

# Surface Mount Power Splitter/Combiner

## SBTC-2-20X+

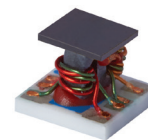
2 Way-0° 50Ω 200 to 2000 MHz

### Features

- wide band frequency, 200-2000 MHz
- excellent amplitude unbalance, 0.2 dB typ.
- small size, 0.166"x0.15"x0.155"
- temperature stable LTCC base
- small size
- low cost
- aqueous washable
- protected by US patent 6,963,255

### Applications

- cellular/GSM
- UHF/VHF receivers/transmitters
- PCN/PCS
- GPS



Generic photo used for illustration purposes only

CASE STYLE: AT1667

**+RoHS Compliant**

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

 Available Tape and Reel at no extra cost

| Reel Size | Devices/Reel |
|-----------|--------------|
| 13"       | 500          |

### Electrical Specifications

| Parameter                   | Frequency (MHz) | Min. | Typ. | Max. | Unit   |
|-----------------------------|-----------------|------|------|------|--------|
| Frequency Range             |                 | 200  |      | 2000 | MHz    |
| Insertion Loss Above 3.0 dB | 200 - 2000      | —    | 0.8  | 2.2  | dB     |
|                             | 800 - 1000      | —    | 0.5  | 0.9  |        |
|                             | 500 - 1500      | —    | 0.5  | 1.5  |        |
|                             | 1800 - 2000     | —    | 1.2  | 2.2  |        |
| Isolation                   | 200 - 2000      | 14   | 20   | —    | dB     |
|                             | 800 - 1000      | 16   | 22   | —    |        |
|                             | 500 - 1500      | 15   | 22   | —    |        |
|                             | 1800 - 2000     | 15   | 20   | —    |        |
| Phase Unbalance             | 200 - 2000      | —    | —    | 10   | Degree |
|                             | 800 - 1000      | —    | —    | 3    |        |
|                             | 500 - 1500      | —    | —    | 5    |        |
|                             | 1800 - 2000     | —    | —    | 10   |        |
| Amplitude Unbalance         | 200 - 2000      | —    | —    | 0.8  | dB     |
|                             | 800 - 1000      | —    | —    | 0.5  |        |
|                             | 500 - 1500      | —    | —    | 0.7  |        |
|                             | 1800 - 2000     | —    | —    | 0.6  |        |

### Maximum Ratings

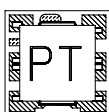
| Parameter                   | Ratings        |
|-----------------------------|----------------|
| Operating Temperature       | -40°C to 85°C  |
| Storage Temperature         | -55°C to 100°C |
| Power Input (as a splitter) | 0.5W max.      |
| Internal Dissipation        | 0.125W max     |

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

### Pin Connections

| Function | Pin Number |
|----------|------------|
| SUM PORT | 6          |
| PORT 1   | 3          |
| PORT 2   | 4          |
| GROUND   | 1,2        |
| NOT USED | 5          |

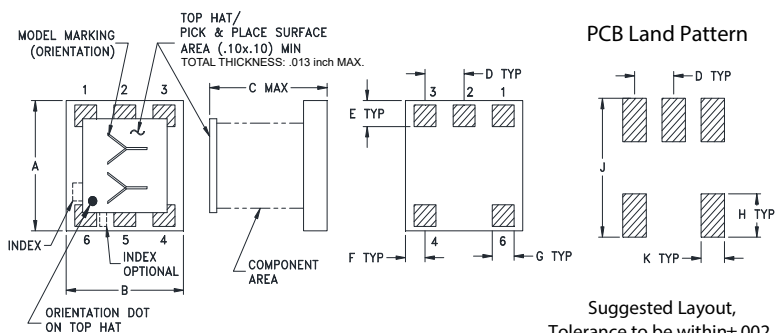
### Product Marking



### Electrical Schematic



## Outline Drawing

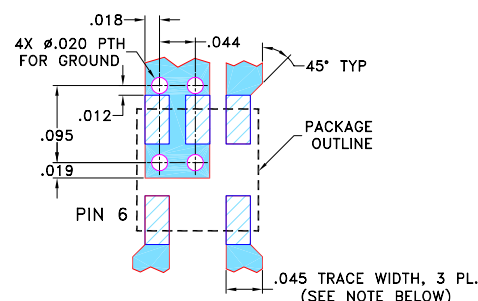


Suggested Layout,  
Tolerance to be within  $\pm 0.002$

## Outline Dimensions (inch/mm)

| A    | B    | C    | D    | E     | F    |
|------|------|------|------|-------|------|
| .150 | .150 | .150 | .050 | .030  | .025 |
| 3.81 | 3.81 | 3.81 | 1.27 | 0.76  | 0.64 |
| G    | H    | J    | K    | wt    |      |
| .028 | .050 | .160 | .030 | grams |      |
| 0.71 | 1.27 | 4.06 | 0.76 | 0.10  |      |

## Demo Board MCL P/N: TB-274 Suggested PCB Layout (PL-152)



NOTE: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS  $0.020" \pm 0.0015"$ ; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.

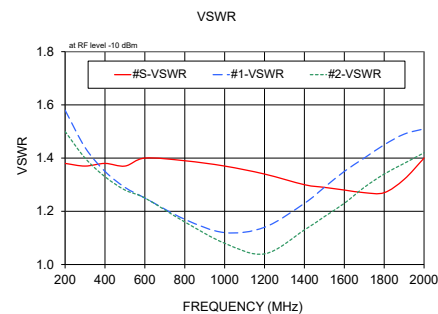
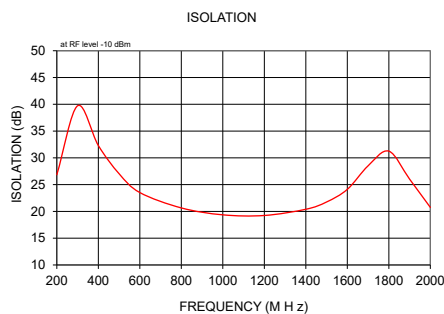
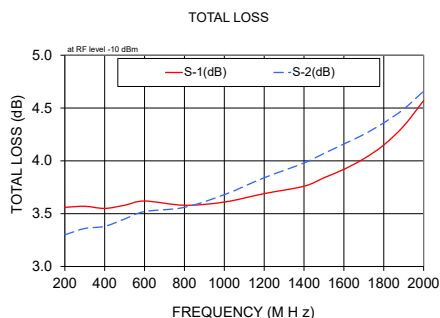
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

## 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                      |                |                        |        |        |        |
| 200.00          | 3.56                         | 3.30                     | 0.26           | 26.85                  | 1.44   | 1.38   | 1.50   |
| 300.00          | 3.57                         | 3.36                     | 0.21           | 39.72                  | 0.88   | 1.37   | 1.44   |
| 400.00          | 3.55                         | 3.38                     | 0.17           | 32.31                  | 0.56   | 1.38   | 1.35   |
| 500.00          | 3.58                         | 3.45                     | 0.13           | 27.04                  | 0.36   | 1.37   | 1.29   |
| 600.00          | 3.62                         | 3.52                     | 0.10           | 23.52                  | 0.22   | 1.40   | 1.25   |
| 800.00          | 3.58                         | 3.56                     | 0.03           | 20.65                  | 0.20   | 1.39   | 1.17   |
| 1000.00         | 3.61                         | 3.68                     | 0.07           | 19.36                  | 0.41   | 1.37   | 1.12   |
| 1200.00         | 3.69                         | 3.84                     | 0.15           | 19.24                  | 0.93   | 1.34   | 1.14   |
| 1400.00         | 3.76                         | 3.98                     | 0.22           | 20.40                  | 1.78   | 1.30   | 1.23   |
| 1500.00         | 3.84                         | 4.07                     | 0.23           | 21.76                  | 2.34   | 1.29   | 1.18   |
| 1600.00         | 3.92                         | 4.16                     | 0.24           | 24.12                  | 2.94   | 1.28   | 1.35   |
| 1700.00         | 4.02                         | 4.25                     | 0.24           | 28.51                  | 3.61   | 1.27   | 1.40   |
| 1800.00         | 4.15                         | 4.36                     | 0.21           | 31.25                  | 4.31   | 1.27   | 1.45   |
| 1900.00         | 4.33                         | 4.49                     | 0.18           | 26.03                  | 4.98   | 1.32   | 1.49   |
| 2000.00         | 4.57                         | 4.66                     | 0.16           | 20.75                  | 5.63   | 1.40   | 1.51   |

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



## Additional Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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](http://www.minicircuits.com/MCLStore/terms.jsp)

# 2 Way-0° Power Splitter/Combiner

SBTC-2-20X+

## Typical Performance Data

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

| 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    |
| 40.0               | 4.02                            | 3.19 | 0.83                           | 12.82             | 3.62                        | 40.0               | 1.75         | 3.54 | 2.79 |
| 50.0               | 3.88                            | 3.16 | 0.71                           | 13.82             | 3.61                        | 50.0               | 1.62         | 3.00 | 2.45 |
| 100.0              | 3.60                            | 3.21 | 0.39                           | 18.71             | 2.63                        | 100.0              | 1.41         | 1.96 | 1.77 |
| 150.0              | 3.53                            | 3.24 | 0.29                           | 23.02             | 1.89                        | 150.0              | 1.37         | 1.66 | 1.56 |
| 200.0              | 3.50                            | 3.26 | 0.24                           | 27.38             | 1.35                        | 200.0              | 1.36         | 1.51 | 1.46 |
| 250.0              | 3.48                            | 3.27 | 0.21                           | 32.24             | 0.97                        | 250.0              | 1.36         | 1.42 | 1.40 |
| 300.0              | 3.47                            | 3.28 | 0.19                           | 35.80             | 0.72                        | 300.0              | 1.36         | 1.36 | 1.35 |
| 350.0              | 3.47                            | 3.29 | 0.18                           | 33.42             | 0.48                        | 350.0              | 1.35         | 1.32 | 1.32 |
| 400.0              | 3.46                            | 3.31 | 0.15                           | 30.06             | 0.26                        | 400.0              | 1.35         | 1.28 | 1.29 |
| 450.0              | 3.47                            | 3.31 | 0.16                           | 27.53             | 0.08                        | 450.0              | 1.35         | 1.24 | 1.27 |
| 500.0              | 3.46                            | 3.33 | 0.13                           | 25.65             | 0.03                        | 500.0              | 1.35         | 1.21 | 1.24 |
| 550.0              | 3.47                            | 3.34 | 0.13                           | 24.16             | 0.17                        | 550.0              | 1.35         | 1.18 | 1.22 |
| 600.0              | 3.47                            | 3.36 | 0.12                           | 22.97             | 0.31                        | 600.0              | 1.35         | 1.15 | 1.20 |
| 650.0              | 3.48                            | 3.37 | 0.11                           | 21.99             | 0.42                        | 650.0              | 1.35         | 1.12 | 1.18 |
| 700.0              | 3.49                            | 3.39 | 0.10                           | 21.15             | 0.52                        | 700.0              | 1.35         | 1.10 | 1.16 |
| 750.0              | 3.50                            | 3.41 | 0.09                           | 20.45             | 0.58                        | 750.0              | 1.35         | 1.08 | 1.14 |
| 800.0              | 3.51                            | 3.43 | 0.08                           | 19.84             | 0.67                        | 800.0              | 1.35         | 1.07 | 1.12 |
| 850.0              | 3.52                            | 3.45 | 0.07                           | 19.33             | 0.69                        | 850.0              | 1.35         | 1.06 | 1.10 |
| 900.0              | 3.53                            | 3.48 | 0.05                           | 18.90             | 0.73                        | 900.0              | 1.35         | 1.07 | 1.09 |
| 950.0              | 3.54                            | 3.50 | 0.04                           | 18.53             | 0.75                        | 950.0              | 1.35         | 1.08 | 1.07 |
| 1000.0             | 3.56                            | 3.53 | 0.03                           | 18.24             | 0.79                        | 1000.0             | 1.36         | 1.10 | 1.06 |
| 1050.0             | 3.57                            | 3.56 | 0.01                           | 17.98             | 0.80                        | 1050.0             | 1.36         | 1.13 | 1.05 |
| 1100.0             | 3.59                            | 3.59 | 0.00                           | 17.79             | 0.77                        | 1100.0             | 1.36         | 1.16 | 1.05 |
| 1150.0             | 3.61                            | 3.61 | 0.00                           | 17.66             | 0.76                        | 1150.0             | 1.36         | 1.19 | 1.06 |
| 1200.0             | 3.63                            | 3.65 | 0.02                           | 17.59             | 0.70                        | 1200.0             | 1.37         | 1.22 | 1.07 |
| 1250.0             | 3.66                            | 3.68 | 0.02                           | 17.58             | 0.67                        | 1250.0             | 1.37         | 1.26 | 1.09 |
| 1300.0             | 3.68                            | 3.72 | 0.04                           | 17.64             | 0.59                        | 1300.0             | 1.37         | 1.29 | 1.11 |
| 1350.0             | 3.71                            | 3.75 | 0.04                           | 17.74             | 0.50                        | 1350.0             | 1.37         | 1.32 | 1.13 |
| 1400.0             | 3.73                            | 3.79 | 0.06                           | 17.94             | 0.35                        | 1400.0             | 1.37         | 1.36 | 1.15 |
| 1450.0             | 3.76                            | 3.82 | 0.06                           | 18.19             | 0.24                        | 1450.0             | 1.37         | 1.40 | 1.17 |
| 1500.0             | 3.79                            | 3.86 | 0.07                           | 18.53             | 0.12                        | 1500.0             | 1.37         | 1.43 | 1.19 |
| 1550.0             | 3.82                            | 3.89 | 0.07                           | 18.98             | 0.05                        | 1550.0             | 1.37         | 1.47 | 1.22 |
| 1600.0             | 3.86                            | 3.93 | 0.07                           | 19.51             | 0.19                        | 1600.0             | 1.37         | 1.51 | 1.24 |
| 1650.0             | 3.89                            | 3.97 | 0.08                           | 20.19             | 0.33                        | 1650.0             | 1.36         | 1.54 | 1.26 |
| 1700.0             | 3.93                            | 4.01 | 0.08                           | 20.98             | 0.49                        | 1700.0             | 1.35         | 1.57 | 1.28 |
| 1750.0             | 3.97                            | 4.05 | 0.08                           | 21.91             | 0.66                        | 1750.0             | 1.35         | 1.60 | 1.31 |
| 1800.0             | 4.02                            | 4.09 | 0.07                           | 22.91             | 0.82                        | 1800.0             | 1.34         | 1.63 | 1.33 |
| 1850.0             | 4.07                            | 4.14 | 0.07                           | 23.78             | 1.04                        | 1850.0             | 1.33         | 1.66 | 1.35 |
| 1900.0             | 4.13                            | 4.19 | 0.06                           | 24.27             | 1.19                        | 1900.0             | 1.33         | 1.67 | 1.36 |
| 1950.0             | 4.19                            | 4.24 | 0.05                           | 24.03             | 1.38                        | 1950.0             | 1.33         | 1.68 | 1.38 |
| 2000.0             | 4.26                            | 4.30 | 0.04                           | 22.96             | 1.51                        | 2000.0             | 1.33         | 1.69 | 1.39 |
| 2050.0             | 4.35                            | 4.36 | 0.01                           | 21.38             | 1.68                        | 2050.0             | 1.35         | 1.69 | 1.40 |
| 2100.0             | 4.45                            | 4.44 | 0.01                           | 19.67             | 1.80                        | 2100.0             | 1.37         | 1.68 | 1.41 |
| 2150.0             | 4.56                            | 4.53 | 0.04                           | 18.00             | 1.89                        | 2150.0             | 1.41         | 1.67 | 1.41 |
| 2200.0             | 4.69                            | 4.64 | 0.06                           | 16.47             | 1.89                        | 2200.0             | 1.46         | 1.64 | 1.41 |
| 2250.0             | 4.85                            | 4.75 | 0.09                           | 15.07             | 1.90                        | 2250.0             | 1.52         | 1.61 | 1.41 |
| 2300.0             | 5.02                            | 4.90 | 0.12                           | 13.82             | 1.78                        | 2300.0             | 1.60         | 1.57 | 1.41 |
| 2350.0             | 5.24                            | 5.06 | 0.18                           | 12.70             | 1.56                        | 2350.0             | 1.69         | 1.53 | 1.40 |
| 2400.0             | 5.46                            | 5.24 | 0.22                           | 11.71             | 1.30                        | 2400.0             | 1.80         | 1.48 | 1.39 |
| 2450.0             | 5.73                            | 5.46 | 0.27                           | 10.82             | 0.88                        | 2450.0             | 1.92         | 1.43 | 1.38 |
| 2500.0             | 6.01                            | 5.70 | 0.31                           | 10.03             | 0.24                        | 2500.0             | 2.05         | 1.38 | 1.38 |
| 2550.0             | 6.34                            | 5.98 | 0.36                           | 9.32              | 0.50                        | 2550.0             | 2.19         | 1.32 | 1.37 |
| 2600.0             | 6.70                            | 6.28 | 0.42                           | 8.71              | 1.53                        | 2600.0             | 2.34         | 1.27 | 1.37 |

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



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IF/RF MICROWAVE COMPONENTS

REV. OR  
SBTC-2-20X+  
1/21/2013  
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## 2 Way-0° Power Splitter/Combiner

**SBTC-2-20X+**

### Typical Performance Data

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

| 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    |
| 40.0               | 4.05                            | 3.21 | 0.84                           | 12.83             | 3.55                        | 40.0               | 1.74         | 3.56 | 2.81 |
| 50.0               | 3.89                            | 3.18 | 0.72                           | 13.79             | 3.54                        | 50.0               | 1.61         | 3.03 | 2.47 |
| 100.0              | 3.60                            | 3.20 | 0.40                           | 18.61             | 2.63                        | 100.0              | 1.42         | 2.00 | 1.80 |
| 150.0              | 3.52                            | 3.22 | 0.30                           | 22.95             | 1.91                        | 150.0              | 1.38         | 1.69 | 1.59 |
| 200.0              | 3.47                            | 3.23 | 0.24                           | 27.33             | 1.40                        | 200.0              | 1.36         | 1.53 | 1.48 |
| 250.0              | 3.45                            | 3.24 | 0.21                           | 32.47             | 1.03                        | 250.0              | 1.36         | 1.45 | 1.42 |
| 300.0              | 3.44                            | 3.25 | 0.19                           | 37.36             | 0.81                        | 300.0              | 1.36         | 1.39 | 1.38 |
| 350.0              | 3.43                            | 3.25 | 0.18                           | 34.53             | 0.56                        | 350.0              | 1.36         | 1.34 | 1.34 |
| 400.0              | 3.43                            | 3.26 | 0.17                           | 30.65             | 0.38                        | 400.0              | 1.36         | 1.30 | 1.31 |
| 450.0              | 3.42                            | 3.26 | 0.16                           | 27.95             | 0.22                        | 450.0              | 1.36         | 1.26 | 1.29 |
| 500.0              | 3.41                            | 3.27 | 0.14                           | 25.91             | 0.10                        | 500.0              | 1.36         | 1.23 | 1.26 |
| 550.0              | 3.42                            | 3.28 | 0.14                           | 24.32             | 0.04                        | 550.0              | 1.36         | 1.20 | 1.24 |
| 600.0              | 3.42                            | 3.30 | 0.13                           | 23.11             | 0.17                        | 600.0              | 1.36         | 1.17 | 1.22 |
| 650.0              | 3.42                            | 3.30 | 0.12                           | 22.10             | 0.25                        | 650.0              | 1.36         | 1.15 | 1.20 |
| 700.0              | 3.42                            | 3.32 | 0.10                           | 21.25             | 0.35                        | 700.0              | 1.36         | 1.12 | 1.18 |
| 750.0              | 3.43                            | 3.33 | 0.10                           | 20.52             | 0.43                        | 750.0              | 1.36         | 1.10 | 1.16 |
| 800.0              | 3.44                            | 3.35 | 0.09                           | 19.91             | 0.44                        | 800.0              | 1.36         | 1.08 | 1.14 |
| 850.0              | 3.44                            | 3.37 | 0.07                           | 19.36             | 0.40                        | 850.0              | 1.36         | 1.07 | 1.12 |
| 900.0              | 3.44                            | 3.38 | 0.06                           | 18.92             | 0.47                        | 900.0              | 1.37         | 1.07 | 1.11 |
| 950.0              | 3.45                            | 3.41 | 0.04                           | 18.51             | 0.52                        | 950.0              | 1.37         | 1.08 | 1.09 |
| 1000.0             | 3.46                            | 3.43 | 0.03                           | 18.21             | 0.61                        | 1000.0             | 1.37         | 1.10 | 1.07 |
| 1050.0             | 3.48                            | 3.46 | 0.02                           | 17.98             | 0.64                        | 1050.0             | 1.37         | 1.12 | 1.06 |
| 1100.0             | 3.49                            | 3.48 | 0.01                           | 17.81             | 0.58                        | 1100.0             | 1.37         | 1.15 | 1.06 |
| 1150.0             | 3.51                            | 3.50 | 0.01                           | 17.66             | 0.53                        | 1150.0             | 1.37         | 1.18 | 1.06 |
| 1200.0             | 3.52                            | 3.53 | 0.01                           | 17.56             | 0.50                        | 1200.0             | 1.38         | 1.21 | 1.07 |
| 1250.0             | 3.54                            | 3.56 | 0.02                           | 17.54             | 0.47                        | 1250.0             | 1.38         | 1.24 | 1.08 |
| 1300.0             | 3.55                            | 3.58 | 0.03                           | 17.63             | 0.34                        | 1300.0             | 1.37         | 1.28 | 1.10 |
| 1350.0             | 3.57                            | 3.61 | 0.04                           | 17.79             | 0.18                        | 1350.0             | 1.37         | 1.31 | 1.12 |
| 1400.0             | 3.59                            | 3.64 | 0.05                           | 17.95             | 0.03                        | 1400.0             | 1.37         | 1.35 | 1.14 |
| 1450.0             | 3.62                            | 3.67 | 0.05                           | 18.17             | 0.12                        | 1450.0             | 1.37         | 1.38 | 1.16 |
| 1500.0             | 3.64                            | 3.70 | 0.06                           | 18.52             | 0.22                        | 1500.0             | 1.37         | 1.42 | 1.18 |
| 1550.0             | 3.67                            | 3.73 | 0.06                           | 18.99             | 0.34                        | 1550.0             | 1.37         | 1.46 | 1.20 |
| 1600.0             | 3.70                            | 3.77 | 0.07                           | 19.51             | 0.45                        | 1600.0             | 1.36         | 1.49 | 1.23 |
| 1650.0             | 3.73                            | 3.80 | 0.07                           | 20.17             | 0.57                        | 1650.0             | 1.36         | 1.53 | 1.25 |
| 1700.0             | 3.76                            | 3.83 | 0.07                           | 20.99             | 0.74                        | 1700.0             | 1.35         | 1.56 | 1.27 |
| 1750.0             | 3.79                            | 3.87 | 0.08                           | 21.94             | 0.89                        | 1750.0             | 1.34         | 1.59 | 1.30 |
| 1800.0             | 3.83                            | 3.90 | 0.07                           | 22.90             | 1.05                        | 1800.0             | 1.33         | 1.61 | 1.31 |
| 1850.0             | 3.88                            | 3.94 | 0.06                           | 23.73             | 1.35                        | 1850.0             | 1.33         | 1.64 | 1.33 |
| 1900.0             | 3.93                            | 3.99 | 0.06                           | 24.34             | 1.49                        | 1900.0             | 1.33         | 1.66 | 1.35 |
| 1950.0             | 3.97                            | 4.03 | 0.06                           | 24.49             | 1.64                        | 1950.0             | 1.33         | 1.67 | 1.37 |
| 2000.0             | 4.05                            | 4.09 | 0.05                           | 23.79             | 1.78                        | 2000.0             | 1.35         | 1.69 | 1.39 |
| 2050.0             | 4.13                            | 4.15 | 0.02                           | 22.19             | 1.99                        | 2050.0             | 1.37         | 1.70 | 1.40 |
| 2100.0             | 4.21                            | 4.22 | 0.01                           | 20.26             | 2.22                        | 2100.0             | 1.38         | 1.69 | 1.40 |
| 2150.0             | 4.30                            | 4.30 | 0.00                           | 18.46             | 2.30                        | 2150.0             | 1.41         | 1.66 | 1.41 |
| 2200.0             | 4.42                            | 4.41 | 0.01                           | 16.86             | 2.22                        | 2200.0             | 1.46         | 1.64 | 1.41 |
| 2250.0             | 4.56                            | 4.50 | 0.06                           | 15.40             | 2.22                        | 2250.0             | 1.53         | 1.62 | 1.41 |
| 2300.0             | 4.72                            | 4.63 | 0.09                           | 14.09             | 2.20                        | 2300.0             | 1.60         | 1.59 | 1.41 |
| 2350.0             | 4.90                            | 4.77 | 0.13                           | 12.95             | 2.04                        | 2350.0             | 1.68         | 1.55 | 1.40 |
| 2400.0             | 5.10                            | 4.93 | 0.17                           | 11.96             | 1.85                        | 2400.0             | 1.78         | 1.50 | 1.39 |
| 2450.0             | 5.34                            | 5.12 | 0.22                           | 11.06             | 1.54                        | 2450.0             | 1.90         | 1.45 | 1.38 |
| 2500.0             | 5.61                            | 5.35 | 0.25                           | 10.22             | 1.08                        | 2500.0             | 2.04         | 1.39 | 1.38 |
| 2550.0             | 5.91                            | 5.61 | 0.30                           | 9.49              | 0.50                        | 2550.0             | 2.19         | 1.34 | 1.38 |
| 2600.0             | 6.23                            | 5.89 | 0.34                           | 8.85              | 0.31                        | 2600.0             | 2.35         | 1.30 | 1.38 |

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



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# 2 Way-0° Power Splitter/Combiner

SBTC-2-20X+

## Typical Performance Data

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

| 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    |
| 40.0               | 4.01                            | 3.18 | 0.83                           | 12.86             | 3.65                        | 40.0               | 1.76         | 3.51 | 2.77 |
| 50.0               | 3.87                            | 3.16 | 0.70                           | 13.89             | 3.62                        | 50.0               | 1.62         | 2.98 | 2.44 |
| 100.0              | 3.60                            | 3.21 | 0.38                           | 18.77             | 2.63                        | 100.0              | 1.41         | 1.94 | 1.75 |
| 150.0              | 3.52                            | 3.24 | 0.28                           | 22.98             | 1.85                        | 150.0              | 1.37         | 1.63 | 1.54 |
| 200.0              | 3.50                            | 3.27 | 0.23                           | 27.24             | 1.33                        | 200.0              | 1.36         | 1.50 | 1.45 |
| 250.0              | 3.49                            | 3.28 | 0.21                           | 31.84             | 0.95                        | 250.0              | 1.36         | 1.41 | 1.39 |
| 300.0              | 3.48                            | 3.30 | 0.18                           | 34.75             | 0.73                        | 300.0              | 1.35         | 1.35 | 1.34 |
| 350.0              | 3.48                            | 3.31 | 0.17                           | 32.78             | 0.45                        | 350.0              | 1.35         | 1.30 | 1.31 |
| 400.0              | 3.47                            | 3.32 | 0.15                           | 29.76             | 0.26                        | 400.0              | 1.35         | 1.26 | 1.28 |
| 450.0              | 3.48                            | 3.33 | 0.15                           | 27.34             | 0.10                        | 450.0              | 1.35         | 1.22 | 1.25 |
| 500.0              | 3.48                            | 3.35 | 0.13                           | 25.50             | 0.04                        | 500.0              | 1.35         | 1.19 | 1.23 |
| 550.0              | 3.49                            | 3.37 | 0.12                           | 24.06             | 0.21                        | 550.0              | 1.35         | 1.17 | 1.21 |
| 600.0              | 3.50                            | 3.38 | 0.12                           | 22.91             | 0.34                        | 600.0              | 1.34         | 1.14 | 1.19 |
| 650.0              | 3.51                            | 3.40 | 0.11                           | 21.94             | 0.45                        | 650.0              | 1.34         | 1.11 | 1.16 |
| 700.0              | 3.52                            | 3.42 | 0.10                           | 21.14             | 0.58                        | 700.0              | 1.34         | 1.09 | 1.15 |
| 750.0              | 3.54                            | 3.45 | 0.09                           | 20.45             | 0.67                        | 750.0              | 1.34         | 1.07 | 1.13 |
| 800.0              | 3.56                            | 3.47 | 0.09                           | 19.86             | 0.64                        | 800.0              | 1.34         | 1.06 | 1.11 |
| 850.0              | 3.55                            | 3.49 | 0.06                           | 19.32             | 0.59                        | 850.0              | 1.35         | 1.06 | 1.09 |
| 900.0              | 3.56                            | 3.51 | 0.05                           | 18.90             | 0.64                        | 900.0              | 1.35         | 1.07 | 1.07 |
| 950.0              | 3.58                            | 3.55 | 0.03                           | 18.54             | 0.71                        | 950.0              | 1.35         | 1.09 | 1.06 |
| 1000.0             | 3.60                            | 3.58 | 0.02                           | 18.24             | 0.89                        | 1000.0             | 1.35         | 1.12 | 1.05 |
| 1050.0             | 3.63                            | 3.63 | 0.00                           | 18.00             | 0.97                        | 1050.0             | 1.36         | 1.14 | 1.05 |
| 1100.0             | 3.66                            | 3.65 | 0.01                           | 17.83             | 0.88                        | 1100.0             | 1.36         | 1.17 | 1.06 |
| 1150.0             | 3.68                            | 3.68 | 0.00                           | 17.73             | 0.84                        | 1150.0             | 1.36         | 1.20 | 1.07 |
| 1200.0             | 3.70                            | 3.71 | 0.01                           | 17.66             | 0.83                        | 1200.0             | 1.37         | 1.24 | 1.08 |
| 1250.0             | 3.73                            | 3.75 | 0.02                           | 17.66             | 0.83                        | 1250.0             | 1.38         | 1.27 | 1.10 |
| 1300.0             | 3.75                            | 3.79 | 0.04                           | 17.72             | 0.67                        | 1300.0             | 1.38         | 1.31 | 1.12 |
| 1350.0             | 3.78                            | 3.82 | 0.04                           | 17.87             | 0.45                        | 1350.0             | 1.38         | 1.34 | 1.15 |
| 1400.0             | 3.81                            | 3.87 | 0.06                           | 18.08             | 0.24                        | 1400.0             | 1.39         | 1.38 | 1.17 |
| 1450.0             | 3.84                            | 3.90 | 0.06                           | 18.38             | 0.08                        | 1450.0             | 1.39         | 1.42 | 1.19 |
| 1500.0             | 3.88                            | 3.94 | 0.06                           | 18.74             | 0.05                        | 1500.0             | 1.39         | 1.45 | 1.22 |
| 1550.0             | 3.91                            | 3.98 | 0.07                           | 19.23             | 0.08                        | 1550.0             | 1.39         | 1.49 | 1.24 |
| 1600.0             | 3.95                            | 4.02 | 0.07                           | 19.81             | 0.20                        | 1600.0             | 1.38         | 1.53 | 1.26 |
| 1650.0             | 3.99                            | 4.07 | 0.08                           | 20.56             | 0.27                        | 1650.0             | 1.38         | 1.56 | 1.28 |
| 1700.0             | 4.03                            | 4.11 | 0.08                           | 21.43             | 0.41                        | 1700.0             | 1.37         | 1.59 | 1.30 |
| 1750.0             | 4.07                            | 4.15 | 0.08                           | 22.50             | 0.55                        | 1750.0             | 1.36         | 1.62 | 1.32 |
| 1800.0             | 4.12                            | 4.20 | 0.08                           | 23.63             | 0.74                        | 1800.0             | 1.36         | 1.65 | 1.34 |
| 1850.0             | 4.18                            | 4.24 | 0.06                           | 24.62             | 1.05                        | 1850.0             | 1.35         | 1.67 | 1.36 |
| 1900.0             | 4.24                            | 4.29 | 0.05                           | 25.03             | 1.14                        | 1900.0             | 1.35         | 1.68 | 1.37 |
| 1950.0             | 4.29                            | 4.34 | 0.05                           | 24.50             | 1.30                        | 1950.0             | 1.34         | 1.69 | 1.39 |
| 2000.0             | 4.37                            | 4.41 | 0.04                           | 23.12             | 1.50                        | 2000.0             | 1.35         | 1.69 | 1.40 |
| 2050.0             | 4.47                            | 4.49 | 0.02                           | 21.39             | 1.73                        | 2050.0             | 1.37         | 1.69 | 1.40 |
| 2100.0             | 4.57                            | 4.57 | 0.00                           | 19.51             | 1.81                        | 2100.0             | 1.39         | 1.68 | 1.40 |
| 2150.0             | 4.69                            | 4.67 | 0.03                           | 17.72             | 1.88                        | 2150.0             | 1.44         | 1.66 | 1.41 |
| 2200.0             | 4.83                            | 4.79 | 0.04                           | 16.12             | 1.88                        | 2200.0             | 1.49         | 1.62 | 1.41 |
| 2250.0             | 4.99                            | 4.92 | 0.07                           | 14.72             | 1.86                        | 2250.0             | 1.56         | 1.59 | 1.41 |
| 2300.0             | 5.18                            | 5.08 | 0.10                           | 13.49             | 1.77                        | 2300.0             | 1.65         | 1.55 | 1.40 |
| 2350.0             | 5.41                            | 5.26 | 0.15                           | 12.41             | 1.53                        | 2350.0             | 1.75         | 1.50 | 1.39 |
| 2400.0             | 5.65                            | 5.47 | 0.18                           | 11.45             | 1.23                        | 2400.0             | 1.87         | 1.45 | 1.38 |
| 2450.0             | 5.94                            | 5.70 | 0.24                           | 10.59             | 0.82                        | 2450.0             | 2.00         | 1.40 | 1.38 |
| 2500.0             | 6.24                            | 5.97 | 0.27                           | 9.84              | 0.21                        | 2500.0             | 2.15         | 1.34 | 1.37 |
| 2550.0             | 6.60                            | 6.27 | 0.33                           | 9.17              | 0.43                        | 2550.0             | 2.30         | 1.29 | 1.37 |
| 2600.0             | 6.97                            | 6.59 | 0.38                           | 8.59              | 1.45                        | 2600.0             | 2.46         | 1.24 | 1.37 |

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



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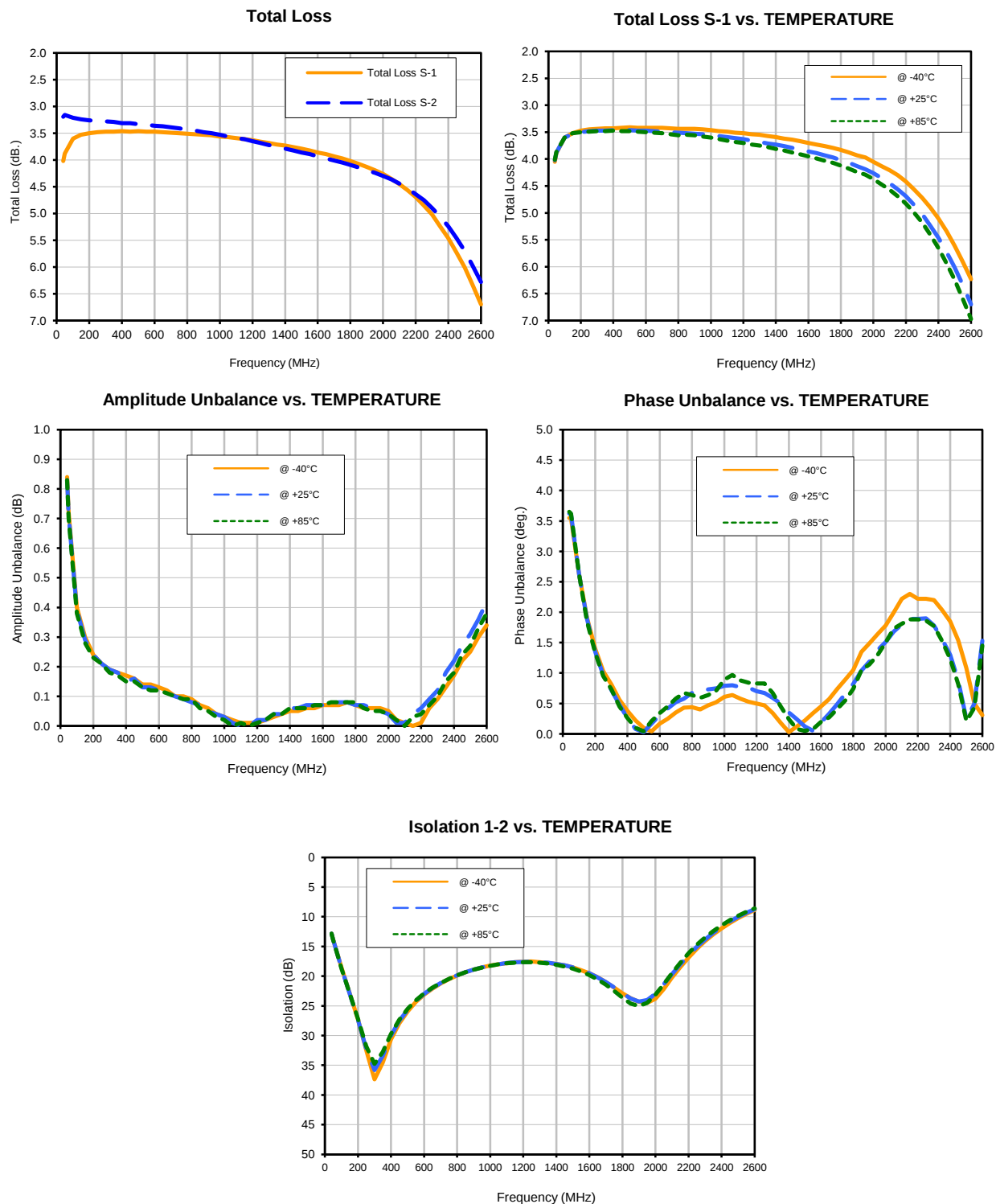
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# 2 Way-0° Power Splitter/Combiner

# SBTC-2-20X+

## Typical Performance Curves



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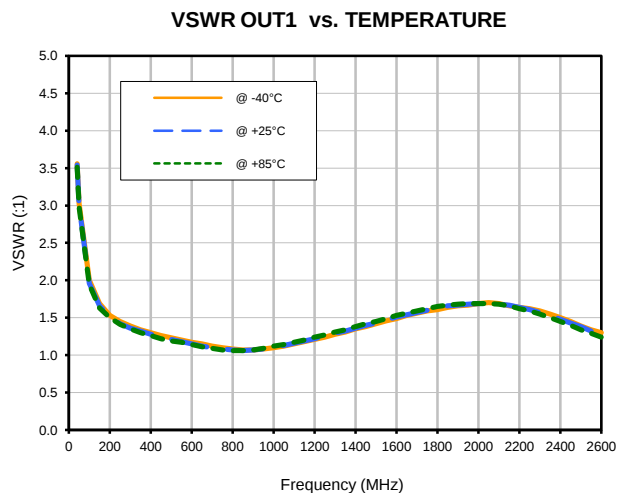
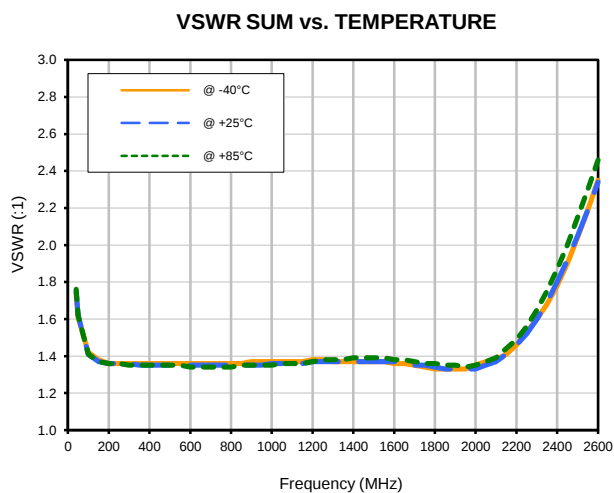
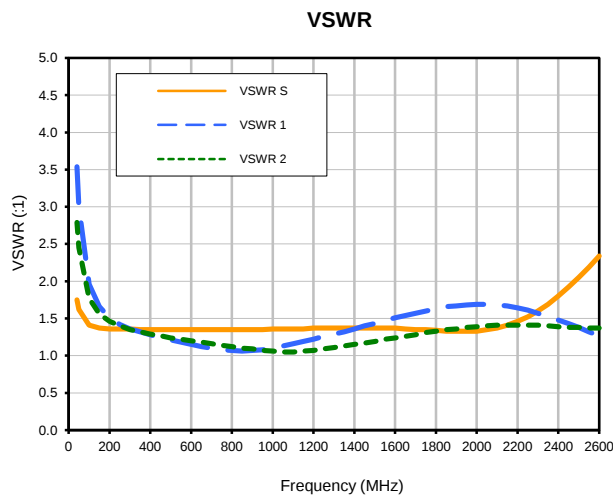
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# 2 Way-0° Power Splitter/Combiner

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## Typical Performance Curves



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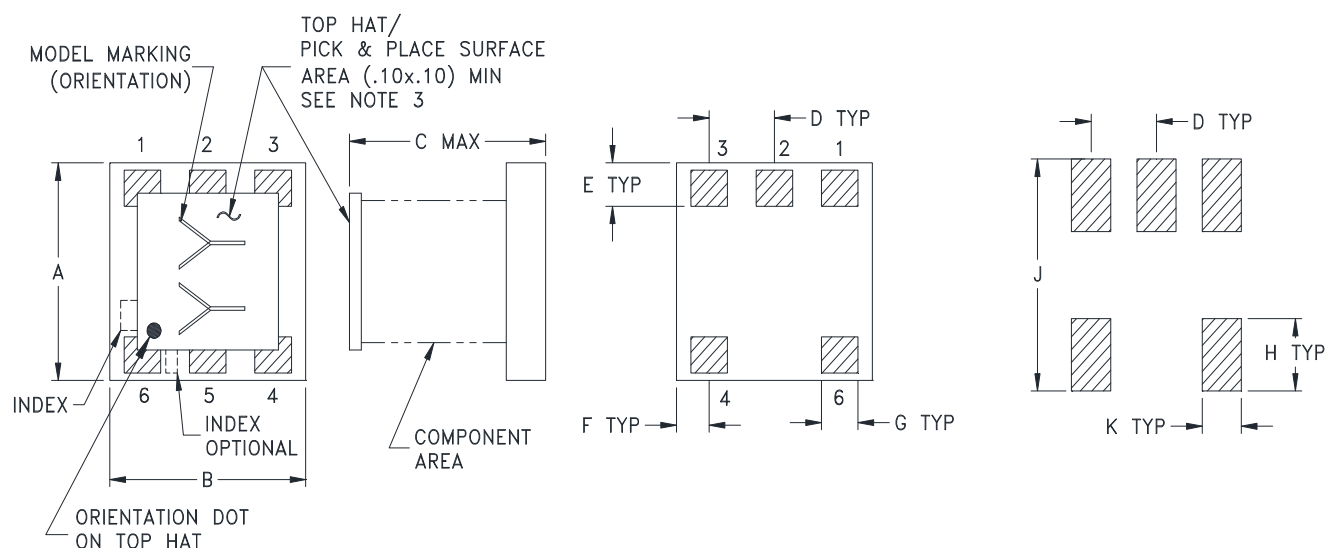


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## Outline Dimensions

AT1667

## PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm .002$

| CASE # | A              | B              | C              | D              | E              | F              | G              | H              | J              | K              | L        | WT. GRAMS |
|--------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------|-----------|
| AT1667 | .150<br>(3.81) | .150<br>(3.81) | .150<br>(3.81) | .050<br>(1.27) | .030<br>(0.76) | .025<br>(0.64) | .028<br>(0.71) | .050<br>(1.27) | .160<br>(4.06) | .030<br>(0.76) | --<br>-- | .10       |

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .01$ ; 3 Pl.  $\pm .005$

### Notes:

1. Open style, Ceramic base.
2. Termination finish: Palladium Silver.
3. Top-hat total thickness: .013 inches MAX.
4. Orientation Dot on Top Hat & Marking on the Substrate both refers to Pin #6 of the Unit.



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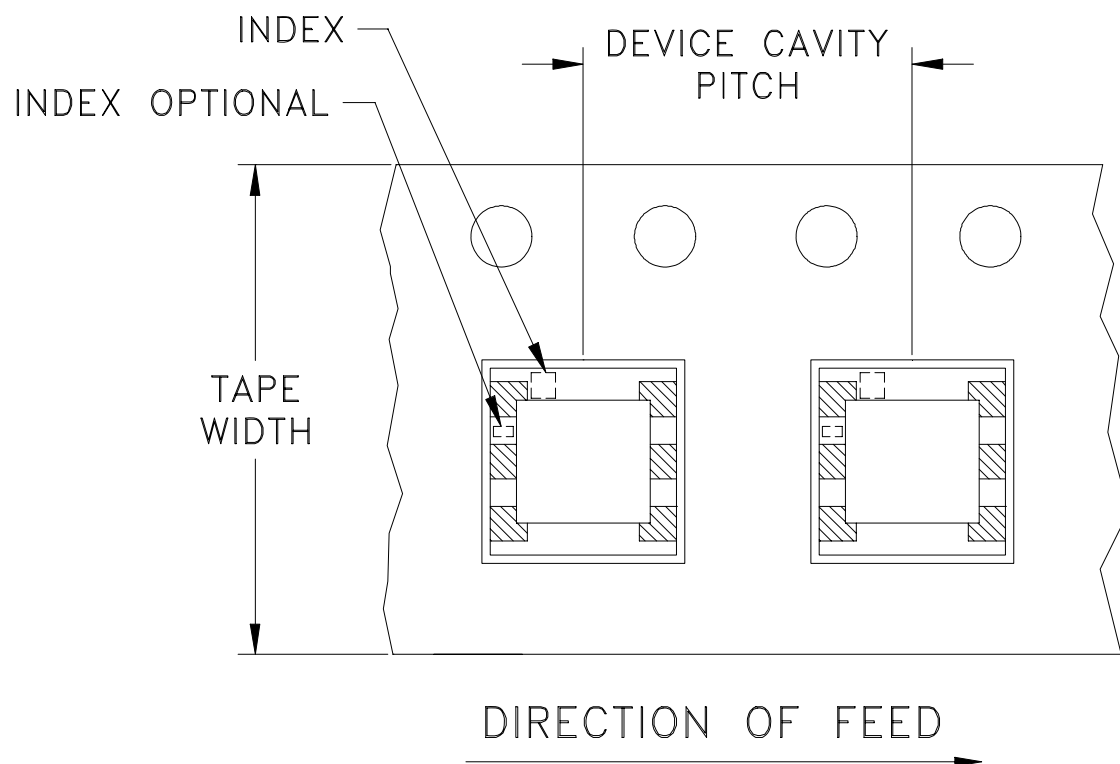


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RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F15

## DEVICE ORIENTATION IN T&R



| Tape Width,<br>mm | Device Cavity<br>Pitch, mm | Reel Size,<br>inches | Devices per Reel |
|-------------------|----------------------------|----------------------|------------------|
| 12                | 8                          | 7                    | 20               |
|                   |                            |                      | 50               |
|                   |                            |                      | 100              |
|                   |                            |                      | 200              |
|                   |                            | 13                   | 500              |
|                   |                            |                      | 1000             |
|                   |                            |                      | 2000             |

**Note:** Please consult individual model data sheet to determine device per reel availability.

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.

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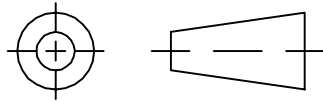
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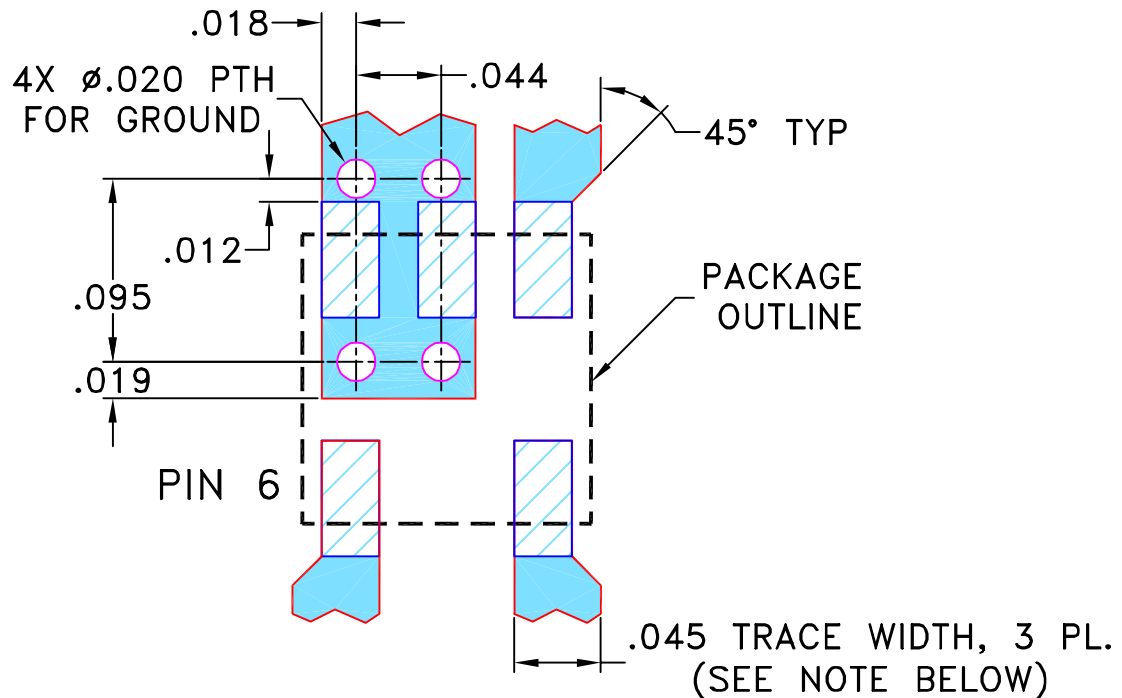
## THIRD ANGLE PROJECTION



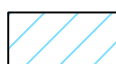
## REVISIONS

| REV | ECN No. | DESCRIPTION           | DATE     | DR | AUTH |
|-----|---------|-----------------------|----------|----|------|
| OR  | M90456  | NEW RELEASE           | 01/16/04 | AV | WP   |
| A   | M102713 | ADDED "...WITH SMOBC" | 01/12/06 | GF | IL   |
|     |         |                       |          |    |      |
|     |         |                       |          |    |      |

### SUGGESTED MOUNTING CONFIGURATION FOR AT1029 CASE STYLE, "nc" PIN CONNECTION



- NOTE: 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS  $0.020'' \pm 0.0015''$ ; 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

TOLERANCES ON:

2 PL DECIMALS  $\pm$ 3 PL DECIMALS  $\pm$  .005ANGLES  $\pm$ FRACTIONS  $\pm$ 

DRAWN

AV

01/07/04

CHECKED

IL

01/16/04

APPROVED

WP

01/16/04


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**PL, nc, AT1029, SBTC, TB-274**

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ASHEETA1.DWG REV:A DATE:01/12/95

SIZE

A

CODE IDENT

15542

DRAWING NO:

98-PL-152

REV:

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FILE: 98PL152

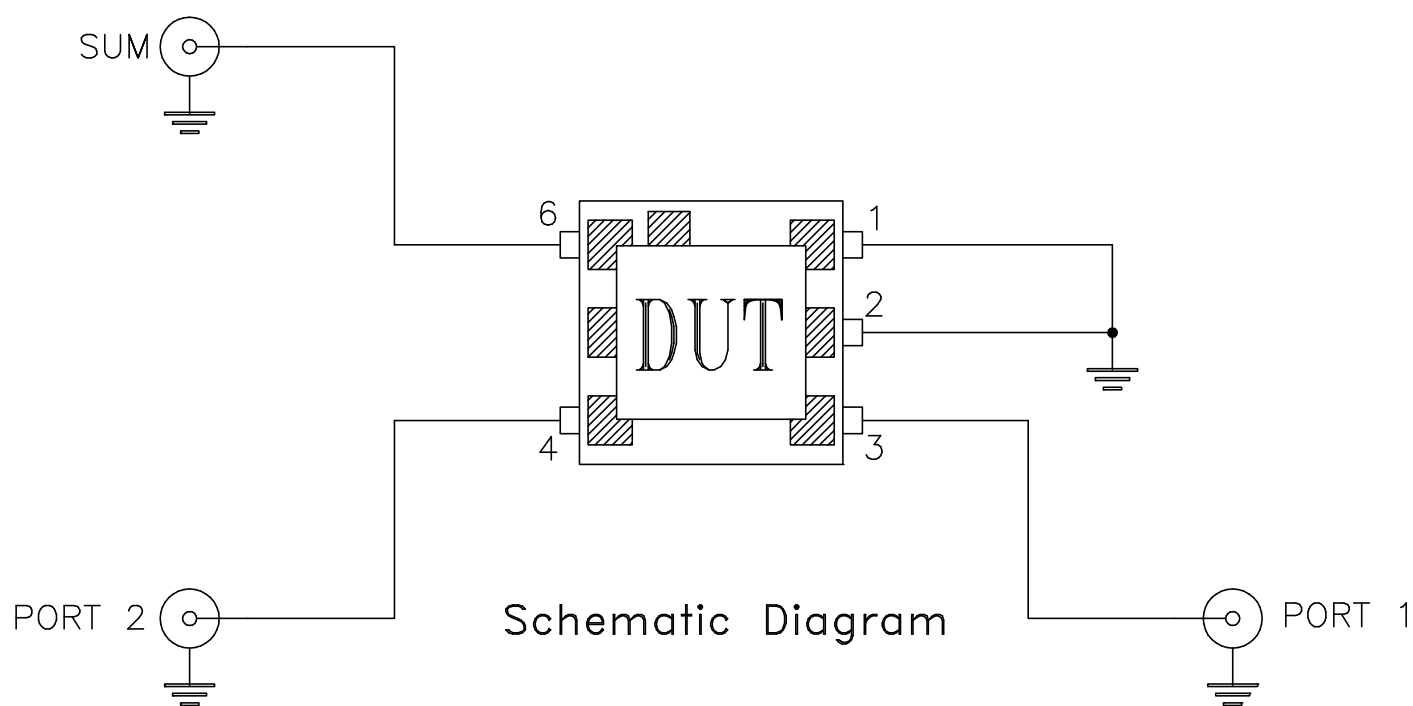
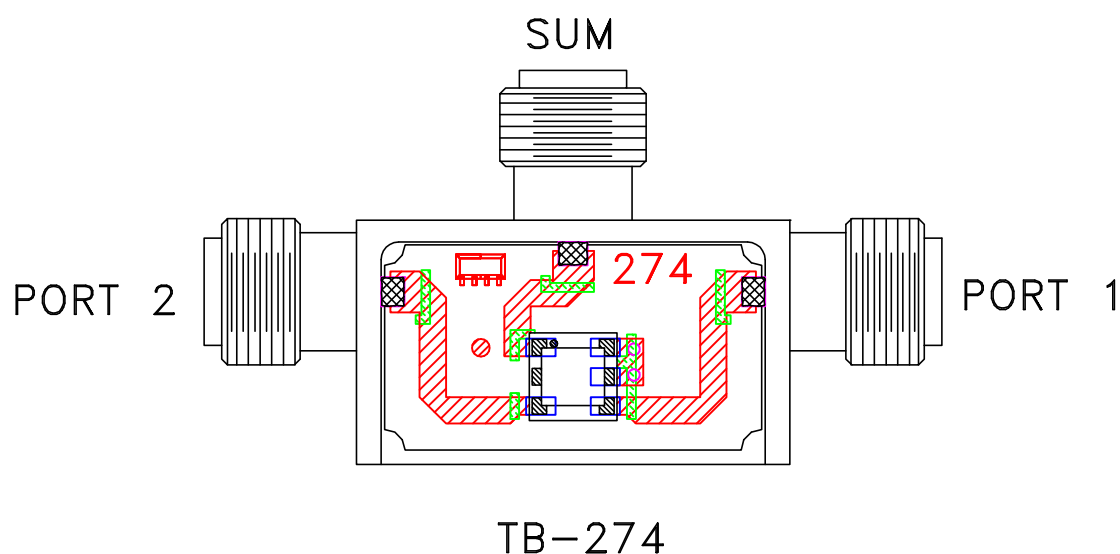
SCALE:

10:1

SHEET:

1 OF 1

# Evaluation Board and Circuit



## 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                                                                              |