



Mini-Circuits®

SURFACE MOUNT

## Power Splitter/Combiner

SBTC-2-20L+

2 Way-0° 50Ω 200 to 2000 MHz

## FEATURES

- Wideband Frequency, 200 to 2000 MHz
- Excellent Amplitude Unbalance, 0.2 dB Typ.
- Small Size, 0.166x0.150x0.155"
- 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
- VSAT

For Model  
without Leads see  
[SBTC-2-20+](#)



Generic photo used for illustration purposes only  
CASE STYLE: AT1029

**+RoHS Compliant**

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

## ELECTRICAL SPECIFICATIONS AT +25°C

| 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  |        |

## ABSOLUTE MAXIMUM RATINGS

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

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

## ELECTRICAL SCHEMATIC



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[www.minicircuits.com](http://www.minicircuits.com) P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 [sales@minicircuits.com](mailto:sales@minicircuits.com)

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ECO-014605  
SBTC-2-20L+  
MCL NY  
251007

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## SURFACE MOUNT

## Power Splitter/Combiner

SBTC-2-20L+

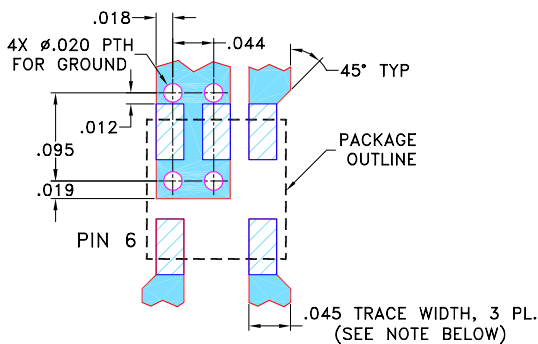
2 Way-0° 50Ω 200 to 2000 MHz

## PIN CONNECTIONS

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

PRODUCT MARKING: N/A

DEMO BOARD MCL P/N: TB-SBTC-2-20L+  
SUGGESTED PCB LAYOUT (PL-152)

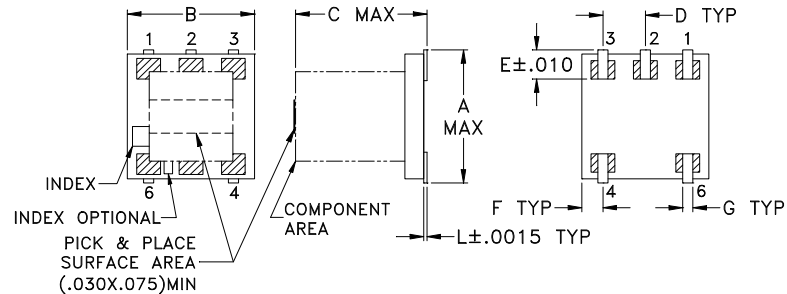


NOTE: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS  $0.020" \pm 0.0015"$ ; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.

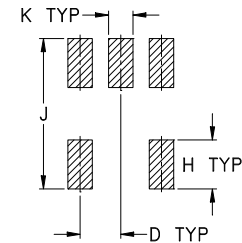
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

## OUTLINE DRAWING



## PCB Land Pattern



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

## OUTLINE DIMENSIONS (Inches mm)

| A    | B    | C    | D    | E    | F    | G    | H    | J    | K    | L    | wt    |
|------|------|------|------|------|------|------|------|------|------|------|-------|
| .166 | .150 | .155 | .050 | .037 | .025 | .012 | .060 | .184 | .030 | .004 | grams |
| 4.22 | 3.81 | 3.94 | 1.27 | 0.94 | 0.64 | 0.30 | 1.52 | 4.67 | 0.76 | 0.10 | 0.10  |

## TAPE &amp; REEL INFORMATION: F76



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SURFACE MOUNT

## Power Splitter/Combiner

SBTC-2-20L+

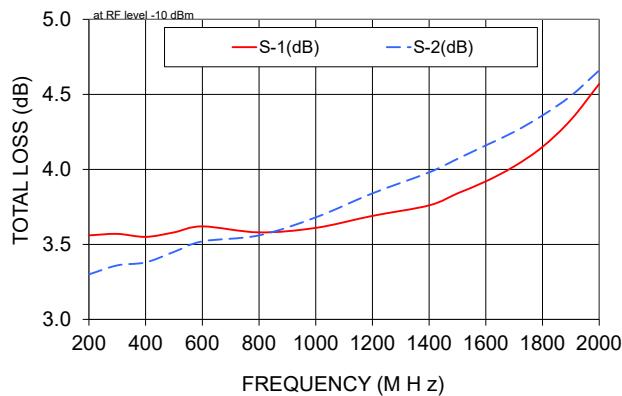
2 Way-0° 50Ω 200 to 2000 MHz

## TYPICAL PERFORMANCE DATA

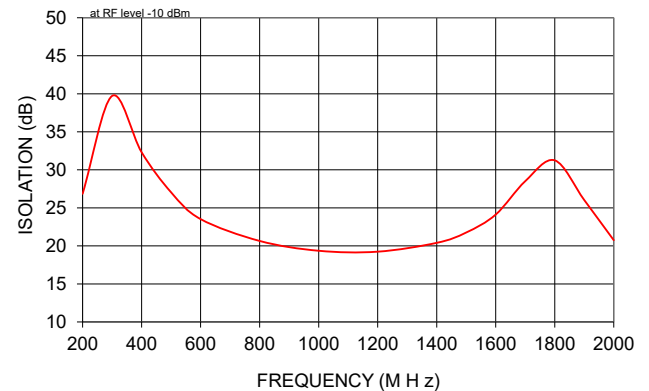
| Frequency<br>(MHz) | Total Loss <sup>1</sup><br>(dB) |      | Amplitude<br>Unbalance<br>(dB) | Isolation<br>(dB) | Phase<br>Unbalance<br>(deg.) | VSWR<br>(:1) |      |      |
|--------------------|---------------------------------|------|--------------------------------|-------------------|------------------------------|--------------|------|------|
|                    | S-1                             | S-2  |                                |                   |                              | S            | 1    | 2    |
| 200                | 3.56                            | 3.30 | 0.26                           | 26.85             | 1.44                         | 1.38         | 1.58 | 1.50 |
| 300                | 3.57                            | 3.36 | 0.21                           | 39.72             | 0.88                         | 1.37         | 1.44 | 1.40 |
| 400                | 3.55                            | 3.38 | 0.17                           | 32.31             | 0.56                         | 1.38         | 1.35 | 1.33 |
| 500                | 3.58                            | 3.45 | 0.13                           | 27.04             | 0.36                         | 1.37         | 1.29 | 1.28 |
| 600                | 3.62                            | 3.52 | 0.10                           | 23.52             | 0.22                         | 1.40         | 1.25 | 1.25 |
| 800                | 3.58                            | 3.56 | 0.03                           | 20.65             | 0.20                         | 1.39         | 1.17 | 1.16 |
| 1000               | 3.61                            | 3.68 | 0.07                           | 19.36             | 0.41                         | 1.37         | 1.12 | 1.08 |
| 1200               | 3.69                            | 3.84 | 0.15                           | 19.24             | 0.93                         | 1.34         | 1.14 | 1.04 |
| 1400               | 3.76                            | 3.98 | 0.22                           | 20.40             | 1.78                         | 1.30         | 1.23 | 1.13 |
| 1500               | 3.84                            | 4.07 | 0.23                           | 21.76             | 2.34                         | 1.29         | 1.29 | 1.18 |
| 1600               | 3.92                            | 4.16 | 0.24                           | 24.12             | 2.94                         | 1.28         | 1.35 | 1.23 |
| 1700               | 4.02                            | 4.25 | 0.24                           | 28.51             | 3.61                         | 1.27         | 1.40 | 1.29 |
| 1800               | 4.15                            | 4.36 | 0.21                           | 31.25             | 4.31                         | 1.27         | 1.45 | 1.34 |
| 1900               | 4.33                            | 4.49 | 0.18                           | 26.03             | 4.98                         | 1.32         | 1.49 | 1.38 |
| 2000               | 4.57                            | 4.66 | 0.16                           | 20.75             | 5.63                         | 1.40         | 1.51 | 1.42 |

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

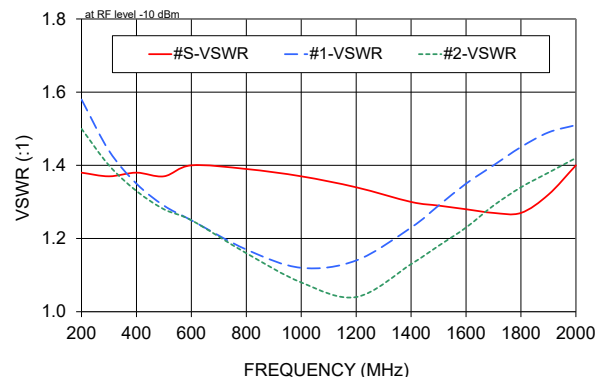
TOTAL LOSS



ISOLATION



VSWR



## 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-Circuits' applicable established test performance criteria and measurement instructions.
- C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard. Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/terms/viewterm.html](http://www.minicircuits.com/terms/viewterm.html)



# 2 Way-0° Power Splitter/Combiner

**SBTC-2-20L+**

## 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)<br>1-2 | VSWR<br>(:1) |      |      |
|----------------|---------------------------------|------|------------------------|---------------------------|--------------------------|--------------|------|------|
|                | S-1                             | S-2  |                        |                           |                          | S            | 1    | 2    |
| 40             | 4.02                            | 3.19 | 0.83                   | 3.62                      | 12.82                    | 1.75         | 3.54 | 2.79 |
| 50             | 3.88                            | 3.16 | 0.71                   | 3.61                      | 13.82                    | 1.62         | 3.00 | 2.45 |
| 100            | 3.60                            | 3.21 | 0.39                   | 2.63                      | 18.71                    | 1.41         | 1.96 | 1.77 |
| 150            | 3.53                            | 3.24 | 0.29                   | 1.89                      | 23.02                    | 1.37         | 1.66 | 1.56 |
| 200            | 3.50                            | 3.26 | 0.24                   | 1.35                      | 27.38                    | 1.36         | 1.51 | 1.46 |
| 250            | 3.48                            | 3.27 | 0.21                   | 0.97                      | 32.24                    | 1.36         | 1.42 | 1.40 |
| 300            | 3.47                            | 3.28 | 0.19                   | 0.72                      | 35.80                    | 1.36         | 1.36 | 1.35 |
| 350            | 3.47                            | 3.29 | 0.18                   | 0.48                      | 33.42                    | 1.35         | 1.32 | 1.32 |
| 400            | 3.46                            | 3.31 | 0.15                   | 0.26                      | 30.06                    | 1.35         | 1.28 | 1.29 |
| 450            | 3.47                            | 3.31 | 0.16                   | 0.08                      | 27.53                    | 1.35         | 1.24 | 1.27 |
| 500            | 3.46                            | 3.33 | 0.13                   | 0.03                      | 25.65                    | 1.35         | 1.21 | 1.24 |
| 550            | 3.47                            | 3.34 | 0.13                   | 0.17                      | 24.16                    | 1.35         | 1.18 | 1.22 |
| 600            | 3.47                            | 3.36 | 0.12                   | 0.31                      | 22.97                    | 1.35         | 1.15 | 1.20 |
| 650            | 3.48                            | 3.37 | 0.11                   | 0.42                      | 21.99                    | 1.35         | 1.12 | 1.18 |
| 700            | 3.49                            | 3.39 | 0.10                   | 0.52                      | 21.15                    | 1.35         | 1.10 | 1.16 |
| 750            | 3.50                            | 3.41 | 0.09                   | 0.58                      | 20.45                    | 1.35         | 1.08 | 1.14 |
| 800            | 3.51                            | 3.43 | 0.08                   | 0.67                      | 19.84                    | 1.35         | 1.07 | 1.12 |
| 850            | 3.52                            | 3.45 | 0.07                   | 0.69                      | 19.33                    | 1.35         | 1.06 | 1.10 |
| 900            | 3.53                            | 3.48 | 0.05                   | 0.73                      | 18.90                    | 1.35         | 1.07 | 1.09 |
| 950            | 3.54                            | 3.50 | 0.04                   | 0.75                      | 18.53                    | 1.35         | 1.08 | 1.07 |
| 1000           | 3.56                            | 3.53 | 0.03                   | 0.79                      | 18.24                    | 1.36         | 1.10 | 1.06 |
| 1050           | 3.57                            | 3.56 | 0.01                   | 0.80                      | 17.98                    | 1.36         | 1.13 | 1.05 |
| 1100           | 3.59                            | 3.59 | 0.00                   | 0.77                      | 17.79                    | 1.36         | 1.16 | 1.05 |
| 1150           | 3.61                            | 3.61 | 0.00                   | 0.76                      | 17.66                    | 1.36         | 1.19 | 1.06 |
| 1200           | 3.63                            | 3.65 | 0.02                   | 0.70                      | 17.59                    | 1.37         | 1.22 | 1.07 |
| 1250           | 3.66                            | 3.68 | 0.02                   | 0.67                      | 17.58                    | 1.37         | 1.26 | 1.09 |
| 1300           | 3.68                            | 3.72 | 0.04                   | 0.59                      | 17.64                    | 1.37         | 1.29 | 1.11 |
| 1350           | 3.71                            | 3.75 | 0.04                   | 0.50                      | 17.74                    | 1.37         | 1.32 | 1.13 |
| 1400           | 3.73                            | 3.79 | 0.06                   | 0.35                      | 17.94                    | 1.37         | 1.36 | 1.15 |
| 1450           | 3.76                            | 3.82 | 0.06                   | 0.24                      | 18.19                    | 1.37         | 1.40 | 1.17 |
| 1500           | 3.79                            | 3.86 | 0.07                   | 0.12                      | 18.53                    | 1.37         | 1.43 | 1.19 |
| 1550           | 3.82                            | 3.89 | 0.07                   | 0.05                      | 18.98                    | 1.37         | 1.47 | 1.22 |
| 1600           | 3.86                            | 3.93 | 0.07                   | 0.19                      | 19.51                    | 1.37         | 1.51 | 1.24 |
| 1650           | 3.89                            | 3.97 | 0.08                   | 0.33                      | 20.19                    | 1.36         | 1.54 | 1.26 |
| 1700           | 3.93                            | 4.01 | 0.08                   | 0.49                      | 20.98                    | 1.35         | 1.57 | 1.28 |
| 1750           | 3.97                            | 4.05 | 0.08                   | 0.66                      | 21.91                    | 1.35         | 1.60 | 1.31 |
| 1800           | 4.02                            | 4.09 | 0.07                   | 0.82                      | 22.91                    | 1.34         | 1.63 | 1.33 |
| 1850           | 4.07                            | 4.14 | 0.07                   | 1.04                      | 23.78                    | 1.33         | 1.66 | 1.35 |
| 1900           | 4.13                            | 4.19 | 0.06                   | 1.19                      | 24.27                    | 1.33         | 1.67 | 1.36 |
| 1950           | 4.19                            | 4.24 | 0.05                   | 1.38                      | 24.03                    | 1.33         | 1.68 | 1.38 |
| 2000           | 4.26                            | 4.30 | 0.04                   | 1.51                      | 22.96                    | 1.33         | 1.69 | 1.39 |
| 2050           | 4.35                            | 4.36 | 0.01                   | 1.68                      | 21.38                    | 1.35         | 1.69 | 1.40 |
| 2100           | 4.45                            | 4.44 | 0.01                   | 1.80                      | 19.67                    | 1.37         | 1.68 | 1.41 |
| 2150           | 4.56                            | 4.53 | 0.04                   | 1.89                      | 18.00                    | 1.41         | 1.67 | 1.41 |
| 2200           | 4.69                            | 4.64 | 0.06                   | 1.89                      | 16.47                    | 1.46         | 1.64 | 1.41 |
| 2250           | 4.85                            | 4.75 | 0.09                   | 1.90                      | 15.07                    | 1.52         | 1.61 | 1.41 |
| 2300           | 5.02                            | 4.90 | 0.12                   | 1.78                      | 13.82                    | 1.60         | 1.57 | 1.41 |
| 2350           | 5.24                            | 5.06 | 0.18                   | 1.56                      | 12.70                    | 1.69         | 1.53 | 1.40 |
| 2400           | 5.46                            | 5.24 | 0.22                   | 1.30                      | 11.71                    | 1.80         | 1.48 | 1.39 |
| 2450           | 5.73                            | 5.46 | 0.27                   | 0.88                      | 10.82                    | 1.92         | 1.43 | 1.38 |
| 2500           | 6.01                            | 5.70 | 0.31                   | 0.24                      | 10.03                    | 2.05         | 1.38 | 1.38 |
| 2550           | 6.34                            | 5.98 | 0.36                   | 0.50                      | 9.32                     | 2.19         | 1.32 | 1.37 |
| 2600           | 6.70                            | 6.28 | 0.42                   | 1.53                      | 8.71                     | 2.34         | 1.27 | 1.37 |

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

REV. X2  
SBTC-2-20L+  
100627  
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# 2 Way-0° Power Splitter/Combiner

**SBTC-2-20L+**

## 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)<br>1-2 | VSWR<br>(:1) |      |      |
|----------------|---------------------------------|------|------------------------|---------------------------|--------------------------|--------------|------|------|
|                | S-1                             | S-2  |                        |                           |                          | S            | 1    | 2    |
| 40             | 4.05                            | 3.21 | 0.84                   | 3.55                      | 12.83                    | 1.74         | 3.56 | 2.81 |
| 50             | 3.89                            | 3.18 | 0.72                   | 3.54                      | 13.79                    | 1.61         | 3.03 | 2.47 |
| 100            | 3.60                            | 3.20 | 0.40                   | 2.63                      | 18.61                    | 1.42         | 2.00 | 1.80 |
| 150            | 3.52                            | 3.22 | 0.30                   | 1.91                      | 22.95                    | 1.38         | 1.69 | 1.59 |
| 200            | 3.47                            | 3.23 | 0.24                   | 1.40                      | 27.33                    | 1.36         | 1.53 | 1.48 |
| 250            | 3.45                            | 3.24 | 0.21                   | 1.03                      | 32.47                    | 1.36         | 1.45 | 1.42 |
| 300            | 3.44                            | 3.25 | 0.19                   | 0.81                      | 37.36                    | 1.36         | 1.39 | 1.38 |
| 350            | 3.43                            | 3.25 | 0.18                   | 0.56                      | 34.53                    | 1.36         | 1.34 | 1.34 |
| 400            | 3.43                            | 3.26 | 0.17                   | 0.38                      | 30.65                    | 1.36         | 1.30 | 1.31 |
| 450            | 3.42                            | 3.26 | 0.16                   | 0.22                      | 27.95                    | 1.36         | 1.26 | 1.29 |
| 500            | 3.41                            | 3.27 | 0.14                   | 0.10                      | 25.91                    | 1.36         | 1.23 | 1.26 |
| 550            | 3.42                            | 3.28 | 0.14                   | 0.04                      | 24.32                    | 1.36         | 1.20 | 1.24 |
| 600            | 3.42                            | 3.30 | 0.13                   | 0.17                      | 23.11                    | 1.36         | 1.17 | 1.22 |
| 650            | 3.42                            | 3.30 | 0.12                   | 0.25                      | 22.10                    | 1.36         | 1.15 | 1.20 |
| 700            | 3.42                            | 3.32 | 0.10                   | 0.35                      | 21.25                    | 1.36         | 1.12 | 1.18 |
| 750            | 3.43                            | 3.33 | 0.10                   | 0.43                      | 20.52                    | 1.36         | 1.10 | 1.16 |
| 800            | 3.44                            | 3.35 | 0.09                   | 0.44                      | 19.91                    | 1.36         | 1.08 | 1.14 |
| 850            | 3.44                            | 3.37 | 0.07                   | 0.40                      | 19.36                    | 1.36         | 1.07 | 1.12 |
| 900            | 3.44                            | 3.38 | 0.06                   | 0.47                      | 18.92                    | 1.37         | 1.07 | 1.11 |
| 950            | 3.45                            | 3.41 | 0.04                   | 0.52                      | 18.51                    | 1.37         | 1.08 | 1.09 |
| 1000           | 3.46                            | 3.43 | 0.03                   | 0.61                      | 18.21                    | 1.37         | 1.10 | 1.07 |
| 1050           | 3.48                            | 3.46 | 0.02                   | 0.64                      | 17.98                    | 1.37         | 1.12 | 1.06 |
| 1100           | 3.49                            | 3.48 | 0.01                   | 0.58                      | 17.81                    | 1.37         | 1.15 | 1.06 |
| 1150           | 3.51                            | 3.50 | 0.01                   | 0.53                      | 17.66                    | 1.37         | 1.18 | 1.06 |
| 1200           | 3.52                            | 3.53 | 0.01                   | 0.50                      | 17.56                    | 1.38         | 1.21 | 1.07 |
| 1250           | 3.54                            | 3.56 | 0.02                   | 0.47                      | 17.54                    | 1.38         | 1.24 | 1.08 |
| 1300           | 3.55                            | 3.58 | 0.03                   | 0.34                      | 17.63                    | 1.37         | 1.28 | 1.10 |
| 1350           | 3.57                            | 3.61 | 0.04                   | 0.18                      | 17.79                    | 1.37         | 1.31 | 1.12 |
| 1400           | 3.59                            | 3.64 | 0.05                   | 0.03                      | 17.95                    | 1.37         | 1.35 | 1.14 |
| 1450           | 3.62                            | 3.67 | 0.05                   | 0.12                      | 18.17                    | 1.37         | 1.38 | 1.16 |
| 1500           | 3.64                            | 3.70 | 0.06                   | 0.22                      | 18.52                    | 1.37         | 1.42 | 1.18 |
| 1550           | 3.67                            | 3.73 | 0.06                   | 0.34                      | 18.99                    | 1.37         | 1.46 | 1.20 |
| 1600           | 3.70                            | 3.77 | 0.07                   | 0.45                      | 19.51                    | 1.36         | 1.49 | 1.23 |
| 1650           | 3.73                            | 3.80 | 0.07                   | 0.57                      | 20.17                    | 1.36         | 1.53 | 1.25 |
| 1700           | 3.76                            | 3.83 | 0.07                   | 0.74                      | 20.99                    | 1.35         | 1.56 | 1.27 |
| 1750           | 3.79                            | 3.87 | 0.08                   | 0.89                      | 21.94                    | 1.34         | 1.59 | 1.30 |
| 1800           | 3.83                            | 3.90 | 0.07                   | 1.05                      | 22.90                    | 1.33         | 1.61 | 1.31 |
| 1850           | 3.88                            | 3.94 | 0.06                   | 1.35                      | 23.73                    | 1.33         | 1.64 | 1.33 |
| 1900           | 3.93                            | 3.99 | 0.06                   | 1.49                      | 24.34                    | 1.33         | 1.66 | 1.35 |
| 1950           | 3.97                            | 4.03 | 0.06                   | 1.64                      | 24.49                    | 1.33         | 1.67 | 1.37 |
| 2000           | 4.05                            | 4.09 | 0.05                   | 1.78                      | 23.79                    | 1.35         | 1.69 | 1.39 |
| 2050           | 4.13                            | 4.15 | 0.02                   | 1.99                      | 22.19                    | 1.37         | 1.70 | 1.40 |
| 2100           | 4.21                            | 4.22 | 0.01                   | 2.22                      | 20.26                    | 1.38         | 1.69 | 1.40 |
| 2150           | 4.30                            | 4.30 | 0.00                   | 2.30                      | 18.46                    | 1.41         | 1.66 | 1.41 |
| 2200           | 4.42                            | 4.41 | 0.01                   | 2.22                      | 16.86                    | 1.46         | 1.64 | 1.41 |
| 2250           | 4.56                            | 4.50 | 0.06                   | 2.22                      | 15.40                    | 1.53         | 1.62 | 1.41 |
| 2300           | 4.72                            | 4.63 | 0.09                   | 2.20                      | 14.09                    | 1.60         | 1.59 | 1.41 |
| 2350           | 4.90                            | 4.77 | 0.13                   | 2.04                      | 12.95                    | 1.68         | 1.55 | 1.40 |
| 2400           | 5.10                            | 4.93 | 0.17                   | 1.85                      | 11.96                    | 1.78         | 1.50 | 1.39 |
| 2450           | 5.34                            | 5.12 | 0.22                   | 1.54                      | 11.06                    | 1.90         | 1.45 | 1.38 |
| 2500           | 5.61                            | 5.35 | 0.25                   | 1.08                      | 10.22                    | 2.04         | 1.39 | 1.38 |
| 2550           | 5.91                            | 5.61 | 0.30                   | 0.50                      | 9.49                     | 2.19         | 1.34 | 1.38 |
| 2600           | 6.23                            | 5.89 | 0.34                   | 0.31                      | 8.85                     | 2.35         | 1.30 | 1.38 |

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

REV. X2  
SBTC-2-20L+  
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# 2 Way-0° Power Splitter/Combiner

**SBTC-2-20L+**

## 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 |           |      |
|----------------|---------------------------------|------|------------------------|---------------------------|-------------------|------|-----------|------|
|                | S-1                             | S-2  |                        |                           |                   | S    | (:1)<br>1 | 2    |
| 40             | 4.01                            | 3.18 | 0.83                   | 3.65                      | 12.86             | 1.76 | 3.51      | 2.77 |
| 50             | 3.87                            | 3.16 | 0.70                   | 3.62                      | 13.89             | 1.62 | 2.98      | 2.44 |
| 100            | 3.60                            | 3.21 | 0.38                   | 2.63                      | 18.77             | 1.41 | 1.94      | 1.75 |
| 150            | 3.52                            | 3.24 | 0.28                   | 1.85                      | 22.98             | 1.37 | 1.63      | 1.54 |
| 200            | 3.50                            | 3.27 | 0.23                   | 1.33                      | 27.24             | 1.36 | 1.50      | 1.45 |
| 250            | 3.49                            | 3.28 | 0.21                   | 0.95                      | 31.84             | 1.36 | 1.41      | 1.39 |
| 300            | 3.48                            | 3.30 | 0.18                   | 0.73                      | 34.75             | 1.35 | 1.35      | 1.34 |
| 350            | 3.48                            | 3.31 | 0.17                   | 0.45                      | 32.78             | 1.35 | 1.30      | 1.31 |
| 400            | 3.47                            | 3.32 | 0.15                   | 0.26                      | 29.76             | 1.35 | 1.26      | 1.28 |
| 450            | 3.48                            | 3.33 | 0.15                   | 0.10                      | 27.34             | 1.35 | 1.22      | 1.25 |
| 500            | 3.48                            | 3.35 | 0.13                   | 0.04                      | 25.50             | 1.35 | 1.19      | 1.23 |
| 550            | 3.49                            | 3.37 | 0.12                   | 0.21                      | 24.06             | 1.35 | 1.17      | 1.21 |
| 600            | 3.50                            | 3.38 | 0.12                   | 0.34                      | 22.91             | 1.34 | 1.14      | 1.19 |
| 650            | 3.51                            | 3.40 | 0.11                   | 0.45                      | 21.94             | 1.34 | 1.11      | 1.16 |
| 700            | 3.52                            | 3.42 | 0.10                   | 0.58                      | 21.14             | 1.34 | 1.09      | 1.15 |
| 750            | 3.54                            | 3.45 | 0.09                   | 0.67                      | 20.45             | 1.34 | 1.07      | 1.13 |
| 800            | 3.56                            | 3.47 | 0.09                   | 0.64                      | 19.86             | 1.34 | 1.06      | 1.11 |
| 850            | 3.55                            | 3.49 | 0.06                   | 0.59                      | 19.32             | 1.35 | 1.06      | 1.09 |
| 900            | 3.56                            | 3.51 | 0.05                   | 0.64                      | 18.90             | 1.35 | 1.07      | 1.07 |
| 950            | 3.58                            | 3.55 | 0.03                   | 0.71                      | 18.54             | 1.35 | 1.09      | 1.06 |
| 1000           | 3.60                            | 3.58 | 0.02                   | 0.89                      | 18.24             | 1.35 | 1.12      | 1.05 |
| 1050           | 3.63                            | 3.63 | 0.00                   | 0.97                      | 18.00             | 1.36 | 1.14      | 1.05 |
| 1100           | 3.66                            | 3.65 | 0.01                   | 0.88                      | 17.83             | 1.36 | 1.17      | 1.06 |
| 1150           | 3.68                            | 3.68 | 0.00                   | 0.84                      | 17.73             | 1.36 | 1.20      | 1.07 |
| 1200           | 3.70                            | 3.71 | 0.01                   | 0.83                      | 17.66             | 1.37 | 1.24      | 1.08 |
| 1250           | 3.73                            | 3.75 | 0.02                   | 0.83                      | 17.66             | 1.38 | 1.27      | 1.10 |
| 1300           | 3.75                            | 3.79 | 0.04                   | 0.67                      | 17.72             | 1.38 | 1.31      | 1.12 |
| 1350           | 3.78                            | 3.82 | 0.04                   | 0.45                      | 17.87             | 1.38 | 1.34      | 1.15 |
| 1400           | 3.81                            | 3.87 | 0.06                   | 0.24                      | 18.08             | 1.39 | 1.38      | 1.17 |
| 1450           | 3.84                            | 3.90 | 0.06                   | 0.08                      | 18.38             | 1.39 | 1.42      | 1.19 |
| 1500           | 3.88                            | 3.94 | 0.06                   | 0.05                      | 18.74             | 1.39 | 1.45      | 1.22 |
| 1550           | 3.91                            | 3.98 | 0.07                   | 0.08                      | 19.23             | 1.39 | 1.49      | 1.24 |
| 1600           | 3.95                            | 4.02 | 0.07                   | 0.20                      | 19.81             | 1.38 | 1.53      | 1.26 |
| 1650           | 3.99                            | 4.07 | 0.08                   | 0.27                      | 20.56             | 1.38 | 1.56      | 1.28 |
| 1700           | 4.03                            | 4.11 | 0.08                   | 0.41                      | 21.43             | 1.37 | 1.59      | 1.30 |
| 1750           | 4.07                            | 4.15 | 0.08                   | 0.55                      | 22.50             | 1.36 | 1.62      | 1.32 |
| 1800           | 4.12                            | 4.20 | 0.08                   | 0.74                      | 23.63             | 1.36 | 1.65      | 1.34 |
| 1850           | 4.18                            | 4.24 | 0.06                   | 1.05                      | 24.62             | 1.35 | 1.67      | 1.36 |
| 1900           | 4.24                            | 4.29 | 0.05                   | 1.14                      | 25.03             | 1.35 | 1.68      | 1.37 |
| 1950           | 4.29                            | 4.34 | 0.05                   | 1.30                      | 24.50             | 1.34 | 1.69      | 1.39 |
| 2000           | 4.37                            | 4.41 | 0.04                   | 1.50                      | 23.12             | 1.35 | 1.69      | 1.40 |
| 2050           | 4.47                            | 4.49 | 0.02                   | 1.73                      | 21.39             | 1.37 | 1.69      | 1.40 |
| 2100           | 4.57                            | 4.57 | 0.00                   | 1.81                      | 19.51             | 1.39 | 1.68      | 1.40 |
| 2150           | 4.69                            | 4.67 | 0.03                   | 1.88                      | 17.72             | 1.44 | 1.66      | 1.41 |
| 2200           | 4.83                            | 4.79 | 0.04                   | 1.88                      | 16.12             | 1.49 | 1.62      | 1.41 |
| 2250           | 4.99                            | 4.92 | 0.07                   | 1.86                      | 14.72             | 1.56 | 1.59      | 1.41 |
| 2300           | 5.18                            | 5.08 | 0.10                   | 1.77                      | 13.49             | 1.65 | 1.55      | 1.40 |
| 2350           | 5.41                            | 5.26 | 0.15                   | 1.53                      | 12.41             | 1.75 | 1.50      | 1.39 |
| 2400           | 5.65                            | 5.47 | 0.18                   | 1.23                      | 11.45             | 1.87 | 1.45      | 1.38 |
| 2450           | 5.94                            | 5.70 | 0.24                   | 0.82                      | 10.59             | 2.00 | 1.40      | 1.38 |
| 2500           | 6.24                            | 5.97 | 0.27                   | 0.21                      | 9.84              | 2.15 | 1.34      | 1.37 |
| 2550           | 6.60                            | 6.27 | 0.33                   | 0.43                      | 9.17              | 2.30 | 1.29      | 1.37 |
| 2600           | 6.97                            | 6.59 | 0.38                   | 1.45                      | 8.59              | 2.46 | 1.24      | 1.37 |

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

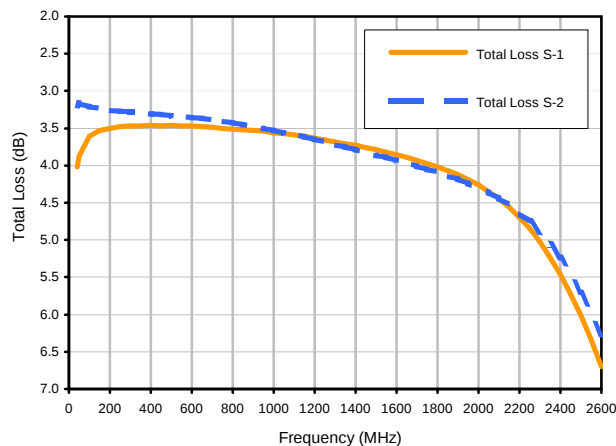
REV. X2  
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# 2 Way-0° Power Splitter/Combiner

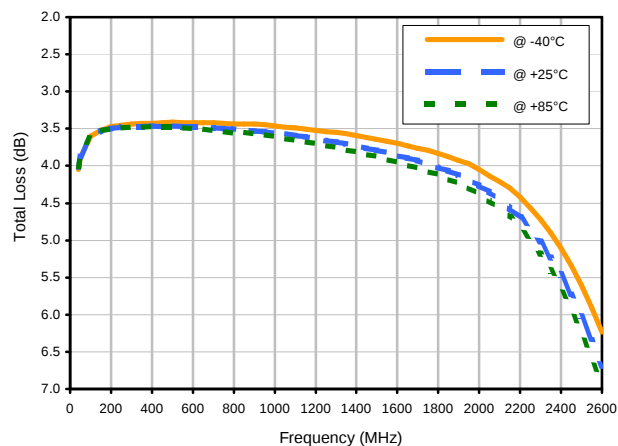
# SBTC-2-20L+

## Typical Performance Curves

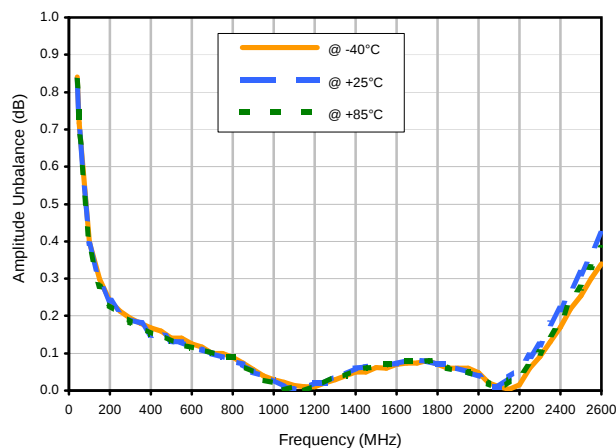
Total Loss



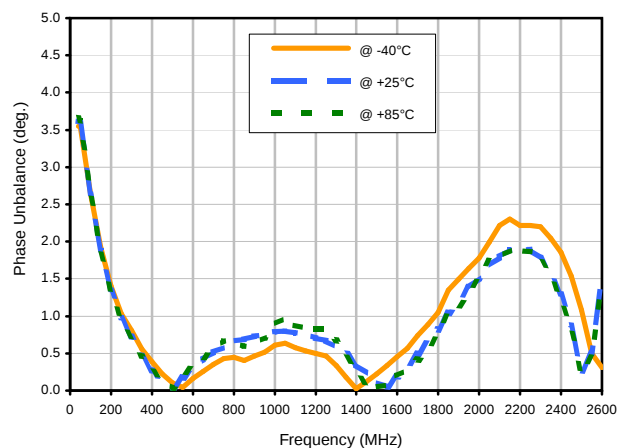
Total Loss S-1 vs. TEMPERATURE



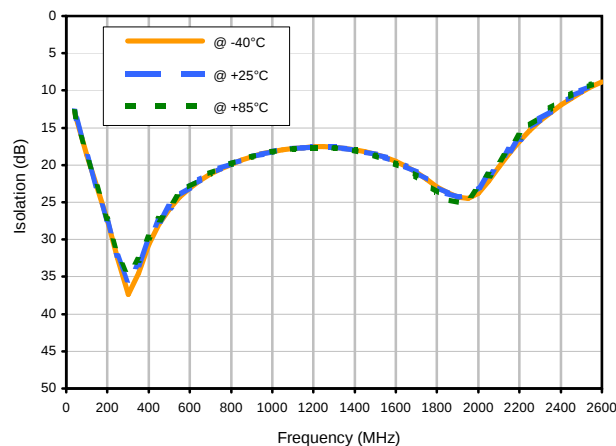
Amplitude Unbalance vs. TEMPERATURE



Phase Unbalance vs. TEMPERATURE



Isolation 1-2 vs. TEMPERATURE



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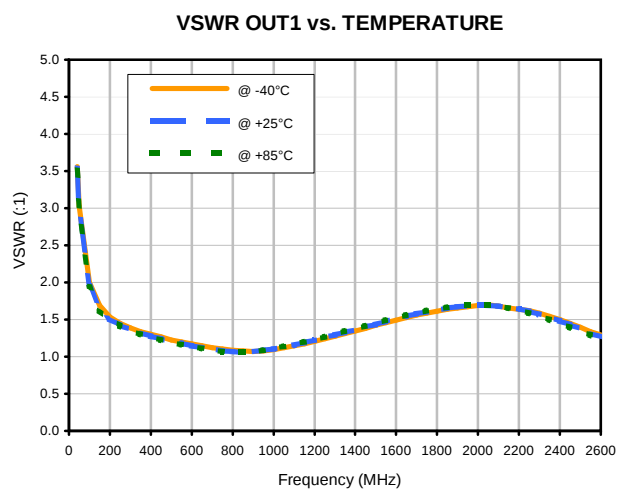
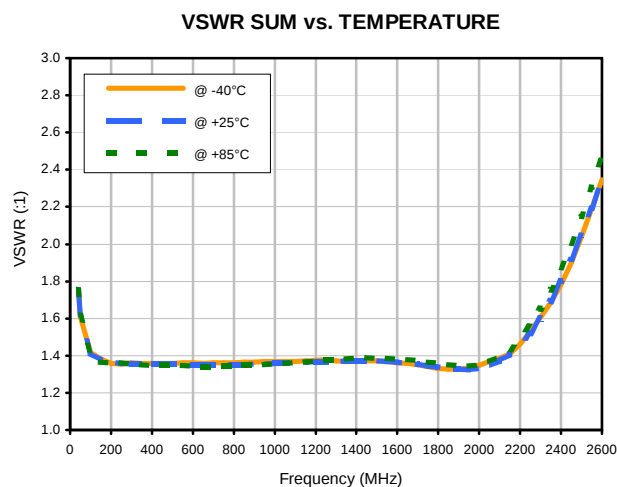
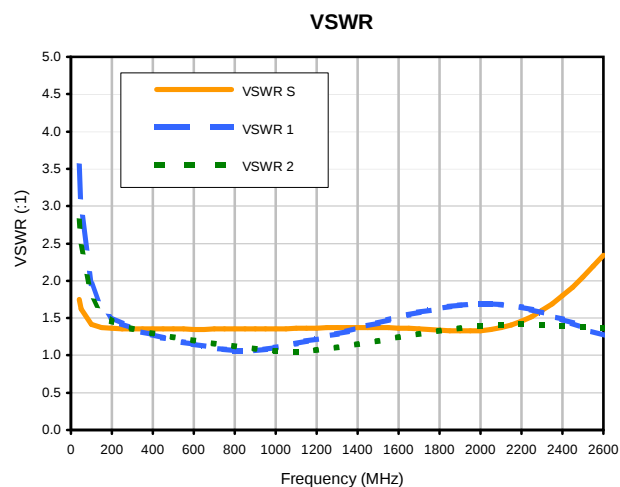
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# 2 Way-0° Power Splitter/Combiner

# SBTC-2-20L+

## Typical Performance Curves



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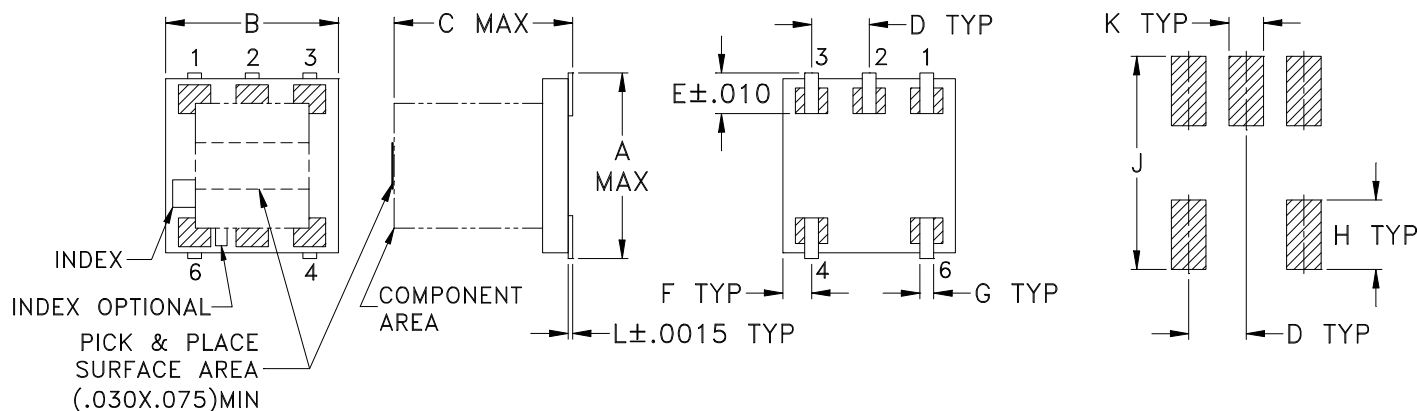
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## Outline Dimensions

AT1029

## 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 |
|--------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------|
| AT1029 | .166<br>(4.22) | .150<br>(3.81) | .155<br>(3.94) | .050<br>(1.27) | .037<br>(0.94) | .025<br>(0.64) | .012<br>(0.30) | .060<br>(1.52) | .184<br>(4.67) | .030<br>(0.76) | .004<br>(0.10) | .10       |

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

### Notes:

- Open style, ceramic base.
- Termination finish:  
For RoHS Case Styles: Tin plate.  
For RoHS-5 Case Styles: Tin-Lead plate.



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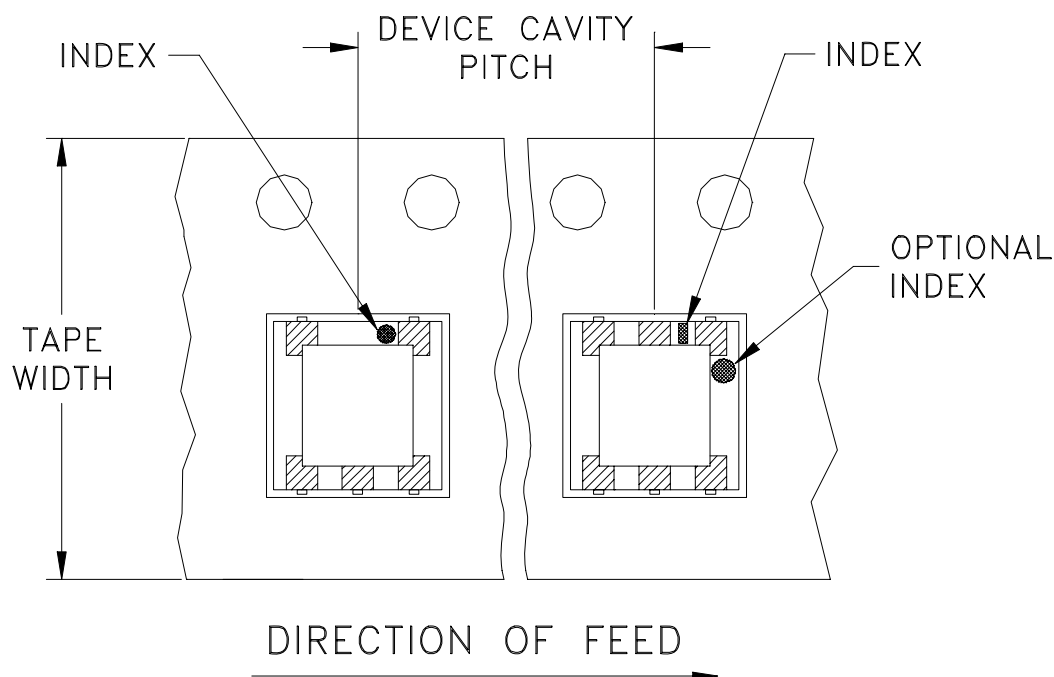


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RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F76

## 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              |
|                   |                            |                      | 500              |
|                   |                            | 13                   | 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.

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



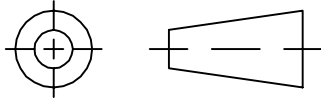
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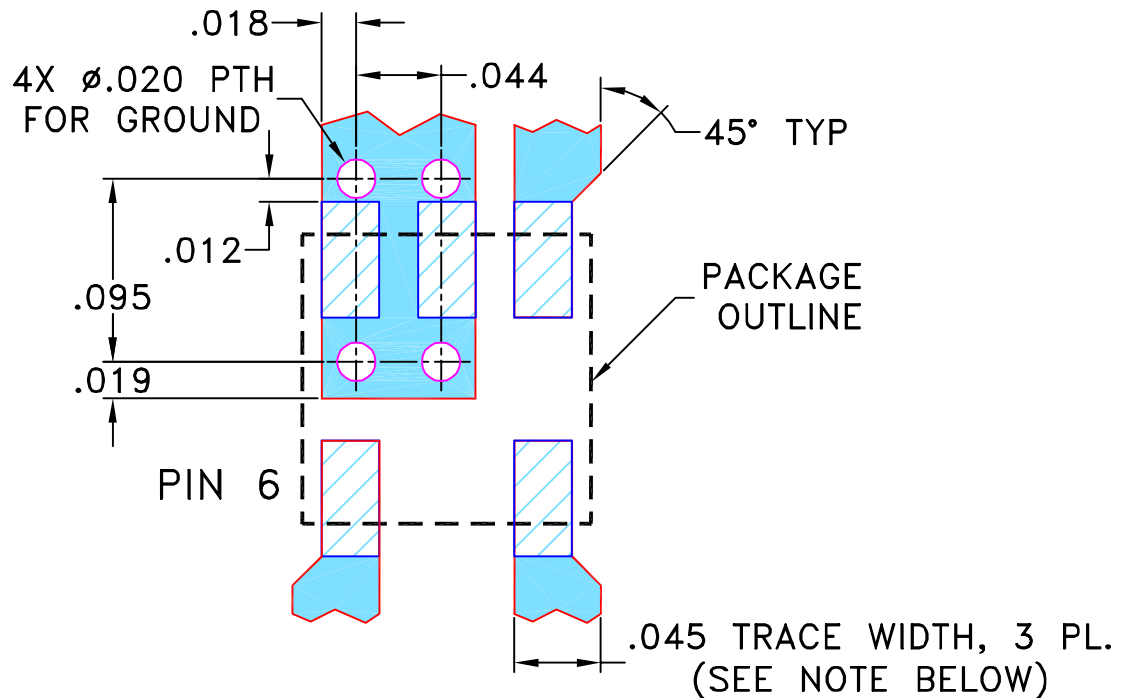
## THIRD ANGLE PROJECTION



## REVISIONS

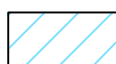
| REV | ECN No. | DESCRIPTION           | DATE     | DR | AUTH |
|-----|---------|-----------------------|----------|----|------|
| OR  | M90456  | NEW RELEASE           | 01/16/04 | AV | WP   |
| A   | M102713 | ADDED "...WITH SMOBC" | 01/12/06 | GF | IL   |
|     |         |                       |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

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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Brooklyn NY 11235

PL, nc, AT1029, SBTC, TB-274

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SIZE

A

CODE IDENT

15542

DRAWING NO:

98-PL-152

REV:

A

FILE: 98PL152

SCALE:

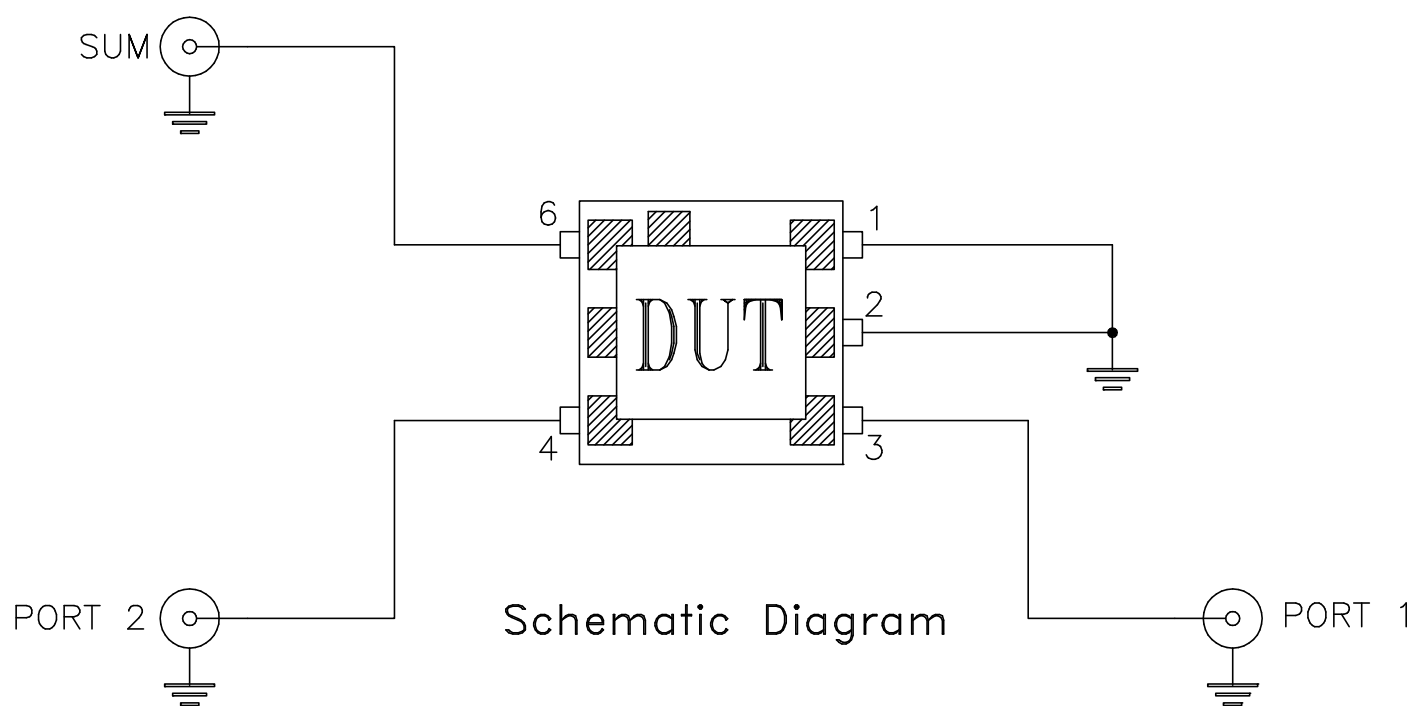
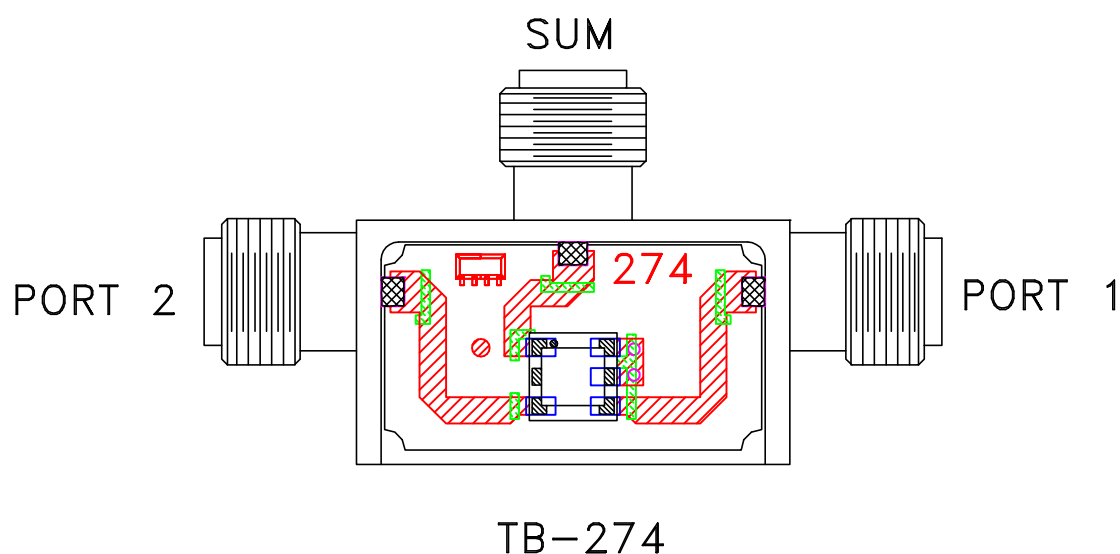
10:1

SHEET:

1 OF 1

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

# 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                                                                              |