

# Surface Mount Power Splitter/Combiner

## SBA-2-20+ SBA-2-20

2 Way-0° 50Ω 1800 to 2200 MHz



Generic photo used for illustration purposes only

CASE STYLE: SM2

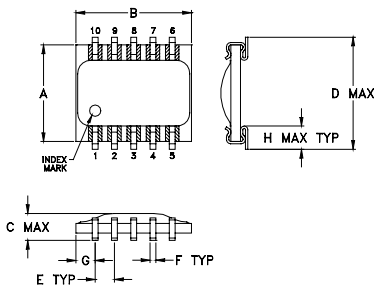
### Maximum Ratings

|                             |                |
|-----------------------------|----------------|
| Operating Temperature       | -40°C to 85°C  |
| Storage Temperature         | -55°C to 100°C |
| Power Input (as a splitter) | 2W max.        |
| Internal Dissipation        | 0.125W max.    |

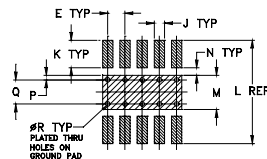
### Pin Connections

|          |               |
|----------|---------------|
| SUM PORT | 3             |
| PORT 1   | 10            |
| PORT 2   | 6             |
| GROUND   | 1,2,4,5,7,8,9 |

### Outline Drawing



### PCB Land Pattern

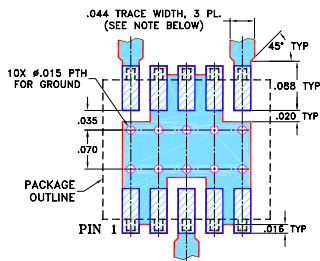


Suggested Layout,  
Tolerance to be within ±0.02  
ADJACENT GROUND PINS SHALL BE CONNECTED  
TO EACH OTHER AND TO GROUND PAD

### Outline Dimensions (inch/mm)

|      |      |      |      |      |      |      |      |       |  |
|------|------|------|------|------|------|------|------|-------|--|
| A    | B    | C    | D    | E    | F    | G    | H    |       |  |
| .250 | .300 | .095 | .290 | .050 | .015 | .050 | .060 |       |  |
| 6.35 | 7.62 | 2.41 | 7.37 | 1.27 | 0.38 | 1.27 | 1.52 |       |  |
| J    | K    | L    | M    | N    | P    | Q    | R    | wt    |  |
| .030 | .080 | .300 | .100 | .020 | .015 | .070 | .014 | grams |  |
| 0.76 | 2.03 | 7.62 | 2.54 | 0.51 | 0.38 | 1.78 | 0.36 | 0.3   |  |

### Demo Board MCL P/N: TB-95 Suggested PCB Layout (PL-070)



NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020" ± .0015"; COPPER 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.  
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.  
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)  
DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

### 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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### Features

- low profile, 0.07" height
- low insertion loss, 0.5 dB typ.
- excellent amplitude unbalance, 0.2 dB typ.
- solder plated leads for excellent solderability and strain relief
- aqueous washable
- protected by U.S Patent, 5,534,830

### Applications

- PCS

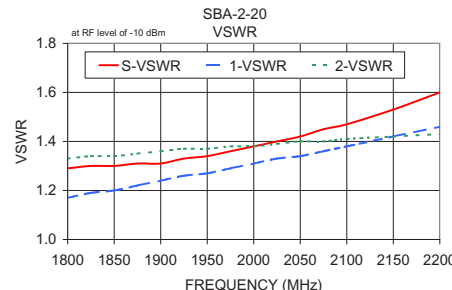
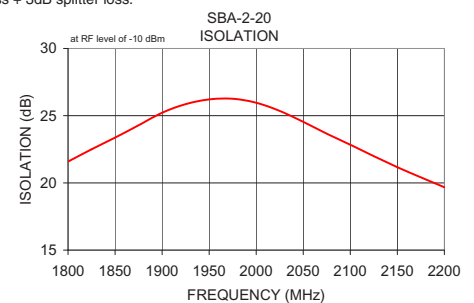
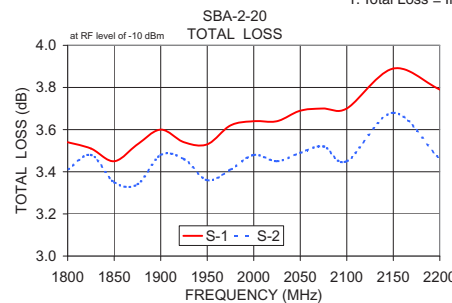
### Electrical Specifications

| FREQ. RANGE (MHz) | ISOLATION (dB) |      | INSERTION LOSS (dB) ABOVE 3.0 dB |      | PHASE UNBALANCE (Degrees) | AMPLITUDE UNBALANCE (dB) |
|-------------------|----------------|------|----------------------------------|------|---------------------------|--------------------------|
|                   | Typ.           | Min. | Typ.                             | Max. | Max.                      | Max.                     |
| $f_c - f_u$       |                |      |                                  |      |                           |                          |
| 1800-2200         | 22             | 13   | 0.5                              | 1.1  | 7.0                       | 0.7                      |

### Typical Performance Data

| Frequency (MHz) | Total Loss <sup>1</sup> (dB) |      | Amplitude Unbalance (dB) | Isolation (dB) | Phase Unbalance (deg.) | VSWR S | VSWR 1 | VSWR 2 |
|-----------------|------------------------------|------|--------------------------|----------------|------------------------|--------|--------|--------|
|                 | S-1                          | S-2  |                          |                |                        |        |        |        |
| 1800            | 3.54                         | 3.41 | 0.13                     | 21.59          | 5.50                   | 1.29   | 1.17   | 1.33   |
| 1825            | 3.51                         | 3.48 | 0.03                     | 22.50          | 5.17                   | 1.30   | 1.19   | 1.34   |
| 1850            | 3.45                         | 3.35 | 0.10                     | 23.37          | 4.49                   | 1.30   | 1.20   | 1.34   |
| 1875            | 3.53                         | 3.34 | 0.19                     | 24.29          | 4.93                   | 1.31   | 1.22   | 1.35   |
| 1900            | 3.60                         | 3.48 | 0.12                     | 25.22          | 5.42                   | 1.31   | 1.24   | 1.36   |
| 1925            | 3.54                         | 3.46 | 0.08                     | 25.86          | 4.91                   | 1.33   | 1.26   | 1.37   |
| 1950            | 3.53                         | 3.36 | 0.17                     | 26.21          | 4.69                   | 1.34   | 1.27   | 1.37   |
| 1975            | 3.62                         | 3.41 | 0.20                     | 26.26          | 5.10                   | 1.36   | 1.29   | 1.38   |
| 2000            | 3.64                         | 3.48 | 0.16                     | 25.96          | 5.21                   | 1.38   | 1.31   | 1.38   |
| 2025            | 3.64                         | 3.45 | 0.18                     | 25.35          | 5.04                   | 1.40   | 1.33   | 1.39   |
| 2050            | 3.69                         | 3.49 | 0.20                     | 24.54          | 5.25                   | 1.42   | 1.34   | 1.40   |
| 2075            | 3.70                         | 3.52 | 0.18                     | 23.66          | 5.15                   | 1.45   | 1.36   | 1.40   |
| 2100            | 3.70                         | 3.45 | 0.25                     | 22.84          | 4.94                   | 1.47   | 1.38   | 1.41   |
| 2150            | 3.89                         | 3.68 | 0.21                     | 21.17          | 6.05                   | 1.53   | 1.42   | 1.42   |
| 2200            | 3.79                         | 3.46 | 0.33                     | 19.68          | 4.90                   | 1.60   | 1.46   | 1.43   |

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



### electrical schematic



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REV. F  
M151107  
SBA-2-20  
RD/TD/CP  
200819

# 2 Way-0° Power Splitter/Combiner

# SBA-2-20+

## Typical Performance Data

TEST CONDITIONS: INPUT POWER = 0dBm @Temperature = +25°C

| FREQ.<br>(MHz) | TOTAL LOSS <sup>1</sup><br>(dB) |      | AMP.<br>UNBAL.<br>(dB) | PHASE<br>UNBAL.<br>(deg.) | ISOLATION<br>(dB) | VSWR<br>(:1) |      |      |
|----------------|---------------------------------|------|------------------------|---------------------------|-------------------|--------------|------|------|
|                | S-1                             | S-2  |                        |                           |                   | S            | 1    | 2    |
| 1000           | 3.60                            | 3.49 | 0.11                   | 0.63                      | 7.75              | 1.66         | 1.48 | 1.44 |
| 1100           | 3.58                            | 3.48 | 0.10                   | 0.76                      | 8.52              | 1.61         | 1.44 | 1.40 |
| 1200           | 3.55                            | 3.46 | 0.09                   | 0.86                      | 9.36              | 1.56         | 1.40 | 1.38 |
| 1300           | 3.52                            | 3.44 | 0.08                   | 0.90                      | 10.27             | 1.51         | 1.37 | 1.35 |
| 1400           | 3.50                            | 3.43 | 0.07                   | 1.01                      | 11.26             | 1.46         | 1.34 | 1.33 |
| 1500           | 3.49                            | 3.42 | 0.07                   | 1.05                      | 12.34             | 1.41         | 1.32 | 1.32 |
| 1600           | 3.47                            | 3.41 | 0.06                   | 1.09                      | 13.53             | 1.36         | 1.31 | 1.31 |
| 1700           | 3.47                            | 3.41 | 0.06                   | 1.14                      | 14.83             | 1.33         | 1.30 | 1.30 |
| 1725           | 3.46                            | 3.40 | 0.06                   | 1.17                      | 15.18             | 1.32         | 1.30 | 1.30 |
| 1750           | 3.47                            | 3.41 | 0.06                   | 1.18                      | 15.52             | 1.31         | 1.29 | 1.30 |
| 1775           | 3.46                            | 3.41 | 0.05                   | 1.19                      | 15.88             | 1.31         | 1.29 | 1.29 |
| 1800           | 3.47                            | 3.42 | 0.05                   | 1.21                      | 16.23             | 1.30         | 1.29 | 1.29 |
| 1825           | 3.48                            | 3.42 | 0.06                   | 1.22                      | 16.61             | 1.30         | 1.29 | 1.29 |
| 1850           | 3.48                            | 3.42 | 0.06                   | 1.23                      | 16.99             | 1.30         | 1.29 | 1.29 |
| 1875           | 3.48                            | 3.43 | 0.05                   | 1.22                      | 17.35             | 1.30         | 1.28 | 1.29 |
| 1900           | 3.48                            | 3.43 | 0.05                   | 1.23                      | 17.72             | 1.30         | 1.28 | 1.28 |
| 1925           | 3.48                            | 3.43 | 0.05                   | 1.27                      | 18.10             | 1.30         | 1.28 | 1.28 |
| 1950           | 3.49                            | 3.44 | 0.05                   | 1.28                      | 18.48             | 1.30         | 1.28 | 1.28 |
| 1975           | 3.50                            | 3.44 | 0.06                   | 1.28                      | 18.84             | 1.31         | 1.28 | 1.28 |
| 2000           | 3.50                            | 3.44 | 0.06                   | 1.31                      | 19.21             | 1.31         | 1.28 | 1.28 |
| 2025           | 3.50                            | 3.45 | 0.05                   | 1.32                      | 19.54             | 1.32         | 1.28 | 1.28 |
| 2050           | 3.51                            | 3.46 | 0.05                   | 1.35                      | 19.85             | 1.32         | 1.28 | 1.27 |
| 2075           | 3.51                            | 3.47 | 0.04                   | 1.37                      | 20.12             | 1.33         | 1.28 | 1.27 |
| 2100           | 3.53                            | 3.47 | 0.06                   | 1.42                      | 20.38             | 1.34         | 1.27 | 1.27 |
| 2125           | 3.53                            | 3.48 | 0.05                   | 1.43                      | 20.58             | 1.35         | 1.27 | 1.27 |
| 2150           | 3.54                            | 3.49 | 0.05                   | 1.45                      | 20.73             | 1.36         | 1.27 | 1.26 |
| 2175           | 3.55                            | 3.50 | 0.05                   | 1.48                      | 20.84             | 1.37         | 1.27 | 1.26 |
| 2200           | 3.56                            | 3.51 | 0.05                   | 1.50                      | 20.88             | 1.38         | 1.27 | 1.26 |
| 2225           | 3.56                            | 3.52 | 0.05                   | 1.51                      | 20.85             | 1.39         | 1.27 | 1.26 |
| 2250           | 3.58                            | 3.53 | 0.05                   | 1.53                      | 20.78             | 1.40         | 1.27 | 1.25 |
| 2275           | 3.59                            | 3.54 | 0.05                   | 1.60                      | 20.65             | 1.42         | 1.27 | 1.25 |
| 2300           | 3.59                            | 3.55 | 0.04                   | 1.60                      | 20.50             | 1.43         | 1.26 | 1.25 |
| 2400           | 3.64                            | 3.60 | 0.04                   | 1.69                      | 19.47             | 1.49         | 1.26 | 1.23 |
| 2500           | 3.69                            | 3.65 | 0.04                   | 1.85                      | 18.18             | 1.54         | 1.25 | 1.21 |
| 2600           | 3.74                            | 3.71 | 0.03                   | 1.97                      | 16.82             | 1.61         | 1.24 | 1.19 |
| 2700           | 3.80                            | 3.78 | 0.02                   | 2.05                      | 15.51             | 1.68         | 1.23 | 1.17 |
| 2800           | 3.87                            | 3.85 | 0.02                   | 2.19                      | 14.27             | 1.76         | 1.21 | 1.14 |
| 2900           | 3.94                            | 3.94 | 0.00                   | 2.37                      | 13.14             | 1.84         | 1.20 | 1.12 |
| 3000           | 4.04                            | 4.06 | 0.02                   | 2.44                      | 12.10             | 1.94         | 1.19 | 1.12 |
| 3100           | 4.14                            | 4.18 | 0.04                   | 2.53                      | 11.14             | 2.06         | 1.19 | 1.13 |
| 3200           | 4.29                            | 4.35 | 0.06                   | 2.62                      | 10.26             | 2.20         | 1.21 | 1.18 |
| 3300           | 4.49                            | 4.56 | 0.07                   | 2.67                      | 9.46              | 2.40         | 1.26 | 1.25 |
| 3400           | 4.75                            | 4.84 | 0.09                   | 2.71                      | 8.75              | 2.66         | 1.34 | 1.36 |
| 3500           | 5.08                            | 5.19 | 0.11                   | 2.75                      | 8.17              | 3.01         | 1.46 | 1.51 |
| 3600           | 5.53                            | 5.67 | 0.14                   | 2.80                      | 7.71              | 3.49         | 1.62 | 1.70 |

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



# 2 Way-0° Power Splitter/Combiner

# SBA-2-20+

## Typical Performance Data

TEST CONDITIONS: INPUT POWER = 0dBm @Temperature = -40°C

| FREQ.<br>(MHz) | TOTAL LOSS <sup>1</sup><br>(dB) |      | AMP.<br>UNBAL.<br>(dB) | PHASE<br>UNBAL.<br>(deg.) | ISOLATION<br>(dB) | VSWR<br>(:1) |      |      |
|----------------|---------------------------------|------|------------------------|---------------------------|-------------------|--------------|------|------|
|                | S-1                             | S-2  |                        |                           |                   | S            | 1    | 2    |
| 1000           | 3.46                            | 3.35 | 0.11                   | 1.06                      | 7.57              | 1.69         | 1.50 | 1.46 |
| 1100           | 3.43                            | 3.32 | 0.11                   | 1.09                      | 8.29              | 1.64         | 1.45 | 1.41 |
| 1200           | 3.39                            | 3.28 | 0.11                   | 1.28                      | 9.11              | 1.59         | 1.41 | 1.37 |
| 1300           | 3.36                            | 3.25 | 0.11                   | 1.41                      | 10.02             | 1.53         | 1.37 | 1.33 |
| 1400           | 3.33                            | 3.23 | 0.10                   | 1.68                      | 10.99             | 1.48         | 1.33 | 1.31 |
| 1500           | 3.31                            | 3.21 | 0.10                   | 1.74                      | 12.07             | 1.43         | 1.31 | 1.30 |
| 1600           | 3.28                            | 3.19 | 0.09                   | 1.80                      | 13.34             | 1.37         | 1.30 | 1.29 |
| 1700           | 3.26                            | 3.17 | 0.09                   | 1.91                      | 14.73             | 1.33         | 1.29 | 1.29 |
| 1725           | 3.26                            | 3.18 | 0.08                   | 1.93                      | 15.08             | 1.33         | 1.29 | 1.30 |
| 1750           | 3.26                            | 3.18 | 0.08                   | 1.93                      | 15.46             | 1.32         | 1.29 | 1.30 |
| 1775           | 3.26                            | 3.18 | 0.08                   | 1.94                      | 15.83             | 1.32         | 1.30 | 1.30 |
| 1800           | 3.26                            | 3.18 | 0.08                   | 1.97                      | 16.22             | 1.32         | 1.30 | 1.30 |
| 1825           | 3.26                            | 3.18 | 0.08                   | 2.00                      | 16.61             | 1.32         | 1.30 | 1.30 |
| 1850           | 3.26                            | 3.19 | 0.07                   | 2.04                      | 17.05             | 1.32         | 1.30 | 1.31 |
| 1875           | 3.27                            | 3.19 | 0.08                   | 2.05                      | 17.43             | 1.33         | 1.31 | 1.31 |
| 1900           | 3.27                            | 3.19 | 0.08                   | 2.06                      | 17.75             | 1.33         | 1.30 | 1.31 |
| 1925           | 3.27                            | 3.20 | 0.07                   | 2.08                      | 18.10             | 1.34         | 1.30 | 1.31 |
| 1950           | 3.27                            | 3.21 | 0.07                   | 2.09                      | 18.54             | 1.34         | 1.30 | 1.32 |
| 1975           | 3.29                            | 3.22 | 0.07                   | 2.09                      | 18.91             | 1.35         | 1.32 | 1.32 |
| 2000           | 3.30                            | 3.22 | 0.08                   | 2.16                      | 19.19             | 1.37         | 1.32 | 1.33 |
| 2025           | 3.30                            | 3.23 | 0.07                   | 2.16                      | 19.36             | 1.38         | 1.32 | 1.33 |
| 2050           | 3.31                            | 3.24 | 0.07                   | 2.21                      | 19.64             | 1.39         | 1.32 | 1.33 |
| 2075           | 3.31                            | 3.24 | 0.07                   | 2.25                      | 19.89             | 1.40         | 1.32 | 1.33 |
| 2100           | 3.32                            | 3.25 | 0.07                   | 2.24                      | 20.10             | 1.41         | 1.32 | 1.33 |
| 2125           | 3.32                            | 3.25 | 0.07                   | 2.29                      | 20.19             | 1.43         | 1.32 | 1.32 |
| 2150           | 3.33                            | 3.27 | 0.06                   | 2.32                      | 20.24             | 1.44         | 1.32 | 1.33 |
| 2175           | 3.35                            | 3.28 | 0.07                   | 2.33                      | 20.24             | 1.46         | 1.32 | 1.32 |
| 2200           | 3.35                            | 3.29 | 0.06                   | 2.36                      | 20.26             | 1.47         | 1.33 | 1.32 |
| 2225           | 3.36                            | 3.29 | 0.07                   | 2.41                      | 20.14             | 1.49         | 1.33 | 1.32 |
| 2250           | 3.38                            | 3.31 | 0.07                   | 2.46                      | 19.98             | 1.50         | 1.33 | 1.32 |
| 2275           | 3.38                            | 3.33 | 0.05                   | 2.51                      | 19.76             | 1.52         | 1.33 | 1.31 |
| 2300           | 3.39                            | 3.32 | 0.07                   | 2.50                      | 19.63             | 1.53         | 1.33 | 1.30 |
| 2400           | 3.43                            | 3.36 | 0.07                   | 2.59                      | 18.56             | 1.58         | 1.32 | 1.28 |
| 2500           | 3.44                            | 3.39 | 0.05                   | 2.81                      | 17.62             | 1.61         | 1.29 | 1.24 |
| 2600           | 3.45                            | 3.40 | 0.05                   | 3.03                      | 16.67             | 1.62         | 1.26 | 1.19 |
| 2700           | 3.46                            | 3.42 | 0.04                   | 3.15                      | 15.61             | 1.65         | 1.21 | 1.15 |
| 2800           | 3.48                            | 3.46 | 0.02                   | 3.34                      | 14.54             | 1.68         | 1.18 | 1.11 |
| 2900           | 3.52                            | 3.52 | 0.00                   | 3.49                      | 13.50             | 1.73         | 1.16 | 1.06 |
| 3000           | 3.58                            | 3.59 | 0.01                   | 3.61                      | 12.40             | 1.81         | 1.14 | 1.06 |
| 3100           | 3.67                            | 3.71 | 0.04                   | 3.64                      | 11.28             | 1.94         | 1.13 | 1.10 |
| 3200           | 3.84                            | 3.88 | 0.03                   | 3.74                      | 10.22             | 2.14         | 1.16 | 1.16 |
| 3300           | 4.06                            | 4.09 | 0.03                   | 3.73                      | 9.30              | 2.39         | 1.23 | 1.27 |
| 3400           | 4.40                            | 4.45 | 0.05                   | 3.82                      | 8.46              | 2.80         | 1.35 | 1.40 |
| 3500           | 4.83                            | 4.88 | 0.05                   | 3.91                      | 7.79              | 3.35         | 1.50 | 1.57 |
| 3600           | 5.37                            | 5.43 | 0.06                   | 4.21                      | 7.34              | 4.06         | 1.72 | 1.78 |

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



# 2 Way-0° Power Splitter/Combiner

# SBA-2-20+

## Typical Performance Data

TEST CONDITIONS: INPUT POWER = 0dBm @Temperature = +85°C

| FREQ.<br>(MHz) | TOTAL LOSS <sup>1</sup><br>(dB) |      | AMP.<br>UNBAL.<br>(dB) | PHASE<br>UNBAL.<br>(deg.) | ISOLATION<br>(dB) | VSWR<br>(:1) |      |      |
|----------------|---------------------------------|------|------------------------|---------------------------|-------------------|--------------|------|------|
|                | S-1                             | S-2  |                        |                           |                   | S            | 1    | 2    |
| 1000           | 3.67                            | 3.55 | 0.12                   | 0.82                      | 7.94              | 1.64         | 1.48 | 1.44 |
| 1100           | 3.65                            | 3.55 | 0.10                   | 0.99                      | 8.73              | 1.59         | 1.45 | 1.42 |
| 1200           | 3.63                            | 3.54 | 0.09                   | 1.04                      | 9.59              | 1.55         | 1.42 | 1.40 |
| 1300           | 3.61                            | 3.54 | 0.07                   | 1.04                      | 10.51             | 1.50         | 1.39 | 1.39 |
| 1400           | 3.60                            | 3.53 | 0.07                   | 1.15                      | 11.49             | 1.45         | 1.38 | 1.37 |
| 1500           | 3.59                            | 3.53 | 0.06                   | 1.19                      | 12.54             | 1.40         | 1.35 | 1.36 |
| 1600           | 3.59                            | 3.53 | 0.06                   | 1.21                      | 13.64             | 1.37         | 1.33 | 1.34 |
| 1700           | 3.58                            | 3.53 | 0.05                   | 1.24                      | 14.83             | 1.34         | 1.31 | 1.32 |
| 1725           | 3.59                            | 3.53 | 0.06                   | 1.25                      | 15.14             | 1.33         | 1.31 | 1.31 |
| 1750           | 3.59                            | 3.53 | 0.06                   | 1.25                      | 15.45             | 1.32         | 1.30 | 1.31 |
| 1775           | 3.59                            | 3.53 | 0.06                   | 1.27                      | 15.78             | 1.32         | 1.30 | 1.30 |
| 1800           | 3.59                            | 3.54 | 0.05                   | 1.29                      | 16.10             | 1.31         | 1.29 | 1.30 |
| 1825           | 3.60                            | 3.54 | 0.06                   | 1.28                      | 16.44             | 1.31         | 1.29 | 1.29 |
| 1850           | 3.60                            | 3.54 | 0.06                   | 1.32                      | 16.78             | 1.30         | 1.28 | 1.29 |
| 1875           | 3.61                            | 3.55 | 0.06                   | 1.32                      | 17.11             | 1.30         | 1.28 | 1.28 |
| 1900           | 3.60                            | 3.54 | 0.06                   | 1.31                      | 17.47             | 1.29         | 1.28 | 1.27 |
| 1925           | 3.61                            | 3.55 | 0.06                   | 1.32                      | 17.82             | 1.29         | 1.27 | 1.27 |
| 1950           | 3.61                            | 3.55 | 0.06                   | 1.37                      | 18.21             | 1.28         | 1.27 | 1.26 |
| 1975           | 3.61                            | 3.55 | 0.06                   | 1.34                      | 18.57             | 1.28         | 1.26 | 1.25 |
| 2000           | 3.62                            | 3.55 | 0.07                   | 1.44                      | 18.97             | 1.28         | 1.26 | 1.25 |
| 2025           | 3.62                            | 3.56 | 0.06                   | 1.39                      | 19.27             | 1.28         | 1.25 | 1.24 |
| 2050           | 3.63                            | 3.56 | 0.07                   | 1.47                      | 19.65             | 1.28         | 1.25 | 1.24 |
| 2075           | 3.63                            | 3.56 | 0.07                   | 1.48                      | 19.99             | 1.28         | 1.24 | 1.23 |
| 2100           | 3.64                            | 3.57 | 0.07                   | 1.52                      | 20.33             | 1.28         | 1.24 | 1.22 |
| 2125           | 3.64                            | 3.57 | 0.07                   | 1.54                      | 20.62             | 1.28         | 1.23 | 1.22 |
| 2150           | 3.64                            | 3.58 | 0.06                   | 1.59                      | 20.92             | 1.28         | 1.23 | 1.21 |
| 2175           | 3.66                            | 3.59 | 0.07                   | 1.60                      | 21.16             | 1.29         | 1.22 | 1.21 |
| 2200           | 3.66                            | 3.60 | 0.06                   | 1.64                      | 21.37             | 1.29         | 1.22 | 1.20 |
| 2225           | 3.66                            | 3.60 | 0.06                   | 1.67                      | 21.48             | 1.30         | 1.22 | 1.20 |
| 2250           | 3.68                            | 3.62 | 0.06                   | 1.71                      | 21.54             | 1.31         | 1.21 | 1.19 |
| 2275           | 3.69                            | 3.63 | 0.06                   | 1.76                      | 21.46             | 1.31         | 1.21 | 1.19 |
| 2300           | 3.69                            | 3.64 | 0.05                   | 1.78                      | 21.45             | 1.32         | 1.20 | 1.18 |
| 2400           | 3.73                            | 3.68 | 0.05                   | 1.84                      | 20.63             | 1.37         | 1.19 | 1.17 |
| 2500           | 3.79                            | 3.75 | 0.04                   | 2.02                      | 19.05             | 1.44         | 1.19 | 1.16 |
| 2600           | 3.87                            | 3.83 | 0.04                   | 2.17                      | 17.28             | 1.53         | 1.19 | 1.15 |
| 2700           | 3.96                            | 3.93 | 0.03                   | 2.22                      | 15.67             | 1.63         | 1.19 | 1.15 |
| 2800           | 4.07                            | 4.05 | 0.02                   | 2.40                      | 14.21             | 1.75         | 1.20 | 1.15 |
| 2900           | 4.20                            | 4.19 | 0.01                   | 2.53                      | 12.92             | 1.89         | 1.21 | 1.15 |
| 3000           | 4.36                            | 4.36 | 0.01                   | 2.62                      | 11.81             | 2.04         | 1.22 | 1.17 |
| 3100           | 4.53                            | 4.55 | 0.02                   | 2.79                      | 10.86             | 2.21         | 1.24 | 1.19 |
| 3200           | 4.73                            | 4.76 | 0.03                   | 2.95                      | 10.03             | 2.38         | 1.28 | 1.22 |
| 3300           | 4.94                            | 5.00 | 0.06                   | 3.07                      | 9.34              | 2.58         | 1.33 | 1.28 |
| 3400           | 5.19                            | 5.27 | 0.08                   | 3.13                      | 8.76              | 2.79         | 1.39 | 1.38 |
| 3500           | 5.48                            | 5.60 | 0.12                   | 3.27                      | 8.28              | 3.07         | 1.49 | 1.50 |
| 3600           | 5.83                            | 5.99 | 0.16                   | 3.29                      | 7.93              | 3.39         | 1.61 | 1.68 |

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

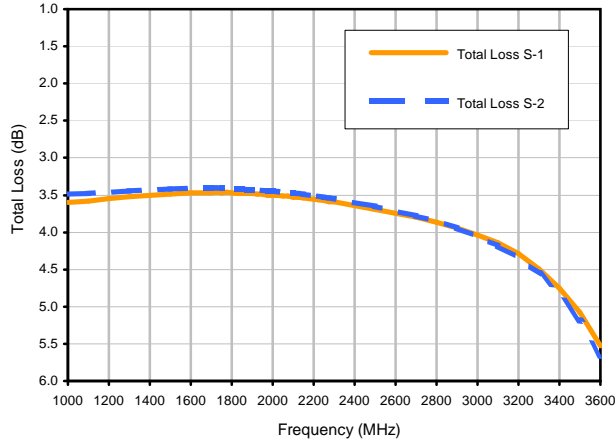


# 2 Way-0° Power Splitter/Combiner

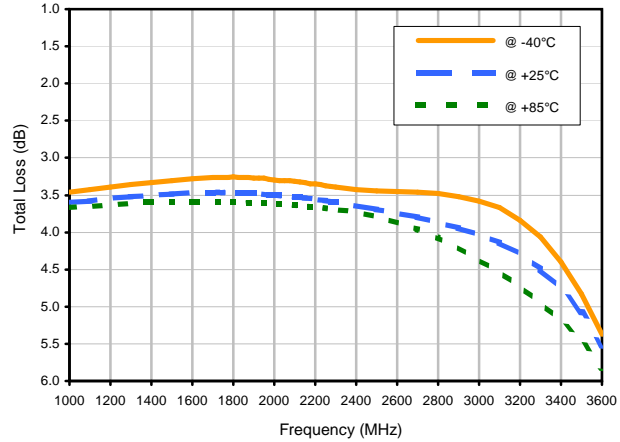
# SBA-2-20+

## Typical Performance Curves

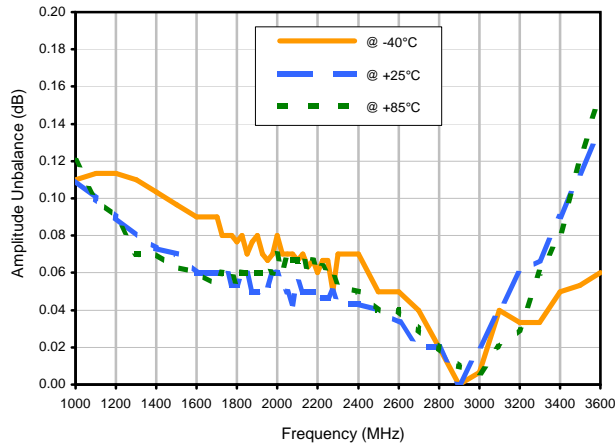
### Total Loss



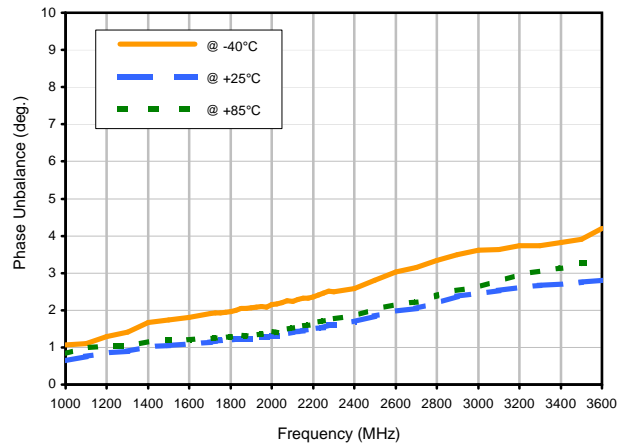
### Total Loss S-1 vs. TEMPERATURE



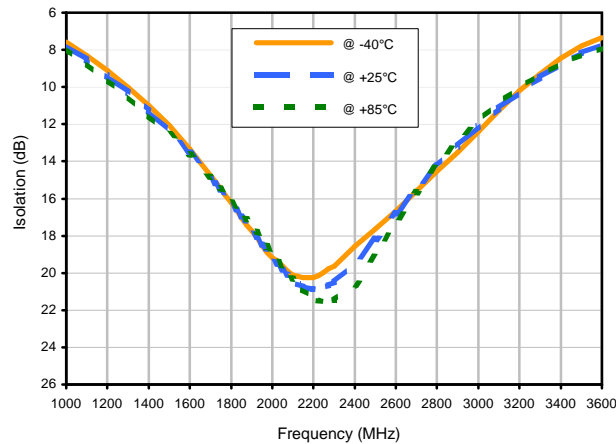
### Amplitude Unbalance vs. TEMPERATURE



### Phase Unbalance vs. TEMPERATURE



### Isolation 1-2 vs. TEMPERATURE



REV. X2  
SBA-2-20+  
100627  
Page 1 of 2



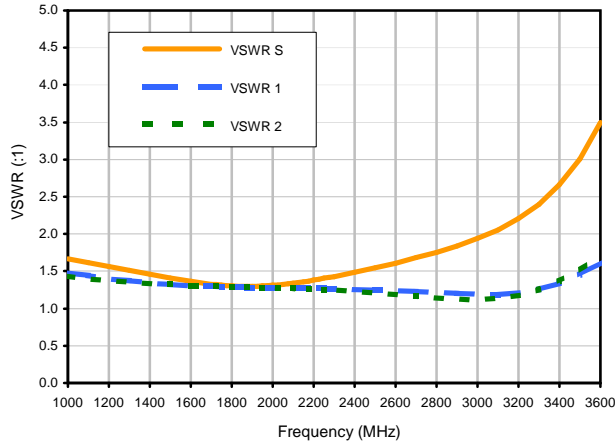
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see [minicircuits.com](http://minicircuits.com)

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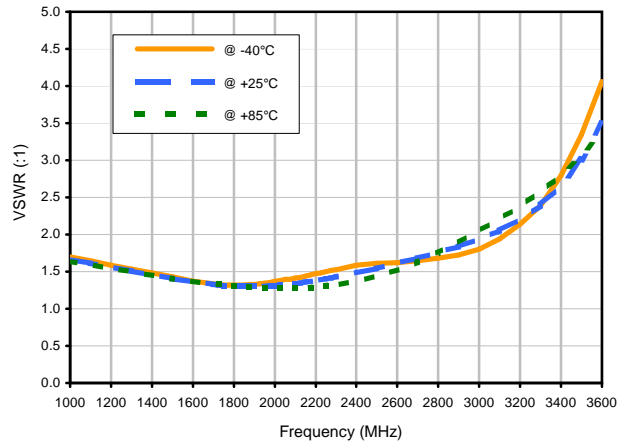
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## Typical Performance Curves

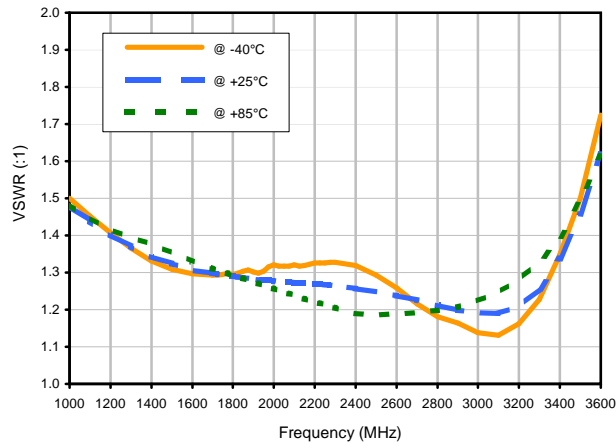
VSWR



VSWR SUM vs. TEMPERATURE



VSWR OUT1 vs. TEMPERATURE

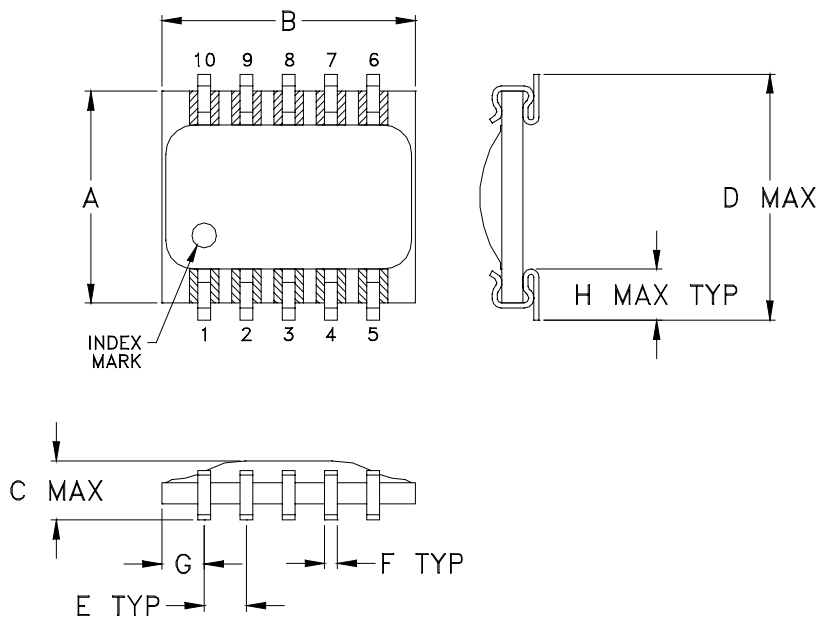


# Case Style

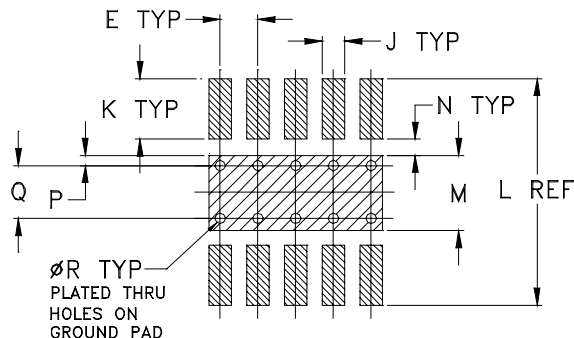
# SM2

SM2

## Outline Dimensions



## PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm 0.002$

ADJACENT GROUND PINS SHALL BE CONNECTED  
TO EACH OTHER AND TO GROUND PAD

| CASE # | A              | B              | C              | D              | E              | F              | G              | H              | J              | K              | L              | M              | N              | P              |
|--------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| SM2    | .250<br>(6.35) | .300<br>(7.62) | .095<br>(2.41) | .290<br>(7.37) | .050<br>(1.27) | .015<br>(0.38) | .050<br>(1.27) | .060<br>(1.52) | .030<br>(0.76) | .080<br>(2.03) | .300<br>(7.62) | .100<br>(2.54) | .020<br>(0.51) | .015<br>(0.38) |

| CASE # | Q              | R              | WT. GRAM |
|--------|----------------|----------------|----------|
| SM2    | .070<br>(1.78) | .014<br>(0.36) | .3       |

Dimensions are in inches (mm). Tolerances:  $\pm .005$

### Notes:

1. Case material: Plastic encapsulation on Ceramic base.
2. Termination finish:  
For RoHS Case Styles: Tin plate over Nickel plate.  
For RoHS-5 Case Styles: Tin-Lead plate.



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# Tape & Reel Packaging TR-F34



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel see note          |      |
|----------------|-------------------------|-------------------|------------------------------------|------|
| 16             | 12                      | 7                 | Small quantity standard (see note) | 20   |
|                |                         |                   |                                    | 50   |
|                |                         |                   | 100                                |      |
|                |                         |                   | 200                                |      |
|                |                         | 13                | Standard                           | 500  |
|                |                         |                   |                                    | 1000 |

Note: Availability of small reel quantity varies by model.  
Refer to pricing and availability on individual model dashboard.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: [www.minicircuits.com/pages/pdfs/tape.pdf](http://www.minicircuits.com/pages/pdfs/tape.pdf)



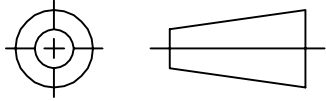
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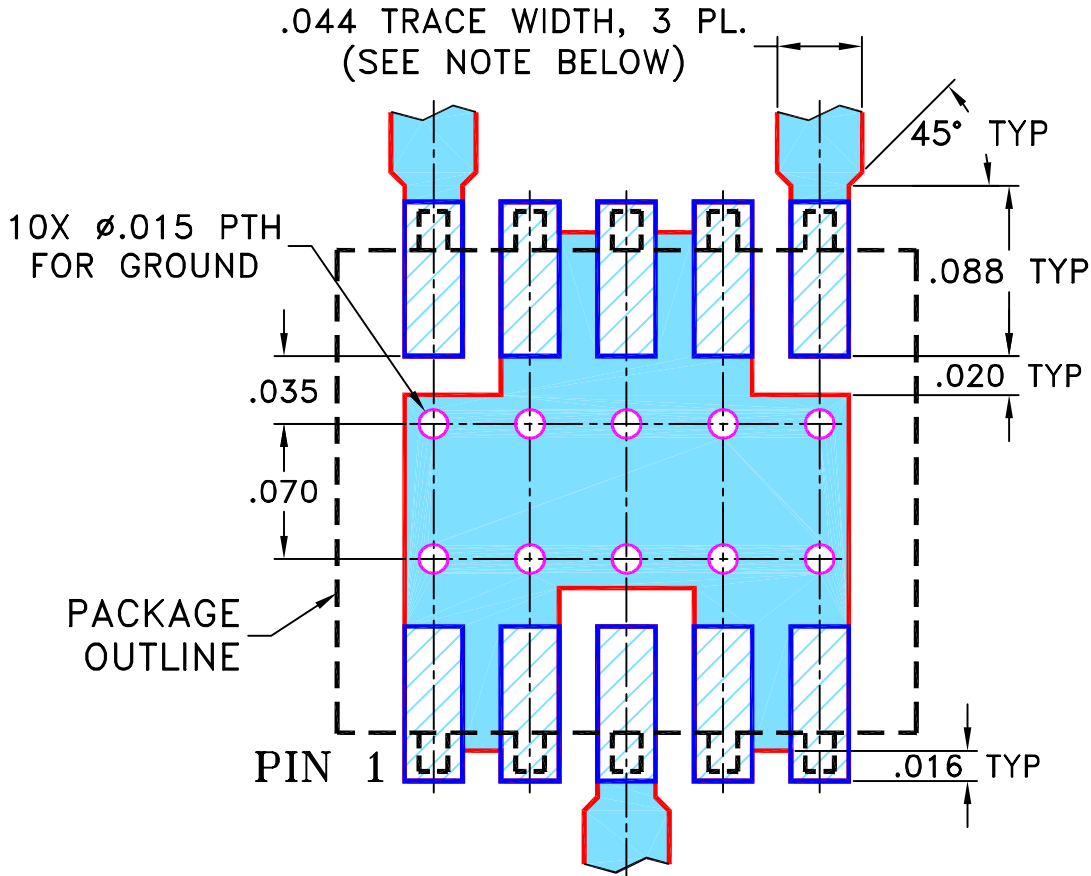
THIRD ANGLE PROJECTION



REVISIONS

| REV | ECN No. | DESCRIPTION  | DATE     | DR  | AUTH |
|-----|---------|--|----------|-----|------|
| OR  | M82272  | NEW RELEASE  | 08/05/02 | MMG | DJ   |
| A   | M101144 | ADDED SM1 CASE STYLE TO TITLE & NOTE 2, UPDATED DWG. | 10/07/05 | MMG | HY   |
| B   | M102713 | ADDED "...WITH SMOBC"                                | 01/14/06 | GF  | IL   |

SUGGESTED MOUNTING CONFIGURATION FOR SM1/SM2 CASE STYLE, "lg" PIN CONNECTION



- NOTES:** 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .020" ± .0015"; COPPER 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.  
 2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

| UNLESS OTHERWISE SPECIFIED | INITIALS    | DATE     |
|----------------------------|-------------|----------|
| DIMENSIONS ARE IN INCHES   | DRAWN MMG   | 07/19/02 |
| TOLERANCES ON:             | CHECKED HY  | 08/01/02 |
| 2 PL DECIMALS ±            | APPROVED DJ | 08/05/02 |
| 3 PL DECIMALS ± .005       |             |          |
| ANGLES ±                   |             |          |
| FRACTIONS ±                |             |          |

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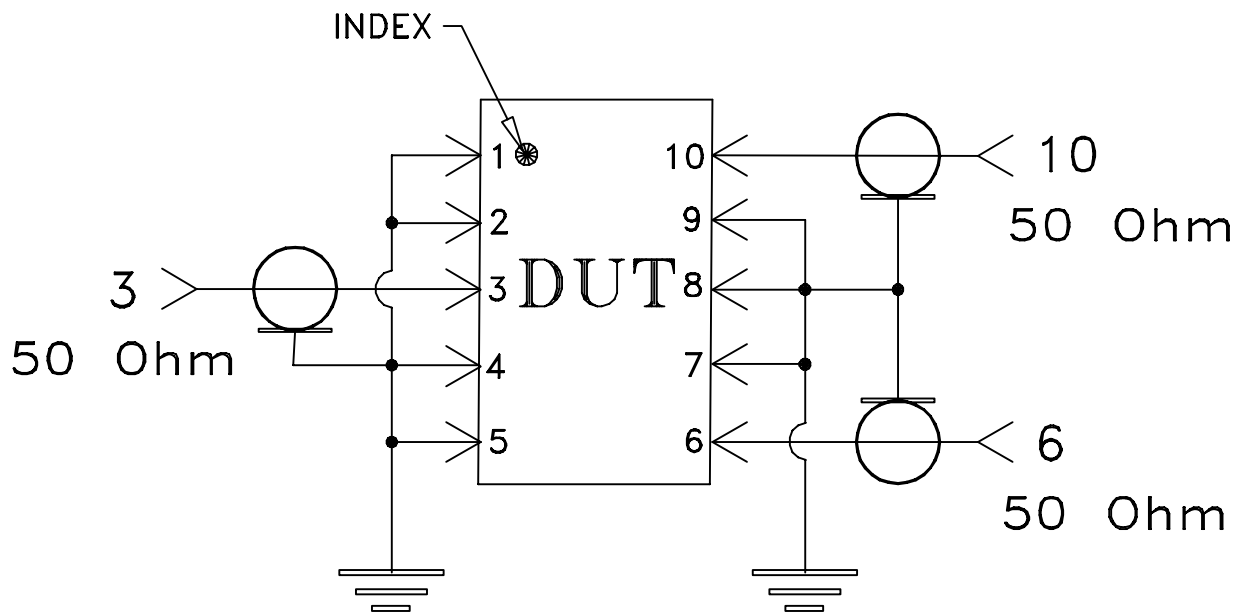
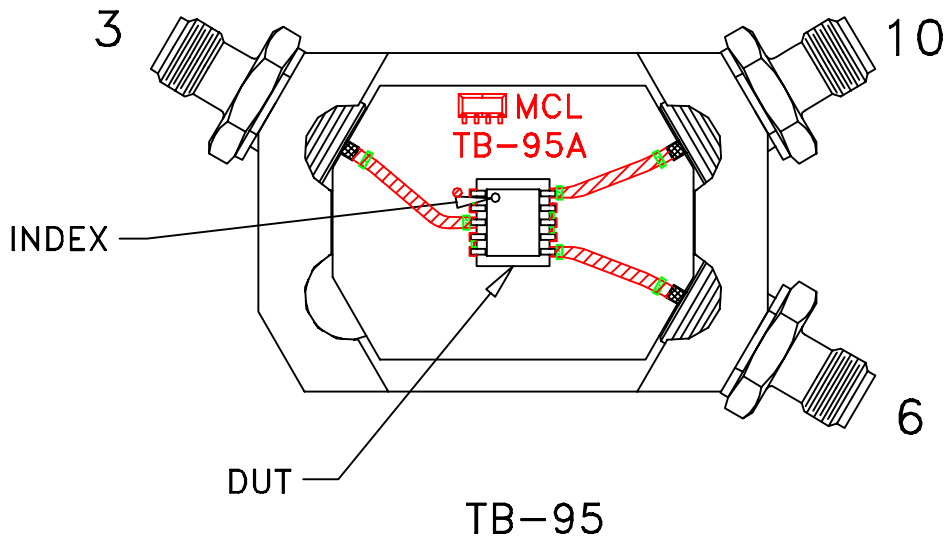
PL, "lg", SM1/SM2, SBA, TB-95

|           |                     |                          |                  |
|-----------|---------------------|--------------------------|------------------|
| SIZE<br>A | CODE IDENT<br>15542 | DRAWING NO:<br>98-PL-070 | REV:<br>B        |
| FILE:     | 98PL070             | SCALE:<br>10:1           | SHEET:<br>1 OF 1 |

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# Evaluation Board and Circuit

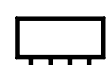
For Pin Connections refer to Data Sheet of the DUT



Schematic Diagram

## Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,  
Dielectric Constant=3.5, Thickness=.020 inch.

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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<br>Ambient Environment   | Individual Model Data Sheet  |
| Storage Temperature            | -55° to 100° C<br>Ambient Environment   | Individual Model Data Sheet  |
| Humidity                       | 90 to 95% RH, 240 hours, 50°C   | MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours |
| Thermal Shock                  | -55° to 100°C, 100 cycles   | MIL-STD-202, Method 107, Condition A-3, except +100°C  |
| Solder Reflow Heat             | Sn-Pb Eutetic Process: 225°C peak<br>Pb-Free Process 245° - 250°C peak  | J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1  |
| Solderability                  | 10X Magnification   | J-STD-002, 95% Coverage  |
| 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               | 50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes   | MIL-STD-202, Method 213, Condition A   |
| Marking Resistance to Solvents | Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C;<br>distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C | MIL-STD-202, Method 215  |