



Mini-Circuits

SURFACE MOUNT

Power Splitter/Combiner

SBTC-2-10L+

2 Way-0° 50Ω 5 to 1000 MHz

FEATURES

- Low Insertion Loss, 0.3 dB Typ.
- Excellent Amplitude Unbalance, 0.1 dB Typ.
- Very Good Phase Unbalance, 1.0 Deg. Typ.
- Temperature Stable LTCC Base
- Small Size
- Low Cost
- Aqueous Washable
- Protected by US Patent 6,963,255

For Model
without Leads see
[SBTC-2-10+](#)



Generic photo used for illustration purposes only

CASE STYLE: AT1029

+RoHS Compliant

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

APPLICATIONS

- UHF/VHF Receivers/Transmitters
- Cellular

ELECTRICAL SPECIFICATIONS AT +25°C

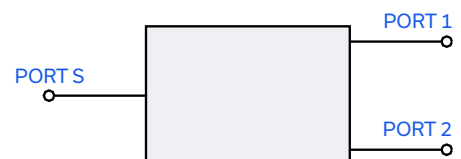
Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		5		1000	MHz
Insertion Loss Above 3.0 dB	5-50		0.3	0.7	dB
	50-500		0.3	0.8	
	500-1000		0.5	1.4	
Isolation	5-50	20	29		dB
	50-500	18	25		
	500-1000	16	21		
Phase Unbalance	5-50			3	Degree
	50-500			3	
	500-1000			5	
Amplitude Unbalance	5-50			0.6	dB
	50-500			0.5	
	500-1000			0.5	

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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Power Splitter/Combiner

SBTC-2-10L+

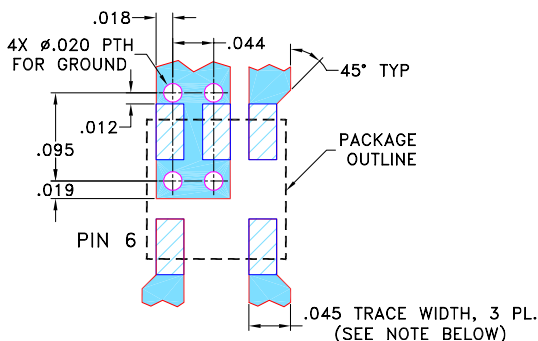
2 Way-0° 50Ω 5 to 1000 MHz

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-2-10L+
SUGGESTED PCB LAYOUT (PL-152)

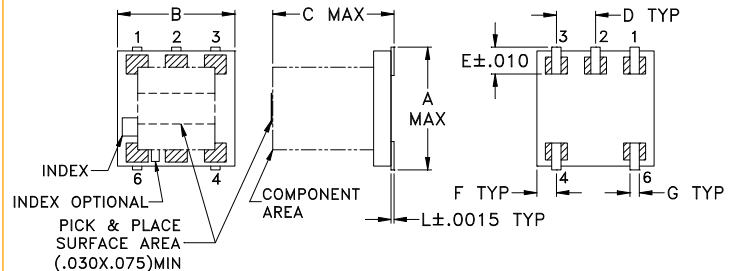


NOTE: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS $0.020'' \pm 0.0015''$; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.

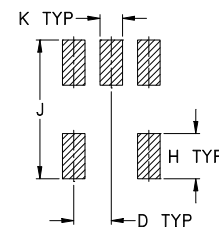
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

-  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 ± 0.002

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 & REEL INFORMATION: F76



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SURFACE MOUNT

Power Splitter/Combiner

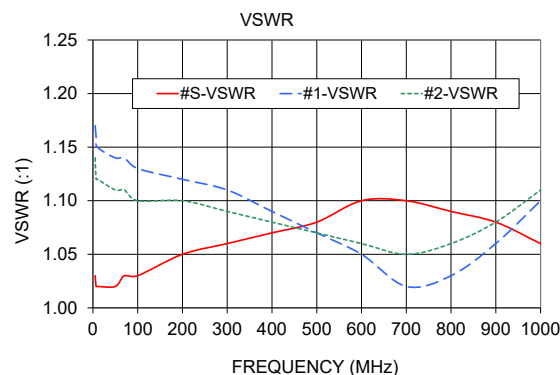
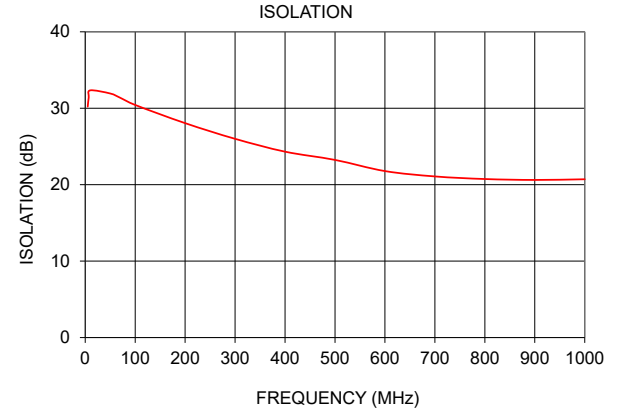
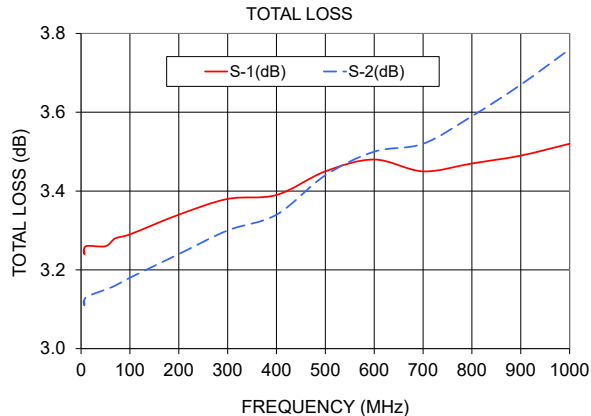
SBTC-2-10L+

2 Way-0° 50Ω 5 to 1000 MHz

TYPICAL PERFORMANCE DATA

Frequency (MHz)	Total Loss ¹ (dB)		Amplitude Unbalance (dB)	Isolation (dB)	Phase Unbalance (deg.)	VSWR (:1)		
	S-1	S-2				S	1	2
5	3.25	3.12	0.13	30.21	0.41	1.03	1.17	1.14
7	3.24	3.11	0.13	31.41	0.32	1.02	1.16	1.12
10	3.26	3.13	0.13	32.34	0.13	1.02	1.15	1.12
50	3.26	3.15	0.12	31.93	0.06	1.02	1.14	1.11
70	3.28	3.16	0.12	31.37	0.07	1.03	1.14	1.11
100	3.29	3.18	0.11	30.43	0.12	1.03	1.13	1.10
200	3.34	3.24	0.10	28.05	0.20	1.05	1.12	1.10
300	3.38	3.30	0.08	26.00	0.24	1.06	1.11	1.09
400	3.39	3.34	0.05	24.32	0.26	1.07	1.09	1.08
500	3.45	3.44	0.02	23.24	0.28	1.08	1.07	1.07
600	3.48	3.50	0.02	21.78	0.28	1.10	1.05	1.06
700	3.45	3.52	0.07	21.08	0.21	1.10	1.02	1.05
800	3.47	3.59	0.12	20.74	0.09	1.09	1.03	1.06
900	3.49	3.67	0.18	20.62	0.06	1.08	1.06	1.08
1000	3.52	3.76	0.24	20.71	0.27	1.06	1.10	1.11

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



- 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/terms/viewterm.html



2 Way-0° Power Splitter/Combiner

SBTC-2-10L+

Typical Performance Data

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

FREQ. (MHz)	TOTAL LOSS ¹ (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. (deg.)	ISOLATION (dB) 1-2	VSWR (:1)		
	S-1	S-2				S	1	2
5	3.25	3.10	0.15	0.38	31.14	1.03	1.16	1.12
10	3.26	3.13	0.13	0.28	32.33	1.02	1.15	1.10
20	3.25	3.12	0.13	0.09	32.53	1.02	1.14	1.10
30	3.25	3.12	0.13	0.02	32.15	1.02	1.14	1.10
40	3.26	3.12	0.13	0.03	31.86	1.02	1.14	1.10
50	3.26	3.13	0.14	0.05	31.64	1.02	1.14	1.10
100	3.29	3.15	0.14	0.14	30.58	1.03	1.14	1.10
150	3.32	3.18	0.14	0.19	29.38	1.03	1.13	1.10
200	3.33	3.20	0.13	0.28	28.13	1.04	1.12	1.10
250	3.35	3.22	0.13	0.36	27.01	1.04	1.11	1.09
300	3.36	3.24	0.12	0.42	25.87	1.05	1.10	1.09
350	3.37	3.26	0.11	0.49	24.88	1.05	1.09	1.08
400	3.39	3.28	0.10	0.59	24.03	1.06	1.07	1.08
450	3.40	3.31	0.09	0.69	23.29	1.06	1.06	1.07
500	3.42	3.33	0.08	0.76	22.59	1.07	1.05	1.07
550	3.43	3.36	0.07	0.83	22.03	1.07	1.04	1.07
600	3.45	3.39	0.06	0.89	21.55	1.08	1.03	1.07
650	3.48	3.42	0.05	0.95	21.10	1.08	1.03	1.07
700	3.50	3.45	0.04	0.98	20.73	1.09	1.04	1.08
750	3.52	3.49	0.03	1.05	20.39	1.09	1.05	1.09
800	3.54	3.53	0.02	1.09	20.10	1.10	1.07	1.10
850	3.58	3.57	0.01	1.10	19.86	1.10	1.09	1.11
900	3.61	3.62	0.01	1.12	19.66	1.11	1.11	1.12
950	3.64	3.67	0.03	1.12	19.52	1.11	1.13	1.13
1000	3.68	3.72	0.04	1.13	19.40	1.11	1.14	1.14
1100	3.77	3.84	0.07	1.12	19.21	1.12	1.18	1.17
1200	3.88	3.97	0.10	1.03	19.13	1.12	1.22	1.19
1300	4.02	4.13	0.12	0.89	19.08	1.13	1.26	1.22
1400	4.19	4.33	0.13	0.70	19.03	1.12	1.29	1.24
1500	4.42	4.56	0.14	0.48	18.93	1.12	1.32	1.26
1600	4.70	4.84	0.14	0.13	18.73	1.12	1.35	1.27
1700	5.07	5.19	0.12	0.13	18.52	1.13	1.39	1.29
1800	5.54	5.63	0.08	0.45	18.42	1.16	1.43	1.30
1900	6.14	6.16	0.02	0.66	18.55	1.20	1.47	1.32
2000	6.90	6.81	0.09	0.75	18.57	1.26	1.52	1.34

¹ Total Loss = Insertion Loss+ 3dB Splitter Loss

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2 Way-0° Power Splitter/Combiner

SBTC-2-10L+

Typical Performance Data

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

FREQ. (MHz)	TOTAL LOSS ¹ (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. (deg.)	ISOLATION (dB) 1-2	VSWR (:1)		
	S-1	S-2				S	1	2
5	3.27	3.10	0.17	1.05	26.45	1.05	1.23	1.17
10	3.22	3.11	0.11	0.73	30.18	1.03	1.16	1.11
20	3.18	3.09	0.09	0.35	33.64	1.02	1.12	1.08
30	3.17	3.08	0.09	0.18	34.82	1.02	1.11	1.07
40	3.17	3.09	0.09	0.13	35.53	1.02	1.11	1.07
50	3.18	3.09	0.09	0.06	36.05	1.02	1.10	1.07
100	3.20	3.11	0.09	0.04	33.70	1.06	1.11	1.08
150	3.22	3.13	0.09	0.08	30.47	1.05	1.10	1.07
200	3.23	3.14	0.09	0.13	29.34	1.05	1.08	1.07
250	3.25	3.16	0.09	0.18	27.79	1.07	1.09	1.08
300	3.25	3.17	0.08	0.22	25.82	1.08	1.07	1.06
350	3.27	3.19	0.08	0.28	24.65	1.09	1.07	1.06
400	3.27	3.20	0.07	0.34	23.94	1.08	1.05	1.05
450	3.28	3.22	0.06	0.38	23.22	1.09	1.04	1.05
500	3.29	3.24	0.05	0.42	22.52	1.10	1.03	1.05
550	3.30	3.26	0.04	0.44	21.93	1.10	1.02	1.05
600	3.31	3.29	0.03	0.45	21.43	1.10	1.02	1.06
650	3.33	3.31	0.02	0.50	21.10	1.10	1.03	1.07
700	3.34	3.33	0.01	0.51	20.80	1.10	1.04	1.08
750	3.36	3.36	0.00	0.54	20.33	1.11	1.05	1.09
800	3.38	3.39	0.01	0.51	19.99	1.12	1.07	1.09
850	3.40	3.43	0.03	0.49	19.85	1.11	1.09	1.11
900	3.43	3.47	0.04	0.48	19.62	1.12	1.11	1.12
950	3.45	3.51	0.06	0.42	19.33	1.14	1.12	1.13
1000	3.48	3.55	0.07	0.42	19.18	1.14	1.14	1.14
1100	3.55	3.64	0.10	0.28	19.06	1.15	1.17	1.16
1200	3.63	3.75	0.13	0.15	19.07	1.15	1.20	1.19
1300	3.74	3.88	0.15	0.14	19.05	1.14	1.24	1.22
1400	3.88	4.04	0.16	0.35	18.94	1.13	1.28	1.24
1500	4.07	4.23	0.16	0.61	18.82	1.11	1.32	1.26
1600	4.33	4.48	0.16	1.05	18.35	1.12	1.34	1.27
1700	4.67	4.80	0.14	1.49	17.83	1.13	1.37	1.28
1800	5.12	5.22	0.10	1.88	17.46	1.16	1.41	1.30
1900	5.75	5.77	0.02	2.18	17.57	1.21	1.47	1.32
2000	6.57	6.48	0.10	2.39	18.29	1.28	1.57	1.37

¹ Total Loss = Insertion Loss+ 3dB Splitter Loss

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2 Way-0° Power Splitter/Combiner

SBTC-2-10L+

Typical Performance Data

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

FREQ. (MHz)	TOTAL LOSS ¹ (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. (deg.)	ISOLATION (dB) 1-2	VSWR (:1)		
	S-1	S-2				S	1	2
5	3.34	3.14	0.20	0.40	28.74	1.03	1.21	1.15
10	3.35	3.17	0.18	0.25	29.26	1.03	1.20	1.14
20	3.34	3.16	0.18	0.08	29.11	1.03	1.19	1.14
30	3.35	3.17	0.18	0.01	28.67	1.03	1.20	1.14
40	3.36	3.17	0.18	0.03	28.27	1.04	1.20	1.14
50	3.37	3.18	0.18	0.03	27.95	1.03	1.20	1.15
100	3.39	3.21	0.18	0.09	27.26	1.01	1.18	1.13
150	3.41	3.24	0.18	0.16	27.56	1.01	1.17	1.13
200	3.43	3.26	0.17	0.25	26.83	1.03	1.17	1.14
250	3.44	3.28	0.16	0.33	25.78	1.02	1.14	1.12
300	3.46	3.30	0.15	0.44	25.14	1.02	1.12	1.12
350	3.47	3.33	0.14	0.53	24.54	1.02	1.12	1.12
400	3.49	3.35	0.13	0.64	23.75	1.02	1.09	1.10
450	3.50	3.38	0.12	0.75	23.08	1.03	1.08	1.10
500	3.53	3.42	0.11	0.84	22.50	1.03	1.07	1.09
550	3.54	3.45	0.09	0.92	22.01	1.04	1.05	1.09
600	3.57	3.49	0.08	0.98	21.58	1.04	1.04	1.09
650	3.60	3.53	0.07	1.09	21.18	1.05	1.04	1.09
700	3.62	3.57	0.05	1.14	20.83	1.06	1.05	1.09
750	3.65	3.61	0.04	1.23	20.49	1.06	1.06	1.09
800	3.68	3.66	0.02	1.30	20.23	1.07	1.07	1.10
850	3.72	3.72	0.01	1.35	20.03	1.08	1.09	1.11
900	3.76	3.77	0.01	1.37	19.83	1.08	1.11	1.12
950	3.80	3.83	0.03	1.40	19.66	1.09	1.13	1.13
1000	3.85	3.89	0.05	1.47	19.55	1.10	1.15	1.15
1100	3.96	4.04	0.08	1.51	19.36	1.11	1.19	1.18
1200	4.08	4.20	0.12	1.49	19.31	1.12	1.23	1.20
1300	4.24	4.38	0.15	1.39	19.38	1.13	1.27	1.23
1400	4.42	4.59	0.18	1.28	19.58	1.13	1.30	1.25
1500	4.64	4.83	0.19	1.09	19.83	1.12	1.33	1.27
1600	4.91	5.12	0.21	0.87	20.08	1.12	1.36	1.29
1700	5.23	5.44	0.21	0.58	20.27	1.11	1.39	1.30
1800	5.63	5.83	0.19	0.36	20.23	1.13	1.41	1.31
1900	6.13	6.28	0.16	0.16	19.76	1.16	1.43	1.30
2000	6.74	6.84	0.10	0.06	18.56	1.22	1.43	1.29

¹ Total Loss = Insertion Loss+ 3dB Splitter Loss

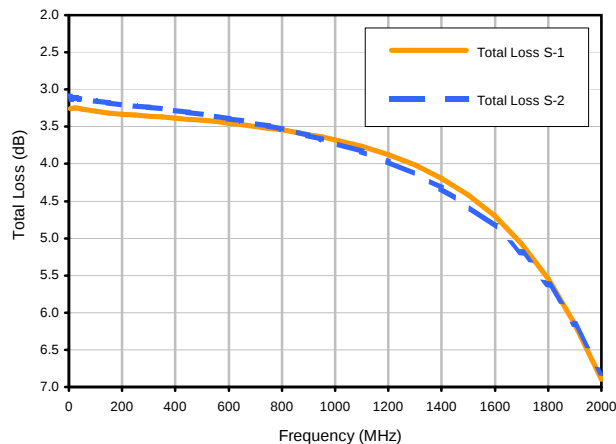
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2 Way-0° Power Splitter/Combiner

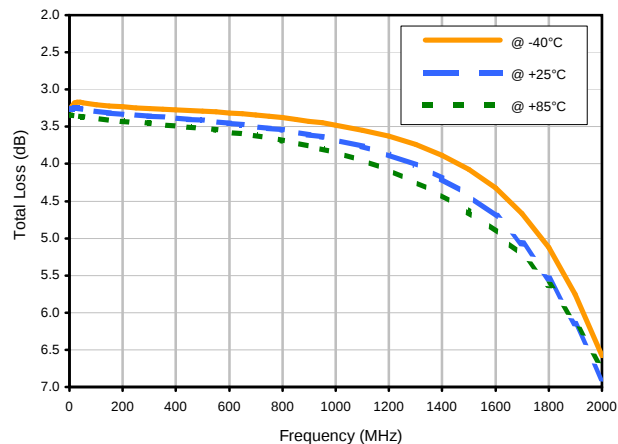
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Typical Performance Curves

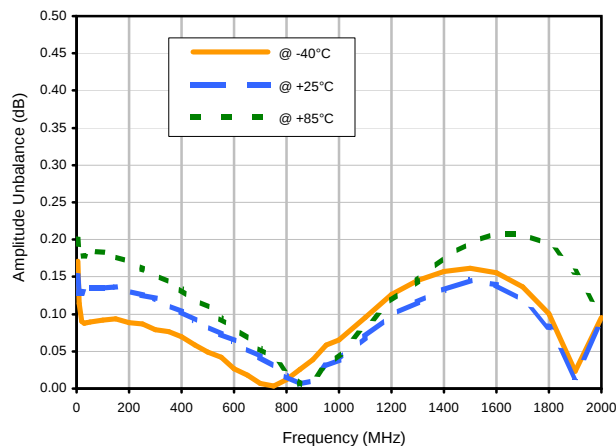
Total Loss



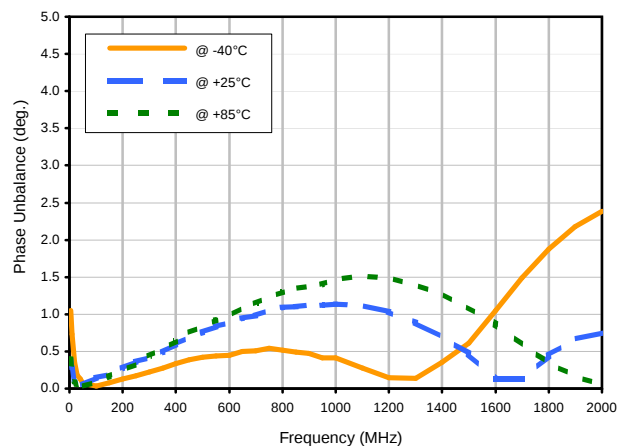
Total Loss S-1 vs. TEMPERATURE



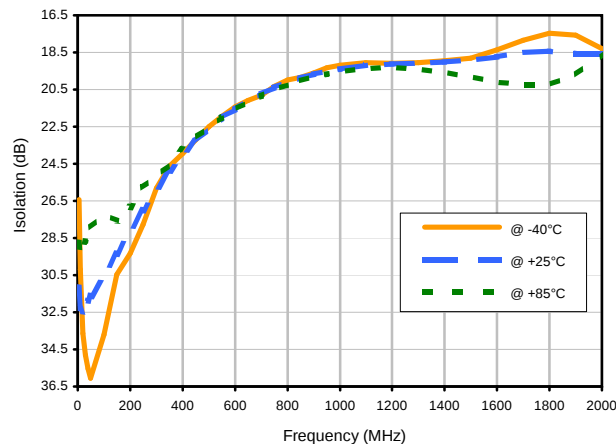
Amplitude Unbalance vs. TEMPERATURE



Phase Unbalance vs. TEMPERATURE



Isolation 1-2 vs. TEMPERATURE

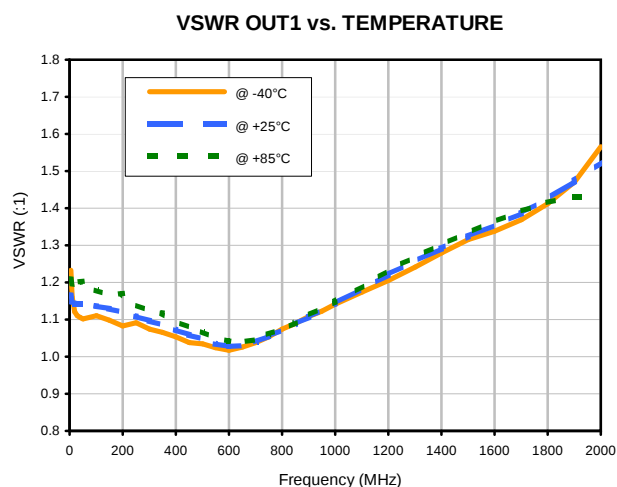
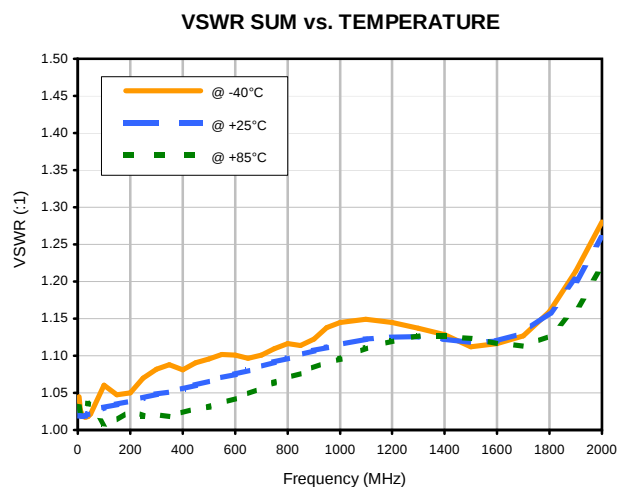
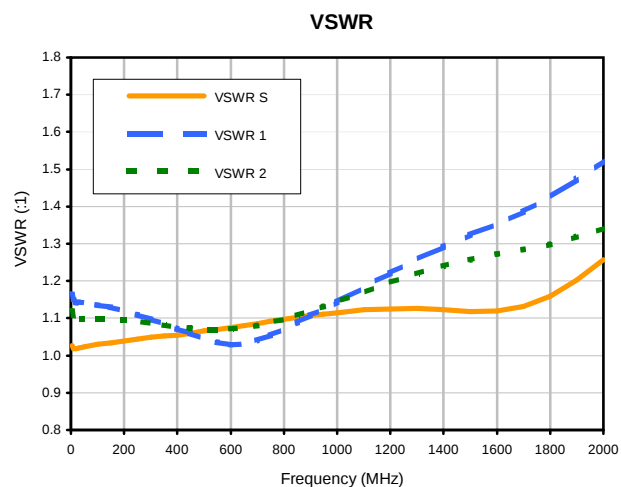


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2 Way-0° Power Splitter/Combiner

SBTC-2-10L+

Typical Performance Curves

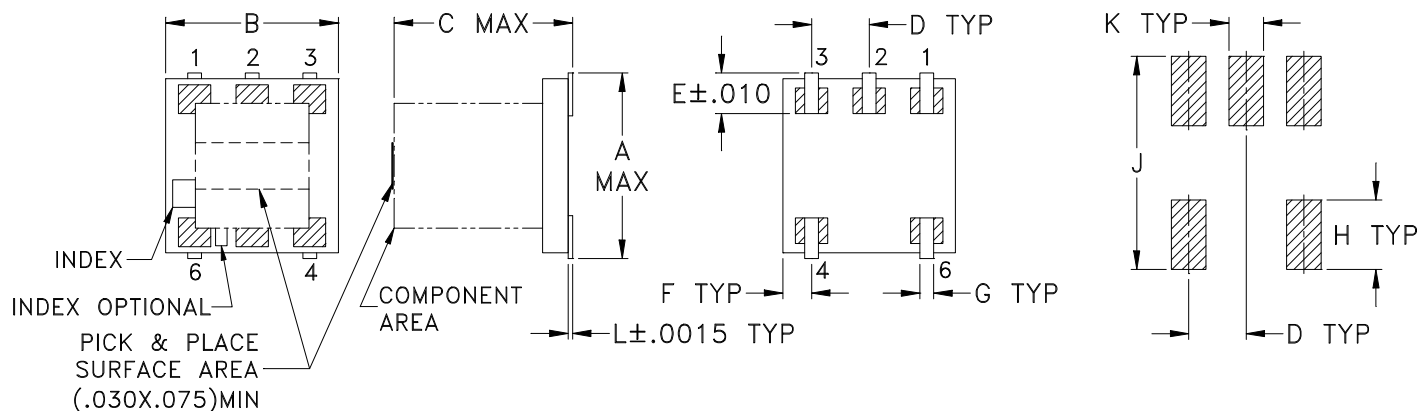


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Outline Dimensions

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 (4.22)	.150 (3.81)	.155 (3.94)	.050 (1.27)	.037 (0.94)	.025 (0.64)	.012 (0.30)	.060 (1.52)	.184 (4.67)	.030 (0.76)	.004 (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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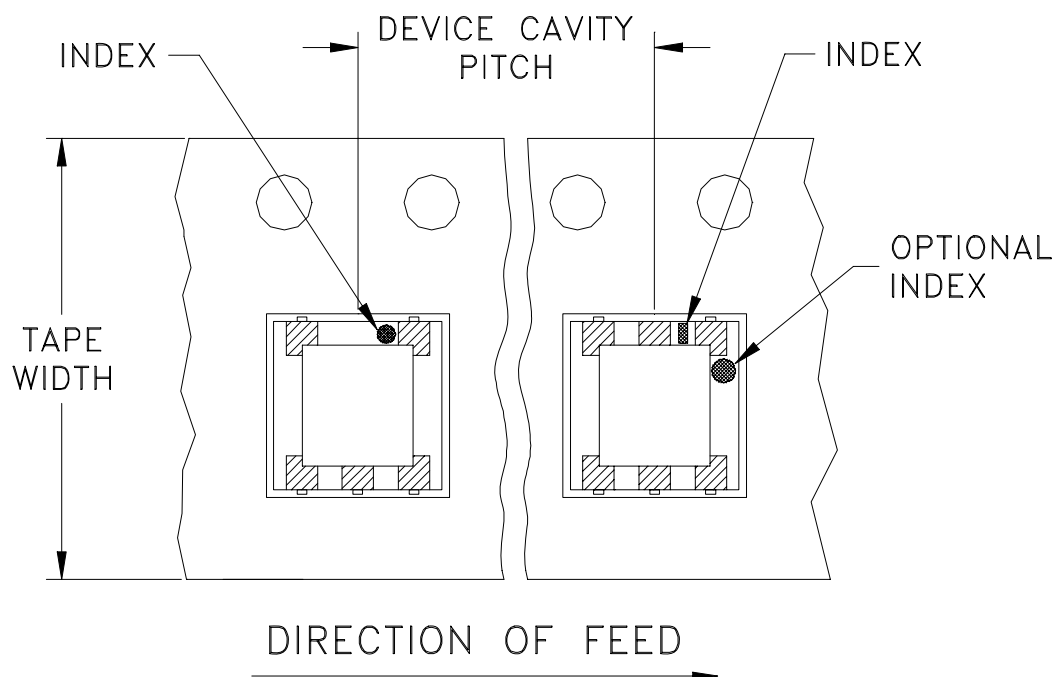


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RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F76

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, 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



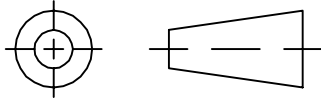
INTERNET <http://www.minicircuits.com>

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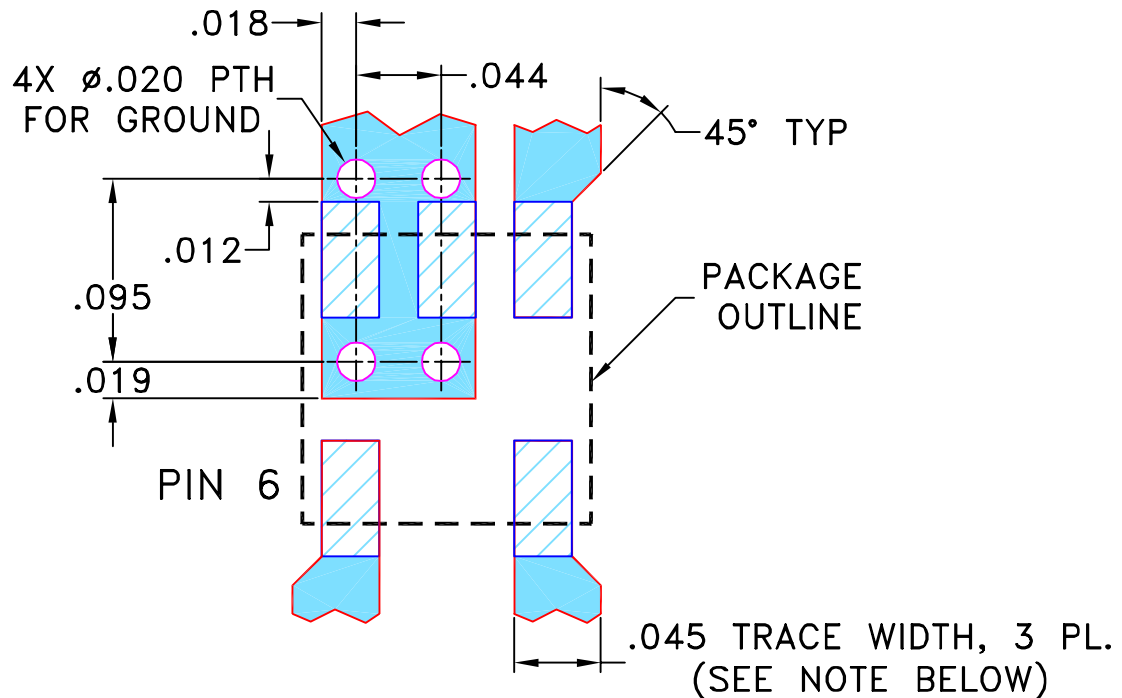
THIRD ANGLE PROJECTION



REVISIONS

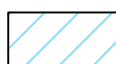
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M90456	NEW RELEASE	01/16/04	AV	WP
A	M102713	ADDED "...WITH SMOBC"	01/12/06	GF	IL

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 $\pm$.005
ANGLES $\pm$
FRACTIONS $\pm$

DRAWN

AV

01/07/04

CHECKED

IL

01/16/04

APPROVED

WP

01/16/04

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



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Brooklyn NY 11235

PL, nc, AT1029, SBTC, TB-274

SIZE
A

CODE IDENT
15542

DRAWING NO:
98-PL-152

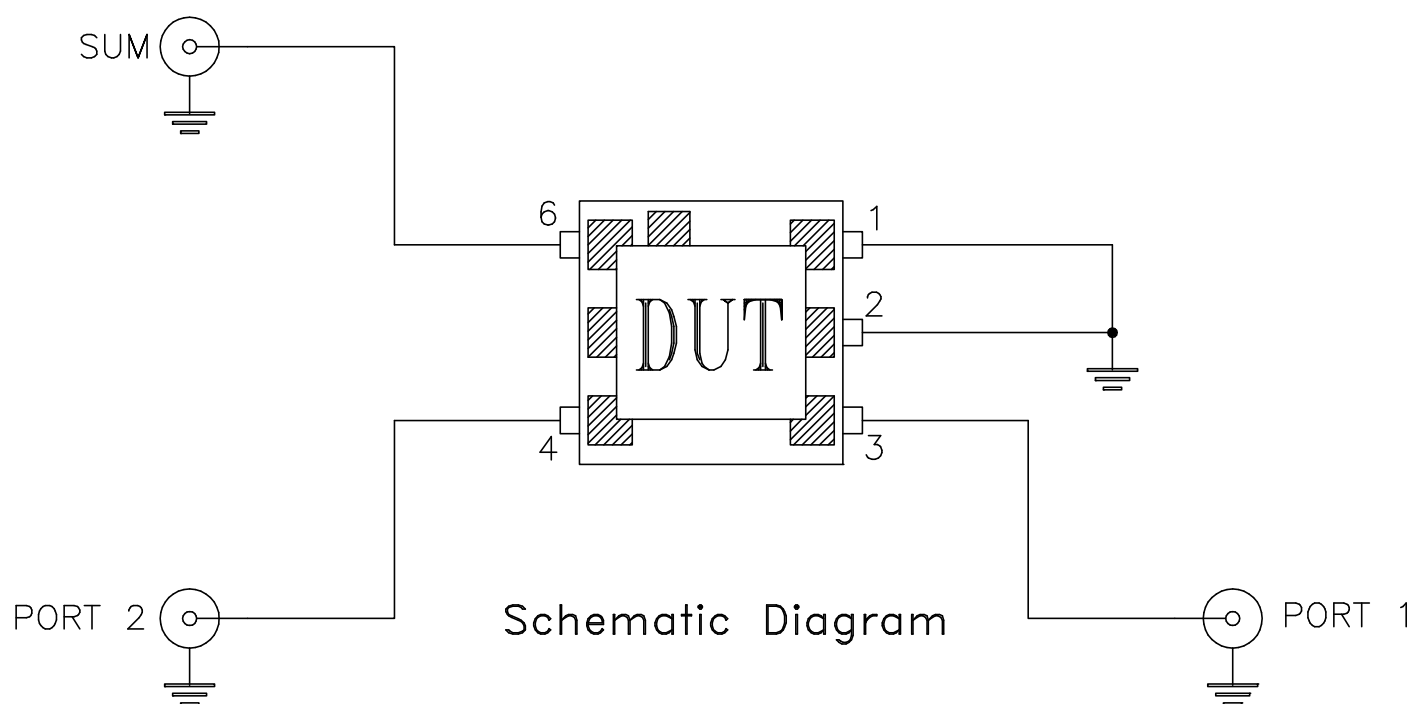
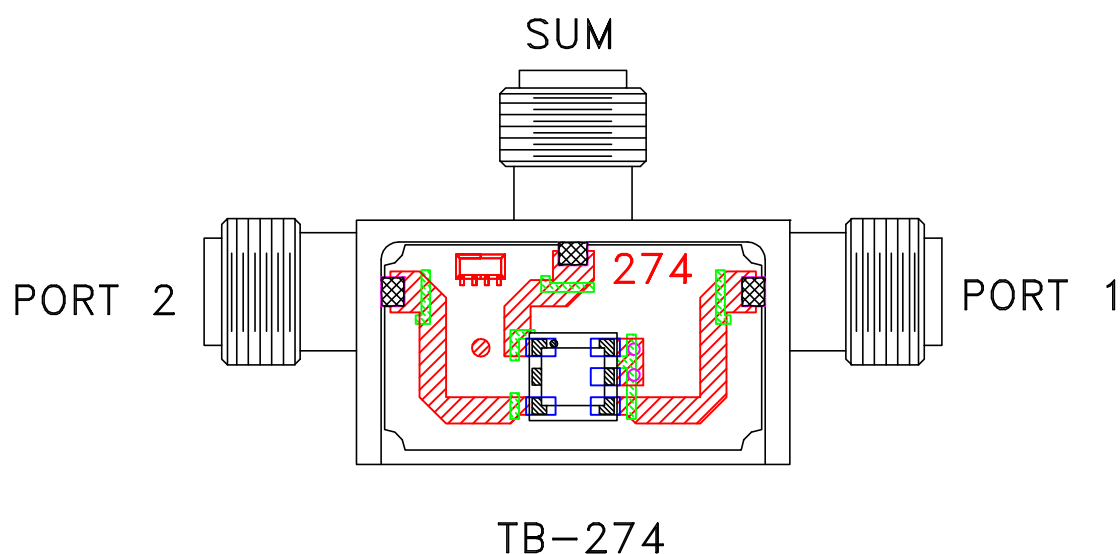
REV:
A

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.

 **Mini-Circuits®**



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 Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C 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 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; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215