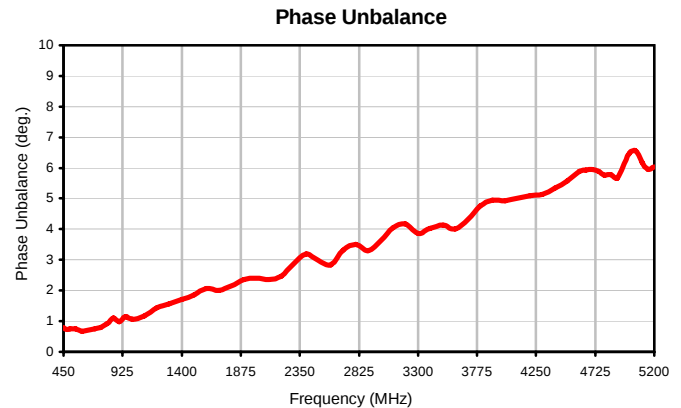
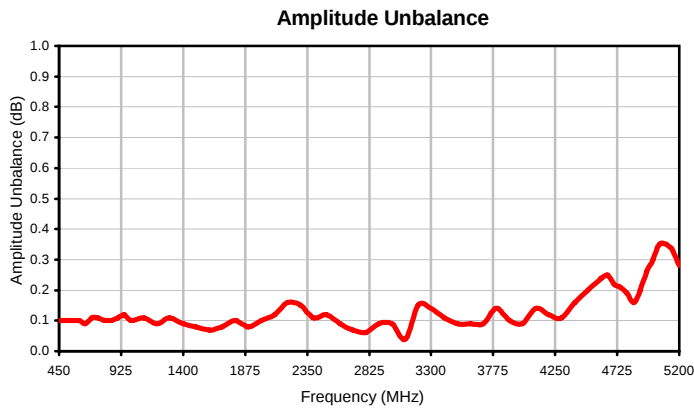
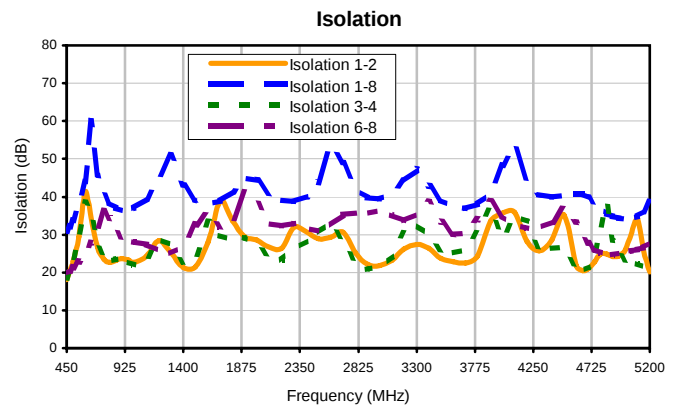
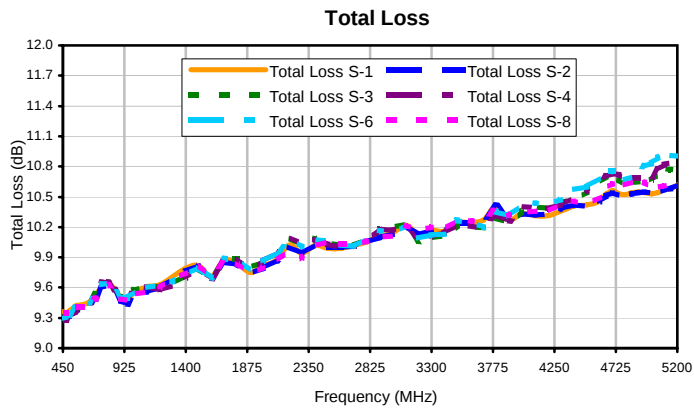
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IF/RF MICROWAVE COMPONENTS

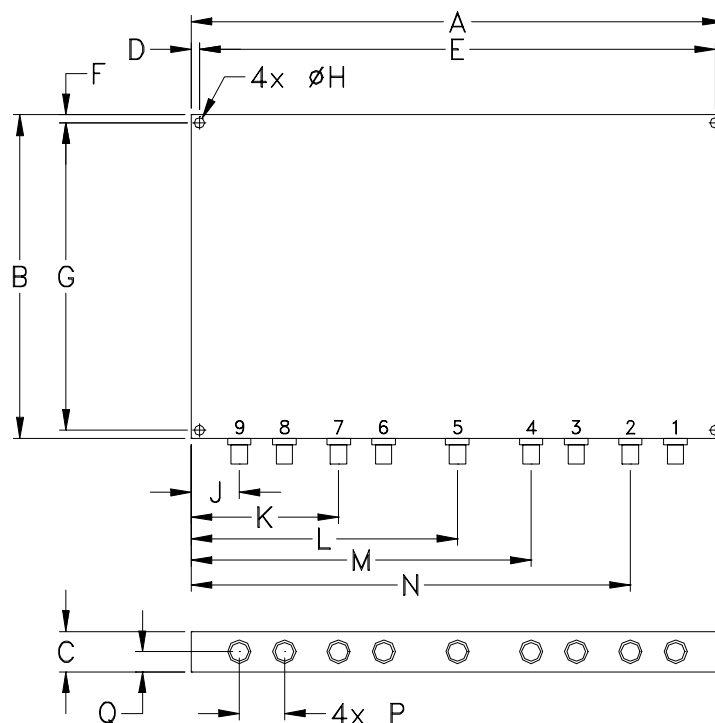


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## Typical Performance Curves



### Outline Dimensions



| CASE #. | A                | B                | C              | D             | E                 | F             | G                 | H              | J              | K               | L                | M                | N                |
|---------|------------------|------------------|----------------|---------------|-------------------|---------------|-------------------|----------------|----------------|-----------------|------------------|------------------|------------------|
| JN1359  | 8.25<br>(209.55) | 5.00<br>(127.00) | .63<br>(16.00) | .13<br>(3.30) | 8.000<br>(203.20) | .13<br>(3.30) | 4.750<br>(120.65) | .156<br>(3.96) | .74<br>(18.80) | 2.28<br>(57.91) | 4.13<br>(104.90) | 5.27<br>(133.86) | 6.81<br>(172.97) |

| CASE #. | P              | Q             | WT, GRAM |
|---------|----------------|---------------|----------|
| JN1359  | .70<br>(17.78) | .31<br>(7.87) | 720      |

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

#### Notes:

- Case material: Aluminum alloy.
- Case finish:  
For RoHS Case Styles: Clear chemical conversion coating, non-chrome or trivalent chrome based.



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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      | -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 |