

Surface Mount

Power Splitter/Combiner

4 Way-0° 50Ω 1500 to 2500 MHz

BP4P1+



Generic photo used for illustration purposes only

CASE STYLE: XX211

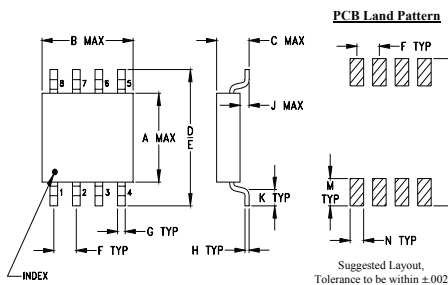
Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-65°C to 150°C
Power Input (as a splitter)	1.5W max.
Internal Dissipation	0.375W max.
Permanent damage may occur if any of these limits are exceeded.	

Pin Connections

SUM PORT	2
PORT 1	1
PORT 2	8
PORT 3	5
PORT 4	4
GROUND	3,6,7

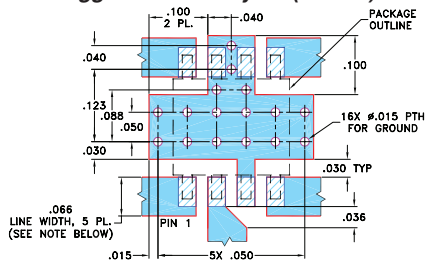
Outline Drawing



Outline Dimensions (inch/mm)

A	B	C	D	E	F	G
.163	.210	.077	.250	.220	.050	.017
4.14	5.33	1.96	6.35	5.59	1.27	0.43
H	J	K	M	N	P	wt
.009	.025	.030	.050	.030	.270	grams
0.23	0.64	0.76	1.27	0.76	6.86	0.10

Demo Board MCL P/N: TB-231 Suggested PCB Layout (PL-113)



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.030" ± 0.002"; 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.
3. DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
4. DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

Features

- low insertion loss, 0.8 dB typ.
- excellent output VSWR, 1.25:1 typ.
- aqueous washable
- excellent power handling, 1.5W

Applications

- PCS/DCS
- GSM
- WCDMA

Electrical Specifications

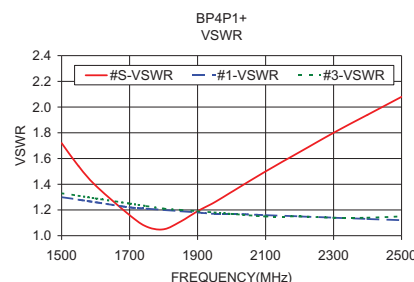
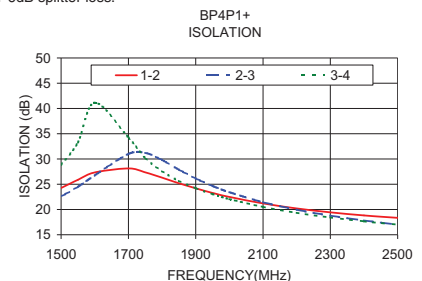
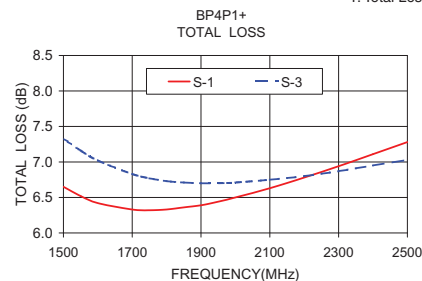
FREQ. RANGE (MHz)	ISOLATION (dB)	INSERTION LOSS (dB) ABOVE 6 dB	PHASE UNBALANCE (Degrees)	AMPLITUDE UNBALANCE ^Δ (dB)	VSWR (:1) Typ.
f_L - f_U	Typ. Min.	Typ. Max.	Max.	Max.	Port S Ports 1,2,3,4
1500-2500	21 15	0.8 1.6	25	0.8	1.6 1.25

^Δ Measurements relative to port 2.

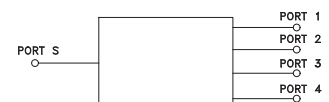
Typical Performance Data

Freq. (MHz)	Total Loss ¹ (dB)				Amp. Unbal. (dB)	Isolation (dB)			Phase Unbal. (deg.)	VSWR S	VSWR 1	VSWR 2	VSWR 3	VSWR 4
	S-1	S-2	S-3	S-4		1-2	2-3	3-4						
1500.00	6.65	7.15	7.33	7.29	0.69	24.25	22.57	28.84	2.37	1.72	1.30	1.36	1.33	1.40
1550.00	6.52	6.97	7.16	7.12	0.64	25.88	24.50	33.27	3.35	1.54	1.28	1.34	1.31	1.37
1600.00	6.42	6.83	7.02	6.99	0.59	27.33	26.75	41.16	4.36	1.39	1.26	1.32	1.29	1.34
1700.00	6.33	6.65	6.83	6.83	0.50	28.13	31.00	34.24	6.30	1.16	1.22	1.29	1.25	1.30
1750.00	6.32	6.60	6.77	6.79	0.47	27.35	31.21	30.19	7.24	1.07	1.21	1.27	1.23	1.28
1800.00	6.33	6.56	6.73	6.76	0.43	26.31	29.80	27.58	8.19	1.05	1.20	1.26	1.21	1.26
1850.00	6.36	6.54	6.71	6.76	0.40	25.20	27.88	25.67	9.12	1.11	1.19	1.25	1.20	1.24
1900.00	6.39	6.53	6.70	6.76	0.36	24.20	26.14	24.21	10.04	1.19	1.18	1.24	1.19	1.23
1950.00	6.44	6.53	6.70	6.77	0.33	23.27	24.66	23.03	10.95	1.26	1.17	1.23	1.18	1.22
2000.00	6.50	6.55	6.71	6.79	0.30	22.49	23.42	22.06	11.89	1.34	1.17	1.22	1.17	1.20
2100.00	6.63	6.59	6.75	6.86	0.27	21.20	21.44	20.52	13.70	1.50	1.16	1.20	1.15	1.18
2200.00	6.78	6.65	6.80	6.94	0.29	20.21	19.96	19.35	15.49	1.65	1.15	1.19	1.15	1.17
2300.00	6.94	6.72	6.87	7.04	0.32	19.44	18.78	18.42	17.28	1.80	1.14	1.19	1.14	1.15
2400.00	7.11	6.81	6.95	7.14	0.34	18.83	17.82	17.65	19.06	1.94	1.13	1.19	1.14	1.14
2500.00	7.28	6.90	7.03	7.25	0.38	18.35	17.00	16.99	20.86	2.08	1.12	1.19	1.15	1.12

1. Total Loss = Insertion Loss + 6dB splitter loss.



electrical schematic



ESD Rating

Human Body Model (HBM): Class 1A (250 v to <500 v) in accordance with ANSI/ESD STM 5.1 - 2001
Machine Model (MM): Class M1 (< 100 v) in accordance with ANSI/ESD STM 5.2 - 1999 (pass 50V)

Notes

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
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REV. C
M151107
ED-12348C/8+
BP4P1+
150619

4 Way-0° Power Splitter/Combiner

BP4P1+

Typical Performance Data

FREQ. (MHz)	TOTAL LOSS ¹ (dB)				AMP. UNBAL. (dB)	ISOLATION (dB)			PHASE UNBAL. (deg.)	FREQ. (MHz)	VSWR (:1)				
	S-1	S-2	S-3	S-4		1-2	2-3	3-4			S	1	2	3	4
1200.0	8.54	9.31	9.51	9.40	0.96	16.69	15.34	17.81	4.31	1200.0	3.90	1.49	1.49	1.49	1.62
1250.0	8.07	8.79	8.98	8.88	0.92	17.59	16.16	18.88	3.09	1250.0	3.35	1.46	1.47	1.47	1.59
1300.0	7.66	8.34	8.53	8.44	0.87	18.63	17.11	20.14	1.95	1300.0	2.89	1.43	1.45	1.44	1.55
1350.0	7.33	7.96	8.15	8.07	0.83	19.81	18.20	21.66	0.86	1350.0	2.51	1.39	1.43	1.41	1.51
1400.0	7.05	7.63	7.83	7.75	0.78	21.15	19.45	23.50	0.72	1400.0	2.20	1.36	1.41	1.39	1.47
1450.0	6.82	7.36	7.55	7.49	0.73	22.64	20.90	25.80	1.42	1450.0	1.94	1.33	1.38	1.36	1.44
1500.0	6.65	7.15	7.33	7.29	0.69	24.25	22.57	28.84	2.37	1500.0	1.72	1.30	1.36	1.33	1.40
1550.0	6.52	6.97	7.16	7.12	0.64	25.88	24.50	33.27	3.35	1550.0	1.54	1.28	1.34	1.31	1.37
1600.0	6.42	6.83	7.02	6.99	0.59	27.33	26.75	41.16	4.36	1600.0	1.39	1.26	1.32	1.29	1.34
1650.0	6.36	6.73	6.91	6.90	0.55	28.14	29.08	41.87	5.35	1650.0	1.26	1.24	1.30	1.26	1.32
1700.0	6.33	6.65	6.83	6.83	0.50	28.13	31.00	34.24	6.30	1700.0	1.16	1.22	1.29	1.25	1.30
1710.0	6.33	6.64	6.82	6.82	0.50	28.02	31.20	33.25	6.48	1710.0	1.14	1.22	1.28	1.24	1.29
1720.0	6.32	6.63	6.80	6.81	0.49	27.88	31.33	32.37	6.67	1720.0	1.12	1.22	1.28	1.24	1.29
1730.0	6.32	6.62	6.79	6.81	0.48	27.72	31.37	31.58	6.86	1730.0	1.10	1.21	1.28	1.23	1.28
1740.0	6.32	6.61	6.78	6.80	0.48	27.54	31.32	30.86	7.05	1740.0	1.09	1.21	1.27	1.23	1.28
1750.0	6.32	6.60	6.77	6.79	0.47	27.35	31.21	30.19	7.24	1750.0	1.07	1.21	1.27	1.23	1.28
1760.0	6.32	6.59	6.77	6.78	0.46	27.16	31.01	29.59	7.43	1760.0	1.06	1.21	1.27	1.22	1.27
1770.0	6.32	6.58	6.76	6.78	0.46	26.96	30.77	29.04	7.63	1770.0	1.05	1.21	1.27	1.22	1.27
1780.0	6.33	6.57	6.75	6.77	0.45	26.75	30.48	28.51	7.82	1780.0	1.05	1.20	1.26	1.22	1.26
1790.0	6.33	6.57	6.74	6.77	0.44	26.53	30.15	28.02	8.01	1790.0	1.05	1.20	1.26	1.22	1.26
1800.0	6.33	6.56	6.73	6.76	0.43	26.31	29.80	27.58	8.19	1800.0	1.05	1.20	1.26	1.21	1.26
1810.0	6.33	6.56	6.73	6.76	0.43	26.08	29.44	27.16	8.37	1810.0	1.06	1.19	1.26	1.21	1.25
1820.0	6.34	6.55	6.72	6.76	0.42	25.85	29.03	26.75	8.56	1820.0	1.07	1.19	1.25	1.21	1.25
1830.0	6.34	6.55	6.72	6.76	0.41	25.63	28.65	26.38	8.74	1830.0	1.09	1.19	1.25	1.20	1.25
1840.0	6.35	6.54	6.72	6.76	0.41	25.41	28.25	26.01	8.93	1840.0	1.10	1.19	1.25	1.20	1.24
1850.0	6.36	6.54	6.71	6.76	0.40	25.20	27.88	25.67	9.12	1850.0	1.11	1.19	1.25	1.20	1.24
1860.0	6.36	6.54	6.71	6.76	0.39	25.00	27.52	25.36	9.30	1860.0	1.13	1.19	1.24	1.20	1.24
1870.0	6.37	6.54	6.71	6.76	0.39	24.79	27.17	25.05	9.49	1870.0	1.14	1.19	1.24	1.19	1.24
1880.0	6.38	6.54	6.71	6.76	0.38	24.59	26.83	24.76	9.67	1880.0	1.16	1.19	1.24	1.19	1.23
1890.0	6.39	6.53	6.70	6.76	0.37	24.39	26.49	24.48	9.86	1890.0	1.17	1.18	1.24	1.19	1.23
1900.0	6.39	6.53	6.70	6.76	0.36	24.20	26.14	24.21	10.04	1900.0	1.19	1.18	1.24	1.19	1.23
1910.0	6.40	6.53	6.70	6.76	0.36	23.99	25.82	23.96	10.22	1910.0	1.20	1.18	1.23	1.18	1.22
1920.0	6.41	6.53	6.70	6.76	0.35	23.80	25.51	23.71	10.41	1920.0	1.22	1.18	1.23	1.18	1.22
1930.0	6.42	6.53	6.70	6.77	0.35	23.61	25.20	23.48	10.58	1930.0	1.23	1.18	1.23	1.18	1.22
1940.0	6.43	6.53	6.70	6.77	0.34	23.43	24.93	23.25	10.77	1940.0	1.25	1.17	1.23	1.18	1.22
1950.0	6.44	6.53	6.70	6.77	0.33	23.27	24.66	23.03	10.95	1950.0	1.26	1.17	1.23	1.18	1.22
2000.0	6.50	6.55	6.71	6.79	0.30	22.49	23.42	22.06	11.89	2000.0	1.34	1.17	1.22	1.17	1.20
2050.0	6.56	6.56	6.72	6.82	0.26	21.80	22.37	21.23	12.80	2050.0	1.42	1.16	1.21	1.16	1.19
2100.0	6.63	6.59	6.75	6.86	0.27	21.20	21.44	20.52	13.70	2100.0	1.50	1.16	1.20	1.15	1.18
2150.0	6.70	6.62	6.77	6.90	0.28	20.67	20.66	19.90	14.60	2150.0	1.57	1.16	1.20	1.15	1.18
2200.0	6.78	6.65	6.80	6.94	0.29	20.21	19.96	19.35	15.49	2200.0	1.65	1.15	1.19	1.15	1.17
2250.0	6.86	6.69	6.83	6.99	0.30	19.81	19.34	18.86	16.39	2250.0	1.72	1.15	1.19	1.14	1.16
2300.0	6.94	6.72	6.87	7.04	0.32	19.44	18.78	18.42	17.28	2300.0	1.80	1.14	1.19	1.14	1.15
2350.0	7.02	6.76	6.91	7.09	0.32	19.13	18.29	18.02	18.18	2350.0	1.87	1.14	1.19	1.14	1.14
2400.0	7.11	6.81	6.95	7.14	0.34	18.83	17.82	17.65	19.06	2400.0	1.94	1.13	1.19	1.14	1.14
2450.0	7.19	6.85	6.99	7.19	0.35	18.60	17.41	17.30	19.99	2450.0	2.01	1.13	1.19	1.15	1.13
2500.0	7.28	6.90	7.03	7.25	0.38	18.35	17.00	16.99	20.86	2500.0	2.08	1.12	1.19	1.15	1.12
2600.0	7.45	6.99	7.12	7.36	0.46	17.96	16.30	16.41	22.59	2600.0	2.21	1.11	1.20	1.16	1.10
2800.0	7.78	7.18	7.32	7.60	0.59	17.37	15.13	15.43	25.97	2800.0	2.48	1.08	1.22	1.19	1.07
3000.0	8.09	7.39	7.53	7.84	0.70	16.95	14.17	14.59	29.18	3000.0	2.74	1.05	1.27	1.24	1.04
3100.0	8.24	7.49	7.65	7.96	0.75	16.76	13.75	14.20	30.75	3100.0	2.87	1.04	1.30	1.27	1.05
3300.0	8.54	7.71	7.90	8.23	0.83	16.42	12.99	13.49	33.53	3300.0	3.15	1.07	1.37	1.35	1.09
3700.0	9.11	8.18	8.48	8.77	0.94	15.73	11.76	12.25	37.96	3700.0	3.76	1.23	1.60	1.55	1.26

¹Total Loss = Insertion Loss + 6dB Splitter Loss

REV. X2

ED12348C/8+

BP4P1+

100623

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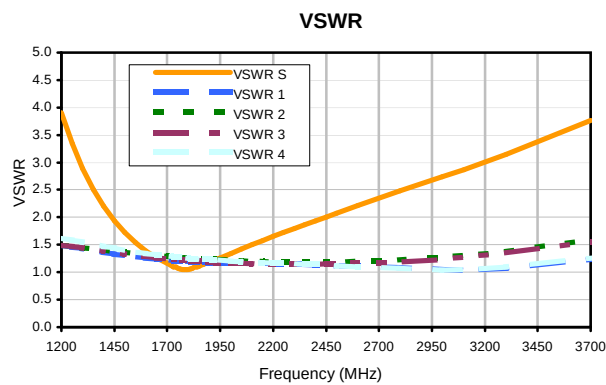
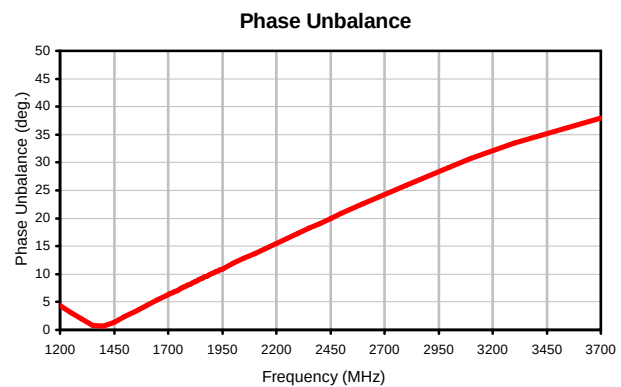
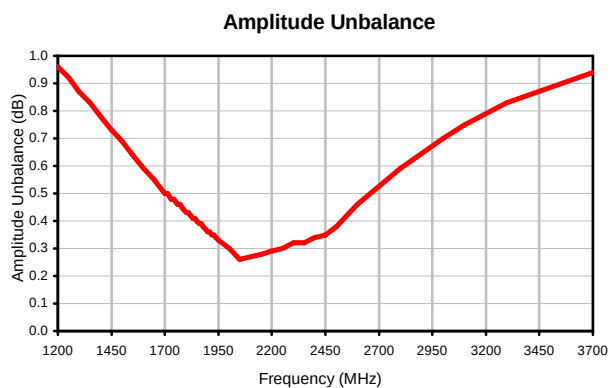
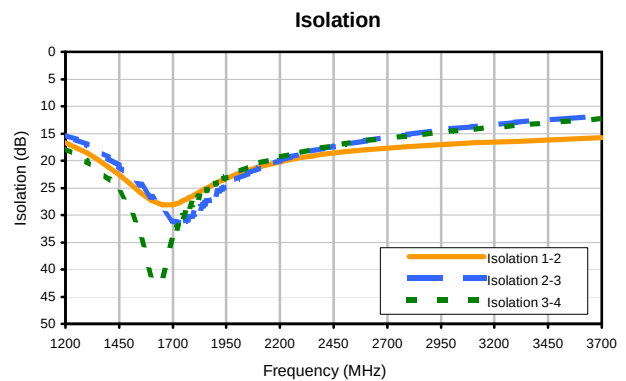
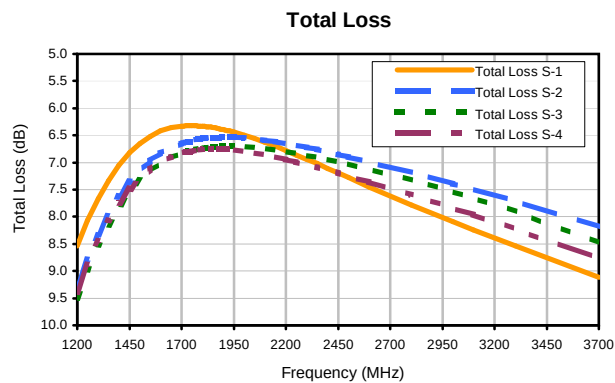
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4 Way-0° Power Splitter/Combiner

BP4P1+

Typical Performance Curves

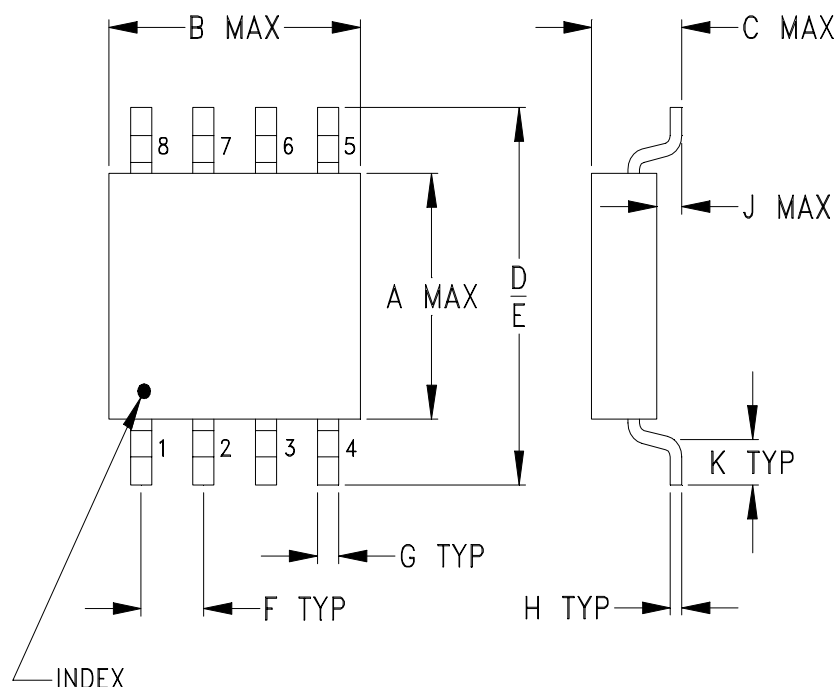


REV. X2
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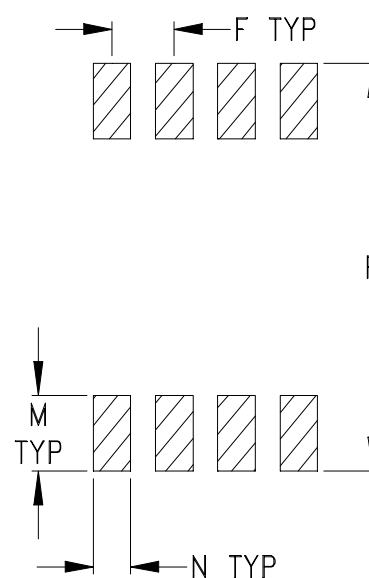


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Outline Dimensions



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
XX211	.163 (4.14)	.210 (5.33)	.077 (1.96)	.250 (6.35)	.220 (5.59)	.050 (1.27)	.017 (0.43)	.009 (0.23)	.025 (0.64)	.030 (0.76)	-- --	.050 (1.27)	.030 (0.76)	.270 (6.86)

CASE #	Q	R	S	WT. GRAM
XX211	-- --	-- --	-- --	.10

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .03$; 3 Pl. $\pm .015$

Notes:

- Case material: Plastic.
 - Termination finish:
For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier. All models, (+) suffix. ☉
For RoHS-5 Case Styles: Tin-Lead plate. All models, No (+) suffix.
 - Special Tolerances: Termination width $\pm .005$ inch, termination thickness $\pm .003$ inch.
- ☉ Model BP4C+ will be supplied with either Tin finish or Tin-Silver-Nickel finish until Tin finish inventory is depleted.



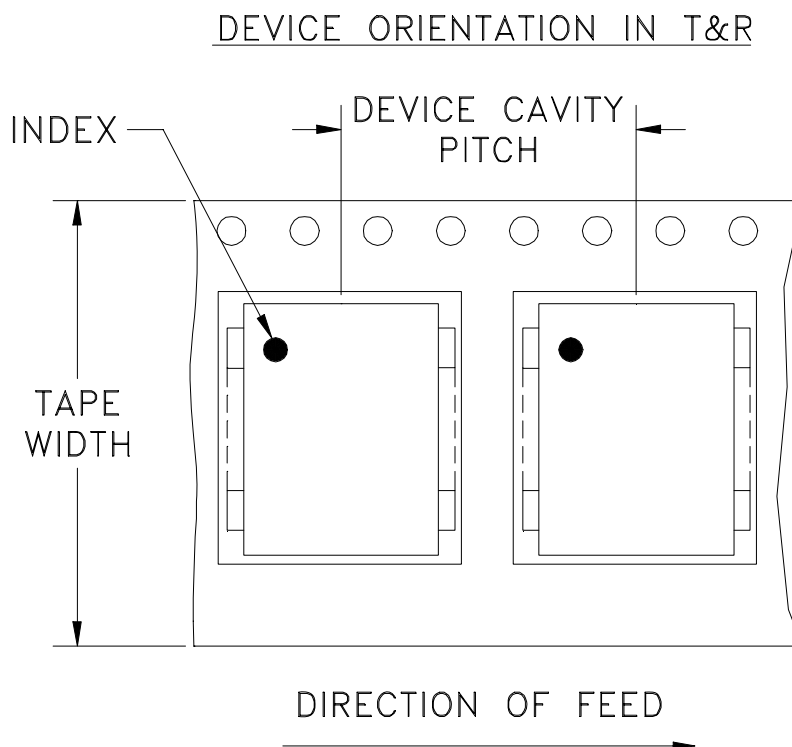
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Tape & Reel Packaging TR-F16



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
12	8	7	Small quantity standards (see note)	20
				50
				100
				200
				500
			Standard	1000*
		13	Standard	2000**

Note : Please Consult individual model data sheet to determine device per reel availability

* BP models only

** MSW and MSWA models

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

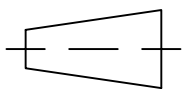


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REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M83023	NEW RELEASE	01/28/03	MMG	HY
A	M102713	ADDED "...WITH SMOBC"	01/14/06	GF	IL
B	M104061	UPDATED DWG. PER B14-TB-231 (REV. A)	04/20/06	MMG	YB

Figure 1: Dimensions of the package. The drawing shows a top view of a package with various dimensions. The package outline is a central rectangle with four notched corners. Dimensions include: .025 (width of a central feature), .050, 3 PL. (width of a side feature), .015 (width of a small gap), .030 TYP (typical width of a central feature), .020 (width of a central feature), .035 (width of a side feature), .040 2 PL. (width of a side feature), .050 (width of a central feature), .080 2 PL. (width of a side feature), .013 (width of a small gap), .044 TRACE WIDTH, 5 PL. (SEE NOTE 1) (width of a trace), and 15X Ø.015 PTH FOR GROUND (15 holes for ground). The package outline is indicated by a dashed line.

	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 ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ±	DRAWN	MMG	01/23/03
	CHECKED	AV	01/28/03
	APPROVED	HY	01/28/03

11

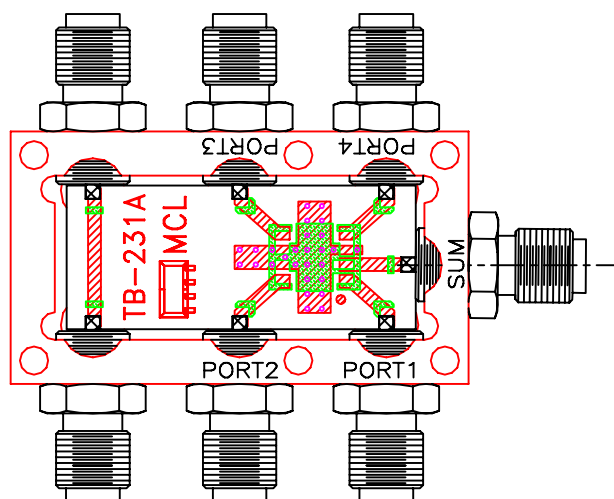
Mini-Circuits® 13 Neptune Avenue
Brooklyn NY 11235

PL, js, XX211, BP4P/BP4C, TB-231

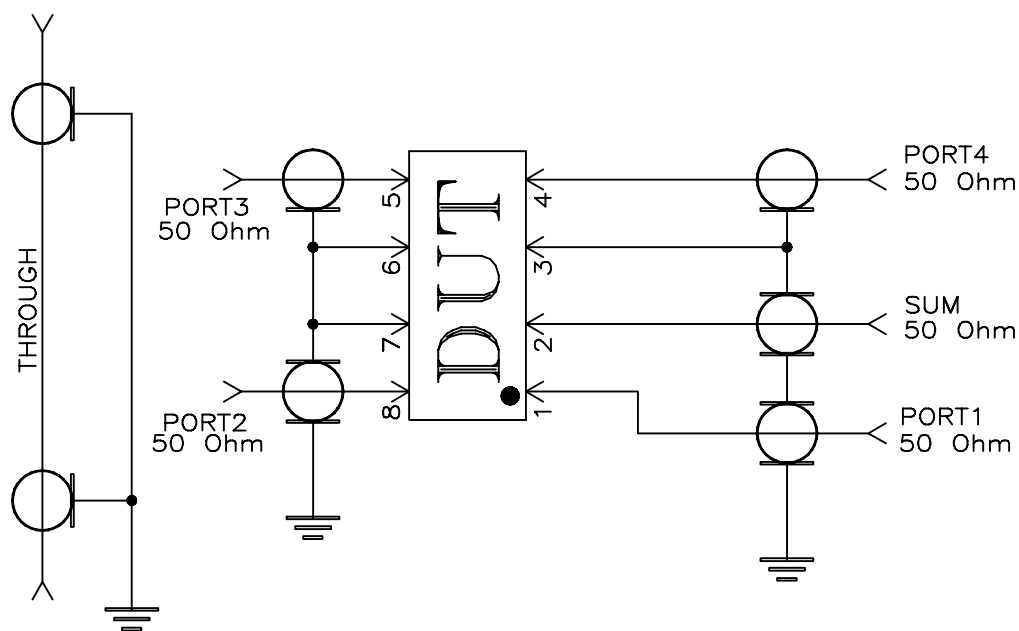
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SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-113		REV: B
FILE: 98PL113		SCALE: 10:1	SHEET: 1 OF 1	

Evaluation Board and Circuit



TB-231



Schematic Diagram

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	-65° to 150° C Ambient Environment	Individual Model Data Sheet
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JESD22-A102-C, Condition C
Temperature Cycling	-65° to 150°C, 100 cycles	JESD22-A104
Temperature Humidity	85°C/ 85% RH, 168 hours	JESD22-113
Solder Reflow Heat	Sn-Pb Eutetic Process: 240°C peak Pb-Free Process: 260°C peak	J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1
Moisture Sensitivity: Level 1	Bake at 125°C for 24 hours Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 240°C peak (Non-RoHS) or 260°C (RoHS)	J-STD-020
Solderability	10X magnification, 95% coverage	JESD22-B102, Method 1: Dip and Look Test
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
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