

Power Splitter/Combiner

SCPQ-21.4

2 Way-90°

50Ω

20 to 23 MHz

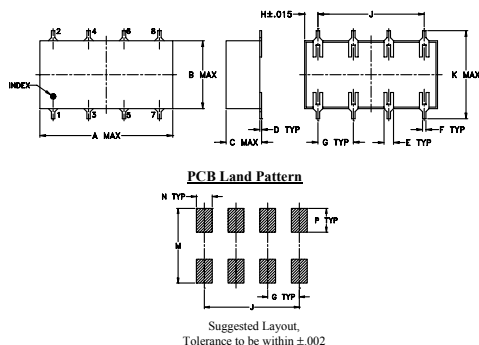
Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Power Input (as a splitter)	1W max.
Permanent damage may occur if any of these limits are exceeded.	

Pin Connections

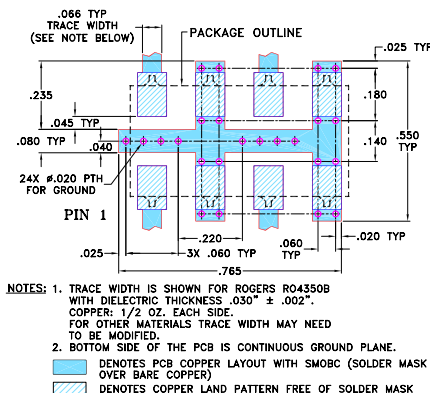
SUM PORT	1
PORT 1 (+90°)	2
PORT 2 (0°)	5
GROUND	3,4,7,8
50 OHM TERM EXTERNAL	6

Outline Drawing



Outline Dimensions (inch)

A	B	C	D	E	F	G
.75	.38	.20	.010	.050	.020	.200
19.05	9.65	5.08	0.25	1.27	0.51	5.08
H	J	K	M	N	P	wt
.075	.600	.450	.470	.100	.150	grams
1.91	15.24	11.43	11.94	2.54	3.81	1.6

Demo Board MCL P/N: TB-51
Suggested PCB Layout (PL-062)

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

Features

- low insertion loss, 0.15 dB typ.
- high isolation, 32 dB typ.

Applications

- HF
- amateur radio
- instrumentation
- balanced amplifiers



CASE STYLE: YY101

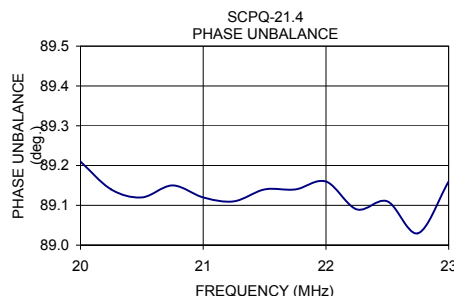
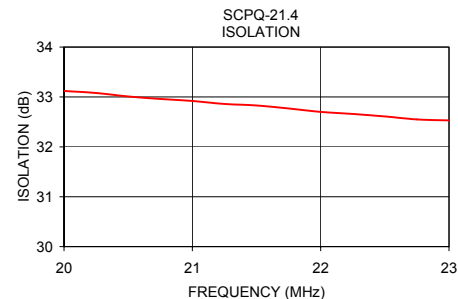
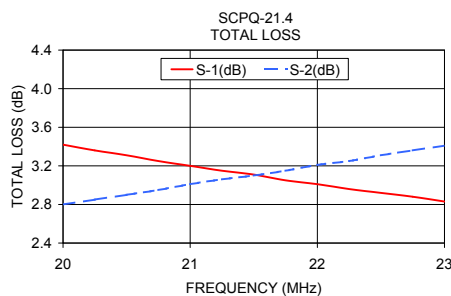
Electrical Specifications

FREQ. RANGE (MHz)	ISOLATION (dB)	INSERTION LOSS (dB) Avg. of Coupled Outputs ABOVE 3 dB	PHASE UNBALANCE (Degrees)	AMPLITUDE UNBALANCE (dB)
f_L - f_U	Typ. Min.	Typ. Max.	Max.	Max.
20-23	32 25	0.15 0.5	2.5	1.0

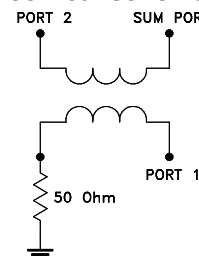
Typical Performance Data

Frequency (MHz)	Total Loss ¹ (dB)		Amplitude Unbalance (dB)	Isolation (dB)	Phase Unbalance (deg.)	VSWR S	VSWR 1	VSWR 2
	S-1	S-2						
20.00	3.42	2.80	0.62	33.12	89.21	1.02	1.02	1.02
20.25	3.36	2.85	0.51	33.08	89.14	1.02	1.02	1.02
20.50	3.31	2.90	0.41	33.01	89.12	1.02	1.02	1.02
20.75	3.25	2.95	0.30	32.96	89.15	1.02	1.02	1.02
21.00	3.20	3.01	0.20	32.92	89.12	1.02	1.02	1.02
21.25	3.15	3.06	0.09	32.86	89.11	1.02	1.02	1.02
21.50	3.11	3.10	0.00	32.83	89.14	1.02	1.02	1.02
21.75	3.05	3.15	0.10	32.77	89.14	1.02	1.02	1.02
22.00	3.01	3.21	0.20	32.70	89.16	1.02	1.02	1.02
22.25	2.96	3.25	0.30	32.66	89.09	1.02	1.02	1.02
22.50	2.92	3.31	0.40	32.61	89.11	1.02	1.02	1.02
22.75	2.88	3.36	0.48	32.55	89.03	1.02	1.02	1.02
23.00	2.83	3.41	0.58	32.53	89.16	1.02	1.02	1.02

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



electrical schematic



2 Way-90° Power Splitter/Combiner

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Typical Performance Data

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

FREQ. (MHz)	TOTAL LOSS ¹ (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. From 90° (deg.)	ISOLATION (dB) 1-2	VSWR (:1)		
	S-1	S-2				S	1	2
10.0	7.58	0.91	6.67	0.36	31.21	1.04	1.03	1.04
11.0	6.92	1.07	5.85	0.43	30.62	1.04	1.03	1.05
12.0	6.33	1.25	5.09	0.45	30.11	1.04	1.03	1.05
13.0	5.82	1.43	4.39	0.47	29.70	1.04	1.03	1.05
14.0	5.36	1.62	3.74	0.50	29.31	1.04	1.04	1.06
15.0	4.96	1.81	3.15	0.52	28.99	1.04	1.04	1.06
16.0	4.59	2.01	2.58	0.54	28.71	1.04	1.04	1.07
17.0	4.26	2.21	2.06	0.60	28.46	1.05	1.04	1.07
18.0	3.97	2.41	1.55	0.64	28.25	1.05	1.04	1.07
18.5	3.83	2.51	1.32	0.64	28.15	1.05	1.04	1.08
19.0	3.70	2.62	1.08	0.66	28.06	1.05	1.04	1.08
19.5	3.58	2.72	0.86	0.67	27.96	1.05	1.04	1.08
20.0	3.46	2.82	0.64	0.71	27.91	1.05	1.04	1.08
20.5	3.35	2.93	0.42	0.71	27.83	1.05	1.04	1.08
21.0	3.24	3.03	0.20	0.73	27.78	1.05	1.04	1.09
21.5	3.14	3.13	0.00	0.74	27.71	1.05	1.04	1.09
22.0	3.04	3.24	0.20	0.77	27.65	1.05	1.04	1.09
22.5	2.95	3.34	0.39	0.77	27.60	1.05	1.04	1.09
23.0	2.86	3.45	0.59	0.80	27.55	1.05	1.04	1.09
23.5	2.77	3.55	0.78	0.82	27.51	1.05	1.04	1.10
24.0	2.69	3.65	0.96	0.83	27.46	1.05	1.04	1.10
24.5	2.62	3.76	1.14	0.83	27.44	1.05	1.04	1.10
25.0	2.54	3.86	1.32	0.86	27.39	1.05	1.04	1.10
25.5	2.47	3.96	1.49	0.88	27.38	1.05	1.04	1.10
26.0	2.41	4.06	1.66	0.91	27.34	1.05	1.04	1.10
26.5	2.34	4.17	1.83	0.92	27.31	1.04	1.04	1.11
27.0	2.27	4.27	1.99	0.95	27.28	1.04	1.03	1.11
27.5	2.22	4.37	2.15	0.96	27.27	1.04	1.03	1.11
28.0	2.16	4.47	2.31	0.98	27.25	1.04	1.03	1.11
28.5	2.10	4.57	2.46	1.00	27.23	1.04	1.03	1.11
29.0	2.05	4.67	2.62	1.01	27.20	1.04	1.03	1.12
29.5	2.00	4.77	2.77	1.01	27.21	1.04	1.03	1.12
30.0	1.95	4.87	2.91	1.05	27.18	1.04	1.03	1.12
31.0	1.86	5.06	3.20	1.08	27.19	1.04	1.03	1.12
32.0	1.77	5.26	3.49	1.10	27.14	1.04	1.03	1.13
33.0	1.69	5.45	3.76	1.15	27.15	1.04	1.03	1.13
34.0	1.62	5.64	4.02	1.20	27.11	1.04	1.03	1.14
35.0	1.55	5.83	4.28	1.25	27.11	1.04	1.03	1.14
36.0	1.48	6.01	4.53	1.29	27.11	1.04	1.03	1.14
37.0	1.42	6.20	4.78	1.34	27.12	1.04	1.03	1.15
38.0	1.37	6.38	5.01	1.37	27.11	1.04	1.03	1.15
39.0	1.32	6.56	5.24	1.42	27.11	1.04	1.03	1.15
40.0	1.27	6.73	5.46	1.46	27.13	1.04	1.03	1.16

¹ Total Loss = Insertion Loss+ 3dB Splitter Loss

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2 Way-90° Power Splitter/Combiner

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Typical Performance Data

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

FREQ. (MHz)	TOTAL LOSS ¹ (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. From 90° (deg.)	ISOLATION (dB) 1-2	VSWR (:1)		
	S-1	S-2				S	1	2
10.0	7.64	0.89	6.75	0.59	30.46	1.04	1.04	1.05
11.0	6.98	1.05	5.92	0.66	29.87	1.05	1.05	1.05
12.0	6.39	1.23	5.17	0.71	29.35	1.05	1.05	1.06
13.0	5.88	1.41	4.47	0.74	28.94	1.05	1.05	1.06
14.0	5.42	1.60	3.82	0.77	28.54	1.05	1.05	1.07
15.0	5.02	1.79	3.22	0.83	28.22	1.05	1.05	1.07
16.0	4.65	1.99	2.66	0.86	27.94	1.05	1.05	1.07
17.0	4.32	2.19	2.13	0.94	27.68	1.05	1.05	1.08
18.0	4.02	2.39	1.63	0.99	27.46	1.06	1.05	1.08
18.5	3.88	2.49	1.39	1.01	27.36	1.06	1.05	1.08
19.0	3.76	2.59	1.17	1.05	27.28	1.06	1.05	1.09
19.5	3.63	2.70	0.94	1.07	27.18	1.06	1.05	1.09
20.0	3.51	2.80	0.72	1.10	27.12	1.06	1.05	1.09
20.5	3.40	2.90	0.50	1.11	27.04	1.06	1.05	1.09
21.0	3.30	3.00	0.29	1.15	26.98	1.06	1.05	1.09
21.5	3.19	3.11	0.09	1.17	26.91	1.06	1.05	1.10
22.0	3.10	3.21	0.11	1.21	26.86	1.06	1.05	1.10
22.5	3.00	3.31	0.31	1.23	26.80	1.06	1.05	1.10
23.0	2.92	3.41	0.50	1.25	26.75	1.06	1.05	1.10
23.5	2.83	3.52	0.69	1.29	26.71	1.06	1.05	1.10
24.0	2.75	3.62	0.88	1.30	26.66	1.06	1.05	1.10
24.5	2.67	3.72	1.06	1.32	26.63	1.06	1.05	1.11
25.0	2.59	3.83	1.24	1.34	26.58	1.06	1.05	1.11
25.5	2.52	3.93	1.40	1.39	26.56	1.06	1.05	1.11
26.0	2.46	4.03	1.57	1.40	26.53	1.06	1.05	1.11
26.5	2.39	4.13	1.74	1.44	26.49	1.06	1.05	1.11
27.0	2.32	4.23	1.91	1.47	26.46	1.06	1.05	1.11
27.5	2.27	4.33	2.06	1.48	26.45	1.06	1.05	1.12
28.0	2.21	4.43	2.22	1.52	26.43	1.06	1.05	1.12
28.5	2.15	4.53	2.38	1.55	26.40	1.06	1.05	1.12
29.0	2.10	4.63	2.53	1.57	26.38	1.06	1.04	1.12
29.5	2.05	4.73	2.68	1.58	26.39	1.06	1.04	1.12
30.0	1.99	4.82	2.83	1.62	26.35	1.06	1.04	1.13
31.0	1.90	5.02	3.12	1.64	26.35	1.06	1.04	1.13
32.0	1.82	5.21	3.40	1.70	26.30	1.06	1.04	1.13
33.0	1.74	5.40	3.66	1.76	26.31	1.06	1.04	1.14
34.0	1.66	5.59	3.93	1.83	26.28	1.06	1.04	1.14
35.0	1.60	5.77	4.18	1.88	26.27	1.06	1.04	1.14
36.0	1.53	5.96	4.43	1.94	26.27	1.06	1.04	1.15
37.0	1.47	6.14	4.67	2.01	26.27	1.06	1.04	1.15
38.0	1.42	6.32	4.90	2.05	26.27	1.06	1.04	1.15
39.0	1.36	6.49	5.12	2.11	26.26	1.06	1.04	1.16
40.0	1.31	6.67	5.36	2.16	26.28	1.06	1.03	1.16

¹ Total Loss = Insertion Loss+ 3dB Splitter Loss

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2 Way-90° Power Splitter/Combiner

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Typical Performance Data

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

FREQ. (MHz)	TOTAL LOSS ¹ (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. From 90° (deg.)	ISOLATION (dB) 1-2	VSWR (:1)		
	S-1	S-2				S	1	2
10.0	7.52	0.91	6.61	0.25	32.03	1.03	1.02	1.03
11.0	6.86	1.07	5.78	0.28	31.44	1.03	1.02	1.04
12.0	6.27	1.25	5.02	0.31	30.91	1.03	1.02	1.04
13.0	5.76	1.44	4.32	0.30	30.49	1.03	1.02	1.05
14.0	5.31	1.62	3.69	0.31	30.09	1.04	1.02	1.05
15.0	4.90	1.82	3.08	0.33	29.77	1.04	1.02	1.05
16.0	4.54	2.02	2.52	0.35	29.48	1.04	1.02	1.06
17.0	4.21	2.22	1.99	0.37	29.21	1.04	1.02	1.06
18.0	3.92	2.43	1.49	0.40	29.00	1.04	1.02	1.07
18.5	3.78	2.53	1.25	0.41	28.89	1.04	1.02	1.07
19.0	3.65	2.63	1.02	0.43	28.80	1.04	1.03	1.07
19.5	3.53	2.74	0.78	0.42	28.70	1.04	1.03	1.07
20.0	3.41	2.84	0.57	0.46	28.63	1.04	1.03	1.07
20.5	3.30	2.95	0.35	0.47	28.56	1.04	1.03	1.08
21.0	3.19	3.05	0.13	0.48	28.50	1.04	1.03	1.08
21.5	3.09	3.16	0.07	0.48	28.42	1.04	1.03	1.08
22.0	2.99	3.26	0.27	0.51	28.38	1.04	1.03	1.08
22.5	2.90	3.37	0.46	0.51	28.31	1.04	1.03	1.08
23.0	2.82	3.47	0.66	0.53	28.26	1.04	1.03	1.09
23.5	2.73	3.58	0.85	0.54	28.22	1.04	1.03	1.09
24.0	2.65	3.68	1.03	0.54	28.16	1.04	1.03	1.09
24.5	2.57	3.78	1.21	0.55	28.13	1.04	1.03	1.09
25.0	2.50	3.89	1.39	0.56	28.08	1.04	1.03	1.09
25.5	2.42	3.99	1.57	0.59	28.06	1.04	1.03	1.10
26.0	2.36	4.09	1.74	0.59	28.03	1.04	1.03	1.10
26.5	2.29	4.20	1.91	0.64	27.99	1.04	1.03	1.10
27.0	2.23	4.30	2.06	0.62	27.95	1.04	1.03	1.10
27.5	2.17	4.40	2.23	0.62	27.94	1.04	1.03	1.11
28.0	2.11	4.50	2.39	0.67	27.92	1.04	1.03	1.11
28.5	2.06	4.61	2.55	0.67	27.89	1.04	1.03	1.11
29.0	2.01	4.70	2.70	0.68	27.86	1.04	1.03	1.11
29.5	1.96	4.81	2.85	0.69	27.87	1.04	1.03	1.11
30.0	1.90	4.91	3.00	0.71	27.83	1.04	1.03	1.12
31.0	1.82	5.10	3.28	0.73	27.83	1.04	1.03	1.12
32.0	1.73	5.30	3.57	0.75	27.77	1.04	1.03	1.12
33.0	1.65	5.49	3.84	0.79	27.78	1.04	1.03	1.13
34.0	1.58	5.68	4.10	0.82	27.74	1.04	1.03	1.13
35.0	1.51	5.87	4.36	0.86	27.74	1.03	1.04	1.14
36.0	1.44	6.06	4.61	0.90	27.72	1.03	1.04	1.14
37.0	1.39	6.24	4.85	0.93	27.72	1.03	1.04	1.14
38.0	1.34	6.43	5.09	0.96	27.70	1.03	1.04	1.15
39.0	1.29	6.61	5.32	1.01	27.69	1.03	1.04	1.15
40.0	1.24	6.79	5.55	1.05	27.70	1.03	1.04	1.16

¹ Total Loss = Insertion Loss+ 3dB Splitter Loss

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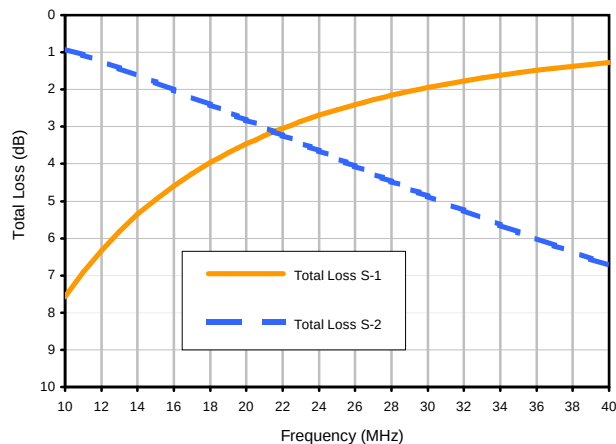


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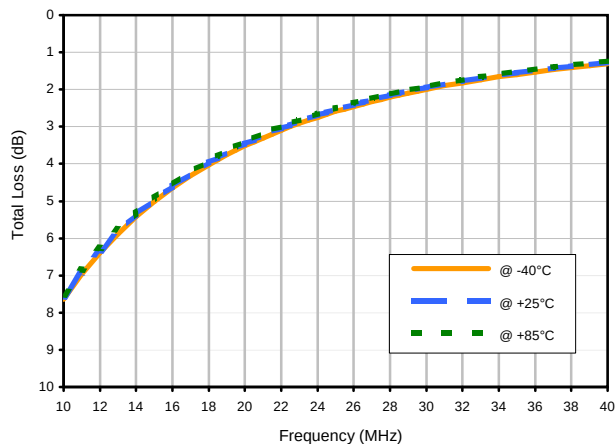
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Typical Performance Curves

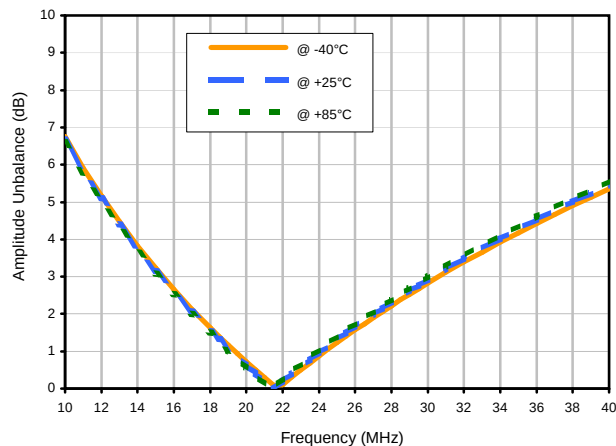
Total Loss



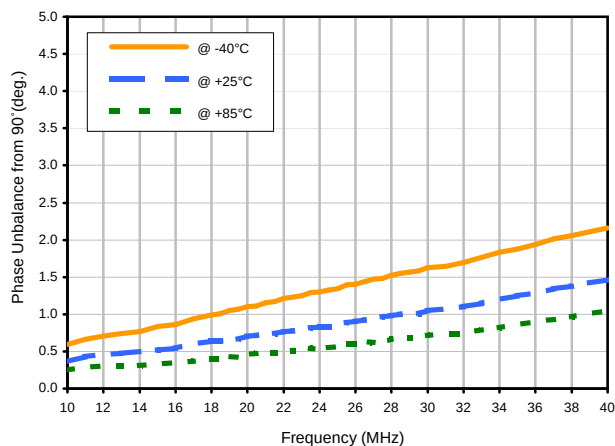
Total Loss S-1 vs. TEMPERATURE



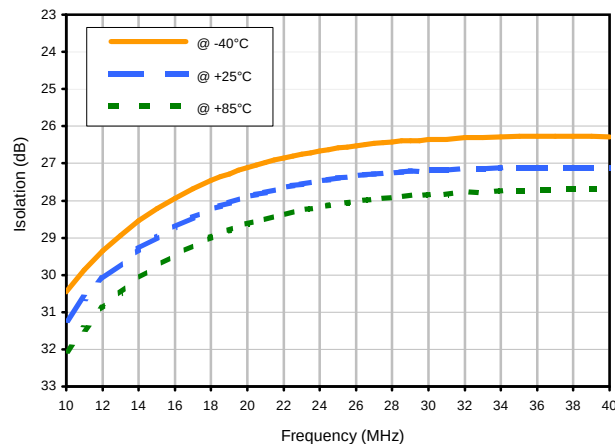
Amplitude Unbalance vs. TEMPERATURE



Phase Unbalance vs. TEMPERATURE



Isolation 1-2 vs. TEMPERATURE



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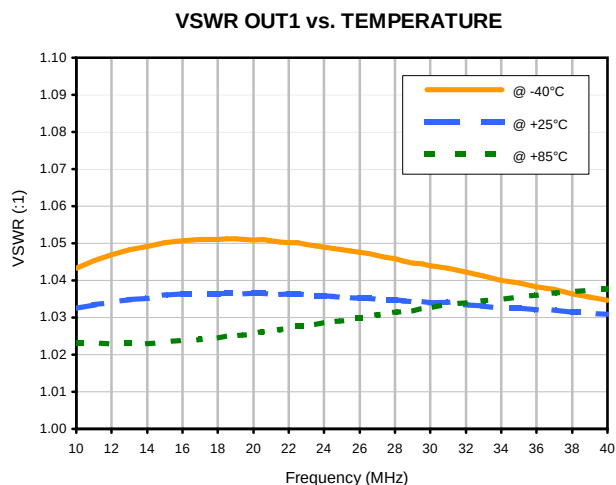
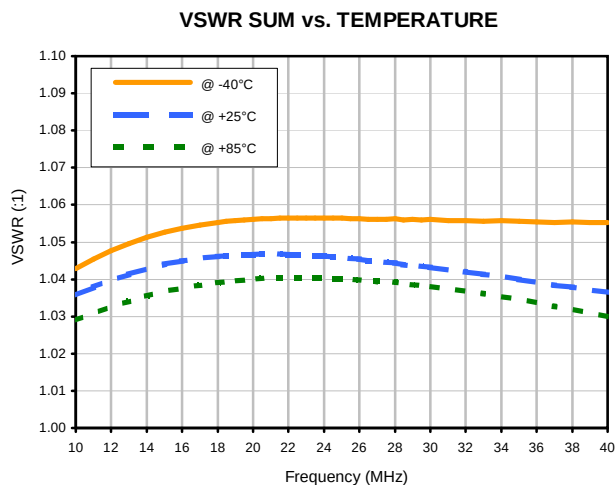
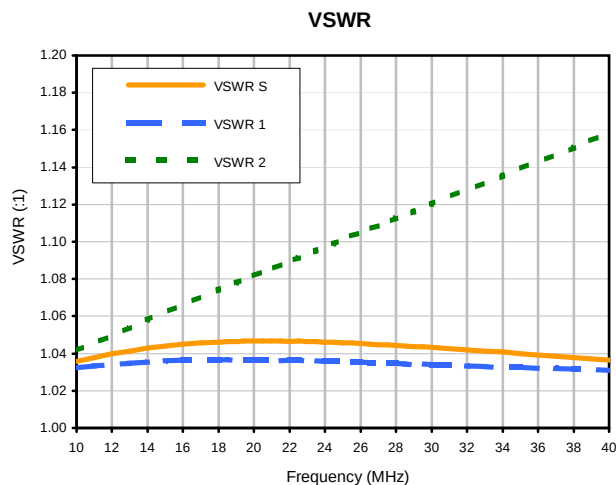


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Typical Performance Curves

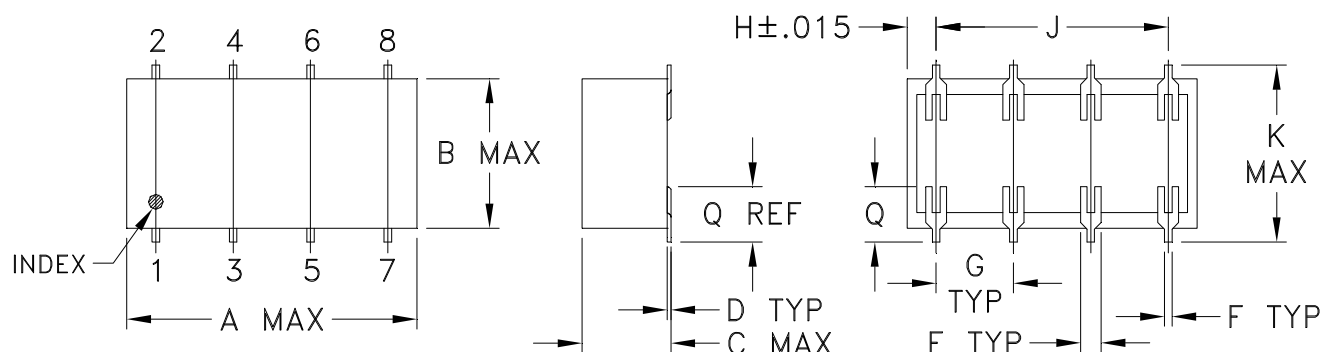


Case Style

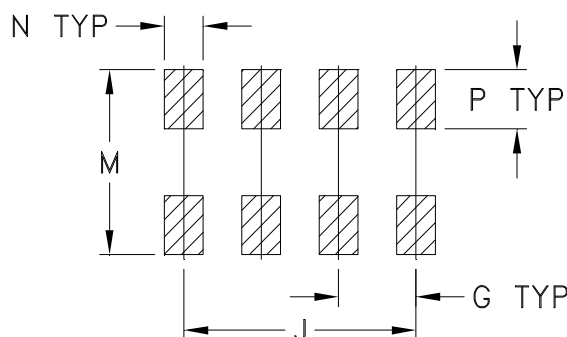
YY

Outline Dimensions

YY101
YY109
YY161



PCB Land Pattern



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

CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	WT. GRAM S
YY101*			.20 (5.08)							.450 (11.43)	--	.470 (11.94)				1.6
YY109*	.75 (19.05)	.38 (9.65)	.20 (5.08)	.010 (0.25)	.050 (1.27)	.020 (0.51)	.200 (5.08)	.075 (1.91)	.600 (15.24)	.720 (18.29)	--	.740 (18.80)	.100 (2.54)	.150 (3.81)	.148 (3.76)	1.6
YY161			.28 (7.11)							.450 (11.43)	--	.470 (11.94)				1.6

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

Notes:

- Case material: Plastic.
- Termination finish:
For RoHS Case Styles: Tin plate over Nickel plate.
For RoHS-5 Case Styles: Tin-Lead plate.
- Special Tolerances: Termination thickness $\pm .003$ inch.
- * Denotes: For SCM mixers, long termination version (case YY109) is available upon request, consult factory. To order short termination version (case YY101) add -NL suffix.

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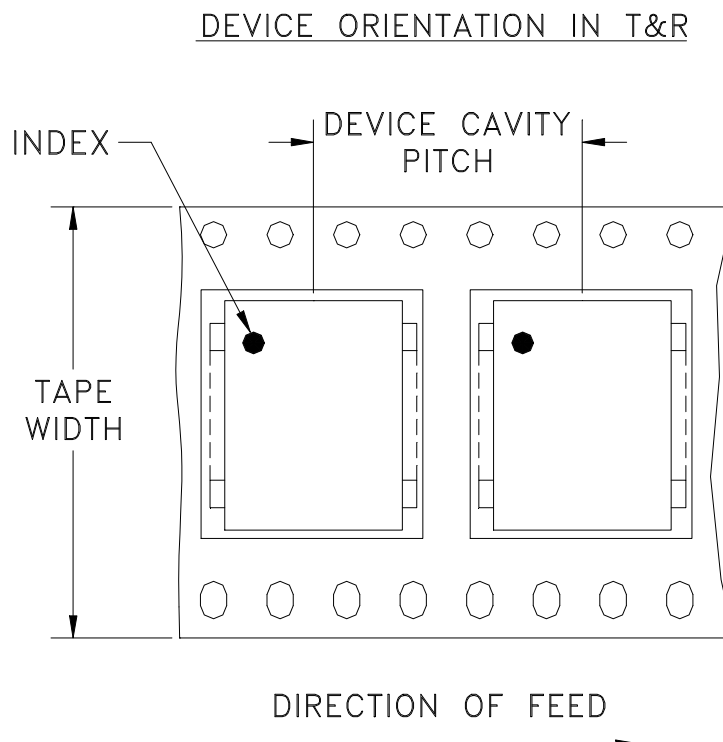
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Tape & Reel Packaging TR-F5



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
32	16	13	500

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



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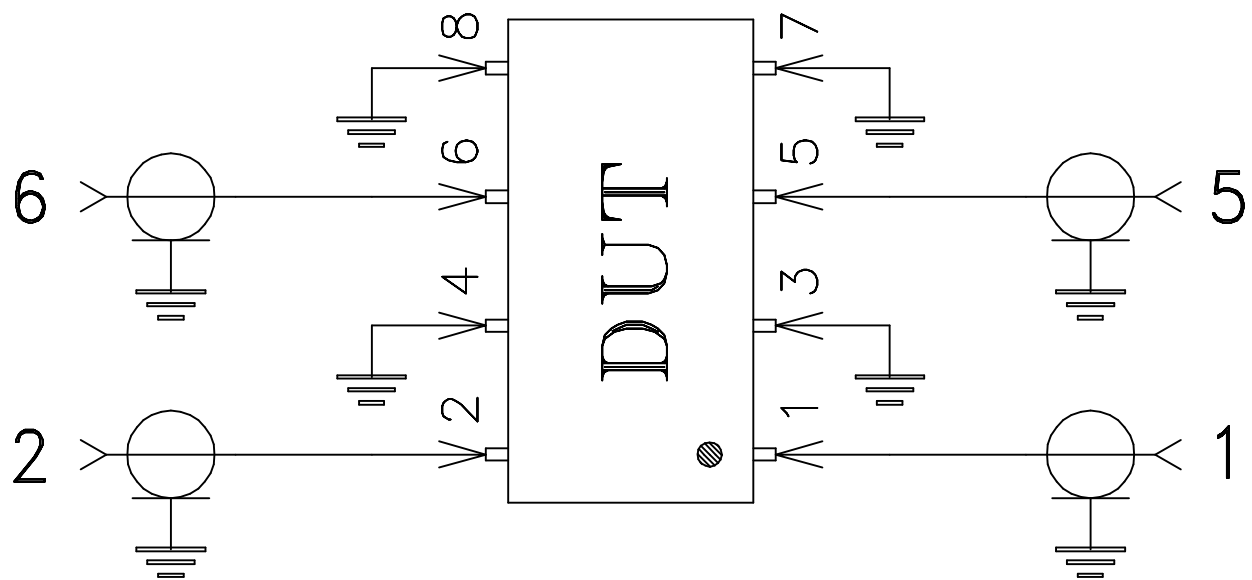
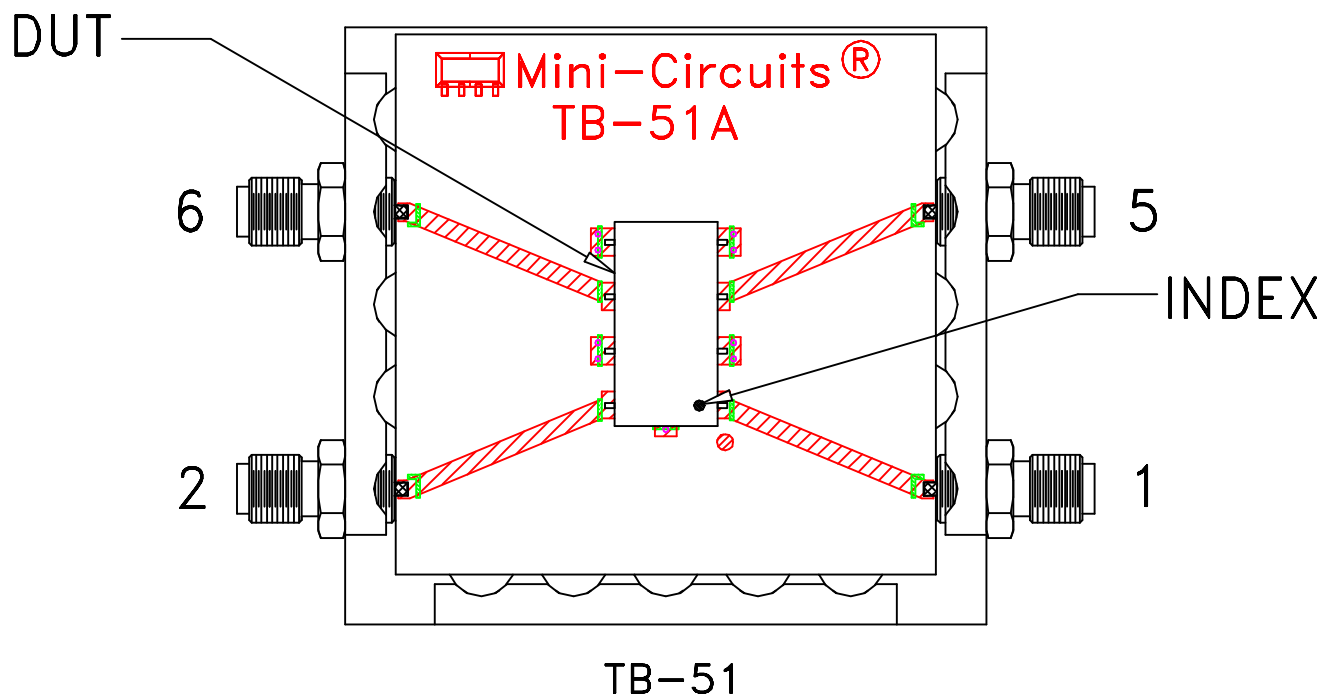
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Evaluation Board and Circuit

For Pins Connections Refer to Data Sheet of the DUT



Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.030 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