



STRIPLINE SURFACE MOUNT

Bi-Directional Coupler

BDCH-15-33+

Mini-Circuits

50Ω 500 to 3000 MHz 15 dB 100W

KEY FEATURES

- High power handling, up to 100W
- Ultra wideband, 500 to 3000 MHz
- Low insertion loss, 0.25 dB

APPLICATIONS

- UHF high power radio
- Transmission signal monitoring
- Antenna reflection monitoring
- Distributed antenna systems (DAS)
- Wireless transmitters

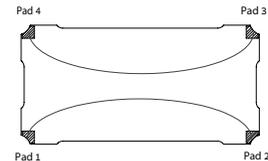
PRODUCT OVERVIEW

Mini-Circuits' BDCH-15-33+ high-power bi-directional coupler provides high power handling up to 100W and low insertion loss of 0.25 dB. Covering frequencies from 500 to 3000 MHz, it supports a wide variety of applications from power amplifiers and antenna feeds to various digital communications and more. High directivity of 25 dB provides accurate sampling from the coupled port, and 30 dB return loss provides excellent matching over full frequency range. The coupler is designed into an open printed laminate (1.00 x 0.50 x 0.051") with wrap-around terminations for good solderability and easy visual inspection.



Generic photo used for illustration purposes only

FUNCTIONAL DIAGRAM



ELECTRICAL SPECIFICATIONS^{1,2} AT +25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Frequency Range		500		3000	MHz
Insertion Loss ³	500-3000	-	0.25	0.45	dB
Coupling Nominal	500-3000	-	15.5±1.0	-	dB
Coupling Flatness (±)	500-3000	-	±0.85	-	dB
	600-3000	-	±0.55	-	
Directivity	500-3000	19	25	-	dB
Return Loss (Input/Output)	500-3000	20	30	-	dB
Return Loss (Coupled Forward/Reverse)	500-3000	20	30	-	dB
Thermal Resistance ⁴	500-3000	-	0.65	-	°C/W

1. Tested on Evaluation Board TB-863-1+. De-embedded to the device reference plane.

2. Model is symmetrical and all ports are interchangeable, see Port Function Description/Configuration table for details and S-Parameters for actual performance.

3. Does not include theoretical loss due to coupling. Nominal theoretical loss is 0.12 dB.

4. Thermal Resistance is defined as, example (θ_{jc})= (Hot Spot Temperature on DUT - Base Plate Temperature)/Input Power)

ABSOLUTE MAXIMUM RATINGS⁵

Operating Case Temperature ⁶	-55 °C to +105 °C	
Storage Temperature	-55 °C to +105 °C	
Power Input	+85 °C case	100 W
	+95 °C case	85 W
	+105 °C case	70 W
DC Current	2 A	

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

6. Case temperature is defined as temperature on base plate.



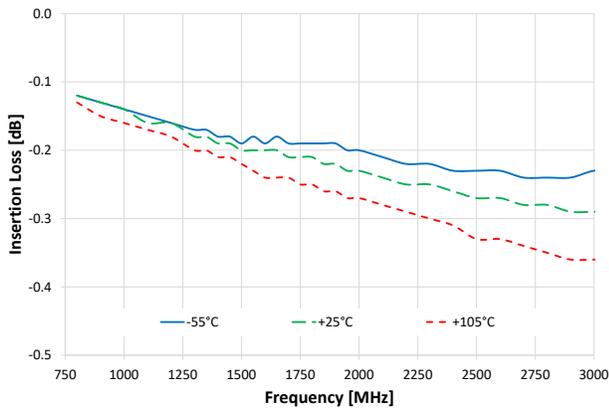


TYPICAL PERFORMANCE GRAPHS

Note: Data corresponds to Configuration A at +25°C unless specified otherwise.

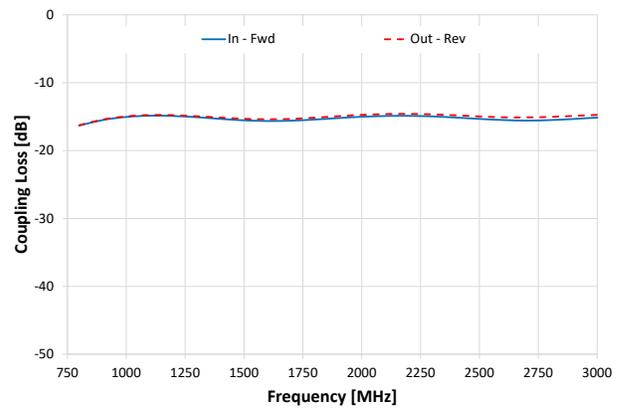
BDCH-15-33+

Insertion Loss vs. Frequency



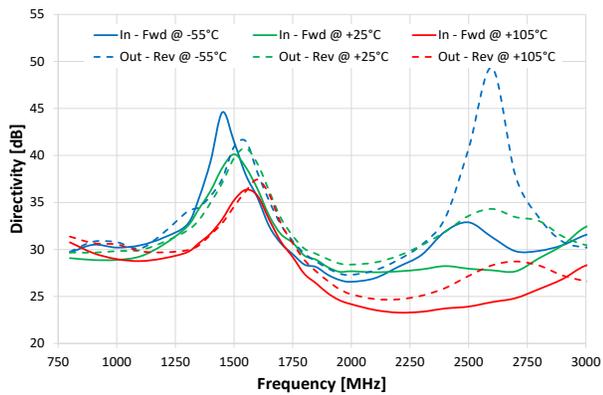
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Coupling Loss vs. Frequency



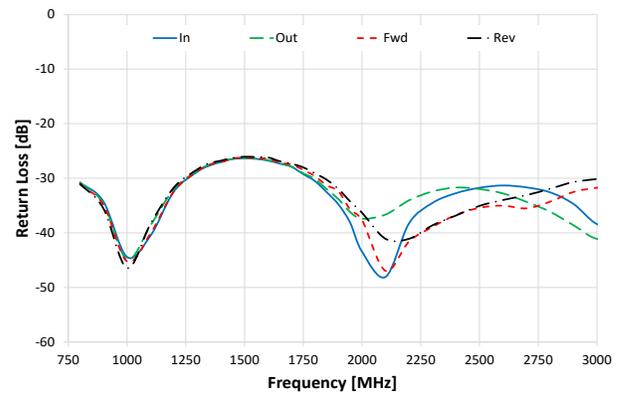
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Directivity vs. Frequency



BDCH-15-33+

Return Loss vs. Frequency





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BDCH-15-33+

Mini-Circuits

50Ω 500 to 3000 MHz 15 dB 100W

FUNCTIONAL DIAGRAM

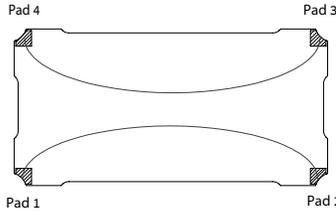


Figure 1. BDCH-15-33+ Functional Diagram

PAD DESCRIPTION/CONFIGURATION ⁷

Function	Pad Number	Description
Input	1	Connects to RF Input Port
Output	2	Connects to RF Output Port
Coupled Forward	4	Connects to Coupled Forward Port
Coupled Reverse	3	Connects to Coupled Reverse Port
Ground	5	Connects to Ground

Configuration	Input	Output	Coupled Forward	Coupled Reverse
A	1	2	4	3
B	2	1	3	4
C	3	4	2	1
D	4	3	1	2

7. Model is symmetrical and all ports are interchangeable, see Port Function Description/Configuration table for details and S-Parameters for actual performance.

SUGGESTED PCB LAYOUT (PL-538)

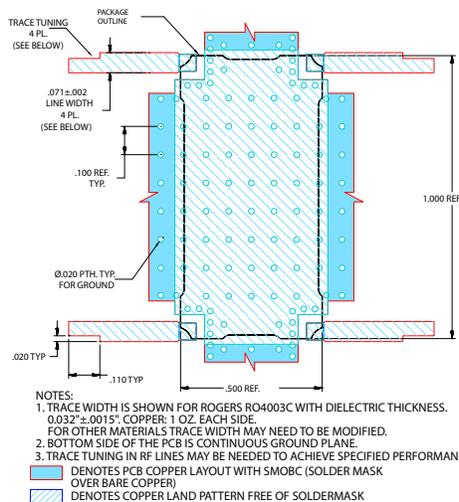
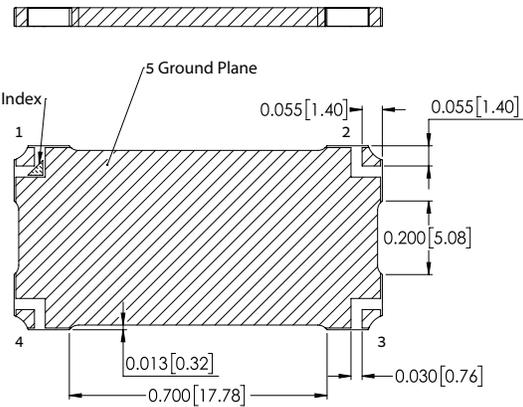
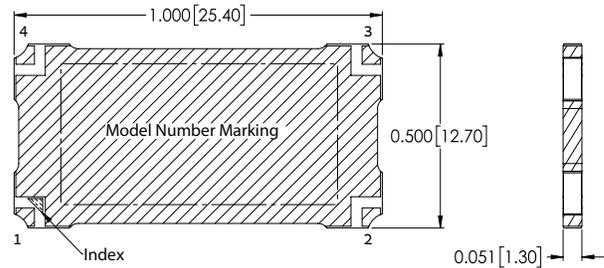


Figure 2. Suggested PCB Layout PL-538

CASE STYLE DRAWING (PQ2098)



NOTES:

- Base material: Printed wiring laminate.
- Termination finish: 2-5 μinch (.05-.13 microns) Immersion Gold.
- Weight: 2.0 grams
- Marking may contain other features or characters for internal lot control.

PRODUCT MARKING*: BDCH-15-33+

*Marking may contain other features or characters for internal lot control.



STRIPLINE SURFACE MOUNT

Bi-Directional Coupler

BDCH-15-33+

50Ω 500 to 3000 MHz 15 dB 100W

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASH BOARD.

[CLICK HERE](#)

Performance Data & Graphs	Data
	Graphs
	S-Parameter (S4P Files) Data Set (.zip file) De-embedded to device pads
Case Style	PQ2098 Lead Finish: 2-5 μ inch (0.05-0.13 microns) Immersion Gold.
RoHS Status	Compliant
Tape and Reel	F118
Suggested Layout for PCB Design	PL-538
Evaluation Board	TB-BDCH-15-33+
	Gerber File
Environmental Rating	ENV02T8

NOTES

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Bi-Directional Coupler

BDCH-15-33+

Typical Performance Data

TEST CONDITIONS: INPUT POWER =+5 dBm @Temperature = -55°C, Configuration A

FREQ. (MHz)	INSERTION LOSS ¹ (dB) In - Out	COUPLING (dB)		DIRECTIVITY (dB) In - Fwd	RETURN LOSS (dB)			
		In - Fwd	Out - Rev		In	Out	Fwd	Rev
300	0.09	19.36	19.35	29.53	25.32	25.02	27.13	27.21
350	0.09	18.27	18.26	28.66	25.88	25.63	27.56	27.81
400	0.09	17.41	17.39	28.30	26.56	26.33	27.38	27.53
450	0.10	16.70	16.68	28.13	27.70	27.47	28.40	28.52
500	0.10	16.15	16.12	28.10	28.74	28.64	30.18	30.48
550	0.10	15.71	15.68	28.06	30.89	30.68	31.78	32.32
600	0.10	15.38	15.34	27.93	33.26	33.09	32.87	33.53
650	0.11	15.14	15.09	27.93	37.19	36.34	33.82	34.49
700	0.12	14.98	14.93	27.95	41.75	39.03	36.02	36.61
750	0.12	14.89	14.83	28.01	50.36	41.31	37.81	40.50
800	0.13	14.87	14.80	27.64	49.36	41.74	39.99	46.51
850	0.13	14.90	14.82	27.81	40.85	39.84	39.23	45.66
900	0.14	14.97	14.87	27.69	36.77	36.20	37.31	39.72
950	0.15	15.06	14.97	27.95	33.39	33.77	35.13	36.88
1000	0.16	15.19	15.07	28.07	31.44	31.53	34.66	35.13
1050	0.17	15.32	15.19	28.53	29.91	30.29	32.73	33.22
1150	0.18	15.55	15.39	29.83	28.27	28.70	28.55	28.89
1200	0.19	15.63	15.46	30.76	28.31	28.49	27.75	27.92
1250	0.20	15.67	15.49	31.10	28.11	28.43	27.08	27.18
1300	0.20	15.67	15.47	31.03	28.95	28.98	27.89	28.01
1350	0.20	15.63	15.44	30.35	29.45	29.39	28.13	28.23
1450	0.21	15.45	15.25	28.04	32.29	31.88	29.84	29.79
1500	0.22	15.34	15.13	26.84	34.15	33.73	31.13	30.80
1550	0.22	15.24	15.01	26.42	36.54	35.51	32.30	32.26
1600	0.22	15.13	14.91	25.86	39.20	37.91	33.94	34.14
1650	0.22	15.04	14.81	25.80	41.08	41.58	35.41	37.78
1750	0.22	14.93	14.70	25.53	39.95	45.70	37.96	45.36
1800	0.23	14.90	14.67	25.84	37.68	44.03	39.35	44.54
1850	0.23	14.91	14.67	25.67	36.74	41.64	42.42	42.12
1900	0.23	14.95	14.70	26.12	35.50	40.65	43.50	39.80
1950	0.23	15.01	14.75	25.89	35.61	40.60	41.37	38.39
2050	0.24	15.20	14.90	25.95	35.61	41.27	36.94	37.92
2100	0.24	15.28	14.99	25.97	35.90	42.43	35.90	38.47
2150	0.24	15.37	15.06	26.04	37.02	42.34	36.81	39.04
2200	0.24	15.44	15.13	25.84	37.92	42.05	36.64	38.03
2250	0.26	15.50	15.17	26.11	39.24	41.75	37.16	37.25
2350	0.28	15.54	15.14	26.09	40.94	41.26	35.80	35.95
2400	0.27	15.45	15.10	26.00	39.01	39.69	33.27	33.88
2450	0.28	15.38	15.01	26.25	38.89	39.70	34.13	34.51
2500	0.29	15.33	14.90	26.31	37.11	38.44	32.64	32.71
2550	0.30	15.17	14.83	26.50	36.99	37.98	33.51	33.87
2600	0.32	15.13	14.69	26.56	35.94	37.46	32.64	33.27
2650	0.31	14.98	14.66	26.40	34.46	35.67	32.87	34.08
2700	0.32	14.90	14.60	26.55	33.23	34.91	31.36	33.24
2750	0.32	14.83	14.59	26.48	32.12	33.37	31.17	33.08
2800	0.34	14.90	14.56	27.27	31.53	32.29	30.07	31.94
2850	0.34	14.91	14.68	26.95	30.68	31.30	29.73	31.43
2900	0.35	15.08	14.81	26.73	29.70	30.17	30.48	31.91
2950	0.35	15.26	14.97	26.58	29.72	30.02	31.29	32.36
3000	0.35	15.47	15.29	25.70	29.69	30.06	34.01	34.95
3050	0.34	15.89	15.70	25.42	30.23	30.53	35.70	35.12
3100	0.35	16.38	16.14	24.67	30.73	30.80	40.17	39.54
3200	0.36	17.66	17.49	22.93	33.14	31.25	46.23	57.93
3300	0.35	19.63	19.49	20.95	34.81	30.28	35.50	39.46

(Note 1) Does not include theoretical loss. Nominal theoretical loss is 0.12 dB.

Notes

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Bi-Directional Coupler

BDCH-15-33+

Typical Performance Data

TEST CONDITIONS: INPUT POWER =+5 dBm @Temperature = -55°C, Configuration B

FREQ. (MHz)	INSERTION LOSS ¹ (dB) In - Out	COUPLING (dB)		DIRECTIVITY (dB) In - Fwd	RETURN LOSS (dB)			
		In - Fwd	Out - Rev		In	Out	Fwd	Rev
300	0.09	19.35	19.36	29.36	25.02	25.32	27.21	27.13
350	0.09	18.26	18.27	28.34	25.63	25.88	27.81	27.56
400	0.09	17.39	17.41	27.97	26.33	26.56	27.53	27.38
450	0.10	16.68	16.70	27.68	27.47	27.70	28.52	28.40
500	0.10	16.12	16.15	27.17	28.64	28.74	30.48	30.18
550	0.10	15.68	15.71	27.09	30.68	30.89	32.32	31.78
600	0.10	15.34	15.38	26.94	33.09	33.26	33.53	32.87
650	0.11	15.09	15.14	27.07	36.34	37.19	34.49	33.82
700	0.11	14.93	14.98	26.96	39.03	41.75	36.61	36.02
750	0.12	14.83	14.89	27.17	41.31	50.36	40.50	37.81
800	0.13	14.80	14.87	27.61	41.74	49.36	46.51	39.99
850	0.13	14.82	14.90	27.84	39.84	40.85	45.66	39.23
900	0.14	14.87	14.97	28.25	36.20	36.77	39.72	37.31
950	0.15	14.97	15.06	28.93	33.77	33.39	36.88	35.13
1000	0.15	15.07	15.19	29.98	31.53	31.44	35.13	34.66
1050	0.16	15.19	15.32	30.86	30.29	29.91	33.22	32.73
1150	0.18	15.39	15.55	32.98	28.70	28.27	28.89	28.55
1200	0.19	15.46	15.63	33.81	28.49	28.31	27.92	27.75
1250	0.19	15.49	15.67	33.50	28.43	28.11	27.18	27.08
1300	0.20	15.47	15.67	32.68	28.98	28.95	28.01	27.89
1350	0.20	15.44	15.63	31.58	29.39	29.45	28.23	28.13
1450	0.21	15.25	15.45	29.32	31.88	32.29	29.79	29.84
1500	0.22	15.13	15.34	28.06	33.73	34.15	30.80	31.13
1550	0.21	15.01	15.24	27.76	35.51	36.54	32.26	32.30
1600	0.21	14.91	15.13	26.94	37.91	39.20	34.14	33.94
1650	0.21	14.81	15.04	26.89	41.58	41.08	37.78	35.41
1750	0.21	14.70	14.93	26.17	45.70	39.95	45.36	37.96
1800	0.22	14.67	14.90	26.48	44.03	37.68	44.54	39.35
1850	0.21	14.67	14.91	26.20	41.64	36.74	42.12	42.42
1900	0.22	14.70	14.95	26.62	40.65	35.50	39.80	43.50
1950	0.22	14.75	15.01	26.58	40.60	35.61	38.39	41.37
2050	0.22	14.90	15.20	27.31	41.27	35.61	37.92	36.94
2100	0.22	14.99	15.28	27.50	42.43	35.90	38.47	35.90
2150	0.23	15.06	15.37	28.10	42.34	37.02	39.04	36.81
2200	0.23	15.13	15.44	28.26	42.05	37.92	38.03	36.64
2250	0.24	15.17	15.50	28.86	41.75	39.24	37.25	37.16
2350	0.26	15.14	15.54	29.31	41.26	40.94	35.95	35.80
2400	0.26	15.10	15.45	29.57	39.69	39.01	33.88	33.27
2450	0.27	15.01	15.38	29.78	39.70	38.89	34.51	34.13
2500	0.28	14.90	15.33	29.99	38.44	37.11	32.71	32.64
2550	0.29	14.83	15.17	30.66	37.98	36.99	33.87	33.51
2600	0.30	14.69	15.13	31.36	37.46	35.94	33.27	32.64
2650	0.30	14.66	14.98	31.19	35.67	34.46	34.08	32.87
2700	0.31	14.60	14.90	32.19	34.91	33.23	33.24	31.36
2750	0.31	14.59	14.83	31.42	33.37	32.12	33.08	31.17
2800	0.33	14.56	14.90	33.27	32.29	31.53	31.94	30.07
2850	0.32	14.68	14.91	33.94	31.30	30.68	31.43	29.73
2900	0.34	14.81	15.08	34.90	30.17	29.70	31.91	30.48
2950	0.33	14.97	15.26	35.35	30.02	29.72	32.36	31.29
3000	0.34	15.29	15.47	34.55	30.06	29.69	34.95	34.01
3050	0.34	15.70	15.89	33.76	30.53	30.23	35.12	35.70
3100	0.34	16.14	16.38	33.03	30.80	30.73	39.54	40.17
3200	0.35	17.49	17.66	30.11	31.25	33.14	57.93	46.23
3300	0.35	19.49	19.63	27.23	30.28	34.81	39.46	35.50

(Note 1) Does not include theoretical loss. Nominal theoretical loss is 0.12 dB.

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Typical Performance Data

TEST CONDITIONS: INPUT POWER =+5 dBm @Temperature = -55°C, Configuration C

FREQ. (MHz)	INSERTION LOSS ¹ (dB) In - Out	COUPLING (dB)		DIRECTIVITY (dB) In - Fwd	RETURN LOSS (dB)			
		In - Fwd	Out - Rev		In	Out	Fwd	Rev
300	0.08	19.36	19.36	29.22	27.21	27.13	25.02	25.32
350	0.09	18.26	18.27	28.19	27.81	27.56	25.63	25.88
400	0.09	17.39	17.41	27.58	27.53	27.38	26.33	26.56
450	0.10	16.68	16.70	27.20	28.52	28.40	27.47	27.70
500	0.10	16.12	16.15	26.89	30.48	30.18	28.64	28.74
550	0.10	15.68	15.71	26.69	32.32	31.78	30.68	30.89
600	0.11	15.34	15.38	26.41	33.53	32.87	33.09	33.26
650	0.11	15.09	15.14	26.41	34.49	33.82	36.34	37.19
700	0.12	14.93	14.98	26.40	36.61	36.02	39.03	41.75
750	0.12	14.83	14.89	26.54	40.50	37.81	41.31	50.36
800	0.13	14.80	14.87	26.52	46.51	39.99	41.74	49.36
850	0.13	14.81	14.90	27.01	45.66	39.23	39.84	40.85
900	0.14	14.87	14.96	27.30	39.72	37.31	36.20	36.77
950	0.15	14.97	15.06	27.99	36.88	35.13	33.77	33.39
1000	0.15	15.07	15.19	28.60	35.13	34.66	31.53	31.44
1050	0.16	15.18	15.32	29.36	33.22	32.73	30.29	29.91
1150	0.18	15.39	15.55	30.80	28.89	28.55	28.70	28.27
1200	0.19	15.46	15.63	31.60	27.92	27.75	28.49	28.31
1250	0.20	15.48	15.66	31.35	27.18	27.08	28.43	28.11
1300	0.21	15.47	15.67	31.07	28.01	27.89	28.98	28.95
1350	0.21	15.44	15.62	30.13	28.23	28.13	29.39	29.45
1450	0.21	15.25	15.45	28.16	29.79	29.84	31.88	32.29
1500	0.22	15.13	15.34	27.19	30.80	31.13	33.73	34.15
1550	0.21	15.02	15.24	26.79	32.26	32.30	35.51	36.54
1600	0.22	14.91	15.13	26.26	34.14	33.94	37.91	39.20
1650	0.22	14.82	15.03	26.17	37.78	35.41	41.58	41.08
1750	0.22	14.71	14.93	25.76	45.36	37.96	45.70	39.95
1800	0.22	14.67	14.90	26.07	44.54	39.35	44.03	37.68
1850	0.21	14.67	14.91	25.99	42.12	42.42	41.64	36.74
1900	0.21	14.70	14.95	26.56	39.80	43.50	40.65	35.50
1950	0.21	14.76	15.01	26.63	38.39	41.37	40.60	35.61
2050	0.22	14.91	15.19	27.51	37.92	36.94	41.27	35.61
2100	0.22	15.00	15.28	28.17	38.47	35.90	42.43	35.90
2150	0.23	15.07	15.37	29.02	39.04	36.81	42.34	37.02
2200	0.23	15.13	15.44	29.57	38.03	36.64	42.05	37.92
2250	0.25	15.18	15.50	30.67	37.25	37.16	41.75	39.24
2350	0.27	15.15	15.54	31.64	35.95	35.80	41.26	40.94
2400	0.27	15.10	15.45	31.84	33.88	33.27	39.69	39.01
2450	0.28	15.02	15.38	32.13	34.51	34.13	39.70	38.89
2500	0.29	14.90	15.32	32.33	32.71	32.64	38.44	37.11
2550	0.29	14.83	15.16	32.24	33.87	33.51	37.98	36.99
2600	0.30	14.70	15.13	31.80	33.27	32.64	37.46	35.94
2650	0.31	14.66	14.98	30.98	34.08	32.87	35.67	34.46
2700	0.31	14.61	14.90	30.98	33.24	31.36	34.91	33.23
2750	0.31	14.59	14.83	30.32	33.08	31.17	33.37	32.12
2800	0.32	14.56	14.89	31.20	31.94	30.07	32.29	31.53
2850	0.32	14.69	14.91	29.96	31.43	29.73	31.30	30.68
2900	0.32	14.82	15.07	29.34	31.91	30.48	30.17	29.70
2950	0.33	14.98	15.25	28.67	32.36	31.29	30.02	29.72
3000	0.34	15.29	15.46	27.34	34.95	34.01	30.06	29.69
3050	0.33	15.70	15.89	26.54	35.12	35.70	30.53	30.23
3100	0.35	16.14	16.37	25.52	39.54	40.17	30.80	30.73
3200	0.35	17.50	17.65	23.20	57.93	46.23	31.25	33.14
3300	0.35	19.50	19.62	20.98	39.46	35.50	30.28	34.81

(Note 1) Does not include theoretical loss. Nominal theoretical loss is 0.12 dB.

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Bi-Directional Coupler

BDCH-15-33+

Typical Performance Data

TEST CONDITIONS: INPUT POWER =+5 dBm @Temperature = -55°C, Configuration D

FREQ. (MHz)	INSERTION LOSS ¹ (dB) In - Out	COUPLING (dB)		DIRECTIVITY (dB) In - Fwd	RETURN LOSS (dB)			
		In - Fwd	Out - Rev		In	Out	Fwd	Rev
300	0.09	19.36	19.36	29.69	27.13	27.21	25.32	25.02
350	0.09	18.27	18.26	28.97	27.56	27.81	25.88	25.63
400	0.09	17.41	17.39	28.74	27.38	27.53	26.56	26.33
450	0.10	16.70	16.68	28.65	28.40	28.52	27.70	27.47
500	0.10	16.15	16.12	28.47	30.18	30.48	28.74	28.64
550	0.10	15.71	15.68	28.51	31.78	32.32	30.89	30.68
600	0.11	15.38	15.34	28.53	32.87	33.53	33.26	33.09
650	0.12	15.14	15.09	28.51	33.82	34.49	37.19	36.34
700	0.12	14.98	14.93	28.32	36.02	36.61	41.75	39.03
750	0.12	14.89	14.83	28.30	37.81	40.50	50.36	41.31
800	0.13	14.87	14.80	28.23	39.99	46.51	49.36	41.74
850	0.13	14.90	14.81	27.98	39.23	45.66	40.85	39.84
900	0.14	14.96	14.87	27.86	37.31	39.72	36.77	36.20
950	0.15	15.06	14.97	27.98	35.13	36.88	33.39	33.77
1000	0.16	15.19	15.07	28.50	34.66	35.13	31.44	31.53
1050	0.16	15.32	15.18	28.84	32.73	33.22	29.91	30.29
1150	0.19	15.55	15.39	30.78	28.55	28.89	28.27	28.70
1200	0.20	15.63	15.46	32.06	27.75	27.92	28.31	28.49
1250	0.20	15.66	15.48	32.83	27.08	27.18	28.11	28.43
1300	0.21	15.67	15.47	32.63	27.89	28.01	28.95	28.98
1350	0.21	15.62	15.44	31.83	28.13	28.23	29.45	29.39
1450	0.21	15.45	15.25	29.16	29.84	29.79	32.29	31.88
1500	0.22	15.34	15.13	27.70	31.13	30.80	34.15	33.73
1550	0.22	15.24	15.02	27.35	32.30	32.26	36.54	35.51
1600	0.23	15.13	14.91	26.57	33.94	34.14	39.20	37.91
1650	0.22	15.03	14.82	26.59	35.41	37.78	41.08	41.58
1750	0.23	14.93	14.71	26.04	37.96	45.36	39.95	45.70
1800	0.23	14.90	14.67	26.25	39.35	44.54	37.68	44.03
1850	0.22	14.91	14.67	25.94	42.42	42.12	36.74	41.64
1900	0.22	14.95	14.70	26.03	43.50	39.80	35.50	40.65
1950	0.23	15.01	14.76	25.74	41.37	38.39	35.61	40.60
2050	0.23	15.19	14.91	25.39	36.94	37.92	35.61	41.27
2100	0.24	15.28	15.00	25.02	35.90	38.47	35.90	42.43
2150	0.24	15.37	15.07	24.90	36.81	39.04	37.02	42.34
2200	0.25	15.44	15.13	24.63	36.64	38.03	37.92	42.05
2250	0.26	15.50	15.18	24.52	37.16	37.25	39.24	41.75
2350	0.28	15.54	15.15	24.37	35.80	35.95	40.94	41.26
2400	0.28	15.45	15.10	24.02	33.27	33.88	39.01	39.69
2450	0.29	15.38	15.02	24.35	34.13	34.51	38.89	39.70
2500	0.30	15.32	14.90	24.51	32.64	32.71	37.11	38.44
2550	0.30	15.16	14.83	24.93	33.51	33.87	36.99	37.98
2600	0.32	15.13	14.70	25.66	32.64	33.27	35.94	37.46
2650	0.32	14.98	14.66	26.05	32.87	34.08	34.46	35.67
2700	0.32	14.90	14.61	26.81	31.36	33.24	33.23	34.91
2750	0.32	14.83	14.59	27.34	31.17	33.08	32.12	33.37
2800	0.33	14.89	14.56	28.93	30.07	31.94	31.53	32.29
2850	0.33	14.91	14.69	30.22	29.73	31.43	30.68	31.30
2900	0.33	15.07	14.82	31.29	30.48	31.91	29.70	30.17
2950	0.34	15.25	14.98	32.32	31.29	32.36	29.72	30.02
3000	0.34	15.46	15.29	32.25	34.01	34.95	29.69	30.06
3050	0.34	15.89	15.70	32.38	35.70	35.12	30.23	30.53
3100	0.35	16.37	16.14	32.07	40.17	39.54	30.73	30.80
3200	0.35	17.65	17.50	30.00	46.23	57.93	33.14	31.25
3300	0.36	19.62	19.50	27.37	35.50	39.46	34.81	30.28

(Note 1) Does not include theoretical loss. Nominal theoretical loss is 0.12 dB.

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Bi-Directional Coupler

BDCH-15-33+

Typical Performance Data

TEST CONDITIONS: INPUT POWER =+5 dBm @Temperature = +25°C, Configuration A

FREQ. (MHz)	INSERTION LOSS ¹ (dB) In - Out	COUPLING (dB)		DIRECTIVITY (dB) In - Fwd	RETURN LOSS (dB)			
		In - Fwd	Out - Rev		In	Out	Fwd	Rev
300	0.09	19.34	19.32	29.53	28.20	28.03	28.67	28.70
350	0.09	18.26	18.23	28.66	27.46	27.34	27.98	28.05
400	0.09	17.39	17.36	28.30	27.59	27.55	28.25	28.12
450	0.10	16.69	16.66	28.13	27.78	27.69	28.27	28.28
500	0.10	16.14	16.10	28.10	28.49	28.43	29.14	29.16
550	0.11	15.70	15.65	28.06	29.19	29.14	29.54	29.76
600	0.11	15.37	15.32	27.93	30.67	30.78	30.94	31.29
650	0.12	15.14	15.07	27.93	32.46	32.42	32.49	32.76
700	0.12	14.98	14.91	27.95	35.02	35.06	34.80	35.08
750	0.13	14.89	14.81	28.01	39.00	38.91	37.83	38.86
800	0.13	14.87	14.79	27.64	44.65	43.54	39.70	42.76
850	0.14	14.89	14.80	27.81	42.04	42.07	40.83	43.14
900	0.15	14.96	14.86	27.69	38.25	37.45	38.15	40.08
950	0.15	15.07	14.95	27.95	33.96	34.02	34.65	35.27
1000	0.16	15.19	15.06	28.07	32.08	31.86	32.95	33.56
1050	0.17	15.32	15.18	28.53	30.07	30.13	30.66	31.05
1150	0.19	15.56	15.38	29.83	28.29	28.43	28.56	29.05
1200	0.20	15.64	15.44	30.76	28.13	28.14	28.19	28.52
1250	0.20	15.67	15.47	31.10	27.77	27.97	27.64	27.97
1300	0.21	15.68	15.46	31.03	28.05	27.96	27.47	27.84
1350	0.21	15.63	15.41	30.35	28.46	28.57	27.62	28.04
1450	0.22	15.46	15.23	28.04	30.31	30.28	28.80	28.93
1500	0.23	15.35	15.12	26.84	30.79	30.46	29.19	29.24
1550	0.23	15.24	14.99	26.42	33.47	32.86	30.81	30.85
1600	0.23	15.14	14.89	25.86	34.27	33.55	31.79	31.49
1650	0.23	15.04	14.79	25.80	38.13	37.07	34.50	34.12
1750	0.24	14.92	14.67	25.53	41.72	41.14	40.38	38.42
1800	0.24	14.90	14.65	25.84	40.17	43.12	41.52	39.53
1850	0.24	14.91	14.65	25.67	38.38	38.64	38.79	38.00
1900	0.24	14.94	14.68	26.12	36.75	38.85	36.61	36.68
1950	0.24	15.01	14.74	25.89	35.59	35.88	34.31	34.37
2050	0.25	15.20	14.89	25.95	34.35	34.80	32.01	32.42
2100	0.25	15.28	14.97	25.97	33.77	34.77	30.79	31.50
2150	0.26	15.39	15.05	26.04	34.00	34.51	30.85	31.56
2200	0.26	15.45	15.11	25.84	33.49	34.33	30.35	30.96
2250	0.27	15.51	15.15	26.11	34.25	35.27	30.87	31.84
2350	0.28	15.52	15.13	26.09	34.84	36.30	32.01	32.85
2400	0.29	15.47	15.07	26.00	34.01	35.85	32.00	33.04
2450	0.30	15.40	14.99	26.25	35.02	36.65	33.51	34.50
2500	0.30	15.30	14.90	26.31	34.36	36.61	34.04	35.08
2550	0.31	15.18	14.80	26.50	34.59	35.88	35.33	36.25
2600	0.31	15.06	14.71	26.56	34.01	36.22	36.43	37.94
2650	0.32	14.96	14.62	26.40	34.18	35.13	37.84	38.91
2700	0.33	14.89	14.56	26.55	33.71	35.14	37.73	40.53
2750	0.34	14.87	14.53	26.48	33.46	33.67	38.38	40.28
2800	0.34	14.87	14.57	27.27	32.98	33.21	36.95	40.36
2850	0.35	14.93	14.65	26.95	32.64	32.19	36.61	39.53
2900	0.35	15.03	14.77	26.73	32.54	32.03	36.36	40.03
2950	0.36	15.22	14.97	26.58	32.47	31.48	35.57	39.06
3000	0.35	15.48	15.25	25.70	32.67	31.87	35.89	39.63
3050	0.36	15.84	15.63	25.42	33.48	31.81	36.36	40.14
3100	0.36	16.30	16.10	24.67	34.67	31.77	36.16	42.15
3200	0.37	17.59	17.41	22.93	37.63	31.49	37.44	47.00
3300	0.37	19.58	19.40	20.95	38.86	30.63	36.50	51.40

(Note 1) Does not include theoretical loss. Nominal theoretical loss is 0.12 dB.

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Bi-Directional Coupler

BDCH-15-33+

Typical Performance Data

TEST CONDITIONS: INPUT POWER =+5 dBm @Temperature = +25°C, Configuration B

FREQ. (MHz)	INSERTION LOSS ¹ (dB) In - Out	COUPLING (dB)		DIRECTIVITY (dB) In - Fwd	RETURN LOSS (dB)			
		In - Fwd	Out - Rev		In	Out	Fwd	Rev
300	0.08	19.32	19.34	29.36	28.03	28.20	28.70	28.67
350	0.09	18.23	18.26	28.34	27.34	27.46	28.05	27.98
400	0.09	17.36	17.39	27.97	27.55	27.59	28.12	28.25
450	0.10	16.66	16.69	27.68	27.69	27.78	28.28	28.27
500	0.10	16.10	16.14	27.17	28.43	28.49	29.16	29.14
550	0.10	15.65	15.70	27.09	29.14	29.19	29.76	29.54
600	0.10	15.32	15.37	26.94	30.78	30.67	31.29	30.94
650	0.11	15.07	15.14	27.07	32.42	32.46	32.76	32.49
700	0.12	14.91	14.98	26.96	35.06	35.02	35.08	34.80
750	0.12	14.81	14.89	27.17	38.91	39.00	38.86	37.83
800	0.13	14.79	14.87	27.61	43.54	44.65	42.76	39.70
850	0.13	14.80	14.89	27.84	42.07	42.04	43.14	40.83
900	0.14	14.86	14.96	28.25	37.45	38.25	40.08	38.15
950	0.15	14.95	15.07	28.93	34.02	33.96	35.27	34.65
1000	0.16	15.06	15.19	29.98	31.86	32.08	33.56	32.95
1050	0.16	15.18	15.32	30.86	30.13	30.07	31.05	30.66
1150	0.18	15.38	15.56	32.98	28.43	28.29	29.05	28.56
1200	0.19	15.44	15.64	33.81	28.14	28.13	28.52	28.19
1250	0.19	15.47	15.67	33.50	27.97	27.77	27.97	27.64
1300	0.20	15.46	15.68	32.68	27.96	28.05	27.84	27.47
1350	0.20	15.41	15.63	31.58	28.57	28.46	28.04	27.62
1450	0.21	15.23	15.46	29.32	30.28	30.31	28.93	28.80
1500	0.22	15.12	15.35	28.06	30.46	30.79	29.24	29.19
1550	0.21	14.99	15.24	27.76	32.86	33.47	30.85	30.81
1600	0.22	14.89	15.14	26.94	33.55	34.27	31.49	31.79
1650	0.22	14.79	15.04	26.89	37.07	38.13	34.12	34.50
1750	0.22	14.67	14.92	26.17	41.14	41.72	38.42	40.38
1800	0.22	14.65	14.90	26.48	43.12	40.17	39.53	41.52
1850	0.22	14.65	14.91	26.20	38.64	38.38	38.00	38.79
1900	0.22	14.68	14.94	26.62	38.85	36.75	36.68	36.61
1950	0.23	14.74	15.01	26.58	35.88	35.59	34.37	34.31
2050	0.23	14.89	15.20	27.31	34.80	34.35	32.42	32.01
2100	0.23	14.97	15.28	27.50	34.77	33.77	31.50	30.79
2150	0.24	15.05	15.39	28.10	34.51	34.00	31.56	30.85
2200	0.24	15.11	15.45	28.26	34.33	33.49	30.96	30.35
2250	0.25	15.15	15.51	28.86	35.27	34.25	31.84	30.87
2350	0.27	15.13	15.52	29.31	36.30	34.84	32.85	32.01
2400	0.27	15.07	15.47	29.57	35.85	34.01	33.04	32.00
2450	0.28	14.99	15.40	29.78	36.65	35.02	34.50	33.51
2500	0.28	14.90	15.30	29.99	36.61	34.36	35.08	34.04
2550	0.30	14.80	15.18	30.66	35.88	34.59	36.25	35.33
2600	0.30	14.71	15.06	31.36	36.22	34.01	37.94	36.43
2650	0.31	14.62	14.96	31.19	35.13	34.18	38.91	37.84
2700	0.32	14.56	14.89	32.19	35.14	33.71	40.53	37.73
2750	0.33	14.53	14.87	31.42	33.67	33.46	40.28	38.38
2800	0.33	14.57	14.87	33.27	33.21	32.98	40.36	36.95
2850	0.33	14.65	14.93	33.94	32.19	32.64	39.53	36.61
2900	0.33	14.77	15.03	34.90	32.03	32.54	40.03	36.36
2950	0.34	14.97	15.22	35.35	31.48	32.47	39.06	35.57
3000	0.34	15.25	15.48	34.55	31.87	32.67	39.63	35.89
3050	0.35	15.63	15.84	33.76	31.81	33.48	40.14	36.36
3100	0.35	16.10	16.30	33.03	31.77	34.67	42.15	36.16
3200	0.36	17.41	17.59	30.11	31.49	37.63	47.00	37.44
3300	0.36	19.40	19.58	27.23	30.63	38.86	51.40	36.50

(Note 1) Does not include theoretical loss. Nominal theoretical loss is 0.12 dB.

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Bi-Directional Coupler

BDCH-15-33+

Typical Performance Data

TEST CONDITIONS: INPUT POWER =+5 dBm @Temperature = +25°C, Configuration C

FREQ. (MHz)	INSERTION LOSS ¹ (dB) In - Out	COUPLING (dB)		DIRECTIVITY (dB) In - Fwd	RETURN LOSS (dB)			
		In - Fwd	Out - Rev		In	Out	Fwd	Rev
300	0.08	19.34	19.35	29.22	28.70	28.67	28.03	28.20
350	0.08	18.24	18.27	28.19	28.05	27.98	27.34	27.46
400	0.09	17.37	17.40	27.58	28.12	28.25	27.55	27.59
450	0.09	16.66	16.70	27.20	28.28	28.27	27.69	27.78
500	0.10	16.10	16.15	26.89	29.16	29.14	28.43	28.49
550	0.10	15.66	15.71	26.69	29.76	29.54	29.14	29.19
600	0.10	15.33	15.38	26.41	31.29	30.94	30.78	30.67
650	0.11	15.08	15.14	26.41	32.76	32.49	32.42	32.46
700	0.11	14.92	14.98	26.40	35.08	34.80	35.06	35.02
750	0.12	14.82	14.90	26.54	38.86	37.83	38.91	39.00
800	0.12	14.79	14.87	26.52	42.76	39.70	43.54	44.65
850	0.13	14.80	14.90	27.01	43.14	40.83	42.07	42.04
900	0.14	14.86	14.96	27.30	40.08	38.15	37.45	38.25
950	0.14	14.95	15.07	27.99	35.27	34.65	34.02	33.96
1000	0.15	15.06	15.19	28.60	33.56	32.95	31.86	32.08
1050	0.16	15.18	15.32	29.36	31.05	30.66	30.13	30.07
1150	0.17	15.38	15.56	30.80	29.05	28.56	28.43	28.29
1200	0.18	15.44	15.64	31.60	28.52	28.19	28.14	28.13
1250	0.18	15.47	15.68	31.35	27.97	27.64	27.97	27.77
1300	0.20	15.46	15.68	31.07	27.84	27.47	27.96	28.05
1350	0.19	15.41	15.64	30.13	28.04	27.62	28.57	28.46
1450	0.20	15.23	15.47	28.16	28.93	28.80	30.28	30.31
1500	0.21	15.12	15.36	27.19	29.24	29.19	30.46	30.79
1550	0.20	15.00	15.24	26.79	30.85	30.81	32.86	33.47
1600	0.21	14.89	15.14	26.26	31.49	31.79	33.55	34.27
1650	0.21	14.81	15.05	26.17	34.12	34.50	37.07	38.13
1750	0.21	14.68	14.93	25.76	38.42	40.38	41.14	41.72
1800	0.21	14.66	14.91	26.07	39.53	41.52	43.12	40.17
1850	0.21	14.66	14.92	25.99	38.00	38.79	38.64	38.38
1900	0.21	14.69	14.96	26.56	36.68	36.61	38.85	36.75
1950	0.21	14.75	15.02	26.63	34.37	34.31	35.88	35.59
2050	0.22	14.91	15.20	27.51	32.42	32.01	34.80	34.35
2100	0.22	14.99	15.29	28.17	31.50	30.79	34.77	33.77
2150	0.23	15.06	15.40	29.02	31.56	30.85	34.51	34.00
2200	0.23	15.11	15.47	29.57	30.96	30.35	34.33	33.49
2250	0.24	15.15	15.53	30.67	31.84	30.87	35.27	34.25
2350	0.25	15.14	15.53	31.64	32.85	32.01	36.30	34.84
2400	0.25	15.08	15.48	31.84	33.04	32.00	35.85	34.01
2450	0.26	15.00	15.41	32.13	34.50	33.51	36.65	35.02
2500	0.27	14.91	15.31	32.33	35.08	34.04	36.61	34.36
2550	0.28	14.81	15.19	32.24	36.25	35.33	35.88	34.59
2600	0.28	14.72	15.07	31.80	37.94	36.43	36.22	34.01
2650	0.29	14.63	14.97	30.98	38.91	37.84	35.13	34.18
2700	0.30	14.57	14.91	30.98	40.53	37.73	35.14	33.71
2750	0.31	14.54	14.89	30.32	40.28	38.38	33.67	33.46
2800	0.31	14.58	14.88	31.20	40.36	36.95	33.21	32.98
2850	0.31	14.66	14.93	29.96	39.53	36.61	32.19	32.64
2900	0.31	14.78	15.04	29.34	40.03	36.36	32.03	32.54
2950	0.32	14.98	15.22	28.67	39.06	35.57	31.48	32.47
3000	0.32	15.26	15.49	27.34	39.63	35.89	31.87	32.67
3050	0.32	15.64	15.85	26.54	40.14	36.36	31.81	33.48
3100	0.33	16.11	16.30	25.52	42.15	36.16	31.77	34.67
3200	0.34	17.42	17.60	23.20	47.00	37.44	31.49	37.63
3300	0.34	19.41	19.58	20.98	51.40	36.50	30.63	38.86

(Note 1) Does not include theoretical loss. Nominal theoretical loss is 0.12 dB.

Notes

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Bi-Directional Coupler

BDCH-15-33+

Typical Performance Data

TEST CONDITIONS: INPUT POWER =+5 dBm @Temperature = +25°C, Configuration D

FREQ. (MHz)	INSERTION LOSS ¹ (dB) In - Out	COUPLING (dB)		DIRECTIVITY (dB) In - Fwd	RETURN LOSS (dB)			
		In - Fwd	Out - Rev		In	Out	Fwd	Rev
300	0.08	19.35	19.34	29.69	28.67	28.70	28.20	28.03
350	0.09	18.27	18.24	28.97	27.98	28.05	27.46	27.34
400	0.09	17.40	17.37	28.74	28.25	28.12	27.59	27.55
450	0.10	16.70	16.66	28.65	28.27	28.28	27.78	27.69
500	0.10	16.15	16.10	28.47	29.14	29.16	28.49	28.43
550	0.10	15.71	15.66	28.51	29.54	29.76	29.19	29.14
600	0.11	15.38	15.33	28.53	30.94	31.29	30.67	30.78
650	0.11	15.14	15.08	28.51	32.49	32.76	32.46	32.42
700	0.12	14.98	14.92	28.32	34.80	35.08	35.02	35.06
750	0.12	14.90	14.82	28.30	37.83	38.86	39.00	38.91
800	0.13	14.87	14.79	28.23	39.70	42.76	44.65	43.54
850	0.13	14.90	14.80	27.98	40.83	43.14	42.04	42.07
900	0.14	14.96	14.86	27.86	38.15	40.08	38.25	37.45
950	0.15	15.07	14.95	27.98	34.65	35.27	33.96	34.02
1000	0.16	15.19	15.06	28.50	32.95	33.56	32.08	31.86
1050	0.17	15.32	15.18	28.84	30.66	31.05	30.07	30.13
1150	0.18	15.56	15.38	30.78	28.56	29.05	28.29	28.43
1200	0.19	15.64	15.44	32.06	28.19	28.52	28.13	28.14
1250	0.19	15.68	15.47	32.83	27.64	27.97	27.77	27.97
1300	0.20	15.68	15.46	32.63	27.47	27.84	28.05	27.96
1350	0.20	15.64	15.41	31.83	27.62	28.04	28.46	28.57
1450	0.21	15.47	15.23	29.16	28.80	28.93	30.31	30.28
1500	0.22	15.36	15.12	27.70	29.19	29.24	30.79	30.46
1550	0.21	15.24	15.00	27.35	30.81	30.85	33.47	32.86
1600	0.22	15.14	14.89	26.57	31.79	31.49	34.27	33.55
1650	0.22	15.05	14.81	26.59	34.50	34.12	38.13	37.07
1750	0.22	14.93	14.68	26.04	40.38	38.42	41.72	41.14
1800	0.22	14.91	14.66	26.25	41.52	39.53	40.17	43.12
1850	0.23	14.92	14.66	25.94	38.79	38.00	38.38	38.64
1900	0.23	14.96	14.69	26.03	36.61	36.68	36.75	38.85
1950	0.23	15.02	14.75	25.74	34.31	34.37	35.59	35.88
2050	0.24	15.20	14.91	25.39	32.01	32.42	34.35	34.80
2100	0.24	15.29	14.99	25.02	30.79	31.50	33.77	34.77
2150	0.25	15.40	15.06	24.90	30.85	31.56	34.00	34.51
2200	0.25	15.47	15.11	24.63	30.35	30.96	33.49	34.33
2250	0.26	15.53	15.15	24.52	30.87	31.84	34.25	35.27
2350	0.27	15.53	15.14	24.37	32.01	32.85	34.84	36.30
2400	0.27	15.48	15.08	24.02	32.00	33.04	34.01	35.85
2450	0.28	15.41	15.00	24.35	33.51	34.50	35.02	36.65
2500	0.28	15.31	14.91	24.51	34.04	35.08	34.36	36.61
2550	0.29	15.19	14.81	24.93	35.33	36.25	34.59	35.88
2600	0.30	15.07	14.72	25.66	36.43	37.94	34.01	36.22
2650	0.31	14.97	14.63	26.05	37.84	38.91	34.18	35.13
2700	0.31	14.91	14.57	26.81	37.73	40.53	33.71	35.14
2750	0.33	14.89	14.54	27.34	38.38	40.28	33.46	33.67
2800	0.32	14.88	14.58	28.93	36.95	40.36	32.98	33.21
2850	0.33	14.93	14.66	30.22	36.61	39.53	32.64	32.19
2900	0.33	15.04	14.78	31.29	36.36	40.03	32.54	32.03
2950	0.33	15.22	14.98	32.32	35.57	39.06	32.47	31.48
3000	0.33	15.49	15.26	32.25	35.89	39.63	32.67	31.87
3050	0.33	15.85	15.64	32.38	36.36	40.14	33.48	31.81
3100	0.34	16.30	16.11	32.07	36.16	42.15	34.67	31.77
3200	0.35	17.60	17.42	30.00	37.44	47.00	37.63	31.49
3300	0.35	19.58	19.41	27.37	36.50	51.40	38.86	30.63

(Note 1) Does not include theoretical loss. Nominal theoretical loss is 0.12 dB.

Notes

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Bi-Directional Coupler

BDCH-15-33+

Typical Performance Data

TEST CONDITIONS: INPUT POWER =+5 dBm @Temperature = +105°C, Configuration A

FREQ. (MHz)	INSERTION LOSS ¹ (dB) In - Out	COUPLING (dB)		DIRECTIVITY (dB) In - Fwd	RETURN LOSS (dB)			
		In - Fwd	Out - Rev		In	Out	Fwd	Rev
300	0.09	19.35	19.31	32.25	31.97	32.35	31.46	31.28
350	0.09	18.26	18.23	30.41	30.50	30.65	28.39	28.28
400	0.10	17.40	17.36	29.65	29.94	29.86	27.70	27.57
450	0.10	16.70	16.66	29.55	29.37	29.22	27.43	27.51
500	0.11	16.15	16.10	29.16	29.33	29.20	28.23	28.23
550	0.11	15.72	15.66	29.45	29.18	29.19	28.97	29.17
600	0.12	15.39	15.32	29.24	29.80	29.86	29.94	30.10
650	0.13	15.15	15.08	29.01	30.91	30.85	30.51	30.83
700	0.13	15.00	14.92	28.47	32.59	32.30	31.46	31.65
750	0.14	14.91	14.81	28.18	35.00	34.95	33.75	33.96
800	0.14	14.88	14.79	28.16	36.90	37.31	36.60	36.97
850	0.15	14.91	14.80	27.95	40.80	41.18	42.83	41.49
900	0.16	14.98	14.87	27.60	42.29	41.43	44.38	42.02
950	0.16	15.09	14.96	27.63	38.52	38.38	37.97	37.70
1000	0.17	15.21	15.07	27.90	35.56	35.22	34.89	35.14
1050	0.18	15.35	15.18	28.09	32.60	32.60	32.24	32.40
1150	0.20	15.58	15.39	29.95	29.18	29.41	28.33	28.59
1200	0.21	15.67	15.45	31.60	28.36	28.36	27.40	27.73
1250	0.21	15.70	15.48	32.94	27.64	27.77	26.47	26.84
1300	0.22	15.72	15.48	33.39	27.28	27.37	26.09	26.44
1350	0.22	15.67	15.43	32.45	27.21	27.44	25.92	26.26
1450	0.24	15.51	15.25	28.47	28.18	28.01	26.08	26.60
1500	0.24	15.40	15.13	26.72	28.42	28.14	26.31	26.81
1550	0.24	15.28	15.01	25.99	29.87	29.62	27.56	27.93
1600	0.25	15.17	14.90	25.01	30.71	30.25	28.76	29.08
1650	0.25	15.08	14.81	24.87	33.07	32.39	31.11	31.39
1750	0.25	14.96	14.69	24.29	38.04	36.33	37.00	39.00
1800	0.25	14.94	14.67	24.44	39.86	38.98	38.29	43.67
1850	0.25	14.95	14.68	24.37	40.16	37.87	35.60	39.62
1900	0.25	14.98	14.71	24.62	38.82	37.44	33.73	36.43
1950	0.26	15.06	14.77	24.61	36.27	34.79	31.62	33.43
2050	0.26	15.24	14.93	24.89	34.32	33.24	29.96	30.86
2100	0.27	15.34	15.01	25.00	33.21	32.88	29.42	30.03
2150	0.28	15.44	15.08	25.19	32.97	32.59	29.27	29.80
2200	0.28	15.52	15.14	25.29	32.65	32.59	28.88	29.37
2250	0.29	15.59	15.17	25.37	32.77	33.17	29.23	30.09
2350	0.30	15.59	15.15	25.69	33.15	34.05	30.07	31.63
2400	0.31	15.55	15.09	25.12	32.54	33.77	30.58	32.17
2450	0.32	15.49	15.00	25.29	33.26	34.52	32.02	33.72
2500	0.33	15.39	14.91	25.30	32.71	33.99	32.64	35.12
2550	0.34	15.28	14.81	25.40	33.18	34.20	34.16	36.38
2600	0.35	15.18	14.73	25.85	32.62	33.68	34.05	37.36
2650	0.35	15.05	14.67	26.00	32.90	33.87	35.64	38.15
2700	0.35	14.97	14.61	26.21	32.58	33.58	37.18	40.02
2750	0.37	14.92	14.59	26.21	32.63	32.91	39.98	41.15
2800	0.36	14.91	14.61	26.21	32.39	32.58	40.56	43.63
2850	0.38	14.98	14.68	26.51	32.47	32.01	37.89	43.21
2900	0.37	15.09	14.81	26.59	32.53	31.76	36.26	45.09
2950	0.39	15.29	15.01	26.72	32.40	31.62	34.13	43.73
3000	0.38	15.55	15.29	26.31	33.16	31.96	33.83	42.74
3050	0.39	15.93	15.66	26.14	33.94	32.46	33.76	41.77
3100	0.38	16.38	16.14	25.90	35.81	33.04	33.42	40.37
3200	0.39	17.66	17.47	23.95	42.89	33.19	34.72	40.96
3300	0.39	19.63	19.44	21.79	42.65	32.49	35.35	47.12

(Note 1) Does not include theoretical loss. Nominal theoretical loss is 0.12 dB.

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Bi-Directional Coupler

BDCH-15-33+

Typical Performance Data

TEST CONDITIONS: INPUT POWER =+5 dBm @Temperature = +105°C, Configuration B

FREQ. (MHz)	INSERTION LOSS ¹ (dB) In - Out	COUPLING (dB)		DIRECTIVITY (dB) In - Fwd	RETURN LOSS (dB)			
		In - Fwd	Out - Rev		In	Out	Fwd	Rev
300	0.08	19.31	19.35	35.01	32.35	31.97	31.28	31.46
350	0.09	18.23	18.26	31.88	30.65	30.50	28.28	28.39
400	0.10	17.36	17.40	30.16	29.86	29.94	27.57	27.70
450	0.10	16.66	16.70	29.24	29.22	29.37	27.51	27.43
500	0.11	16.10	16.15	28.45	29.20	29.33	28.23	28.23
550	0.11	15.66	15.72	28.23	29.19	29.18	29.17	28.97
600	0.11	15.32	15.39	27.83	29.86	29.80	30.10	29.94
650	0.12	15.08	15.15	27.90	30.85	30.91	30.83	30.51
700	0.13	14.92	15.00	27.70	32.30	32.59	31.65	31.46
750	0.13	14.81	14.91	27.69	34.95	35.00	33.96	33.75
800	0.14	14.79	14.88	27.51	37.31	36.90	36.97	36.60
850	0.14	14.80	14.91	27.70	41.18	40.80	41.49	42.83
900	0.15	14.87	14.98	27.75	41.43	42.29	42.02	44.38
950	0.16	14.96	15.09	28.28	38.38	38.52	37.70	37.97
1000	0.17	15.07	15.21	29.08	35.22	35.56	35.14	34.89
1050	0.18	15.18	15.35	29.95	32.60	32.60	32.40	32.24
1150	0.19	15.39	15.58	31.22	29.41	29.18	28.59	28.33
1200	0.20	15.45	15.67	32.68	28.36	28.36	27.73	27.40
1250	0.21	15.48	15.70	32.87	27.77	27.64	26.84	26.47
1300	0.22	15.48	15.72	33.33	27.37	27.28	26.44	26.09
1350	0.22	15.43	15.67	32.58	27.44	27.21	26.26	25.92
1450	0.23	15.25	15.51	29.87	28.01	28.18	26.60	26.08
1500	0.24	15.13	15.40	28.41	28.14	28.42	26.81	26.31
1550	0.23	15.01	15.28	27.81	29.62	29.87	27.93	27.56
1600	0.24	14.90	15.17	26.81	30.25	30.71	29.08	28.76
1650	0.24	14.81	15.08	26.63	32.39	33.07	31.39	31.11
1750	0.24	14.69	14.96	26.03	36.33	38.04	39.00	37.00
1800	0.24	14.67	14.94	26.00	38.98	39.86	43.67	38.29
1850	0.24	14.68	14.95	26.01	37.87	40.16	39.62	35.60
1900	0.24	14.71	14.98	26.33	37.44	38.82	36.43	33.73
1950	0.24	14.77	15.06	26.37	34.79	36.27	33.43	31.62
2050	0.25	14.93	15.24	27.01	33.24	34.32	30.86	29.96
2100	0.25	15.01	15.34	27.37	32.88	33.21	30.03	29.42
2150	0.26	15.08	15.44	27.92	32.59	32.97	29.80	29.27
2200	0.26	15.14	15.52	28.00	32.59	32.65	29.37	28.88
2250	0.27	15.17	15.59	28.19	33.17	32.77	30.09	29.23
2350	0.29	15.15	15.59	28.32	34.05	33.15	31.63	30.07
2400	0.30	15.09	15.55	28.35	33.77	32.54	32.17	30.58
2450	0.31	15.00	15.49	28.12	34.52	33.26	33.72	32.02
2500	0.31	14.91	15.39	28.62	33.99	32.71	35.12	32.64
2550	0.33	14.81	15.28	28.58	34.20	33.18	36.38	34.16
2600	0.33	14.73	15.18	29.11	33.68	32.62	37.36	34.05
2650	0.34	14.67	15.05	29.14	33.87	32.90	38.15	35.64
2700	0.34	14.61	14.97	29.56	33.58	32.58	40.02	37.18
2750	0.35	14.59	14.92	29.85	32.91	32.63	41.15	39.98
2800	0.35	14.61	14.91	30.05	32.58	32.39	43.63	40.56
2850	0.36	14.68	14.98	30.93	32.01	32.47	43.21	37.89
2900	0.36	14.81	15.09	31.82	31.76	32.53	45.09	36.26
2950	0.37	15.01	15.29	32.42	31.62	32.40	43.73	34.13
3000	0.37	15.29	15.55	33.97	31.96	33.16	42.74	33.83
3050	0.37	15.66	15.93	33.90	32.46	33.94	41.77	33.76
3100	0.38	16.14	16.38	33.60	33.04	35.81	40.37	33.42
3200	0.39	17.47	17.66	30.38	33.19	42.89	40.96	34.72
3300	0.39	19.44	19.63	26.88	32.49	42.65	47.12	35.35

(Note 1) Does not include theoretical loss. Nominal theoretical loss is 0.12 dB.

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Bi-Directional Coupler

BDCH-15-33+

Typical Performance Data

TEST CONDITIONS: INPUT POWER =+5 dBm @Temperature = +105°C, Configuration C

FREQ. (MHz)	INSERTION LOSS ¹ (dB) In - Out	COUPLING (dB)		DIRECTIVITY (dB) In - Fwd	RETURN LOSS (dB)			
		In - Fwd	Out - Rev		In	Out	Fwd	Rev
300	0.08	19.31	19.35	32.02	31.28	31.46	32.35	31.97
350	0.09	18.23	18.27	30.01	28.28	28.39	30.65	30.50
400	0.10	17.36	17.41	29.07	27.57	27.70	29.86	29.94
450	0.10	16.66	16.71	28.73	27.51	27.43	29.22	29.37
500	0.10	16.10	16.16	27.93	28.23	28.23	29.20	29.33
550	0.11	15.66	15.73	28.08	29.17	28.97	29.19	29.18
600	0.11	15.33	15.40	27.70	30.10	29.94	29.86	29.80
650	0.12	15.08	15.17	27.50	30.83	30.51	30.85	30.91
700	0.13	14.92	15.01	27.03	31.65	31.46	32.30	32.59
750	0.13	14.82	14.92	27.02	33.96	33.75	34.95	35.00
800	0.14	14.80	14.90	27.36	36.97	36.60	37.31	36.90
850	0.15	14.81	14.92	27.63	41.49	42.83	41.18	40.80
900	0.16	14.88	14.99	27.80	42.02	44.38	41.43	42.29
950	0.17	14.97	15.10	28.39	37.70	37.97	38.38	38.52
1000	0.18	15.08	15.22	29.12	35.14	34.89	35.22	35.56
1050	0.18	15.19	15.36	29.82	32.40	32.24	32.60	32.60
1150	0.20	15.40	15.60	32.28	28.59	28.33	29.41	29.18
1200	0.21	15.46	15.68	33.82	27.73	27.40	28.36	28.36
1250	0.22	15.49	15.72	34.03	26.84	26.47	27.77	27.64
1300	0.23	15.48	15.73	33.14	26.44	26.09	27.37	27.28
1350	0.23	15.44	15.68	31.96	26.26	25.92	27.44	27.21
1450	0.24	15.26	15.52	28.52	26.60	26.08	28.01	28.18
1500	0.25	15.14	15.41	27.08	26.81	26.31	28.14	28.42
1550	0.25	15.02	15.29	26.44	27.93	27.56	29.62	29.87
1600	0.25	14.91	15.18	25.51	29.08	28.76	30.25	30.71
1650	0.26	14.81	15.09	25.13	31.39	31.11	32.39	33.07
1750	0.26	14.69	14.96	24.50	39.00	37.00	36.33	38.04
1800	0.26	14.67	14.95	24.66	43.67	38.29	38.98	39.86
1850	0.26	14.68	14.96	24.53	39.62	35.60	37.87	40.16
1900	0.26	14.71	14.99	24.84	36.43	33.73	37.44	38.82
1950	0.27	14.77	15.06	25.11	33.43	31.62	34.79	36.27
2050	0.28	14.93	15.25	26.22	30.86	29.96	33.24	34.32
2100	0.28	15.01	15.34	27.07	30.03	29.42	32.88	33.21
2150	0.28	15.08	15.44	28.13	29.80	29.27	32.59	32.97
2200	0.29	15.14	15.52	29.02	29.37	28.88	32.59	32.65
2250	0.30	15.16	15.59	29.88	30.09	29.23	33.17	32.77
2350	0.31	15.15	15.59	31.86	31.63	30.07	34.05	33.15
2400	0.32	15.09	15.55	31.42	32.17	30.58	33.77	32.54
2450	0.33	15.00	15.49	31.88	33.72	32.02	34.52	33.26
2500	0.33	14.92	15.39	31.84	35.12	32.64	33.99	32.71
2550	0.35	14.81	15.28	31.29	36.38	34.16	34.20	33.18
2600	0.35	14.73	15.18	32.16	37.36	34.05	33.68	32.62
2650	0.37	14.67	15.06	31.42	38.15	35.64	33.87	32.90
2700	0.37	14.62	14.98	31.64	40.02	37.18	33.58	32.58
2750	0.38	14.60	14.93	30.33	41.15	39.98	32.91	32.63
2800	0.39	14.62	14.92	29.83	43.63	40.56	32.58	32.39
2850	0.40	14.69	14.99	29.23	43.21	37.89	32.01	32.47
2900	0.40	14.82	15.09	28.85	45.09	36.26	31.76	32.53
2950	0.41	15.02	15.30	28.36	43.73	34.13	31.62	32.40
3000	0.41	15.29	15.56	27.55	42.74	33.83	31.96	33.16
3050	0.42	15.67	15.93	26.82	41.77	33.76	32.46	33.94
3100	0.42	16.14	16.38	26.14	40.37	33.42	33.04	35.81
3200	0.42	17.47	17.67	23.80	40.96	34.72	33.19	42.89
3300	0.41	19.45	19.64	21.59	47.12	35.35	32.49	42.65

(Note 1) Does not include theoretical loss. Nominal theoretical loss is 0.12 dB.

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Bi-Directional Coupler

BDCH-15-33+

Typical Performance Data

TEST CONDITIONS: INPUT POWER =+5 dBm @Temperature = +105°C, Configuration D

FREQ. (MHz)	INSERTION LOSS ¹ (dB) In - Out	COUPLING (dB)		DIRECTIVITY (dB) In - Fwd	RETURN LOSS (dB)			
		In - Fwd	Out - Rev		In	Out	Fwd	Rev
300	0.09	19.35	19.31	29.69	31.46	31.28	31.97	32.35
350	0.09	18.27	18.23	28.97	28.39	28.28	30.50	30.65
400	0.10	17.41	17.36	28.74	27.70	27.57	29.94	29.86
450	0.11	16.71	16.66	28.65	27.43	27.51	29.37	29.22
500	0.11	16.16	16.10	28.47	28.23	28.23	29.33	29.20
550	0.12	15.73	15.66	28.51	28.97	29.17	29.18	29.19
600	0.12	15.40	15.33	28.53	29.94	30.10	29.80	29.86
650	0.13	15.17	15.08	28.51	30.51	30.83	30.91	30.85
700	0.14	15.01	14.92	28.32	31.46	31.65	32.59	32.30
750	0.14	14.92	14.82	28.30	33.75	33.96	35.00	34.95
800	0.15	14.90	14.80	28.23	36.60	36.97	36.90	37.31
850	0.16	14.92	14.81	27.98	42.83	41.49	40.80	41.18
900	0.17	14.99	14.88	27.86	44.38	42.02	42.29	41.43
950	0.18	15.10	14.97	27.98	37.97	37.70	38.52	38.38
1000	0.19	15.22	15.08	28.50	34.89	35.14	35.56	35.22
1050	0.20	15.36	15.19	28.84	32.24	32.40	32.60	32.60
1150	0.21	15.60	15.40	30.78	28.33	28.59	29.18	29.41
1200	0.23	15.68	15.46	32.06	27.40	27.73	28.36	28.36
1250	0.23	15.72	15.49	32.83	26.47	26.84	27.64	27.77
1300	0.24	15.73	15.48	32.63	26.09	26.44	27.28	27.37
1350	0.24	15.68	15.44	31.83	25.92	26.26	27.21	27.44
1450	0.25	15.52	15.26	29.16	26.08	26.60	28.18	28.01
1500	0.27	15.41	15.14	27.70	26.31	26.81	28.42	28.14
1550	0.26	15.29	15.02	27.35	27.56	27.93	29.87	29.62
1600	0.27	15.18	14.91	26.57	28.76	29.08	30.71	30.25
1650	0.27	15.09	14.81	26.59	31.11	31.39	33.07	32.39
1750	0.27	14.96	14.69	26.04	37.00	39.00	38.04	36.33
1800	0.27	14.95	14.67	26.25	38.29	43.67	39.86	38.98
1850	0.28	14.96	14.68	25.94	35.60	39.62	40.16	37.87
1900	0.28	14.99	14.71	26.03	33.73	36.43	38.82	37.44
1950	0.29	15.06	14.77	25.74	31.62	33.43	36.27	34.79
2050	0.30	15.25	14.93	25.39	29.96	30.86	34.32	33.24
2100	0.30	15.34	15.01	25.02	29.42	30.03	33.21	32.88
2150	0.31	15.44	15.08	24.90	29.27	29.80	32.97	32.59
2200	0.31	15.52	15.14	24.63	28.88	29.37	32.65	32.59
2250	0.32	15.59	15.16	24.52	29.23	30.09	32.77	33.17
2350	0.33	15.59	15.15	24.37	30.07	31.63	33.15	34.05
2400	0.34	15.55	15.09	24.02	30.58	32.17	32.54	33.77
2450	0.35	15.49	15.00	24.35	32.02	33.72	33.26	34.52
2500	0.36	15.39	14.92	24.51	32.64	35.12	32.71	33.99
2550	0.37	15.28	14.81	24.93	34.16	36.38	33.18	34.20
2600	0.38	15.18	14.73	25.66	34.05	37.36	32.62	33.68
2650	0.39	15.06	14.67	26.05	35.64	38.15	32.90	33.87
2700	0.39	14.98	14.62	26.81	37.18	40.02	32.58	33.58
2750	0.40	14.93	14.60	27.34	39.98	41.15	32.63	32.91
2800	0.40	14.92	14.62	28.93	40.56	43.63	32.39	32.58
2850	0.41	14.99	14.69	30.22	37.89	43.21	32.47	32.01
2900	0.41	15.09	14.82	31.29	36.26	45.09	32.53	31.76
2950	0.42	15.30	15.02	32.32	34.13	43.73	32.40	31.62
3000	0.42	15.56	15.29	32.25	33.83	42.74	33.16	31.96
3050	0.42	15.93	15.67	32.38	33.76	41.77	33.94	32.46
3100	0.42	16.38	16.14	32.07	33.42	40.37	35.81	33.04
3200	0.43	17.67	17.47	30.00	34.72	40.96	42.89	33.19
3300	0.42	19.64	19.45	27.37	35.35	47.12	42.65	32.49

(Note 1) Does not include theoretical loss. Nominal theoretical loss is 0.12 dB.

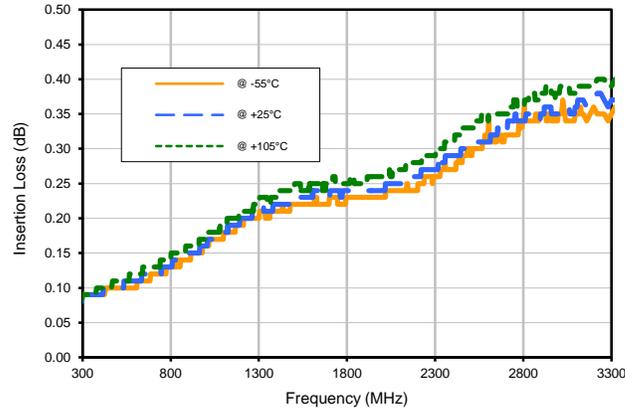
Notes

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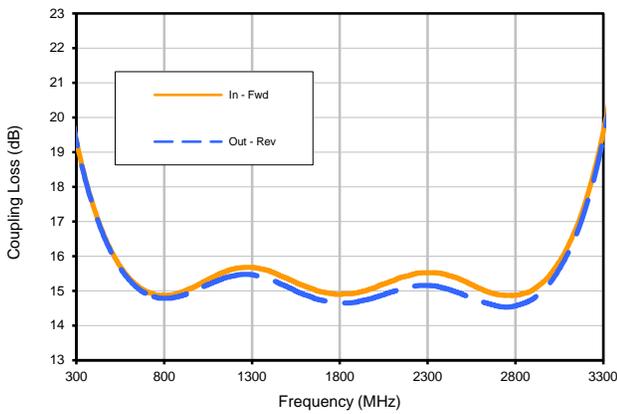


Typical Performance Curves (Configuration A)

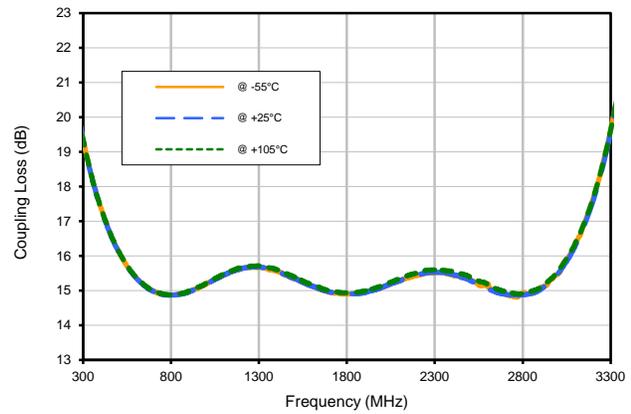
Insertion Loss vs. Temperature



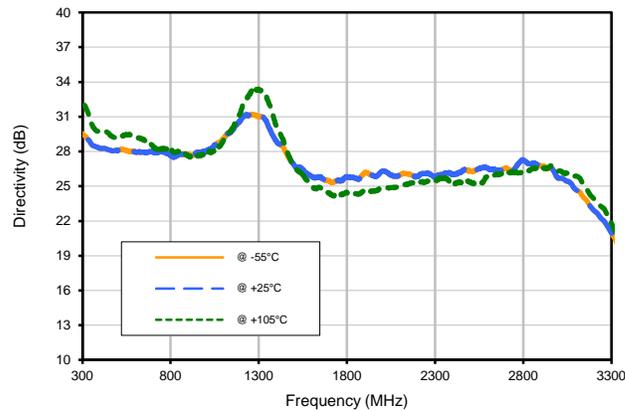
Coupling Loss



Coupling Loss vs. Temperature



Directivity vs. Temperature

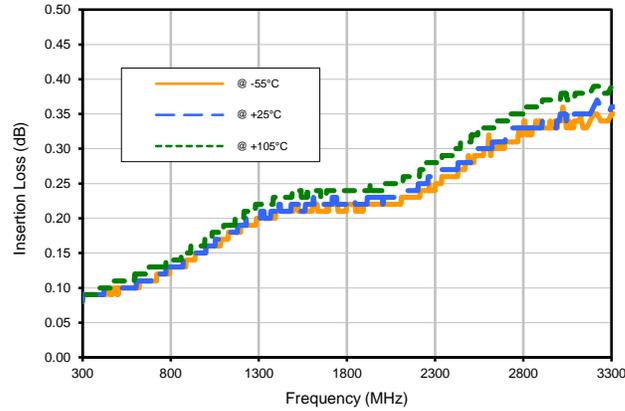


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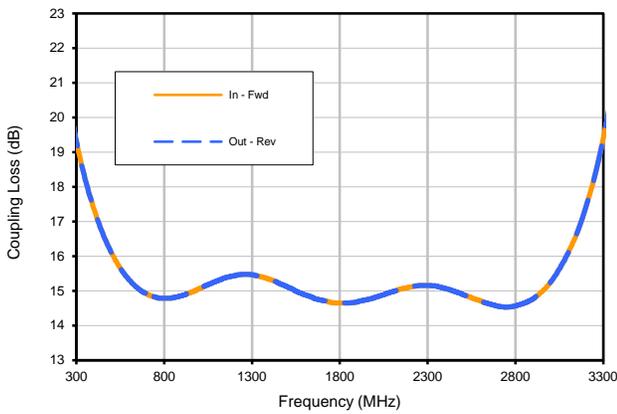
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Typical Performance Curves (Configuration B)

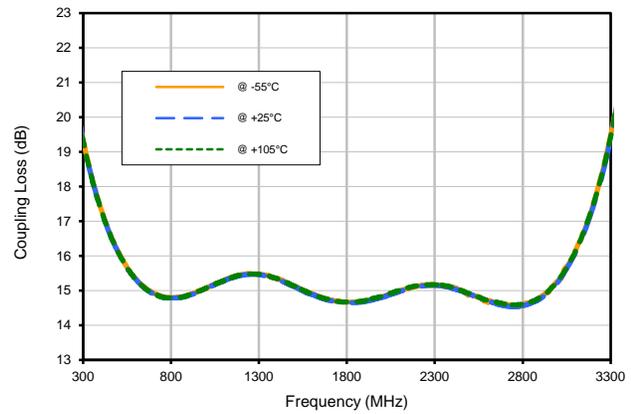
Insertion Loss vs. Temperature



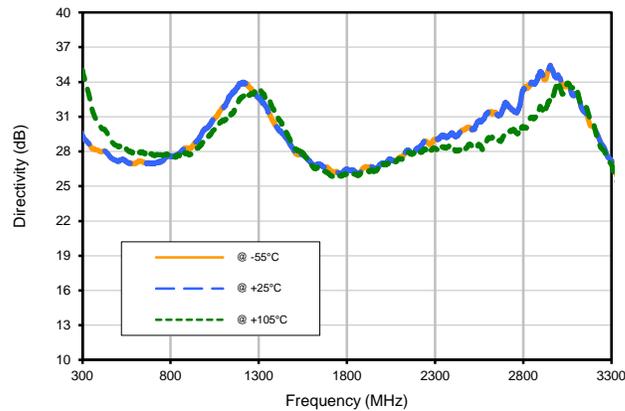
Coupling Loss



Coupling Loss vs. Temperature



Directivity vs. Temperature

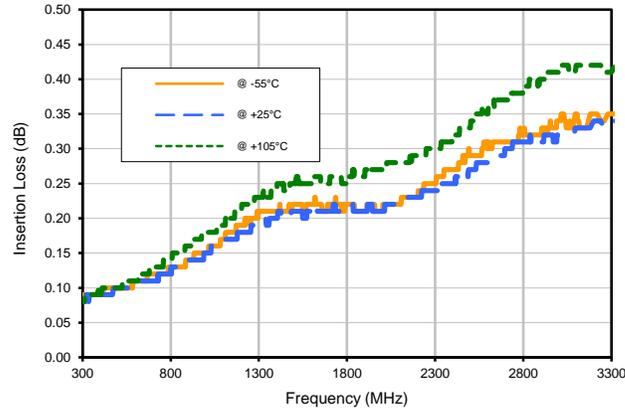


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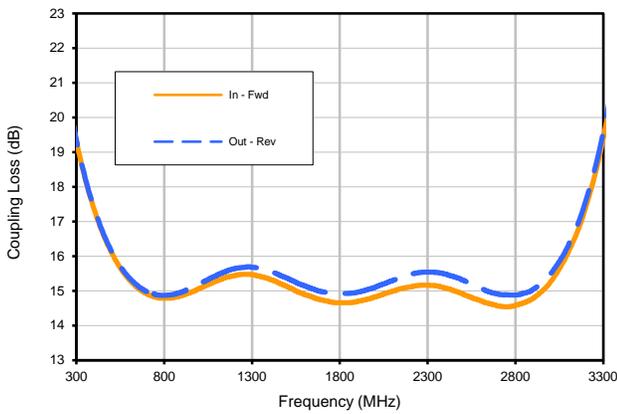
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Typical Performance Curves (Configuration C)

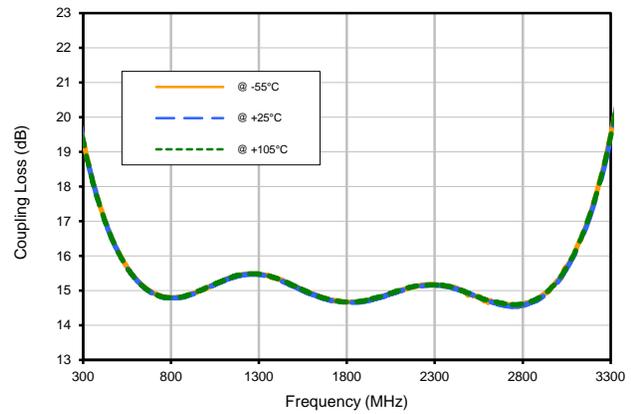
Insertion Loss vs. Temperature



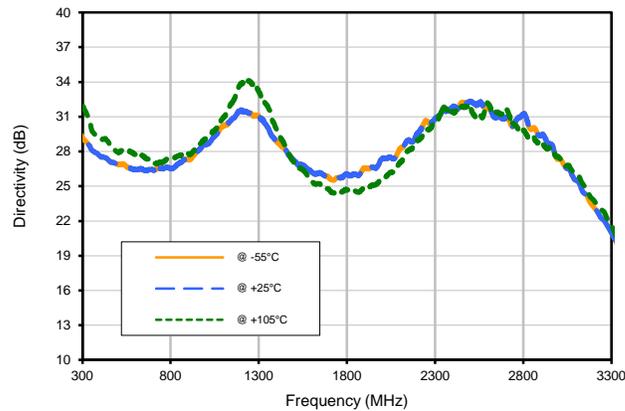
Coupling Loss



Coupling Loss vs. Temperature



Directivity vs. Temperature

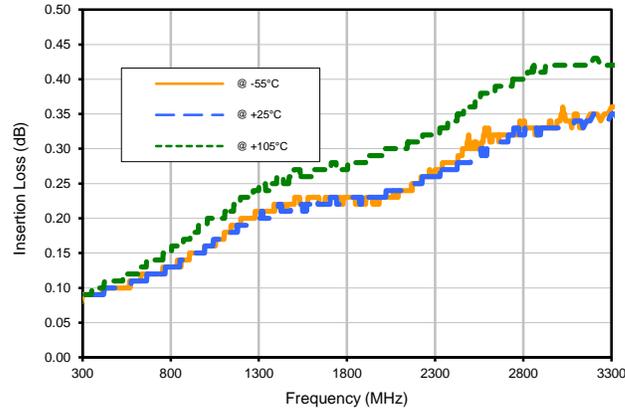


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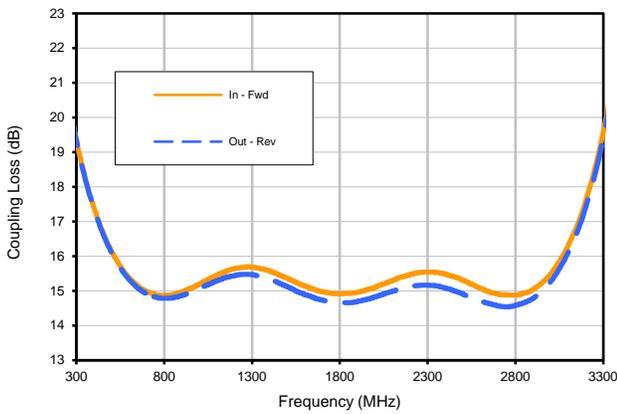
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Typical Performance Curves (Configuration D)

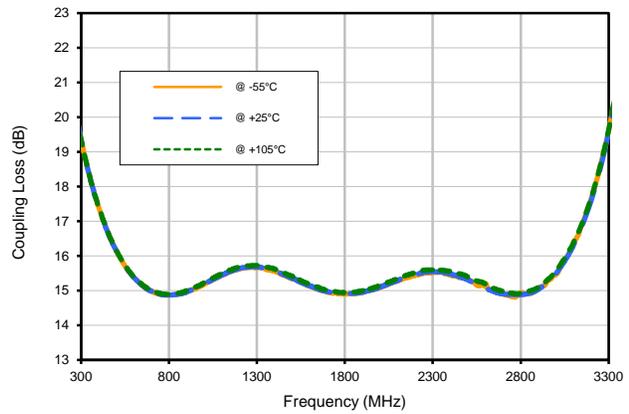
Insertion Loss vs. Temperature



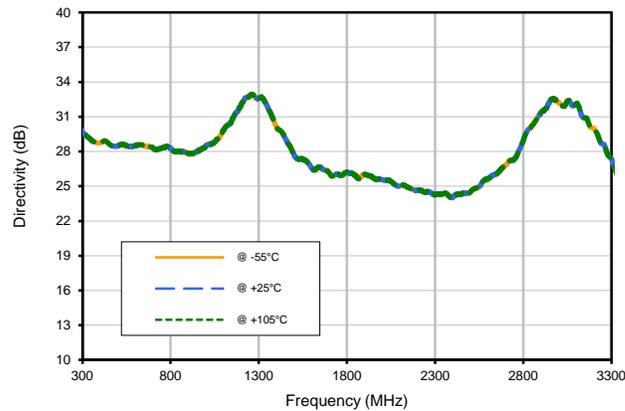
Coupling Loss



Coupling Loss vs. Temperature



Directivity vs. Temperature



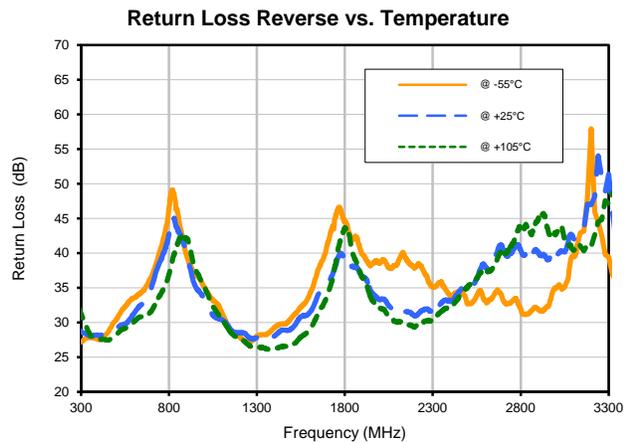
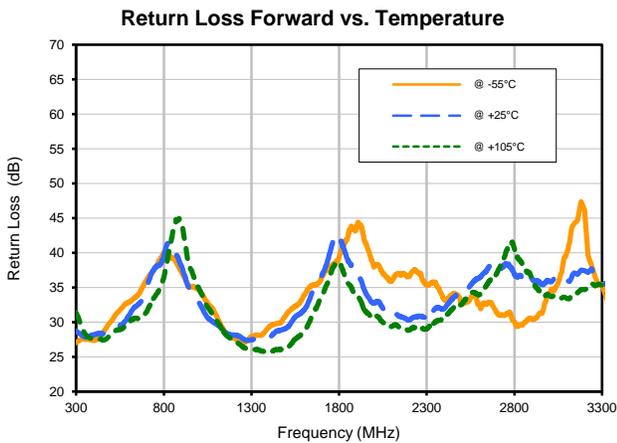
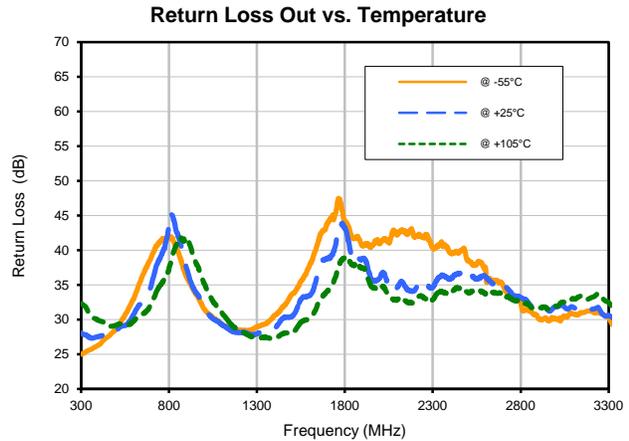
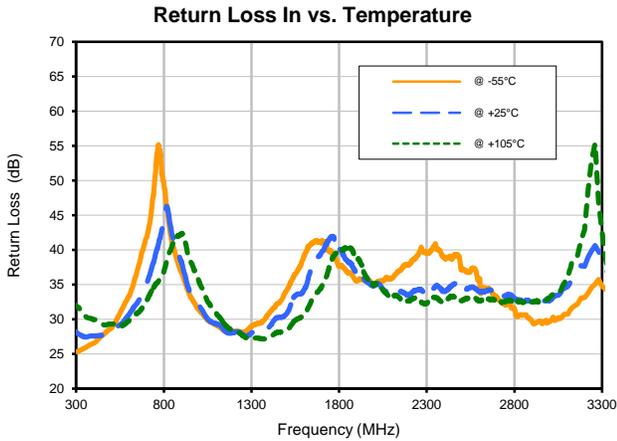
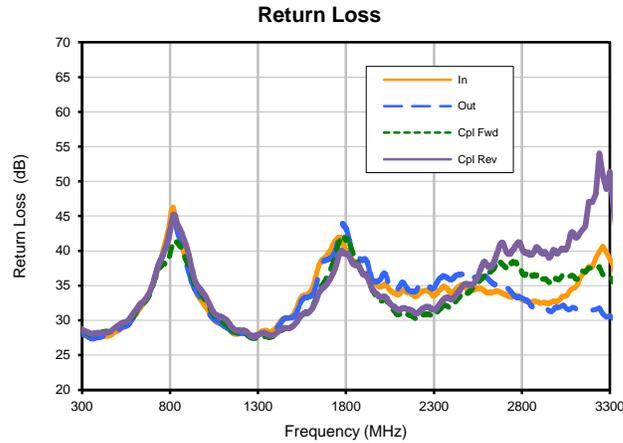
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Bi-Directional Coupler

BDCH-15-33+

Typical Performance Curves (R. Loss at Configuration A)



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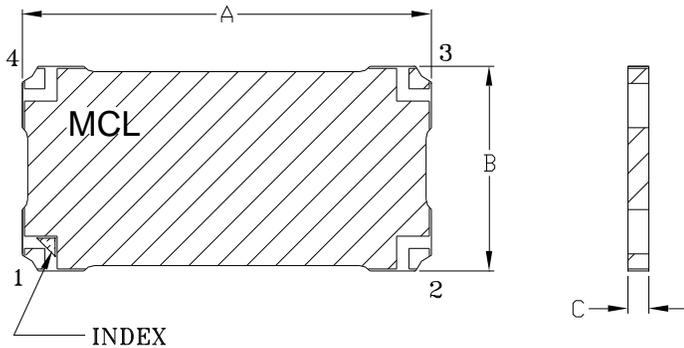
Case Style

PQ

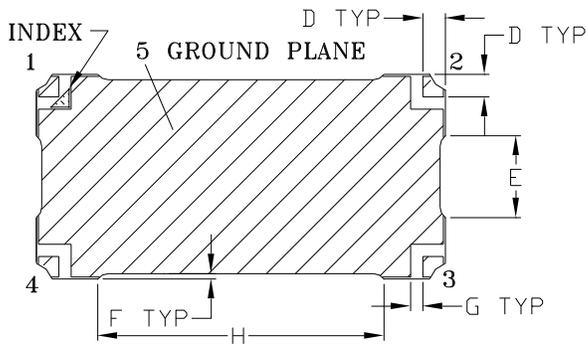
Outline Dimensions

PQ2098

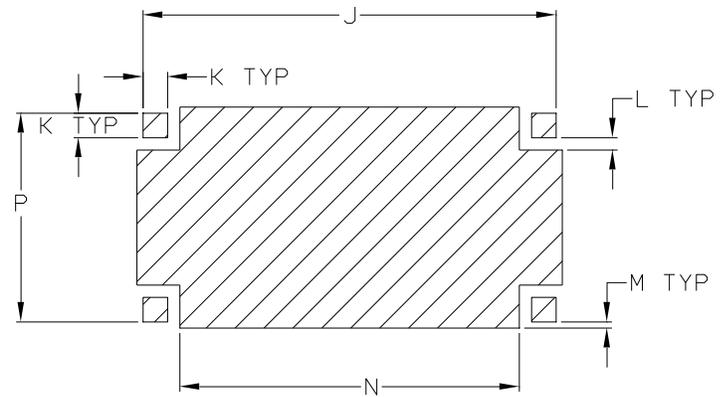
TOP SIDE



BOTTOM SIDE



PCB LAND PATTERN



 METALLIZATION  SOLDER RESIST

CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N	P	WT. GRAMS
PQ2098	1.000 (25.40)	.500 (12.70)	.051 (1.30)	.055 (1.40)	.200 (5.08)	.013 (0.33)	.030 (0.76)	.700 (17.78)	1.010 (25.65)	.060 (1.52)	.030 (0.76)	.015 (0.38)	.830 (21.08)	.510 (12.95)	2.0

Dimensions are in inches (mm). Tolerances: 2PL. +/- .03; 3PL. +/- .010

Notes:

1. Base material: Printed wiring laminate.
2. Termination finish:
For RoHS Cases, all models (+) suffix: 2-5 μ inch (.05-.13 microns) Immersion Gold.
For RoHS-5 Cases, all models no (+) suffix: Tin-Lead plate.

 **Mini-Circuits**[®]

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

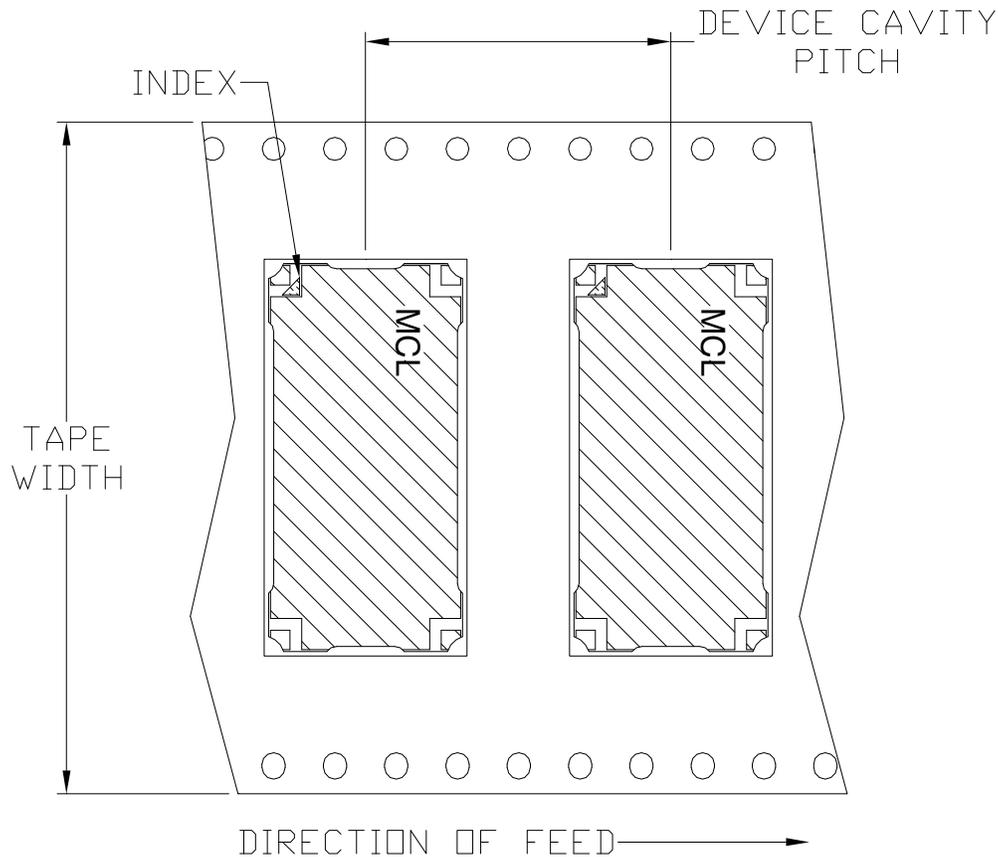
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

Mini-Circuits ISO 9001 & ISO 14001 Certified

Tape & Reel Packaging TR-F118

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
44	20	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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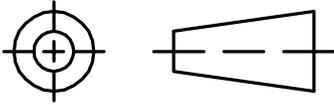
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THIRD ANGLE PROJECTION



REVISIONS

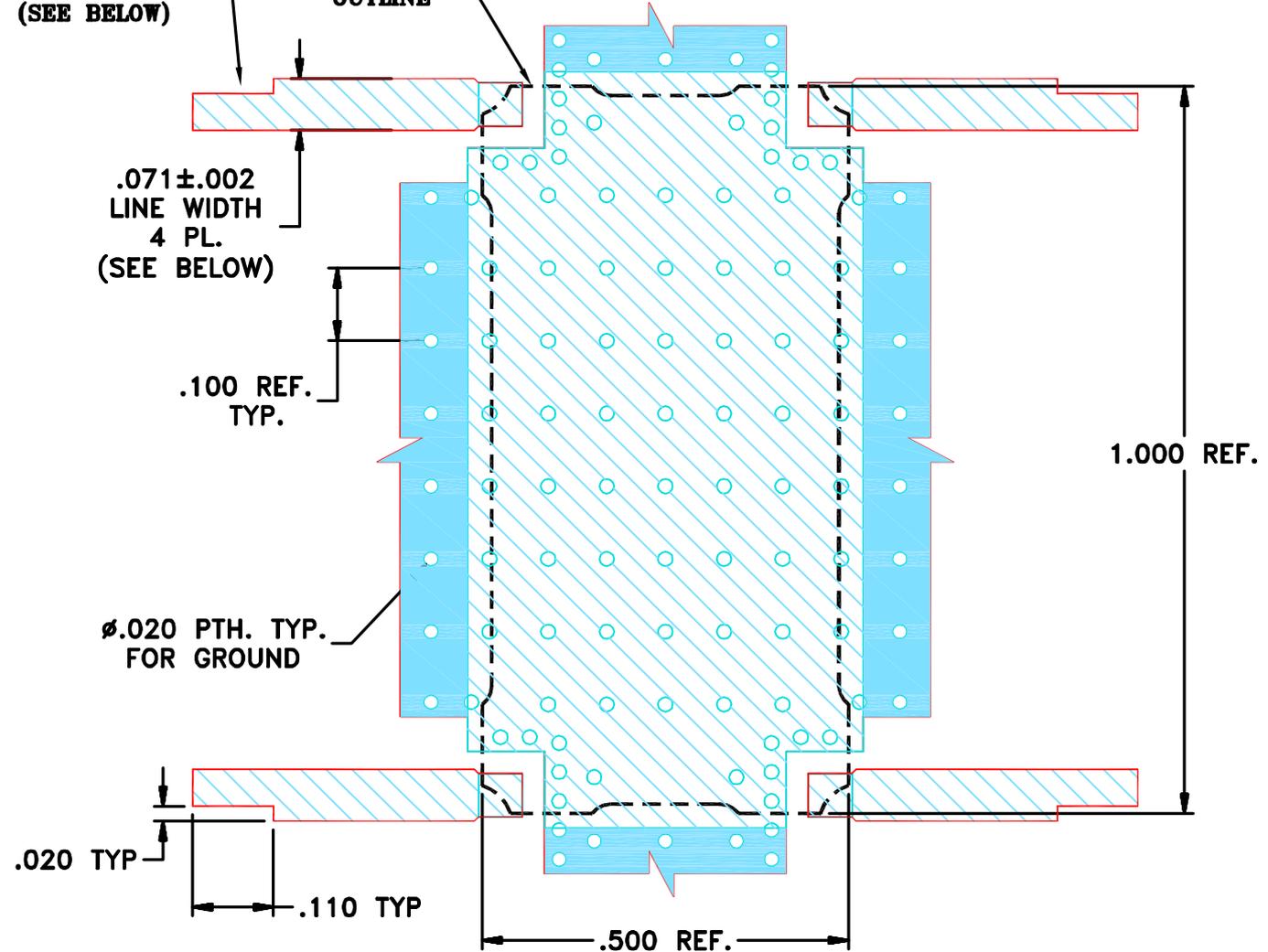
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M165053	NEW RELEASE	12/17	DK	HH
OR	R92774	NEW RELEASE	12/17	DK	HH

SUGGESTED MOUNTING CONFIGURATION

FOR PQ2098 /2098-1/2098-2 CASE STYLES 04DC01 PIN CONNECTION, 50 OHM

TRACE TUNING
4 PL.
(SEE BELOW)

PACKAGE
OUTLINE



NOTES:

- TRACE WIDTH IS SHOWN FOR ROGERS R04003C WITH DIELECTRIC THICKNESS. 0.032"±.0015". COPPER: 1 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- TRACE TUNING IN RF LINES MAY BE NEEDED TO ACHIEVE SPECIFIED PERFORMANCE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

UNLESS OTHERWISE SPECIFIED

INITIALS

DATE

DIMENSIONS ARE IN INCHES

DRAWN DK (RAYON) 03 DEC 17

TOLERANCES ON:

CHECKED RM (RAYON) 03 DEC 17

2 PL DECIMALS ±

APPROVED HH (RAYON) 03 DEC 17

3 PL DECIMALS ± .005

ANGLES ± 1°

FRACTIONS ±



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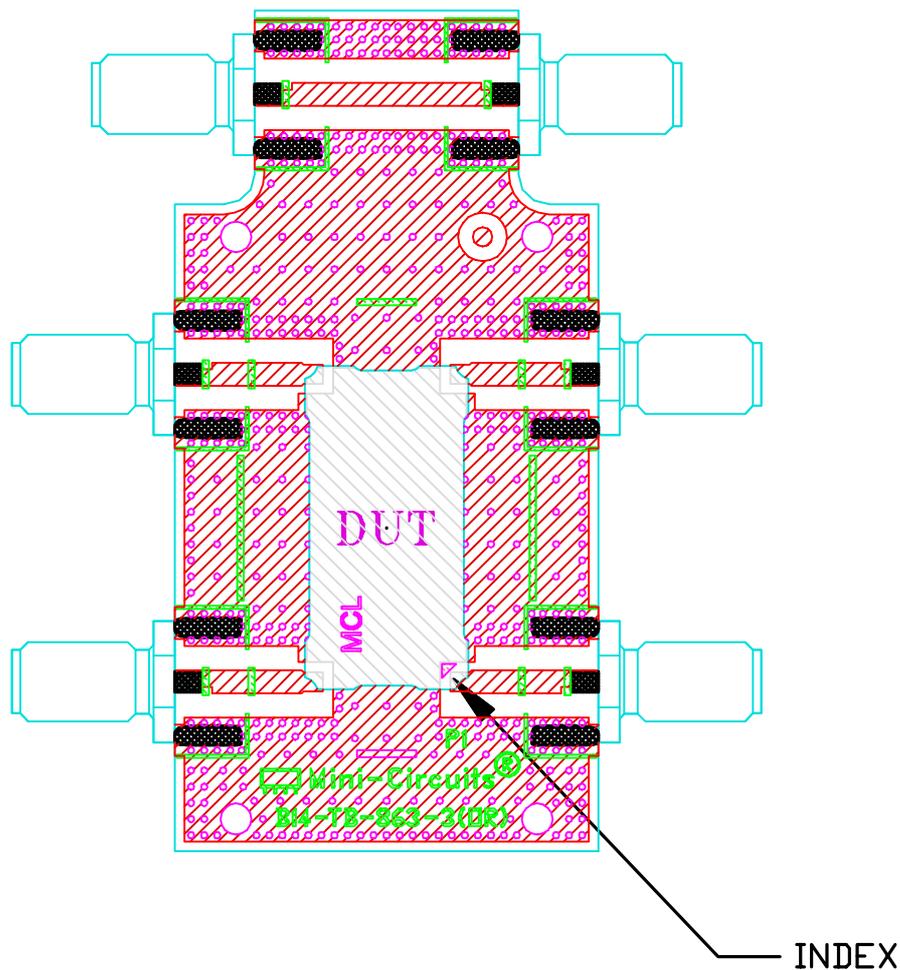
13 Neptune Avenue
Brooklyn NY 11235

PL FOR MBD PQ2098
TB-863-1 (50Ω)

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SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-538	REV: OR
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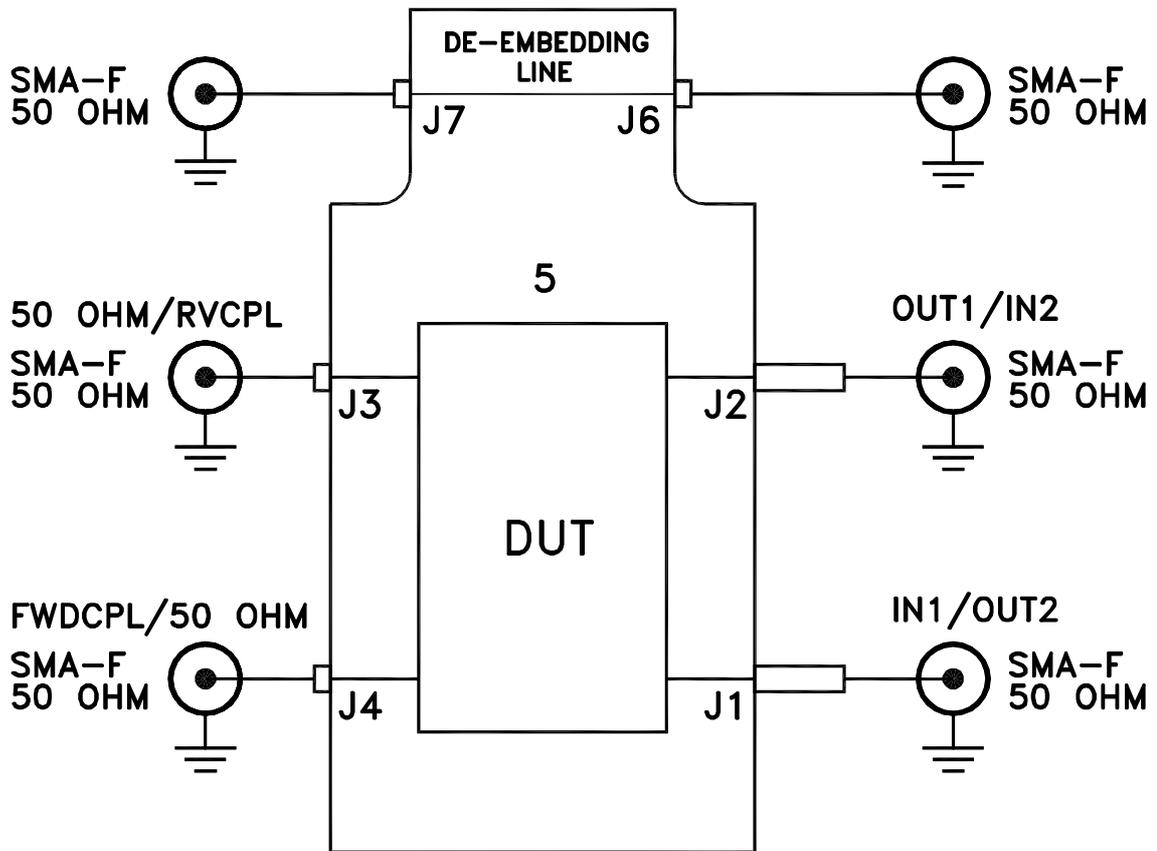
Evaluation Board and Circuit



TB-863-1

NOTES:

1. SMA FEMALE CONNECTORS.
2. PCB MATERIAL: ROGERS R04003C OR EQUIVALENT, DIELECTRIC CONSTANT=3.5, DIELECTRIC THICKNESS=.032 INCH.



TB-863-1
Schematic Diagram



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	-55° to 105° C Case Environment	Individual Model Data Sheet
Storage Temperature	-55° to 105°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 Eutectic Process 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020C, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
Vibration (high Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-883, Method 2007.3, Condition A
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