



Mini-Circuits

## STRIPLINE SURFACE MOUNT

## 2 Way 90° Power Splitter

QCH-272+

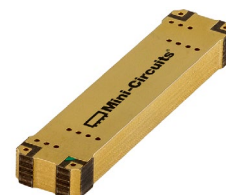
50Ω 2 Way-90° 700 to 2700 MHz 200W

## KEY FEATURES

- High power handling, up to 200W
- Wide bandwidth
- Excellent Amplitude Unbalance,  $\pm 0.1$ dB

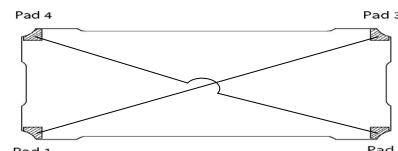
## APPLICATIONS

- Balanced Amplifiers
- I & Q Modulators
- Defense and Military



Generic photo used for illustration purposes only

## FUNCTIONAL DIAGRAM



## PRODUCT OVERVIEW

Mini-Circuits new 2-way 90° power splitter, QCH-272+ capable of handling up to 200W with amplitude unbalance of  $\pm 0.1$  dB typ and phase unbalance of  $\pm 0.9$  deg. typ. Operating over a frequency range of 700 to 2700 MHz, the outstanding phase and amplitude unbalance make this component a versatile building block for use in a variety of systems and sub-system designs from balanced amplifiers and antenna feeds to military applications and more. The splitter is fabricated using laminated PCB process (1.8 x 0.4 x 0.19") and includes wrap-around terminations for good solderability and easy visual inspection.

ELECTRICAL SPECIFICATIONS<sup>1,2</sup> AT +25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Frequency Range		700		2700	MHz
Insertion Loss <sup>3</sup>	700-2700	-	0.3	0.5	dB
Isolation	700-2700	17	22	-	dB
Phase Unbalance	700-2700	-	$\pm 0.9$	$\pm 5$	deg
Amplitude Unbalance	700-2700	-	$\pm 0.1$	$\pm 1$	dB
	700-2700	-	$\pm 0.1$	$\pm 0.6$	
Return Loss	700-2700	16.5	23	-	dB
Thermal Resistance <sup>4</sup>	700-2700	-	0.3	-	°C/W

1. Tested on Evaluation Board TB-884+. De-embedded to the device reference plane.

2. Symmetrical all ports are interchangeable. See Pad Configuration Table and S-Parameters for actual performance.

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

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

ABSOLUTE MAXIMUM RATINGS<sup>5</sup>

Operating Case Temperature <sup>6</sup>		-55 °C to +105 °C
Storage Temperature		-55 °C to +105 °C
Power Input	+85 °C case	200 W
	+95 °C case	170 W
	+105 °C case	140 W

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

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





## STRIPLINE SURFACE MOUNT

# 2 Way 90° Power Splitter

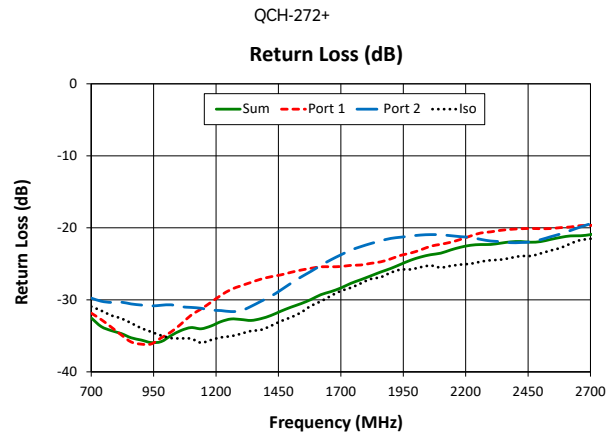
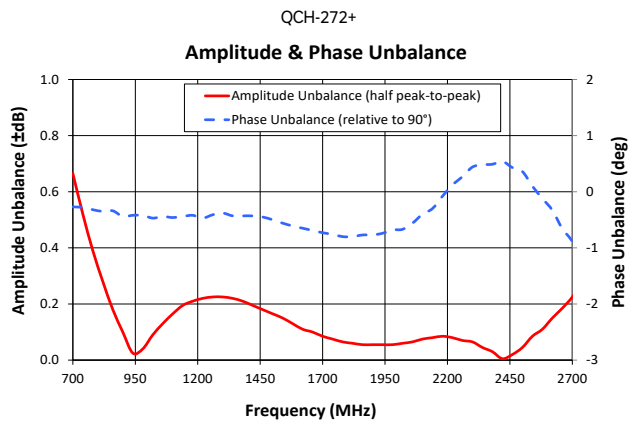
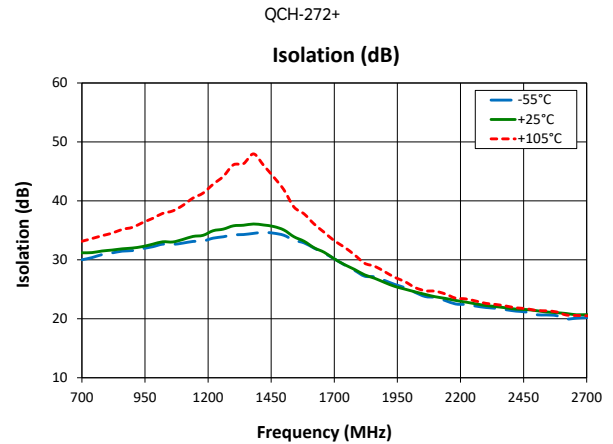
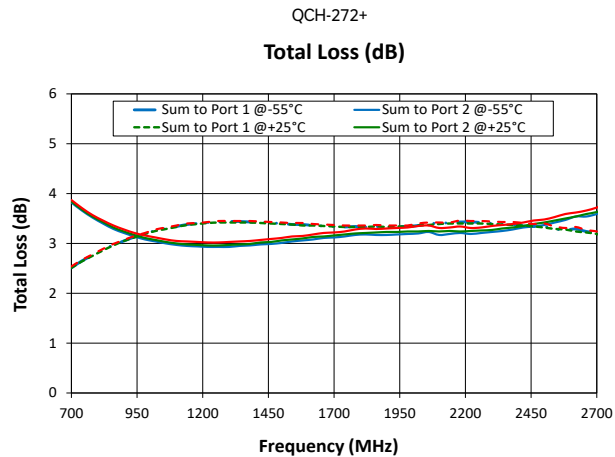
## QCH-272+

Mini-Circuits

50Ω 2 Way-90° 700 to 2700 MHz 200W

### TYPICAL PERFORMANCE GRAPHS

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





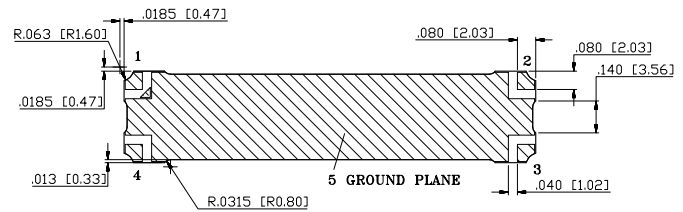
## 2 Way 90° Power Splitter

50Ω    2 Way-90°    700 to 2700 MHz    200W

## PAD DESCRIPTION/CONFIGURATION<sup>7</sup>

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	Sum	Isolation	Port 1 (0°)	Port 2 (90°)
A	1	2	3	4
B	2	1	4	3
C	3	4	1	2
D	4	3	2	1





 SOLDER RESIST

Figure 1: Dimensions of the PCB. The drawing shows a top-down view of a rectangular PCB. The central feature is a large rectangular pad with a cross-hatched pattern, labeled "6.620 PTH. TYP. FOR GROUND". This central pad is surrounded by four smaller rectangular pads, two on the left and two on the right. The overall width of the PCB is labeled "1.800 REF.". The overall length is labeled "4.00 REF.". The central pad has a width of ".090 TYP.". The pads on the left and right have a width of ".105 TYP.". The pads on the top and bottom have a width of ".040 TYP.". The line width for the central pad is labeled ".071±.002 LINE WIDTH (SEE BELOW)".

NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS RO4003C WITH DIELECTRIC THICKNESS  $0.032 \pm .0015$ . COPPER: 1 OZ. EACH SIDE.
2. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
3. BOTH SIDES OF THE PCB IS COATED WITH A GROUND PLANE.
3. CUTOUTS IN RF LINES ARE REQUIRED TO ACHIEVE SPECIFIED ISOLATION.

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

 DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

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





Mini-Circuits

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# 2 Way 90° Power Splitter

**QCH-272+**

50Ω 2 Way-90° 700 to 2700 MHz 200W

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	PQ2181 Lead Finish: 2-5 inch (0.05-0.13 microns) Immersion Gold.
RoHS Status	Compliant
Tape and Reel	F120
Suggested Layout for PCB Design	PL-480
Evaluation Board	TB-884+
	Gerber File
Environmental Rating	ENV02T8

## NOTES

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## 2 Way 90° Power Splitter/Combiner

QCH-272+

## Typical Performance Data

Test Conditions: Input Power =+5 dBm @Temperature = -55°C, Configuration A

Freq. (MHz)	Total Loss <sup>1</sup>			Amp. Unbal. (±dB) (half P-P)	Phase Unbal. (deg) (Rel. to 90°)	Isolation (dB) Port 1 - Port 2	Return Loss			
	Sum-Port 1	Sum-Port 2	Avg				(dB)			
							Sum	Port 1	Port 2	Iso
700	2.51	3.82	3.12	0.66	-0.48	30.01	-30.99	-31.17	-28.62	-29.65
740	2.65	3.66	3.13	0.51	-0.47	30.38	-32.54	-32.42	-29.46	-30.65
780	2.76	3.52	3.12	0.38	-0.53	30.90	-33.04	-33.41	-29.66	-31.66
820	2.87	3.40	3.13	0.27	-0.59	31.18	-33.38	-34.45	-29.85	-32.45
860	2.97	3.29	3.13	0.17	-0.57	31.48	-33.51	-35.46	-30.12	-33.43
900	3.05	3.21	3.13	0.09	-0.66	31.57	-33.41	-36.08	-30.30	-34.54
940	3.13	3.14	3.13	0.01	-0.65	31.91	-33.97	-36.55	-30.64	-35.51
980	3.19	3.08	3.13	0.06	-0.67	32.22	-34.09	-35.81	-30.81	-36.10
1020	3.26	3.04	3.15	0.11	-0.72	32.66	-34.07	-34.80	-30.84	-36.27
1060	3.30	3.00	3.15	0.15	-0.71	32.62	-34.02	-33.60	-30.95	-35.69
1100	3.34	2.97	3.15	0.18	-0.74	32.84	-33.81	-32.03	-30.77	-34.98
1140	3.38	2.95	3.16	0.21	-0.71	33.12	-33.96	-30.98	-30.42	-34.70
1180	3.40	2.94	3.16	0.23	-0.70	33.19	-33.31	-30.00	-30.23	-34.06
1220	3.42	2.93	3.17	0.24	-0.76	33.68	-32.57	-28.98	-30.07	-33.67
1260	3.43	2.93	3.17	0.25	-0.70	33.91	-32.15	-28.13	-29.96	-33.50
1300	3.44	2.93	3.18	0.25	-0.67	34.23	-32.12	-27.48	-30.08	-32.98
1340	3.44	2.95	3.19	0.24	-0.74	34.29	-32.55	-26.89	-29.88	-32.77
1380	3.43	2.96	3.19	0.23	-0.73	34.49	-31.99	-26.25	-29.32	-32.89
1420	3.42	2.98	3.19	0.22	-0.76	34.66	-31.53	-25.88	-28.96	-32.65
1460	3.41	2.99	3.19	0.20	-0.77	34.52	-30.92	-25.49	-28.18	-32.32
1500	3.40	3.01	3.20	0.19	-0.81	34.17	-30.28	-25.06	-27.33	-32.23
1540	3.38	3.04	3.21	0.17	-0.88	33.33	-29.81	-24.82	-26.38	-31.36
1580	3.38	3.06	3.22	0.16	-0.92	32.88	-29.37	-24.57	-25.70	-30.78
1620	3.36	3.08	3.22	0.13	-0.97	31.98	-28.61	-24.57	-24.71	-30.37
1660	3.35	3.11	3.23	0.11	-1.04	31.14	-28.10	-24.71	-23.86	-29.36
1700	3.34	3.12	3.23	0.11	-1.16	30.16	-27.59	-24.64	-23.16	-28.85
1740	3.33	3.14	3.23	0.10	-1.16	29.15	-27.25	-24.53	-22.62	-28.27
1780	3.34	3.17	3.25	0.08	-1.31	28.22	-26.94	-24.42	-22.30	-27.27
1820	3.33	3.18	3.25	0.07	-1.39	27.23	-26.72	-23.88	-21.82	-26.71
1860	3.34	3.17	3.25	0.09	-1.36	27.12	-26.80	-23.84	-21.68	-26.36
1900	3.33	3.17	3.25	0.08	-1.23	26.49	-26.47	-23.38	-21.39	-25.54
1940	3.34	3.18	3.26	0.08	-1.21	25.82	-26.01	-22.94	-21.24	-25.03
1980	3.34	3.19	3.26	0.08	-1.14	25.27	-25.21	-22.70	-20.97	-24.87
2020	3.36	3.20	3.28	0.08	-1.22	24.48	-24.46	-22.40	-20.72	-24.52
2060	3.39	3.23	3.31	0.08	-1.41	23.78	-24.14	-21.82	-20.59	-24.30
2100	3.41	3.17	3.29	0.12	-0.90	23.62	-23.31	-21.50	-20.63	-24.26
2140	3.41	3.19	3.30	0.11	-0.80	23.09	-22.63	-21.10	-20.49	-24.05
2180	3.43	3.21	3.32	0.11	-0.64	22.52	-22.20	-20.77	-20.61	-23.88
2220	3.43	3.19	3.31	0.12	-0.36	22.42	-21.77	-20.21	-20.69	-24.03
2260	3.42	3.21	3.31	0.11	-0.10	22.16	-21.66	-19.88	-20.77	-23.93
2300	3.40	3.23	3.31	0.09	0.08	21.92	-21.75	-19.86	-20.88	-23.96
2340	3.38	3.25	3.31	0.07	0.05	21.78	-21.49	-19.87	-20.89	-24.20
2380	3.38	3.28	3.33	0.05	0.10	21.54	-21.24	-19.81	-20.93	-24.03
2420	3.35	3.32	3.33	0.02	0.11	21.30	-21.06	-19.76	-20.93	-23.65
2460	3.34	3.34	3.34	0.00	-0.06	21.15	-21.01	-19.85	-20.97	-23.93
2500	3.34	3.37	3.35	0.02	-0.31	20.69	-20.84	-19.54	-20.88	-23.08
2540	3.29	3.42	3.35	0.07	-0.41	20.65	-20.39	-19.46	-20.66	-22.71
2580	3.27	3.47	3.37	0.11	-0.68	20.54	-20.16	-19.17	-20.46	-22.23
2620	3.29	3.54	3.41	0.13	-1.32	19.98	-20.20	-18.99	-20.14	-21.52
2660	3.24	3.54	3.39	0.16	-1.51	20.11	-19.87	-18.99	-19.46	-21.37
2700	3.21	3.59	3.40	0.20	-1.44	20.21	-19.95	-18.93	-19.13	-21.22
2740	3.14	3.66	3.39	0.27	-1.95	20.21	-19.72	-18.92	-18.66	-20.87
2780	3.13	3.71	3.41	0.31	-2.24	20.15	-19.83	-18.93	-18.47	-21.02
2820	3.08	3.77	3.41	0.36	-2.40	20.17	-19.59	-18.84	-17.77	-20.87

(Note 1) Total loss is the loss from Sum to each coupled port including the 3dB theoretical split.

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## 2 Way 90° Power Splitter/Combiner

QCH-272+

## Typical Performance Data

Test Conditions: Input Power = +5 dBm @ Temperature = -55°C, Configuration B

Freq. (MHz)	Total Loss <sup>1</sup>			Amp. Unbal. (±dB) (half P-P)	Phase Unbal. (deg) (Rel. to 90°)	Isolation (dB) Port 1 - Port 2	Return Loss			
	Sum-Port 1	Sum-Port 2	Avg				Sum	Port 1	Port 2	Iso
700	2.51	3.83	3.12	0.66	0.26	30.18	29.65	28.62	31.17	30.99
740	2.64	3.66	3.12	0.51	0.32	30.48	30.65	29.46	32.42	32.54
780	2.75	3.52	3.12	0.38	0.29	30.97	31.66	29.66	33.41	33.04
820	2.86	3.40	3.12	0.27	0.29	31.19	32.45	29.85	34.45	33.38
860	2.96	3.30	3.13	0.17	0.35	31.44	33.43	30.12	35.46	33.51
900	3.04	3.22	3.13	0.08	0.33	31.62	34.54	30.30	36.08	33.41
940	3.12	3.14	3.13	0.01	0.37	31.79	35.51	30.64	36.55	33.97
980	3.18	3.08	3.13	0.06	0.41	32.07	36.10	30.81	35.81	34.09
1020	3.24	3.04	3.14	0.11	0.40	32.49	36.27	30.84	34.80	34.07
1060	3.29	3.00	3.14	0.15	0.45	32.51	35.69	30.95	33.60	34.02
1100	3.33	2.97	3.15	0.19	0.42	32.73	34.98	30.77	32.03	33.81
1140	3.37	2.95	3.15	0.22	0.49	32.99	34.70	30.42	30.98	33.96
1180	3.39	2.94	3.16	0.23	0.54	33.10	34.06	30.23	30.00	33.31
1220	3.41	2.94	3.17	0.24	0.52	33.51	33.67	30.07	28.98	32.57
1260	3.42	2.94	3.17	0.25	0.60	33.88	33.50	29.96	28.13	32.15
1300	3.42	2.95	3.18	0.25	0.58	34.17	32.98	30.08	27.48	32.12
1340	3.42	2.95	3.18	0.24	0.56	34.37	32.77	29.88	26.89	32.55
1380	3.41	2.97	3.18	0.23	0.59	34.62	32.89	29.32	26.25	31.99
1420	3.40	2.99	3.19	0.22	0.52	34.84	32.65	28.96	25.88	31.53
1460	3.39	3.00	3.19	0.20	0.48	34.85	32.32	28.18	25.49	30.92
1500	3.37	3.02	3.19	0.18	0.44	34.53	32.23	27.33	25.06	30.28
1540	3.37	3.05	3.21	0.17	0.33	33.89	31.36	26.38	24.82	29.81
1580	3.36	3.06	3.21	0.16	0.33	33.37	30.78	25.70	24.57	29.37
1620	3.34	3.09	3.21	0.14	0.25	32.44	30.37	24.71	24.57	28.61
1660	3.33	3.10	3.21	0.12	0.18	31.47	29.36	23.86	24.71	28.10
1700	3.34	3.12	3.23	0.12	0.05	30.50	28.85	23.16	24.64	27.59
1740	3.32	3.13	3.22	0.11	0.07	29.55	28.27	22.62	24.53	27.25
1780	3.33	3.15	3.24	0.10	0.01	28.48	27.27	22.30	24.42	26.94
1820	3.34	3.16	3.25	0.09	-0.01	27.52	26.71	21.82	23.88	26.72
1860	3.34	3.16	3.25	0.10	0.02	27.24	26.36	21.68	23.84	26.80
1900	3.33	3.16	3.24	0.09	0.11	26.63	25.54	21.39	23.38	26.47
1940	3.34	3.16	3.25	0.09	0.12	25.89	25.03	21.24	22.94	26.01
1980	3.35	3.17	3.26	0.10	0.25	25.28	24.87	20.97	22.70	25.21
2020	3.36	3.19	3.27	0.09	0.14	24.51	24.52	20.72	22.40	24.46
2060	3.39	3.21	3.30	0.10	0.09	23.77	24.30	20.59	21.82	24.14
2100	3.40	3.16	3.28	0.13	0.54	23.63	24.26	20.63	21.50	23.31
2140	3.40	3.17	3.28	0.12	0.75	23.04	24.05	20.49	21.10	22.63
2180	3.41	3.20	3.30	0.12	0.80	22.48	23.88	20.61	20.77	22.20
2220	3.39	3.18	3.28	0.11	1.19	22.40	24.03	20.69	20.21	21.77
2260	3.38	3.20	3.29	0.10	1.30	22.13	23.93	20.77	19.88	21.66
2300	3.37	3.23	3.30	0.08	1.40	21.91	23.96	20.88	19.86	21.75
2340	3.35	3.24	3.29	0.06	1.30	21.76	24.20	20.89	19.87	21.49
2380	3.35	3.28	3.31	0.04	1.32	21.54	24.03	20.93	19.81	21.24
2420	3.32	3.31	3.31	0.01	1.22	21.30	23.65	20.93	19.76	21.06
2460	3.31	3.37	3.34	0.03	1.17	21.16	23.93	20.97	19.85	21.01
2500	3.31	3.37	3.34	0.03	0.96	20.72	23.08	20.88	19.54	20.84
2540	3.25	3.42	3.33	0.09	0.73	20.67	22.71	20.66	19.46	20.39
2580	3.23	3.46	3.34	0.11	0.31	20.59	22.23	20.46	19.17	20.16
2620	3.25	3.49	3.37	0.12	-0.34	19.99	21.52	20.14	18.99	20.20
2660	3.20	3.54	3.37	0.16	-0.39	20.15	21.37	19.46	18.99	19.87
2700	3.19	3.59	3.39	0.20	-0.55	20.24	21.22	19.13	18.93	19.95
2740	3.12	3.64	3.37	0.26	-1.02	20.25	20.87	18.66	18.92	19.72
2780	3.12	3.70	3.40	0.28	-1.32	20.18	21.02	18.47	18.93	19.83
2820	3.07	3.74	3.39	0.33	-1.51	20.20	20.87	17.77	18.84	19.59

(Note 1) Total loss is the loss from Sum to each coupled port including the 3dB theoretical split.

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## Typical Performance Data

Test Conditions: Input Power = +5 dBm @ Temperature = -55°C, Configuration C

Freq. (MHz)	Total Loss <sup>1</sup>			Amp. Unbal. (±dB) (half P-P)	Phase Unbal. (deg) (Rel. to 90°)	Isolation (dB) Port 1 - Port 2	Return Loss			
	Sum-Port 1	Sum-Port 2	Avg				Sum	Port 1	Port 2	Iso
700	2.51	3.82	3.12	0.66	0.38	29.41	31.17	30.99	29.65	28.62
740	2.64	3.66	3.12	0.51	0.42	29.68	32.42	32.54	30.65	29.46
780	2.76	3.52	3.12	0.38	0.38	29.93	33.41	33.04	31.66	29.66
820	2.87	3.40	3.13	0.27	0.38	30.03	34.45	33.38	32.45	29.85
860	2.96	3.30	3.13	0.17	0.46	30.22	35.46	33.51	33.43	30.12
900	3.05	3.21	3.13	0.08	0.43	30.34	36.08	33.41	34.54	30.30
940	3.13	3.14	3.13	0.01	0.48	30.48	36.55	33.97	35.51	30.64
980	3.19	3.08	3.13	0.06	0.52	30.61	35.81	34.09	36.10	30.81
1020	3.25	3.04	3.14	0.11	0.52	30.62	34.80	34.07	36.27	30.84
1060	3.30	3.00	3.15	0.15	0.59	30.43	33.60	34.02	35.69	30.95
1100	3.34	2.97	3.15	0.19	0.58	30.24	32.03	33.81	34.98	30.77
1140	3.38	2.95	3.16	0.22	0.63	30.03	30.98	33.96	34.70	30.42
1180	3.39	2.94	3.16	0.23	0.70	30.02	30.00	33.31	34.06	30.23
1220	3.42	2.94	3.17	0.24	0.67	29.99	28.98	32.57	33.67	30.07
1260	3.42	2.93	3.17	0.25	0.75	29.80	28.13	32.15	33.50	29.96
1300	3.43	2.94	3.18	0.25	0.76	29.83	27.48	32.12	32.98	30.08
1340	3.43	2.95	3.18	0.24	0.74	29.66	26.89	32.55	32.77	29.88
1380	3.42	2.96	3.18	0.23	0.79	29.40	26.25	31.99	32.89	29.32
1420	3.41	2.98	3.19	0.22	0.74	29.22	25.88	31.53	32.65	28.96
1460	3.40	3.00	3.20	0.21	0.72	28.69	25.49	30.92	32.32	28.18
1500	3.39	3.02	3.20	0.19	0.70	28.08	25.06	30.28	32.23	27.33
1540	3.38	3.04	3.21	0.17	0.62	27.56	24.82	29.81	31.36	26.38
1580	3.37	3.05	3.21	0.16	0.58	27.06	24.57	29.37	30.78	25.70
1620	3.36	3.08	3.22	0.14	0.55	26.40	24.57	28.61	30.37	24.71
1660	3.34	3.10	3.22	0.12	0.50	25.89	24.71	28.10	29.36	23.86
1700	3.34	3.11	3.22	0.12	0.34	25.23	24.64	27.59	28.85	23.16
1740	3.33	3.12	3.22	0.11	0.38	24.58	24.53	27.25	28.27	22.62
1780	3.33	3.14	3.23	0.10	0.33	23.89	24.42	26.94	27.27	22.30
1820	3.33	3.16	3.24	0.09	0.22	23.42	23.88	26.72	26.71	21.82
1860	3.34	3.16	3.25	0.09	0.27	23.03	23.84	26.80	26.36	21.68
1900	3.33	3.16	3.24	0.09	0.38	22.49	23.38	26.47	25.54	21.39
1940	3.34	3.16	3.25	0.09	0.38	22.05	22.94	26.01	25.03	21.24
1980	3.34	3.17	3.25	0.09	0.49	21.61	22.70	25.21	24.87	20.97
2020	3.36	3.19	3.27	0.09	0.34	21.16	22.40	24.46	24.52	20.72
2060	3.39	3.21	3.30	0.09	0.30	20.76	21.82	24.14	24.30	20.59
2100	3.41	3.16	3.28	0.13	0.70	20.61	21.50	23.31	24.26	20.63
2140	3.41	3.17	3.29	0.12	0.89	20.27	21.10	22.63	24.05	20.49
2180	3.43	3.20	3.31	0.12	0.94	19.91	20.77	22.20	23.88	20.61
2220	3.43	3.18	3.30	0.13	1.29	19.91	20.21	21.77	24.03	20.69
2260	3.42	3.20	3.31	0.11	1.53	19.77	19.88	21.66	23.93	20.77
2300	3.41	3.23	3.32	0.09	1.69	19.64	19.86	21.75	23.96	20.88
2340	3.39	3.25	3.32	0.07	1.61	19.65	19.87	21.49	24.20	20.89
2380	3.38	3.28	3.33	0.05	1.70	19.64	19.81	21.24	24.03	20.93
2420	3.36	3.31	3.33	0.02	1.55	19.55	19.76	21.06	23.65	20.93
2460	3.35	3.37	3.36	0.01	1.59	19.67	19.85	21.01	23.93	20.97
2500	3.35	3.36	3.35	0.01	1.39	19.50	19.54	20.84	23.08	20.88
2540	3.29	3.43	3.36	0.07	1.13	19.61	19.46	20.39	22.71	20.66
2580	3.26	3.45	3.35	0.10	0.80	19.73	19.17	20.16	22.23	20.46
2620	3.29	3.49	3.39	0.10	0.14	19.24	18.99	20.20	21.52	20.14
2660	3.24	3.54	3.39	0.15	0.18	19.34	18.99	19.87	21.37	19.46
2700	3.20	3.58	3.39	0.19	0.09	19.35	18.93	19.95	21.22	19.13
2740	3.14	3.64	3.38	0.25	-0.51	19.19	18.92	19.72	20.87	18.66
2780	3.12	3.70	3.40	0.29	-0.74	19.13	18.93	19.83	21.02	18.47
2820	3.07	3.73	3.39	0.33	-0.89	18.82	18.84	19.59	20.87	17.77

(Note 1) Total loss is the loss from Sum to each coupled port including the 3dB theoretical split.

## Notes

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.  
 B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuits' applicable established test performance criteria and measurement instructions.  
 C. The parts covered by this specification document are subject to Mini-Circuits' standard limited warranty and terms and conditions (collectively, "Standard Terms"). Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCStore/terms.jsp](http://www.minicircuits.com/MCStore/terms.jsp)



## 2 Way 90° Power Splitter/Combiner

QCH-272+

## Typical Performance Data

Test Conditions: Input Power =+5 dBm @Temperature = -55°C, Configuration D

Freq. (MHz)	Total Loss <sup>1</sup> (dB)			Amp. Unbal. (±dB) (half P-P)	Phase Unbal. (deg) (Rel. to 90°)	Isolation (dB) Port 1 - Port 2	Return Loss (dB)			
	Sum-Port 1	Sum-Port 2	Avg				Sum	Port 1	Port 2	Iso
700	2.51	3.83	3.12	0.66	-0.58	29.29	28.62	29.65	30.99	31.17
740	2.64	3.66	3.12	0.51	-0.57	29.65	29.46	30.65	32.54	32.42
780	2.76	3.52	3.12	0.38	-0.64	29.90	29.66	31.66	33.04	33.41
820	2.87	3.41	3.13	0.27	-0.71	30.01	29.85	32.45	33.38	34.45
860	2.96	3.30	3.13	0.17	-0.68	30.26	30.12	33.43	33.51	35.46
900	3.05	3.22	3.13	0.09	-0.76	30.44	30.30	34.54	33.41	36.08
940	3.13	3.15	3.14	0.01	-0.78	30.59	30.64	35.51	33.97	36.55
980	3.19	3.08	3.13	0.05	-0.80	30.73	30.81	36.10	34.09	35.81
1020	3.25	3.05	3.15	0.11	-0.84	30.86	30.84	36.27	34.07	34.80
1060	3.30	3.00	3.15	0.15	-0.83	30.65	30.95	35.69	34.02	33.60
1100	3.34	2.98	3.16	0.18	-0.89	30.32	30.77	34.98	33.81	32.03
1140	3.38	2.95	3.16	0.21	-0.87	30.03	30.42	34.70	33.96	30.98
1180	3.39	2.94	3.16	0.23	-0.85	30.16	30.23	34.06	33.31	30.00
1220	3.42	2.94	3.17	0.24	-0.90	30.04	30.07	33.67	32.57	28.98
1260	3.43	2.93	3.17	0.25	-0.85	29.60	29.96	33.50	32.15	28.13
1300	3.43	2.94	3.18	0.24	-0.86	29.42	30.08	32.98	32.12	27.48
1340	3.43	2.96	3.19	0.24	-0.92	29.49	29.88	32.77	32.55	26.89
1380	3.42	2.96	3.18	0.23	-0.89	29.20	29.32	32.89	31.99	26.25
1420	3.41	2.99	3.19	0.21	-0.96	28.64	28.96	32.65	31.53	25.88
1460	3.40	3.00	3.20	0.20	-1.00	27.99	28.18	32.32	30.92	25.49
1500	3.38	3.02	3.20	0.18	-1.07	27.62	27.33	32.23	30.28	25.06
1540	3.38	3.05	3.21	0.17	-1.15	27.17	26.38	31.36	29.81	24.82
1580	3.37	3.06	3.21	0.16	-1.15	26.54	25.70	30.78	29.37	24.57
1620	3.35	3.09	3.22	0.13	-1.25	25.95	24.71	30.37	28.61	24.57
1660	3.34	3.11	3.22	0.11	-1.37	25.54	23.86	29.36	28.10	24.71
1700	3.34	3.13	3.23	0.11	-1.44	25.12	23.16	28.85	27.59	24.64
1740	3.33	3.14	3.23	0.10	-1.46	24.31	22.62	28.27	27.25	24.53
1780	3.34	3.18	3.26	0.08	-1.63	23.54	22.30	27.27	26.94	24.42
1820	3.34	3.19	3.26	0.08	-1.62	23.18	21.82	26.71	26.72	23.88
1860	3.35	3.18	3.26	0.09	-1.61	22.92	21.68	26.36	26.80	23.84
1900	3.34	3.18	3.26	0.08	-1.51	22.39	21.39	25.54	26.47	23.38
1940	3.34	3.18	3.26	0.08	-1.45	21.89	21.24	25.03	26.01	22.94
1980	3.36	3.19	3.27	0.08	-1.38	21.56	20.97	24.87	25.21	22.70
2020	3.37	3.22	3.29	0.08	-1.41	21.23	20.72	24.52	24.46	22.40
2060	3.40	3.23	3.31	0.08	-1.58	20.82	20.59	24.30	24.14	21.82
2100	3.41	3.18	3.29	0.12	-1.09	20.63	20.63	24.26	23.31	21.50
2140	3.40	3.19	3.29	0.11	-0.91	20.28	20.49	24.05	22.63	21.10
2180	3.42	3.21	3.31	0.10	-0.72	20.00	20.61	23.88	22.20	20.77
2220	3.40	3.19	3.29	0.11	-0.45	20.00	20.69	24.03	21.77	20.21
2260	3.39	3.21	3.30	0.09	-0.28	19.80	20.77	23.93	21.66	19.88
2300	3.38	3.23	3.30	0.07	-0.20	19.65	20.88	23.96	21.75	19.86
2340	3.35	3.26	3.30	0.05	-0.23	19.66	20.89	24.20	21.49	19.87
2380	3.35	3.29	3.32	0.04	-0.22	19.66	20.93	24.03	21.24	19.81
2420	3.32	3.33	3.32	0.00	-0.19	19.57	20.93	23.65	21.06	19.76
2460	3.32	3.35	3.33	0.02	-0.46	19.64	20.97	23.93	21.01	19.85
2500	3.32	3.38	3.35	0.03	-0.74	19.49	20.88	23.08	20.84	19.54
2540	3.26	3.43	3.34	0.09	-0.81	19.59	20.66	22.71	20.39	19.46
2580	3.24	3.48	3.36	0.12	-1.13	19.64	20.46	22.23	20.16	19.17
2620	3.26	3.55	3.40	0.15	-1.79	19.21	20.14	21.52	20.20	18.99
2660	3.21	3.54	3.37	0.17	-2.07	19.32	19.46	21.37	19.87	18.99
2700	3.20	3.60	3.40	0.20	-2.03	19.31	19.13	21.22	19.95	18.93
2740	3.13	3.67	3.39	0.27	-2.39	19.19	18.66	20.87	19.72	18.92
2780	3.13	3.73	3.42	0.30	-2.78	19.15	18.47	21.02	19.83	18.93
2820	3.09	3.78	3.42	0.35	-2.98	18.90	17.77	20.87	19.59	18.84

(Note 1) Total loss is the loss from Sum to each coupled port including the 3dB theoretical split.

## Notes

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





## 2 Way 90° Power Splitter/Combiner

QCH-272+

## Typical Performance Data

Test Conditions: Input Power =+5 dBm @Temperature = +25°C, Configuration A

Freq. (MHz)	Total Loss <sup>1</sup>			Amp. Unbal. (±dB) (half P-P)	Phase Unbal. (deg) (Rel. to 90°)	Isolation (dB) Port 1 - Port 2	Return Loss			
	Sum-Port 1	Sum-Port 2	Avg				Sum	Port 1	Port 2	Iso
700	2.51	3.84	3.12	0.67	-0.27	31.20	-32.51	-31.85	-29.76	-30.93
740	2.64	3.68	3.13	0.52	-0.28	31.23	-33.71	-32.74	-30.19	-31.50
780	2.75	3.54	3.13	0.39	-0.32	31.50	-34.27	-33.78	-30.36	-32.16
820	2.86	3.43	3.14	0.28	-0.35	31.66	-34.68	-34.86	-30.32	-32.58
860	2.96	3.32	3.14	0.18	-0.34	31.87	-35.27	-35.85	-30.57	-33.23
900	3.05	3.24	3.14	0.10	-0.44	32.00	-35.58	-36.15	-30.72	-33.93
940	3.12	3.17	3.14	0.03	-0.42	32.25	-35.93	-36.13	-30.85	-34.44
980	3.19	3.11	3.15	0.04	-0.42	32.65	-35.80	-35.28	-30.75	-34.95
1020	3.25	3.07	3.16	0.09	-0.47	33.06	-34.96	-34.45	-30.69	-35.32
1060	3.29	3.03	3.16	0.13	-0.44	33.03	-34.25	-33.35	-30.96	-35.35
1100	3.33	3.00	3.16	0.17	-0.46	33.46	-33.85	-32.13	-31.05	-35.40
1140	3.37	2.98	3.17	0.20	-0.44	33.97	-34.02	-31.28	-31.17	-35.95
1180	3.39	2.97	3.17	0.21	-0.42	34.16	-33.63	-30.33	-31.42	-35.57
1220	3.41	2.96	3.18	0.22	-0.47	34.94	-33.02	-29.36	-31.49	-35.21
1260	3.42	2.96	3.18	0.23	-0.41	35.21	-32.66	-28.56	-31.63	-35.05
1300	3.42	2.97	3.19	0.23	-0.38	35.77	-32.73	-28.05	-31.52	-34.71
1340	3.42	2.98	3.19	0.22	-0.43	35.87	-32.86	-27.58	-30.91	-34.32
1380	3.42	2.99	3.20	0.21	-0.43	36.08	-32.61	-27.12	-30.20	-34.17
1420	3.41	3.02	3.21	0.20	-0.43	35.91	-32.17	-26.79	-29.50	-33.61
1460	3.40	3.03	3.21	0.18	-0.45	35.65	-31.57	-26.53	-28.63	-32.95
1500	3.39	3.06	3.22	0.17	-0.50	35.07	-31.02	-26.18	-27.70	-32.43
1540	3.38	3.08	3.23	0.15	-0.56	33.92	-30.53	-25.87	-26.84	-31.76
1580	3.36	3.10	3.23	0.13	-0.61	33.16	-29.96	-25.62	-26.05	-30.84
1620	3.36	3.13	3.24	0.11	-0.65	32.05	-29.28	-25.41	-25.21	-30.21
1660	3.35	3.14	3.24	0.10	-0.69	31.28	-28.86	-25.41	-24.44	-29.45
1700	3.34	3.16	3.25	0.09	-0.73	30.17	-28.35	-25.37	-23.75	-28.76
1740	3.33	3.18	3.25	0.08	-0.76	29.20	-27.71	-25.21	-23.10	-28.32
1780	3.33	3.20	3.26	0.07	-0.80	28.38	-27.20	-25.16	-22.61	-27.71
1820	3.33	3.21	3.27	0.06	-0.80	27.46	-26.67	-24.93	-22.18	-27.10
1860	3.34	3.22	3.28	0.06	-0.77	26.87	-26.13	-24.72	-21.80	-26.85
1900	3.33	3.23	3.28	0.06	-0.77	26.15	-25.64	-24.31	-21.47	-26.22
1940	3.34	3.23	3.28	0.06	-0.74	25.49	-25.06	-23.82	-21.30	-25.80
1980	3.34	3.24	3.29	0.06	-0.68	25.03	-24.49	-23.50	-21.14	-25.77
2020	3.36	3.24	3.30	0.06	-0.67	24.57	-24.05	-23.06	-21.00	-25.46
2060	3.37	3.25	3.31	0.07	-0.56	24.14	-23.73	-22.55	-20.94	-25.24
2100	3.39	3.24	3.31	0.08	-0.40	23.74	-23.52	-22.29	-20.97	-25.51
2140	3.40	3.25	3.32	0.08	-0.30	23.46	-23.07	-22.00	-21.09	-25.29
2180	3.40	3.24	3.32	0.09	-0.08	23.12	-22.69	-21.60	-21.23	-25.10
2220	3.40	3.25	3.32	0.08	0.12	22.84	-22.42	-21.13	-21.34	-24.99
2260	3.40	3.26	3.33	0.07	0.27	22.54	-22.32	-20.72	-21.60	-24.70
2300	3.39	3.27	3.33	0.07	0.44	22.26	-22.31	-20.56	-21.83	-24.50
2340	3.38	3.30	3.34	0.05	0.48	22.07	-22.13	-20.35	-21.91	-24.42
2380	3.37	3.32	3.34	0.03	0.49	21.86	-21.95	-20.21	-22.06	-24.18
2420	3.36	3.35	3.35	0.01	0.54	21.64	-21.90	-20.13	-22.04	-23.92
2460	3.34	3.39	3.36	0.02	0.43	21.57	-22.00	-20.09	-21.95	-23.91
2500	3.32	3.42	3.37	0.05	0.36	21.38	-21.91	-20.12	-21.65	-23.56
2540	3.29	3.46	3.37	0.09	0.10	21.16	-21.61	-20.10	-21.24	-23.15
2580	3.28	3.50	3.39	0.11	-0.12	21.04	-21.33	-19.97	-20.85	-22.79
2620	3.24	3.54	3.39	0.15	-0.33	20.89	-21.12	-19.88	-20.37	-22.19
2660	3.22	3.59	3.40	0.19	-0.66	20.68	-21.10	-19.69	-19.88	-21.69
2700	3.19	3.63	3.40	0.23	-0.89	20.70	-20.94	-19.66	-19.43	-21.52
2740	3.14	3.70	3.41	0.28	-1.31	20.48	-20.65	-19.61	-18.99	-21.09
2780	3.12	3.75	3.42	0.33	-1.64	20.36	-20.46	-19.37	-18.53	-20.74
2820	3.08	3.82	3.43	0.38	-1.79	20.25	-20.43	-19.24	-18.23	-20.67

(Note 1) Total loss is the loss from Sum to each coupled port including the 3dB theoretical split.

## Notes

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## 2 Way 90° Power Splitter/Combiner

QCH-272+

## Typical Performance Data

Test Conditions: Input Power = +5 dBm @ Temperature = +25°C, Configuration B

Freq. (MHz)	Total Loss <sup>1</sup>			Amp. Unbal. (±dB) (half P-P)	Phase Unbal. (deg) (Rel. to 90°)	Isolation (dB) Port 1 - Port 2	Return Loss			
	Sum-Port 1	Sum-Port 2	Avg				Sum	Port 1	Port 2	Iso
700	2.54	3.84	3.14	0.66	0.11	31.37	30.93	29.76	31.85	32.51
740	2.67	3.68	3.15	0.51	0.14	31.33	31.50	30.19	32.74	33.71
780	2.78	3.54	3.14	0.38	0.10	31.57	32.16	30.36	33.78	34.27
820	2.89	3.43	3.15	0.27	0.10	31.67	32.58	30.32	34.86	34.68
860	2.99	3.32	3.15	0.17	0.15	31.83	33.23	30.57	35.85	35.27
900	3.07	3.24	3.15	0.08	0.10	32.04	33.93	30.72	36.15	35.58
940	3.15	3.17	3.16	0.01	0.12	32.12	34.44	30.85	36.13	35.93
980	3.22	3.11	3.16	0.06	0.16	32.49	34.95	30.75	35.28	35.80
1020	3.28	3.07	3.17	0.11	0.13	32.87	35.32	30.69	34.45	34.96
1060	3.32	3.03	3.17	0.15	0.18	32.93	35.35	30.96	33.35	34.25
1100	3.36	3.00	3.18	0.19	0.15	33.36	35.40	31.05	32.13	33.85
1140	3.40	2.98	3.18	0.21	0.19	33.85	35.95	31.17	31.28	34.02
1180	3.42	2.97	3.19	0.23	0.21	34.09	35.57	31.42	30.33	33.63
1220	3.44	2.97	3.20	0.24	0.19	34.81	35.21	31.49	29.36	33.02
1260	3.45	2.97	3.20	0.24	0.23	35.24	35.05	31.63	28.56	32.66
1300	3.45	2.98	3.21	0.24	0.19	35.77	34.71	31.52	28.05	32.73
1340	3.45	2.99	3.21	0.24	0.16	36.08	34.32	30.91	27.58	32.86
1380	3.45	3.00	3.22	0.23	0.17	36.34	34.17	30.20	27.12	32.61
1420	3.44	3.02	3.22	0.21	0.12	36.26	33.61	29.50	26.79	32.17
1460	3.43	3.04	3.23	0.20	0.06	36.16	32.95	28.63	26.53	31.57
1500	3.41	3.06	3.23	0.18	0.00	35.59	32.43	27.70	26.18	31.02
1540	3.41	3.08	3.24	0.17	-0.08	34.55	31.76	26.84	25.87	30.53
1580	3.39	3.10	3.24	0.15	-0.15	33.59	30.84	26.05	25.62	29.96
1620	3.39	3.13	3.26	0.14	-0.23	32.47	30.21	25.21	25.41	29.28
1660	3.38	3.14	3.26	0.13	-0.29	31.55	29.45	24.44	25.41	28.86
1700	3.37	3.15	3.26	0.11	-0.32	30.46	28.76	23.75	25.37	28.35
1740	3.37	3.17	3.27	0.10	-0.38	29.51	28.32	23.10	25.21	27.71
1780	3.37	3.18	3.27	0.10	-0.40	28.55	27.71	22.61	25.16	27.20
1820	3.37	3.19	3.28	0.09	-0.39	27.67	27.10	22.18	24.93	26.67
1860	3.38	3.20	3.29	0.09	-0.39	26.91	26.85	21.80	24.72	26.13
1900	3.38	3.20	3.29	0.09	-0.35	26.22	26.22	21.47	24.31	25.64
1940	3.38	3.21	3.29	0.09	-0.31	25.50	25.80	21.30	23.82	25.06
1980	3.39	3.22	3.30	0.09	-0.24	24.98	25.77	21.14	23.50	24.49
2020	3.40	3.22	3.31	0.09	-0.17	24.53	25.46	21.00	23.06	24.05
2060	3.42	3.23	3.32	0.10	-0.15	24.08	25.24	20.94	22.55	23.73
2100	3.43	3.22	3.32	0.11	0.00	23.71	25.51	20.97	22.29	23.52
2140	3.43	3.22	3.32	0.11	0.12	23.36	25.29	21.09	22.00	23.07
2180	3.43	3.22	3.32	0.11	0.38	23.06	25.10	21.23	21.60	22.69
2220	3.42	3.24	3.33	0.09	0.53	22.79	24.99	21.34	21.13	22.42
2260	3.41	3.25	3.33	0.08	0.57	22.49	24.70	21.60	20.72	22.32
2300	3.41	3.27	3.34	0.07	0.68	22.23	24.50	21.83	20.56	22.31
2340	3.39	3.29	3.34	0.05	0.66	22.04	24.42	21.91	20.35	22.13
2380	3.39	3.33	3.36	0.03	0.59	21.85	24.18	22.06	20.21	21.95
2420	3.37	3.36	3.36	0.01	0.55	21.62	23.92	22.04	20.13	21.90
2460	3.35	3.40	3.37	0.03	0.37	21.58	23.91	21.95	20.09	22.00
2500	3.34	3.43	3.38	0.05	0.12	21.39	23.56	21.65	20.12	21.91
2540	3.31	3.46	3.38	0.08	-0.13	21.17	23.15	21.24	20.10	21.61
2580	3.30	3.50	3.40	0.10	-0.41	21.06	22.79	20.85	19.97	21.33
2620	3.27	3.54	3.40	0.13	-0.73	20.88	22.19	20.37	19.88	21.12
2660	3.25	3.57	3.41	0.16	-1.02	20.69	21.69	19.88	19.69	21.10
2700	3.22	3.63	3.42	0.20	-1.23	20.72	21.52	19.43	19.66	20.94
2740	3.19	3.69	3.43	0.25	-1.55	20.51	21.09	18.99	19.61	20.65
2780	3.16	3.74	3.44	0.29	-2.00	20.36	20.74	18.53	19.37	20.46
2820	3.13	3.80	3.45	0.33	-2.16	20.25	20.67	18.23	19.24	20.43

(Note 1) Total loss is the loss from Sum to each coupled port including the 3dB theoretical split.

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## 2 Way 90° Power Splitter/Combiner

QCH-272+

## Typical Performance Data

Test Conditions: Input Power = +5 dBm @ Temperature = +25°C, Configuration C

Freq. (MHz)	Total Loss <sup>1</sup>			Amp. Unbal. (±dB) (half P-P)	Phase Unbal. (deg) (Rel. to 90°)	Isolation (dB) Port 1 - Port 2	Return Loss			
	Sum-Port 1	Sum-Port 2	Avg				Sum	Port 1	Port 2	Iso
700	2.51	3.84	3.12	0.67	0.50	30.21	31.85	32.51	30.93	29.76
740	2.64	3.68	3.13	0.52	0.52	30.23	32.74	33.71	31.50	30.19
780	2.75	3.54	3.13	0.40	0.50	30.39	33.78	34.27	32.16	30.36
820	2.86	3.43	3.14	0.29	0.51	30.44	34.86	34.68	32.58	30.32
860	2.96	3.32	3.14	0.18	0.58	30.40	35.85	35.27	33.23	30.57
900	3.04	3.24	3.14	0.10	0.54	30.52	36.15	35.58	33.93	30.72
940	3.12	3.17	3.14	0.02	0.59	30.52	36.13	35.93	34.44	30.85
980	3.19	3.11	3.15	0.04	0.64	30.59	35.28	35.80	34.95	30.75
1020	3.25	3.07	3.16	0.09	0.63	30.77	34.45	34.96	35.32	30.69
1060	3.29	3.03	3.16	0.14	0.70	30.78	33.35	34.25	35.35	30.96
1100	3.33	3.00	3.16	0.17	0.70	30.91	32.13	33.85	35.40	31.05
1140	3.37	2.98	3.17	0.20	0.75	30.99	31.28	34.02	35.95	31.17
1180	3.38	2.97	3.17	0.21	0.82	31.20	30.33	33.63	35.57	31.42
1220	3.41	2.97	3.18	0.22	0.81	31.35	29.36	33.02	35.21	31.49
1260	3.41	2.97	3.18	0.23	0.87	31.23	28.56	32.66	35.05	31.63
1300	3.42	2.98	3.19	0.22	0.88	31.26	28.05	32.73	34.71	31.52
1340	3.42	2.99	3.20	0.22	0.86	31.04	27.58	32.86	34.32	30.91
1380	3.41	3.00	3.20	0.21	0.91	30.73	27.12	32.61	34.17	30.20
1420	3.40	3.02	3.21	0.20	0.89	30.39	26.79	32.17	33.61	29.50
1460	3.39	3.04	3.21	0.18	0.86	29.85	26.53	31.57	32.95	28.63
1500	3.38	3.05	3.21	0.17	0.83	29.09	26.18	31.02	32.43	27.70
1540	3.37	3.08	3.22	0.15	0.76	28.38	25.87	30.53	31.76	26.84
1580	3.35	3.10	3.22	0.14	0.73	27.71	25.62	29.96	30.84	26.05
1620	3.35	3.12	3.23	0.12	0.68	26.91	25.41	29.28	30.21	25.21
1660	3.34	3.14	3.24	0.11	0.63	26.37	25.41	28.86	29.45	24.44
1700	3.33	3.15	3.24	0.10	0.61	25.58	25.37	28.35	28.76	23.75
1740	3.33	3.17	3.25	0.08	0.58	24.95	25.21	27.71	28.32	23.10
1780	3.32	3.18	3.25	0.08	0.56	24.37	25.16	27.20	27.71	22.61
1820	3.33	3.19	3.26	0.07	0.54	23.82	24.93	26.67	27.10	22.18
1860	3.33	3.20	3.26	0.07	0.60	23.30	24.72	26.13	26.85	21.80
1900	3.33	3.20	3.26	0.07	0.62	22.70	24.31	25.64	26.22	21.47
1940	3.34	3.21	3.27	0.07	0.67	22.27	23.82	25.06	25.80	21.30
1980	3.34	3.22	3.28	0.07	0.73	21.84	23.50	24.49	25.77	21.14
2020	3.36	3.22	3.29	0.07	0.77	21.50	23.06	24.05	25.46	21.00
2060	3.38	3.23	3.30	0.08	0.88	21.21	22.55	23.73	25.24	20.94
2100	3.39	3.22	3.30	0.08	0.98	20.84	22.29	23.52	25.51	20.97
2140	3.40	3.22	3.31	0.09	1.12	20.72	22.00	23.07	25.29	21.09
2180	3.41	3.22	3.31	0.09	1.41	20.55	21.60	22.69	25.10	21.23
2220	3.40	3.24	3.32	0.08	1.54	20.39	21.13	22.42	24.99	21.34
2260	3.40	3.25	3.32	0.08	1.70	20.28	20.72	22.32	24.70	21.60
2300	3.40	3.27	3.33	0.06	1.85	20.14	20.56	22.31	24.50	21.83
2340	3.38	3.30	3.34	0.05	1.88	20.09	20.35	22.13	24.42	21.91
2380	3.38	3.33	3.35	0.03	1.89	20.06	20.21	21.95	24.18	22.06
2420	3.36	3.36	3.36	0.00	1.86	19.92	20.13	21.90	23.92	22.04
2460	3.34	3.40	3.37	0.03	1.77	19.96	20.09	22.00	23.91	21.95
2500	3.32	3.43	3.37	0.06	1.59	19.95	20.12	21.91	23.56	21.65
2540	3.29	3.47	3.38	0.09	1.31	19.87	20.10	21.61	23.15	21.24
2580	3.28	3.50	3.39	0.11	1.13	19.94	19.97	21.33	22.79	20.85
2620	3.24	3.53	3.38	0.15	0.79	19.81	19.88	21.12	22.19	20.37
2660	3.22	3.57	3.39	0.18	0.57	19.69	19.69	21.10	21.69	19.88
2700	3.18	3.62	3.39	0.22	0.40	19.68	19.66	20.94	21.52	19.43
2740	3.14	3.69	3.41	0.28	0.03	19.46	19.61	20.65	21.09	18.99
2780	3.11	3.74	3.41	0.31	-0.39	19.34	19.37	20.46	20.74	18.53
2820	3.07	3.80	3.42	0.36	-0.53	19.16	19.24	20.43	20.67	18.23

(Note 1) Total loss is the loss from Sum to each coupled port including the 3dB theoretical split.

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## 2 Way 90° Power Splitter/Combiner

QCH-272+

## Typical Performance Data

Test Conditions: Input Power = +5 dBm @ Temperature = +25°C, Configuration D

Freq. (MHz)	Total Loss <sup>1</sup>			Amp. Unbal. (±dB) (half P-P)	Phase Unbal. (deg) (Rel. to 90°)	Isolation (dB) Port 1 - Port 2	Return Loss			
	Sum-Port 1	Sum-Port 2	Avg				Sum	Port 1	Port 2	Iso
700	2.54	3.84	3.14	0.66	-0.63	30.09	29.76	30.93	32.51	31.85
740	2.67	3.68	3.15	0.51	-0.66	30.21	30.19	31.50	33.71	32.74
780	2.78	3.54	3.14	0.38	-0.73	30.36	30.36	32.16	34.27	33.78
820	2.89	3.43	3.15	0.27	-0.78	30.42	30.32	32.58	34.68	34.86
860	2.99	3.32	3.15	0.17	-0.78	30.45	30.57	33.23	35.27	35.85
900	3.08	3.24	3.16	0.09	-0.88	30.62	30.72	33.93	35.58	36.15
940	3.16	3.17	3.16	0.01	-0.91	30.62	30.85	34.44	35.93	36.13
980	3.22	3.11	3.16	0.05	-0.92	30.69	30.75	34.95	35.80	35.28
1020	3.28	3.07	3.17	0.11	-0.99	30.98	30.69	35.32	34.96	34.45
1060	3.33	3.03	3.18	0.15	-0.96	30.95	30.96	35.35	34.25	33.35
1100	3.37	3.00	3.18	0.18	-1.02	30.89	31.05	35.40	33.85	32.13
1140	3.40	2.98	3.18	0.21	-1.02	30.91	31.17	35.95	34.02	31.28
1180	3.42	2.96	3.18	0.23	-1.01	31.26	31.42	35.57	33.63	30.33
1220	3.44	2.96	3.19	0.24	-1.07	31.25	31.49	35.21	33.02	29.36
1260	3.45	2.96	3.20	0.25	-1.05	30.82	31.63	35.05	32.66	28.56
1300	3.45	2.97	3.20	0.24	-1.08	30.68	31.52	34.71	32.73	28.05
1340	3.46	2.98	3.21	0.24	-1.14	30.75	30.91	34.32	32.86	27.58
1380	3.45	2.99	3.21	0.23	-1.13	30.35	30.20	34.17	32.61	27.12
1420	3.44	3.02	3.22	0.21	-1.19	29.61	29.50	33.61	32.17	26.79
1460	3.43	3.03	3.23	0.20	-1.24	29.03	28.63	32.95	31.57	26.53
1500	3.42	3.05	3.23	0.18	-1.33	28.62	27.70	32.43	31.02	26.18
1540	3.41	3.08	3.24	0.17	-1.40	27.98	26.84	31.76	30.53	25.87
1580	3.39	3.10	3.24	0.15	-1.46	27.18	26.05	30.84	29.96	25.62
1620	3.39	3.13	3.26	0.13	-1.54	26.51	25.21	30.21	29.28	25.41
1660	3.38	3.14	3.26	0.12	-1.62	26.09	24.44	29.45	28.86	25.41
1700	3.37	3.16	3.26	0.11	-1.66	25.51	23.75	28.76	28.35	25.37
1740	3.37	3.18	3.27	0.10	-1.71	24.67	23.10	28.32	27.71	25.21
1780	3.37	3.19	3.28	0.09	-1.75	24.06	22.61	27.71	27.20	25.16
1820	3.37	3.21	3.29	0.08	-1.73	23.65	22.18	27.10	26.67	24.93
1860	3.38	3.22	3.30	0.08	-1.75	23.25	21.80	26.85	26.13	24.72
1900	3.38	3.22	3.30	0.08	-1.76	22.66	21.47	26.22	25.64	24.31
1940	3.38	3.23	3.30	0.08	-1.72	22.18	21.30	25.80	25.06	23.82
1980	3.40	3.23	3.31	0.08	-1.66	21.86	21.14	25.77	24.49	23.50
2020	3.40	3.24	3.32	0.08	-1.61	21.63	21.00	25.46	24.05	23.06
2060	3.42	3.24	3.33	0.09	-1.56	21.30	20.94	25.24	23.73	22.55
2100	3.43	3.24	3.33	0.09	-1.40	20.88	20.97	25.51	23.52	22.29
2140	3.43	3.24	3.33	0.09	-1.27	20.78	21.09	25.29	23.07	22.00
2180	3.44	3.24	3.34	0.10	-1.05	20.68	21.23	25.10	22.69	21.60
2220	3.42	3.25	3.33	0.09	-0.87	20.50	21.34	24.99	22.42	21.13
2260	3.42	3.26	3.34	0.08	-0.81	20.32	21.60	24.70	22.32	20.72
2300	3.41	3.27	3.34	0.07	-0.70	20.16	21.83	24.50	22.31	20.56
2340	3.39	3.29	3.34	0.05	-0.71	20.11	21.91	24.42	22.13	20.35
2380	3.39	3.32	3.35	0.03	-0.75	20.08	22.06	24.18	21.95	20.21
2420	3.37	3.35	3.36	0.01	-0.74	19.93	22.04	23.92	21.90	20.13
2460	3.35	3.38	3.36	0.02	-0.94	19.94	21.95	23.91	22.00	20.09
2500	3.34	3.41	3.37	0.04	-1.10	19.94	21.65	23.56	21.91	20.12
2540	3.31	3.46	3.38	0.08	-1.34	19.84	21.24	23.15	21.61	20.10
2580	3.30	3.50	3.40	0.10	-1.64	19.86	20.85	22.79	21.33	19.97
2620	3.27	3.54	3.40	0.14	-1.85	19.81	20.37	22.19	21.12	19.88
2660	3.25	3.59	3.42	0.17	-2.26	19.70	19.88	21.69	21.10	19.69
2700	3.23	3.63	3.43	0.21	-2.51	19.66	19.43	21.52	20.94	19.66
2740	3.19	3.70	3.44	0.26	-2.83	19.50	18.99	21.09	20.65	19.61
2780	3.17	3.76	3.45	0.30	-3.24	19.42	18.53	20.74	20.46	19.37
2820	3.14	3.82	3.47	0.34	-3.42	19.27	18.23	20.67	20.43	19.24

(Note 1) Total loss is the loss from Sum to each coupled port including the 3dB theoretical split.

## Notes

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## 2 Way 90° Power Splitter/Combiner

QCH-272+

## Typical Performance Data

Test Conditions: Input Power =+5 dBm @Temperature = +105°C, Configuration A

Freq. (MHz)	Total Loss <sup>1</sup>			Amp. Unbal. (±dB) (half P-P)	Phase Unbal. (deg) (Rel. to 90°)	Isolation (dB) Port 1 - Port 2	Return Loss			
	Sum-Port 1	Sum-Port 2	Avg				Sum	Port 1	Port 2	Iso
700	2.54	3.87	3.15	0.67	-0.21	33.15	-34.38	-34.97	-32.07	-34.06
740	2.67	3.71	3.16	0.53	-0.20	33.61	-36.21	-36.88	-33.17	-35.38
780	2.78	3.57	3.16	0.40	-0.23	34.10	-36.68	-38.71	-33.26	-36.61
820	2.89	3.46	3.17	0.29	-0.26	34.53	-37.16	-40.98	-33.34	-37.69
860	2.99	3.36	3.17	0.19	-0.23	35.17	-37.70	-43.29	-33.90	-38.75
900	3.07	3.28	3.17	0.11	-0.31	35.51	-37.65	-42.54	-33.89	-40.42
940	3.15	3.21	3.18	0.04	-0.29	36.31	-38.21	-41.77	-34.18	-41.72
980	3.21	3.16	3.18	0.03	-0.29	37.03	-38.22	-39.97	-34.16	-42.75
1020	3.28	3.12	3.20	0.08	-0.33	37.88	-37.38	-37.76	-33.98	-43.82
1060	3.32	3.08	3.20	0.12	-0.31	38.30	-36.48	-36.18	-34.39	-44.54
1100	3.36	3.05	3.20	0.15	-0.33	39.24	-36.03	-34.79	-34.55	-45.13
1140	3.40	3.04	3.22	0.18	-0.31	40.48	-36.51	-33.69	-35.00	-47.00
1180	3.41	3.03	3.22	0.19	-0.30	41.32	-36.34	-32.65	-35.63	-46.77
1220	3.43	3.02	3.22	0.20	-0.36	42.83	-35.98	-31.66	-35.82	-45.08
1260	3.45	3.02	3.23	0.21	-0.33	44.15	-35.38	-30.63	-35.87	-45.24
1300	3.45	3.03	3.23	0.21	-0.27	46.11	-35.06	-29.98	-35.73	-44.08
1340	3.45	3.04	3.24	0.20	-0.36	46.30	-35.52	-29.33	-34.94	-43.13
1380	3.45	3.05	3.25	0.20	-0.34	47.97	-35.15	-28.65	-33.80	-42.66
1420	3.44	3.07	3.25	0.18	-0.36	46.02	-34.48	-28.36	-32.76	-40.81
1460	3.43	3.09	3.26	0.17	-0.36	44.04	-33.92	-28.02	-31.23	-38.17
1500	3.42	3.11	3.26	0.15	-0.37	41.90	-33.23	-27.67	-29.84	-37.00
1540	3.41	3.14	3.27	0.13	-0.41	38.97	-32.83	-27.45	-28.40	-35.19
1580	3.41	3.15	3.28	0.12	-0.41	37.81	-32.56	-27.10	-27.67	-33.92
1620	3.39	3.18	3.28	0.10	-0.43	36.08	-31.88	-27.00	-26.59	-33.34
1660	3.38	3.21	3.29	0.08	-0.44	34.67	-31.35	-26.91	-25.60	-32.16
1700	3.37	3.22	3.29	0.07	-0.49	33.24	-30.72	-26.70	-24.75	-31.24
1740	3.36	3.24	3.30	0.06	-0.46	32.15	-30.16	-26.56	-23.97	-30.58
1780	3.36	3.28	3.32	0.04	-0.57	30.85	-29.26	-26.46	-23.42	-29.41
1820	3.36	3.30	3.33	0.02	-0.65	29.42	-28.50	-26.02	-22.80	-28.91
1860	3.37	3.29	3.33	0.03	-0.60	28.91	-28.08	-26.00	-22.35	-28.51
1900	3.36	3.30	3.33	0.03	-0.51	27.98	-27.30	-25.45	-21.99	-27.73
1940	3.36	3.31	3.33	0.02	-0.53	27.02	-26.51	-24.89	-21.74	-27.26
1980	3.36	3.32	3.34	0.03	-0.45	26.30	-25.73	-24.43	-21.45	-27.10
2020	3.40	3.35	3.37	0.02	-0.78	25.30	-25.34	-24.08	-21.33	-26.54
2060	3.42	3.36	3.39	0.03	-0.77	24.76	-25.18	-23.42	-21.24	-26.40
2100	3.42	3.31	3.36	0.06	-0.25	24.68	-24.44	-22.89	-21.35	-26.10
2140	3.42	3.32	3.37	0.05	-0.20	24.21	-23.91	-22.52	-21.36	-25.93
2180	3.46	3.34	3.40	0.06	-0.09	23.51	-23.58	-22.15	-21.59	-25.33
2220	3.45	3.31	3.38	0.07	0.17	23.38	-23.14	-21.58	-21.72	-25.35
2260	3.45	3.32	3.38	0.07	0.42	23.02	-23.02	-21.16	-21.88	-24.99
2300	3.44	3.35	3.39	0.05	0.61	22.62	-22.96	-20.95	-22.07	-24.53
2340	3.43	3.37	3.40	0.04	0.69	22.43	-22.61	-20.84	-22.25	-24.71
2380	3.43	3.39	3.41	0.02	0.78	22.17	-22.45	-20.66	-22.42	-24.48
2420	3.41	3.42	3.41	0.01	0.89	21.86	-22.37	-20.43	-22.43	-23.93
2460	3.39	3.46	3.42	0.04	0.65	21.73	-22.56	-20.52	-22.68	-24.39
2500	3.40	3.48	3.44	0.05	0.60	21.41	-22.44	-20.36	-22.38	-23.78
2540	3.34	3.53	3.43	0.10	0.57	21.35	-21.97	-20.44	-21.78	-23.51
2580	3.31	3.59	3.45	0.14	0.47	21.17	-21.83	-20.40	-21.50	-23.24
2620	3.33	3.62	3.47	0.15	-0.10	20.63	-21.50	-20.21	-20.61	-22.25
2660	3.27	3.66	3.46	0.20	-0.36	20.57	-21.44	-20.49	-20.06	-22.08
2700	3.24	3.72	3.47	0.25	-0.32	20.51	-21.36	-20.34	-19.66	-21.68
2740	3.18	3.80	3.48	0.32	-0.85	20.33	-20.99	-20.20	-19.15	-20.99
2780	3.16	3.86	3.50	0.37	-1.32	20.03	-21.05	-20.09	-19.02	-20.87
2820	3.12	3.92	3.50	0.41	-1.55	19.94	-20.74	-19.79	-18.49	-20.50

(Note 1) Total loss is the loss from Sum to each coupled port including the 3dB theoretical split.

## Notes

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## 2 Way 90° Power Splitter/Combiner

QCH-272+

## Typical Performance Data

Test Conditions: Input Power = +5 dBm @Temperature = +105°C, Configuration B

Freq. (MHz)	Total Loss <sup>1</sup>			Amp. Unbal. (±dB) (half P-P)	Phase Unbal. (deg) (Rel. to 90°)	Isolation (dB) Port 1 - Port 2	Return Loss			
	Sum-Port 1	Sum-Port 2	Avg				Sum	Port 1	Port 2	Iso
700	2.56	3.86	3.16	0.65	0.03	33.40	34.06	32.07	34.97	34.38
740	2.69	3.70	3.17	0.50	0.06	33.75	35.38	33.17	36.88	36.21
780	2.80	3.56	3.16	0.38	0.03	34.20	36.61	33.26	38.71	36.68
820	2.92	3.45	3.18	0.26	0.03	34.54	37.69	33.34	40.98	37.16
860	3.01	3.35	3.18	0.17	0.07	35.12	38.75	33.90	43.29	37.70
900	3.10	3.27	3.18	0.08	0.03	35.56	40.42	33.89	42.54	37.65
940	3.18	3.20	3.19	0.01	0.04	36.11	41.72	34.18	41.77	38.21
980	3.24	3.14	3.19	0.06	0.06	36.77	42.75	34.16	39.97	38.22
1020	3.30	3.10	3.20	0.11	0.03	37.59	43.82	33.98	37.76	37.38
1060	3.34	3.06	3.20	0.15	0.06	38.13	44.54	34.39	36.18	36.48
1100	3.38	3.04	3.21	0.18	0.01	39.06	45.13	34.55	34.79	36.03
1140	3.42	3.02	3.22	0.21	0.04	40.23	47.00	35.00	33.69	36.51
1180	3.44	3.01	3.22	0.22	0.06	41.12	46.77	35.63	32.65	36.34
1220	3.46	3.01	3.23	0.23	0.02	42.42	45.08	35.82	31.66	35.98
1260	3.47	3.01	3.23	0.24	0.04	44.15	45.24	35.87	30.63	35.38
1300	3.48	3.02	3.24	0.24	0.02	45.97	44.08	35.73	29.98	35.06
1340	3.48	3.03	3.25	0.23	-0.05	47.17	43.13	34.94	29.33	35.52
1380	3.47	3.04	3.25	0.23	-0.05	49.29	42.66	33.80	28.65	35.15
1420	3.46	3.06	3.26	0.21	-0.12	47.58	40.81	32.76	28.36	34.48
1460	3.46	3.08	3.27	0.20	-0.18	45.61	38.17	31.23	28.02	33.92
1500	3.45	3.10	3.27	0.18	-0.22	43.20	37.00	29.84	27.67	33.23
1540	3.44	3.13	3.28	0.17	-0.32	39.97	35.19	28.40	27.45	32.83
1580	3.44	3.13	3.28	0.16	-0.35	38.33	33.92	27.67	27.10	32.56
1620	3.42	3.16	3.29	0.14	-0.37	36.64	33.34	26.59	27.00	31.88
1660	3.41	3.18	3.29	0.12	-0.41	34.99	32.16	25.60	26.91	31.35
1700	3.41	3.21	3.31	0.11	-0.55	33.59	31.24	24.75	26.70	30.72
1740	3.40	3.22	3.31	0.10	-0.54	32.49	30.58	23.97	26.56	30.16
1780	3.40	3.24	3.32	0.09	-0.60	31.04	29.41	23.42	26.46	29.26
1820	3.41	3.26	3.33	0.08	-0.64	29.63	28.91	22.80	26.02	28.50
1860	3.41	3.26	3.33	0.08	-0.65	28.93	28.51	22.35	26.00	28.08
1900	3.41	3.26	3.33	0.08	-0.58	28.04	27.73	21.99	25.45	27.30
1940	3.41	3.27	3.34	0.08	-0.60	27.01	27.26	21.74	24.89	26.51
1980	3.42	3.28	3.35	0.08	-0.53	26.23	27.10	21.45	24.43	25.73
2020	3.45	3.33	3.39	0.07	-0.78	25.25	26.54	21.33	24.08	25.34
2060	3.47	3.32	3.39	0.08	-0.76	24.69	26.40	21.24	23.42	25.18
2100	3.47	3.27	3.37	0.11	-0.35	24.65	26.10	21.35	22.89	24.44
2140	3.47	3.28	3.37	0.10	-0.20	24.11	25.93	21.36	22.52	23.91
2180	3.49	3.31	3.40	0.10	-0.22	23.45	25.33	21.59	22.15	23.58
2220	3.48	3.29	3.38	0.10	0.17	23.35	25.35	21.72	21.58	23.14
2260	3.47	3.30	3.38	0.09	0.23	22.99	24.99	21.88	21.16	23.02
2300	3.47	3.33	3.40	0.08	0.35	22.61	24.53	22.07	20.95	22.96
2340	3.45	3.34	3.39	0.06	0.29	22.42	24.71	22.25	20.84	22.61
2380	3.45	3.38	3.41	0.04	0.29	22.17	24.48	22.42	20.66	22.45
2420	3.43	3.41	3.42	0.02	0.24	21.85	23.93	22.43	20.43	22.37
2460	3.42	3.47	3.44	0.03	0.14	21.74	24.39	22.68	20.52	22.56
2500	3.42	3.47	3.44	0.02	-0.05	21.42	23.78	22.38	20.36	22.44
2540	3.37	3.53	3.45	0.08	-0.18	21.37	23.51	21.78	20.44	21.97
2580	3.35	3.55	3.45	0.10	-0.68	21.20	23.24	21.50	20.40	21.83
2620	3.36	3.58	3.47	0.11	-0.84	20.64	22.25	20.61	20.21	21.50
2660	3.32	3.66	3.49	0.17	-1.16	20.59	22.08	20.06	20.49	21.44
2700	3.30	3.72	3.50	0.20	-1.36	20.53	21.68	19.66	20.34	21.36
2740	3.24	3.79	3.51	0.27	-1.88	20.36	20.99	19.15	20.20	20.99
2780	3.23	3.84	3.52	0.30	-2.23	20.03	20.87	19.02	20.09	21.05
2820	3.19	3.90	3.53	0.35	-2.58	19.95	20.50	18.49	19.79	20.74

(Note 1) Total loss is the loss from Sum to each coupled port including the 3dB theoretical split.

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## 2 Way 90° Power Splitter/Combiner

QCH-272+

## Typical Performance Data

Test Conditions: Input Power = +5 dBm @Temperature = +105°C, Configuration C

Freq. (MHz)	Total Loss <sup>1</sup>			Amp. Unbal. (±dB) (half P-P)	Phase Unbal. (deg) (Rel. to 90°)	Isolation (dB) Port 1 - Port 2	Return Loss			
	Sum-Port 1	Sum-Port 2	Avg				Sum	Port 1	Port 2	Iso
700	2.54	3.86	3.15	0.67	0.34	32.12	34.97	34.38	34.06	32.07
740	2.67	3.70	3.15	0.52	0.37	32.58	36.88	36.21	35.38	33.17
780	2.78	3.56	3.15	0.39	0.36	32.93	38.71	36.68	36.61	33.26
820	2.90	3.45	3.17	0.28	0.36	33.19	40.98	37.16	37.69	33.34
860	2.99	3.35	3.17	0.18	0.44	33.57	43.29	37.70	38.75	33.90
900	3.08	3.27	3.17	0.10	0.41	33.53	42.54	37.65	40.42	33.89
940	3.15	3.20	3.17	0.02	0.44	33.77	41.77	38.21	41.72	34.18
980	3.22	3.14	3.18	0.04	0.48	33.95	39.97	38.22	42.75	34.16
1020	3.28	3.10	3.19	0.09	0.48	34.12	37.76	37.38	43.82	33.98
1060	3.32	3.06	3.19	0.13	0.53	34.30	36.18	36.48	44.54	34.39
1100	3.36	3.04	3.20	0.16	0.50	34.51	34.79	36.03	45.13	34.55
1140	3.40	3.02	3.21	0.19	0.55	34.66	33.69	36.51	47.00	35.00
1180	3.41	3.01	3.21	0.20	0.60	35.28	32.65	36.34	46.77	35.63
1220	3.43	3.01	3.21	0.21	0.56	35.42	31.66	35.98	45.08	35.82
1260	3.44	3.01	3.22	0.22	0.60	35.28	30.63	35.38	45.24	35.87
1300	3.45	3.01	3.22	0.22	0.63	35.28	29.98	35.06	44.08	35.73
1340	3.46	3.03	3.24	0.22	0.58	34.84	29.33	35.52	43.13	34.94
1380	3.45	3.04	3.24	0.21	0.63	34.39	28.65	35.15	42.66	33.80
1420	3.44	3.06	3.25	0.19	0.59	33.84	28.36	34.48	40.81	32.76
1460	3.43	3.07	3.25	0.18	0.57	32.83	28.02	33.92	38.17	31.23
1500	3.42	3.09	3.25	0.16	0.56	31.71	27.67	33.23	37.00	29.84
1540	3.41	3.12	3.26	0.14	0.50	30.59	27.45	32.83	35.19	28.40
1580	3.40	3.13	3.26	0.14	0.48	29.76	27.10	32.56	33.92	27.67
1620	3.39	3.16	3.27	0.12	0.48	28.74	27.00	31.88	33.34	26.59
1660	3.38	3.18	3.28	0.10	0.47	27.85	26.91	31.35	32.16	25.60
1700	3.37	3.20	3.28	0.09	0.33	26.94	26.70	30.72	31.24	24.75
1740	3.36	3.21	3.28	0.07	0.37	26.09	26.56	30.16	30.58	23.97
1780	3.36	3.24	3.30	0.06	0.34	25.24	26.46	29.26	29.41	23.42
1820	3.36	3.26	3.31	0.05	0.18	24.62	26.02	28.50	28.91	22.80
1860	3.37	3.26	3.31	0.05	0.25	24.04	26.00	28.08	28.51	22.35
1900	3.36	3.26	3.31	0.05	0.33	23.38	25.45	27.30	27.73	21.99
1940	3.37	3.27	3.32	0.05	0.30	22.82	24.89	26.51	27.26	21.74
1980	3.37	3.28	3.32	0.04	0.39	22.28	24.43	25.73	27.10	21.45
2020	3.40	3.33	3.36	0.04	0.05	21.65	24.08	25.34	26.54	21.33
2060	3.43	3.32	3.37	0.05	0.10	21.41	23.42	25.18	26.40	21.24
2100	3.44	3.27	3.35	0.08	0.53	21.22	22.89	24.44	26.10	21.35
2140	3.43	3.28	3.35	0.07	0.66	20.95	22.52	23.91	25.93	21.36
2180	3.47	3.31	3.39	0.08	0.67	20.61	22.15	23.58	25.33	21.59
2220	3.46	3.29	3.37	0.08	1.04	20.61	21.58	23.14	25.35	21.72
2260	3.46	3.30	3.38	0.08	1.22	20.46	21.16	23.02	24.99	21.88
2300	3.46	3.33	3.39	0.06	1.40	20.27	20.95	22.96	24.53	22.07
2340	3.44	3.35	3.39	0.04	1.38	20.24	20.84	22.61	24.71	22.25
2380	3.44	3.38	3.41	0.03	1.46	20.16	20.66	22.45	24.48	22.42
2420	3.43	3.41	3.42	0.00	1.39	20.00	20.43	22.37	23.93	22.43
2460	3.40	3.47	3.43	0.04	1.38	20.06	20.52	22.56	24.39	22.68
2500	3.41	3.47	3.44	0.04	1.26	19.93	20.36	22.44	23.78	22.38
2540	3.35	3.53	3.44	0.09	1.08	20.02	20.44	21.97	23.51	21.78
2580	3.32	3.56	3.44	0.12	0.70	20.12	20.40	21.83	23.24	21.50
2620	3.34	3.58	3.46	0.13	0.59	19.68	20.21	21.50	22.25	20.61
2660	3.28	3.66	3.47	0.20	0.28	19.77	20.49	21.44	22.08	20.06
2700	3.25	3.71	3.47	0.24	0.14	19.71	20.34	21.36	21.68	19.66
2740	3.18	3.78	3.47	0.31	-0.47	19.55	20.20	20.99	20.99	19.15
2780	3.16	3.84	3.49	0.35	-0.83	19.50	20.09	21.05	20.87	19.02
2820	3.12	3.90	3.49	0.39	-1.15	19.21	19.79	20.74	20.50	18.49

(Note 1) Total loss is the loss from Sum to each coupled port including the 3dB theoretical split.

## Notes

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## 2 Way 90° Power Splitter/Combiner

QCH-272+

## Typical Performance Data

Test Conditions: Input Power = +5 dBm @Temperature = +105°C, Configuration D

Freq. (MHz)	Total Loss <sup>1</sup>			Amp. Unbal. (±dB) (half P-P)	Phase Unbal. (deg) (Rel. to 90°)	Isolation (dB) Port 1 - Port 2	Return Loss			
	Sum-Port 1	Sum-Port 2	Avg				Sum	Port 1	Port 2	Iso
700	2.56	3.88	3.17	0.66	-0.51	31.95	32.07	34.06	34.38	34.97
740	2.69	3.72	3.17	0.51	-0.51	32.51	33.17	35.38	36.21	36.88
780	2.81	3.58	3.18	0.39	-0.57	32.86	33.26	36.61	36.68	38.71
820	2.92	3.47	3.19	0.27	-0.63	33.15	33.34	37.69	37.16	40.98
860	3.02	3.37	3.19	0.18	-0.60	33.62	33.90	38.75	37.70	43.29
900	3.10	3.29	3.19	0.10	-0.68	33.63	33.89	40.42	37.65	42.54
940	3.18	3.22	3.20	0.02	-0.71	33.88	34.18	41.72	38.21	41.77
980	3.25	3.16	3.20	0.04	-0.72	34.07	34.16	42.75	38.22	39.97
1020	3.31	3.13	3.22	0.09	-0.80	34.39	33.98	43.82	37.38	37.76
1060	3.35	3.09	3.22	0.14	-0.76	34.50	34.39	44.54	36.48	36.18
1100	3.39	3.06	3.22	0.17	-0.82	34.42	34.55	45.13	36.03	34.79
1140	3.43	3.04	3.23	0.19	-0.84	34.50	35.00	47.00	36.51	33.69
1180	3.45	3.03	3.23	0.21	-0.83	35.32	35.63	46.77	36.34	32.65
1220	3.47	3.03	3.24	0.22	-0.90	35.16	35.82	45.08	35.98	31.66
1260	3.48	3.03	3.25	0.23	-0.89	34.52	35.87	45.24	35.38	30.63
1300	3.49	3.04	3.26	0.23	-0.90	34.32	35.73	44.08	35.06	29.98
1340	3.49	3.06	3.27	0.22	-1.00	34.36	34.94	43.13	35.52	29.33
1380	3.48	3.06	3.26	0.21	-0.99	33.72	33.80	42.66	35.15	28.65
1420	3.47	3.09	3.28	0.20	-1.05	32.68	32.76	40.81	34.48	28.36
1460	3.47	3.10	3.28	0.19	-1.10	31.73	31.23	38.17	33.92	28.02
1500	3.45	3.12	3.28	0.17	-1.16	31.16	29.84	37.00	33.23	27.67
1540	3.45	3.15	3.30	0.15	-1.23	30.11	28.40	35.19	32.83	27.45
1580	3.44	3.17	3.30	0.14	-1.22	29.14	27.67	33.92	32.56	27.10
1620	3.43	3.20	3.31	0.12	-1.26	28.31	26.59	33.34	31.88	27.00
1660	3.42	3.22	3.32	0.10	-1.34	27.56	25.60	32.16	31.35	26.91
1700	3.42	3.24	3.33	0.10	-1.37	26.89	24.75	31.24	30.72	26.70
1740	3.40	3.26	3.33	0.08	-1.36	25.79	23.97	30.58	30.16	26.56
1780	3.41	3.29	3.35	0.07	-1.50	24.93	23.42	29.41	29.26	26.46
1820	3.42	3.32	3.37	0.06	-1.48	24.49	22.80	28.91	28.50	26.02
1860	3.42	3.31	3.36	0.06	-1.49	24.03	22.35	28.51	28.08	26.00
1900	3.42	3.31	3.36	0.06	-1.43	23.37	21.99	27.73	27.30	25.45
1940	3.42	3.32	3.37	0.05	-1.41	22.74	21.74	27.26	26.51	24.89
1980	3.44	3.33	3.38	0.06	-1.36	22.33	21.45	27.10	25.73	24.43
2020	3.46	3.37	3.41	0.05	-1.60	21.80	21.33	26.54	25.34	24.08
2060	3.48	3.37	3.42	0.06	-1.59	21.52	21.24	26.40	25.18	23.42
2100	3.48	3.32	3.40	0.09	-1.13	21.29	21.35	26.10	24.44	22.89
2140	3.48	3.33	3.40	0.08	-1.03	21.02	21.36	25.93	23.91	22.52
2180	3.50	3.35	3.42	0.08	-0.91	20.75	21.59	25.33	23.58	22.15
2220	3.49	3.33	3.41	0.09	-0.67	20.74	21.72	25.35	23.14	21.58
2260	3.48	3.33	3.40	0.08	-0.51	20.51	21.88	24.99	23.02	21.16
2300	3.48	3.36	3.42	0.06	-0.40	20.30	22.07	24.53	22.96	20.95
2340	3.46	3.38	3.42	0.05	-0.37	20.27	22.25	24.71	22.61	20.84
2380	3.46	3.40	3.43	0.03	-0.34	20.19	22.42	24.48	22.45	20.66
2420	3.44	3.44	3.44	0.01	-0.23	20.04	22.43	23.93	22.37	20.43
2460	3.43	3.47	3.45	0.02	-0.58	20.04	22.68	24.39	22.56	20.52
2500	3.43	3.50	3.46	0.03	-0.68	19.93	22.38	23.78	22.44	20.36
2540	3.38	3.54	3.46	0.08	-0.70	20.02	21.78	23.51	21.97	20.44
2580	3.36	3.61	3.48	0.12	-0.89	20.06	21.50	23.24	21.83	20.40
2620	3.37	3.64	3.50	0.13	-1.52	19.71	20.61	22.25	21.50	20.21
2660	3.33	3.68	3.50	0.18	-1.83	19.79	20.06	22.08	21.44	20.49
2700	3.31	3.74	3.52	0.21	-1.81	19.72	19.66	21.68	21.36	20.34
2740	3.25	3.82	3.53	0.28	-2.20	19.62	19.15	20.99	20.99	20.20
2780	3.24	3.89	3.55	0.32	-2.72	19.61	19.02	20.87	21.05	20.09
2820	3.20	3.94	3.55	0.37	-2.98	19.34	18.49	20.50	20.74	19.79

(Note 1) Total loss is the loss from Sum to each coupled port including the 3dB theoretical split.

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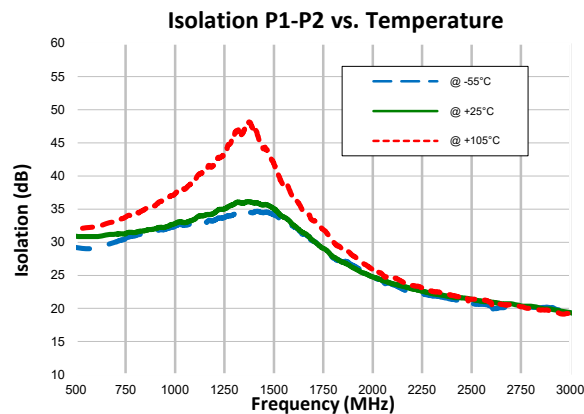
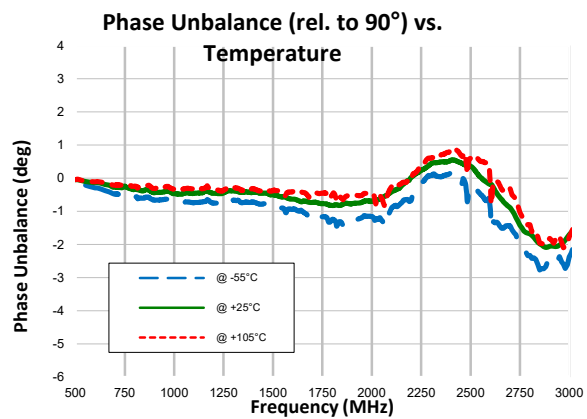
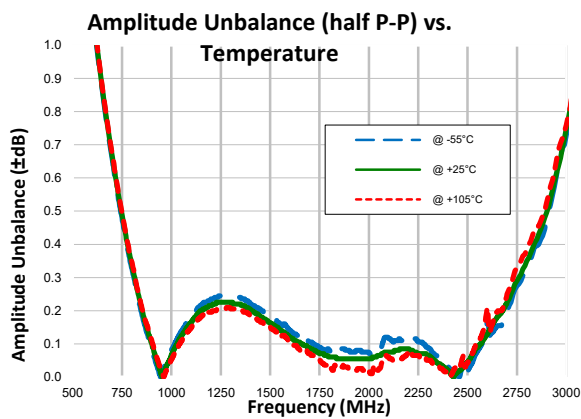
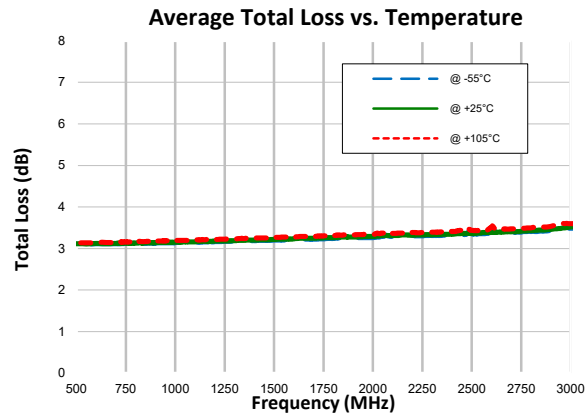
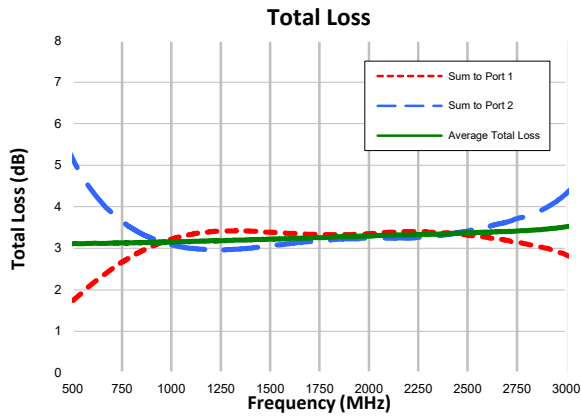




## 2 Way 90° Power Splitter/Combiner

QCH-272+

## Typical Performance Graphs (Configuration A)



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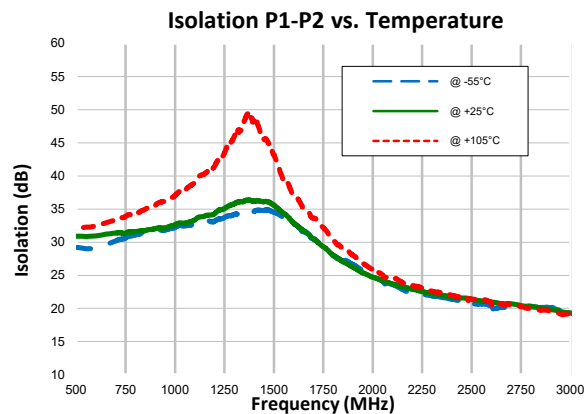
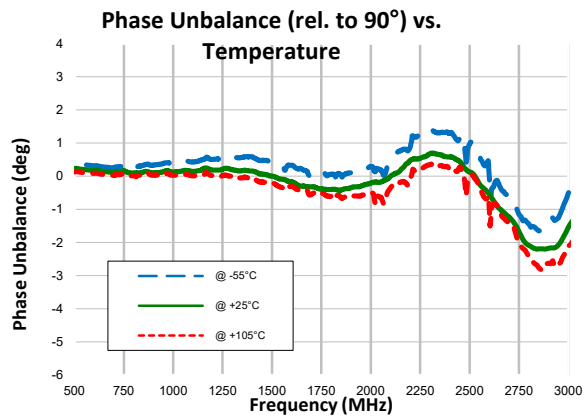
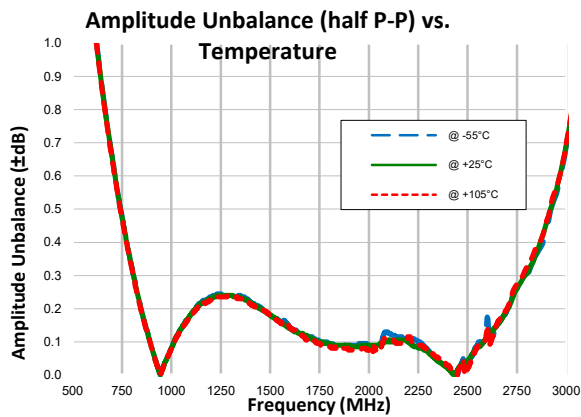
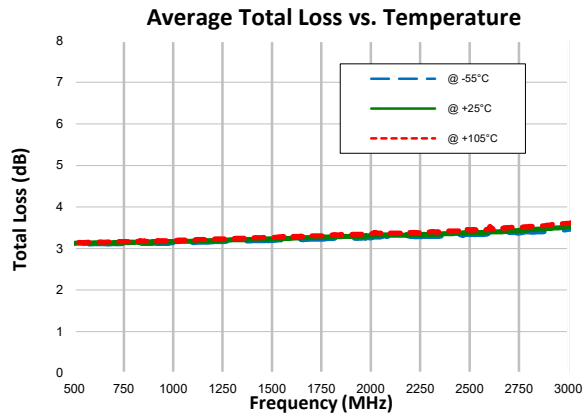
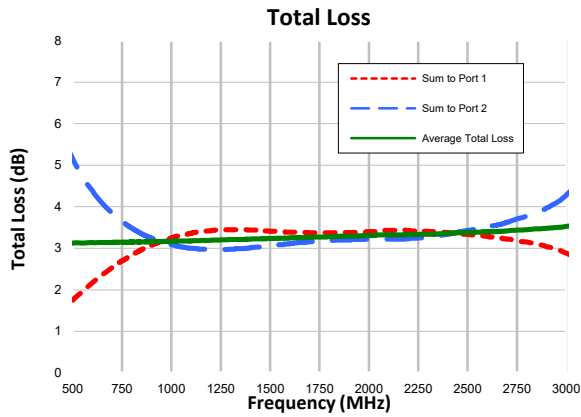


Surface Mount

## 2 Way 90° Power Splitter/Combiner

QCH-272+

### Typical Performance Curves (Configuration B)



#### Notes

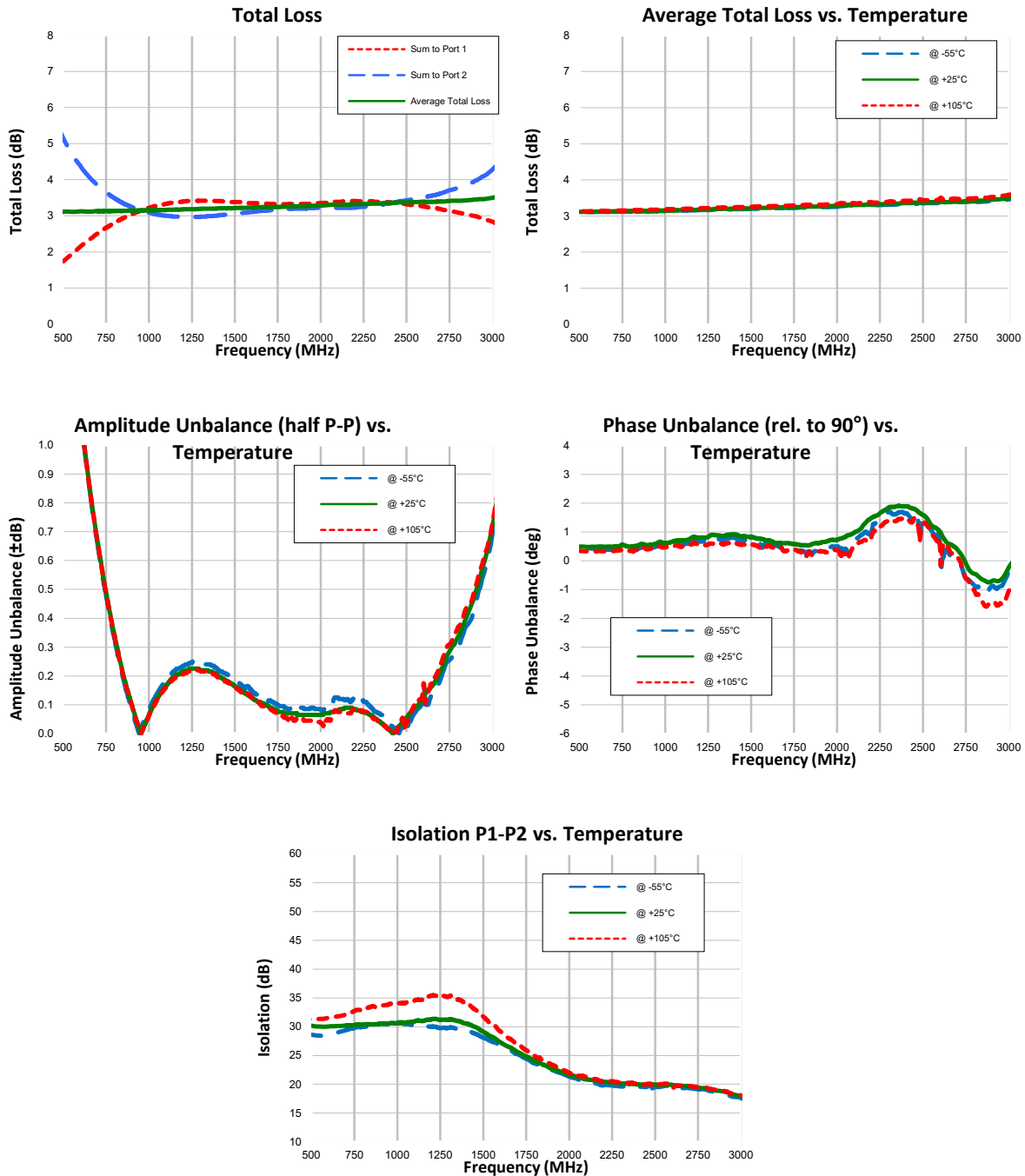
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## 2 Way 90° Power Splitter/Combiner

QCH-272+

## Typical Performance Curves (Configuration C)



## Notes

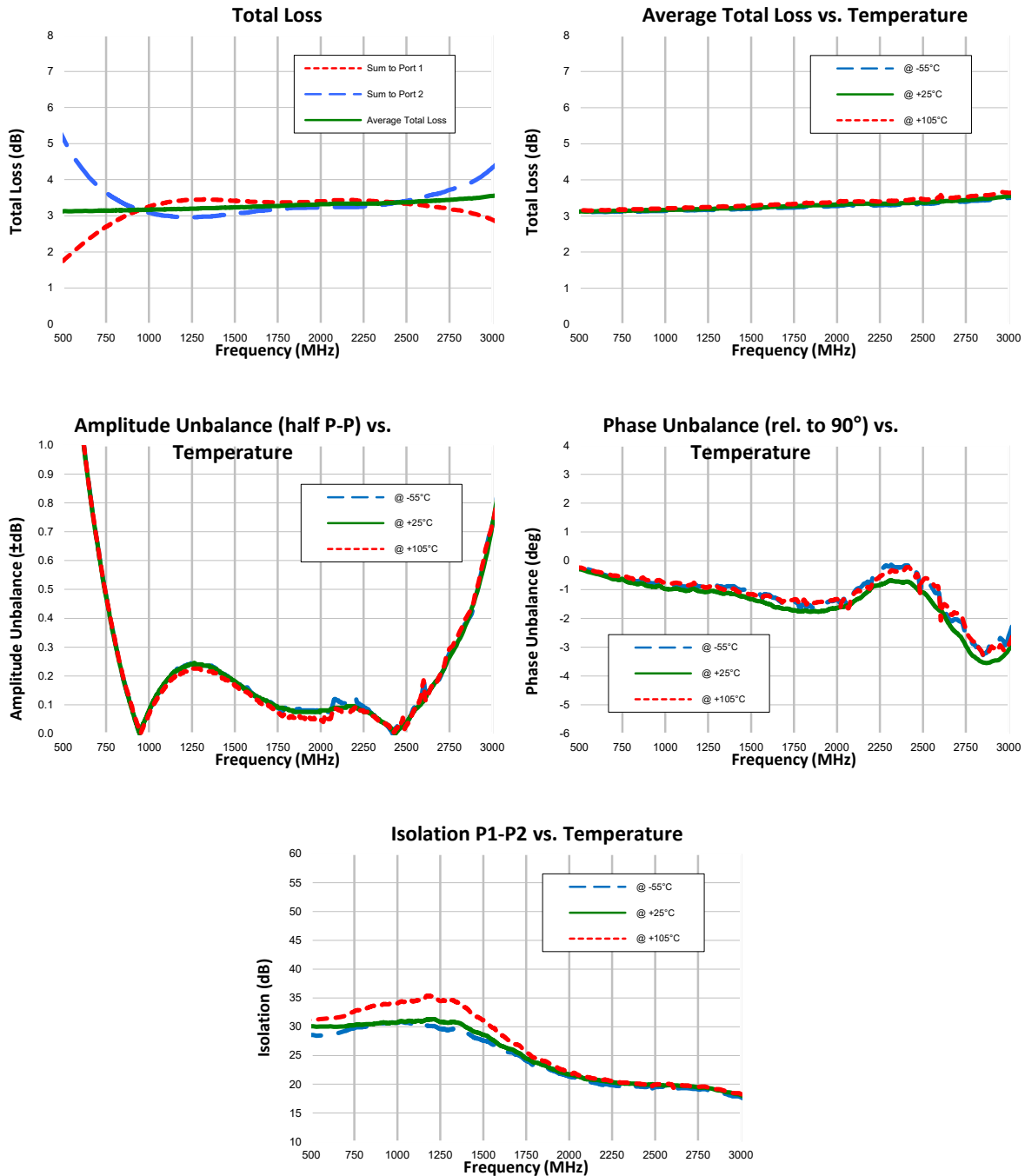
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## 2 Way 90° Power Splitter/Combiner

QCH-272+

## Typical Performance Curves (Configuration D)



## Notes

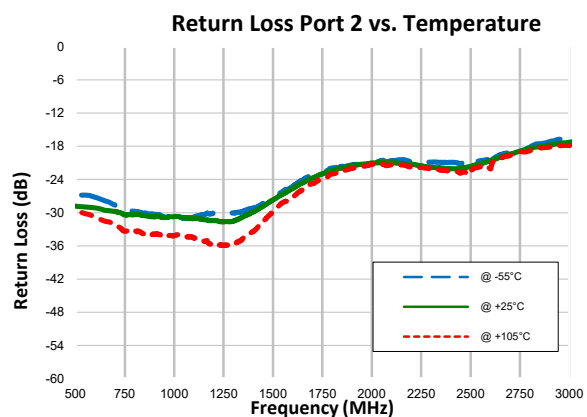
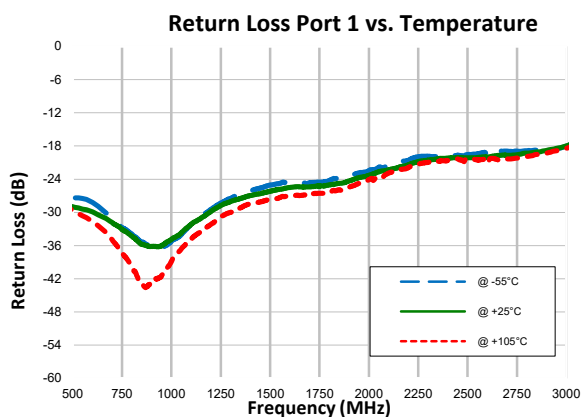
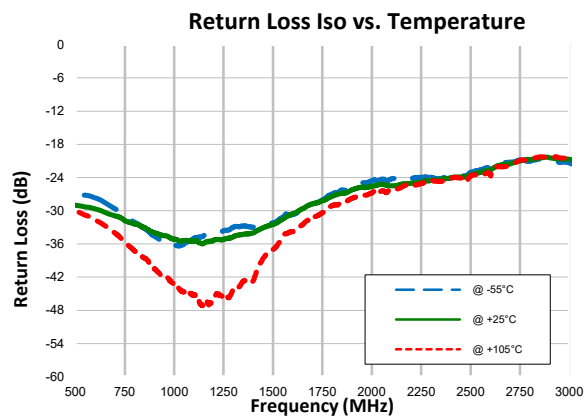
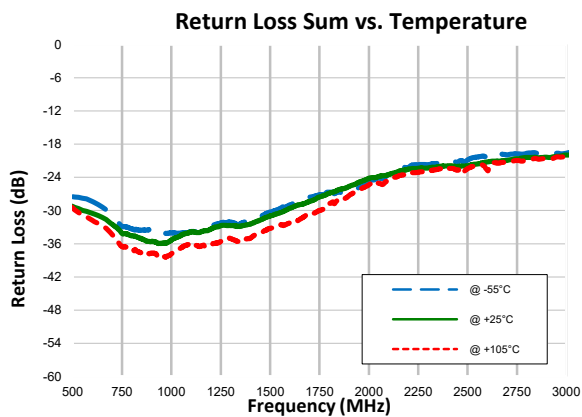
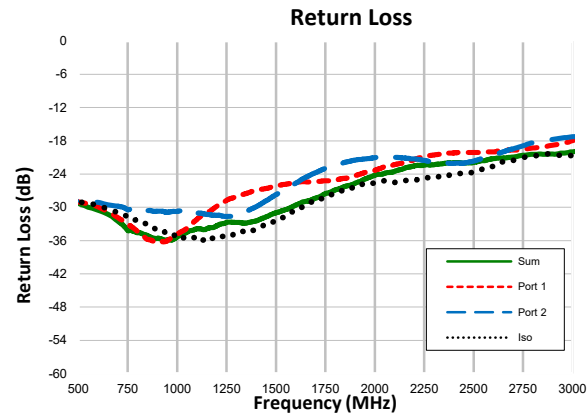
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## 2 Way 90° Power Splitter/Combiner

QCH-272+

## Typical Performance Curves (VSWR at Configuration A)



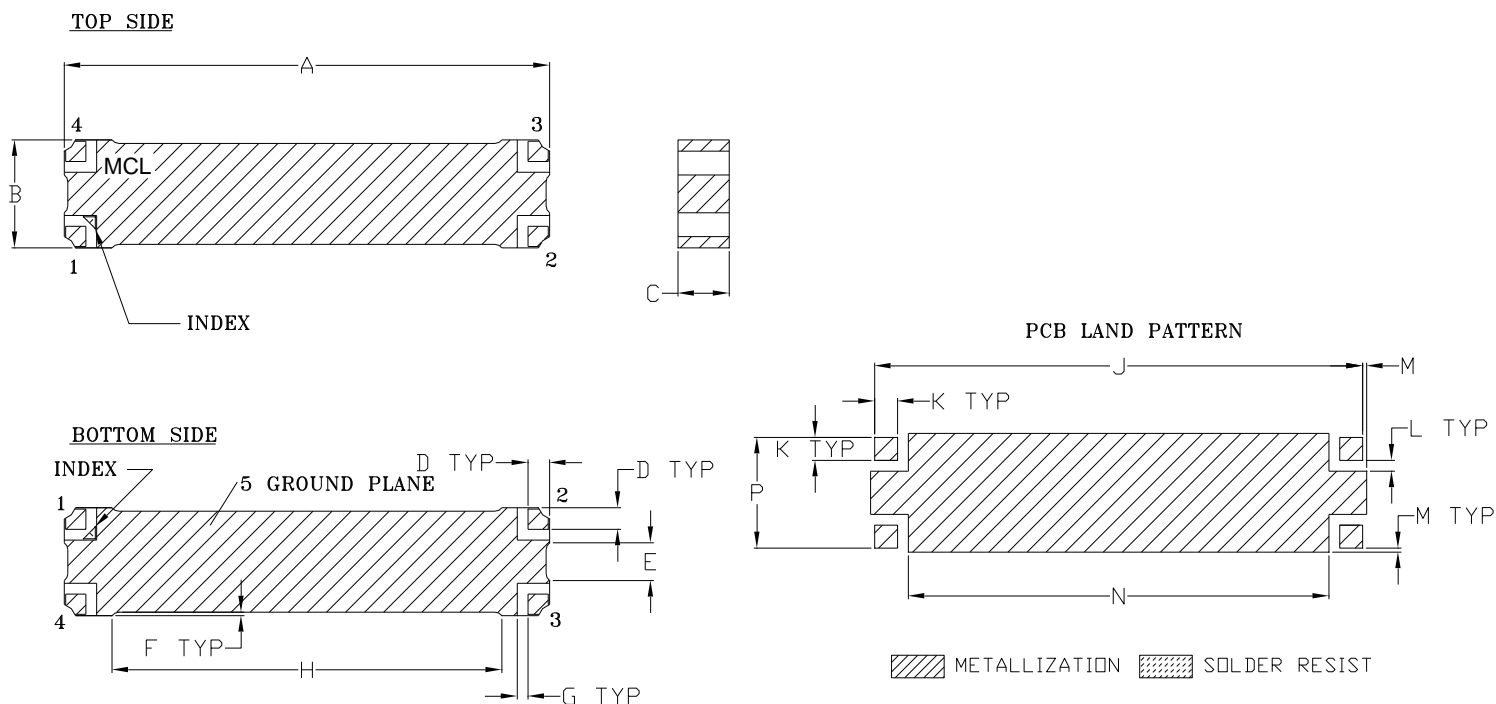
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## Outline Dimensions

PQ2181



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N	P	WT. GRAMS
PQ2181	1.800 (45.72)	.400 (10.16)	.190 (4.83)	.080 (2.03)	.140 (3.56)	.013 (0.33)	.040 (1.02)	1.446 (36.73)	1.810 (45.97)	.085 (2.16)	.040 (1.02)	.015 (0.38)	1.560 (39.62)	.410 (10.41)	1.0

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  $\mu$ inch (.05-.13 microns) Immersion Gold.  
For RoHS-5 Cases, all models no (+) suffix: Tin-Lead plate.

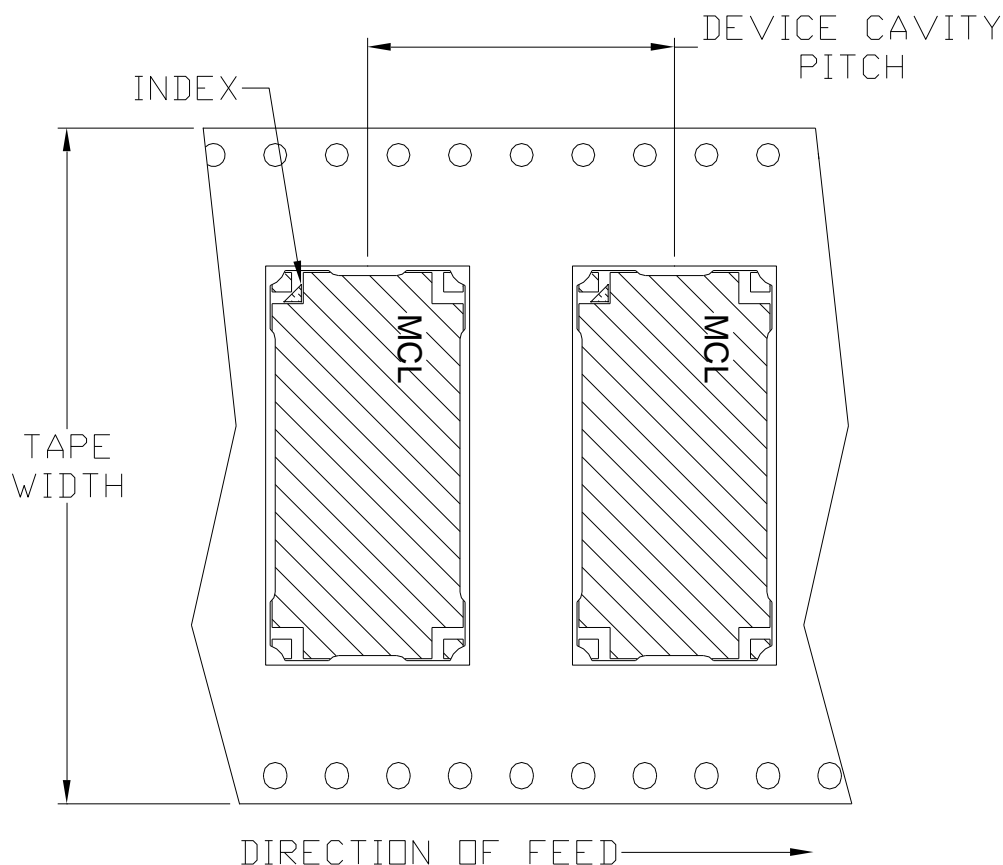


INTERNET <http://www.minicircuits.com>

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 Mini-Circuits ISO 9001 & ISO 14001 Certified

# Tape & Reel Packaging TR-F120

## DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
72	16	13	Small	20
			quantity	50
			standards	100
			(see note)	200
			Standard	500

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

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

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



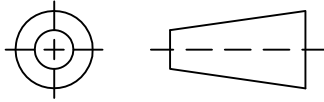
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## THIRD ANGLE PROJECTION

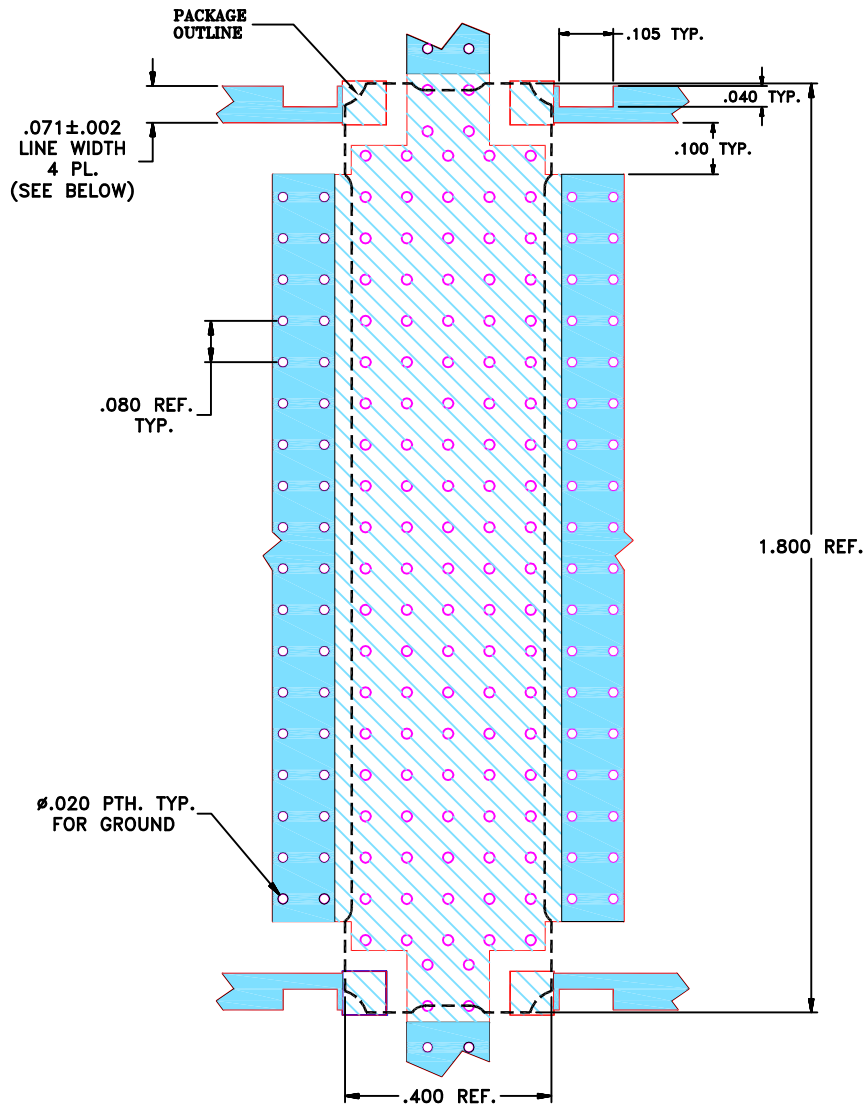


## REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M155012	NEW RELEASE (FROM RAVON)	09/16	GF	YB
A	M163158	ADD TRACE CUTOUTS	07/17	HH	YB
A	R92310	ADD TRACE CUTOUTS	07/17	HH	YB


**SUGGESTED MOUNTING CONFIGURATION**


FOR PQ2181 CASE STYLE 08DC08 PIN CONNECTION, 50 OHM



## NOTES:

- TRACE WIDTH IS SHOWN FOR ROGERS R04003C WITH DIELECTRIC THICKNESS.  $.032 \pm .003$ ". COPPER: 1 OZ. EACH SIDE.  
FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- CUTOUTS IN RF LINES ARE REQUIRED TO ACHIEVE SPECIFIED ISOLATION.

 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

TOLERANCES ON:

2 PL DECIMALS  $\pm$ 3 PL DECIMALS  $\pm$  .005ANGLES  $\pm$ FRACTIONS  $\pm$ 

DRAWN

GF (RAVON)

14 SEP 16

CHECKED


HH (RAVON)

14 SEP 16

APPROVED

YB (RAVON)

14 SEP 16

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



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TB-884+SIZE  
ACODE IDENT  
15542DRAWING NO:  
98-PL-480REV:  
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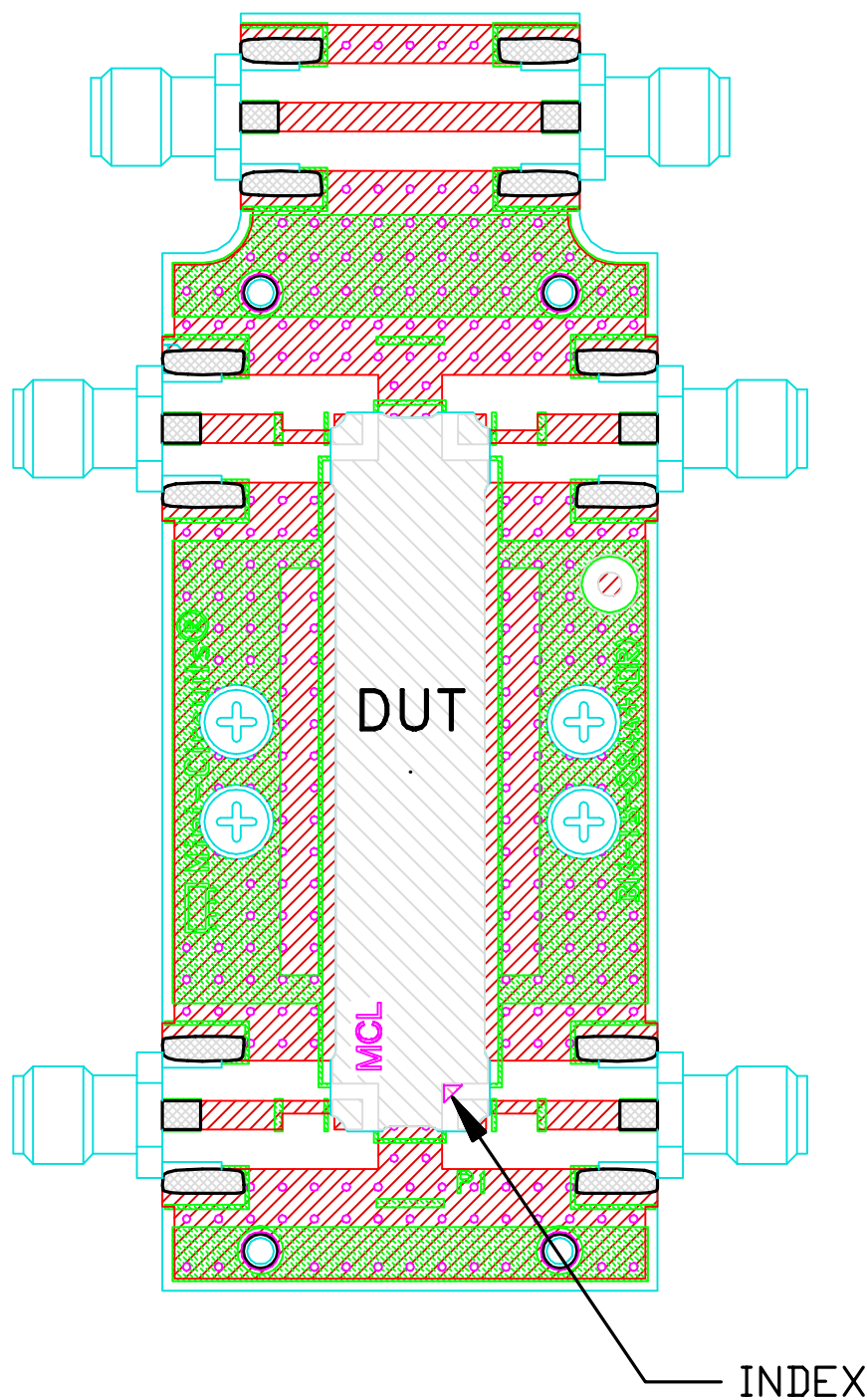
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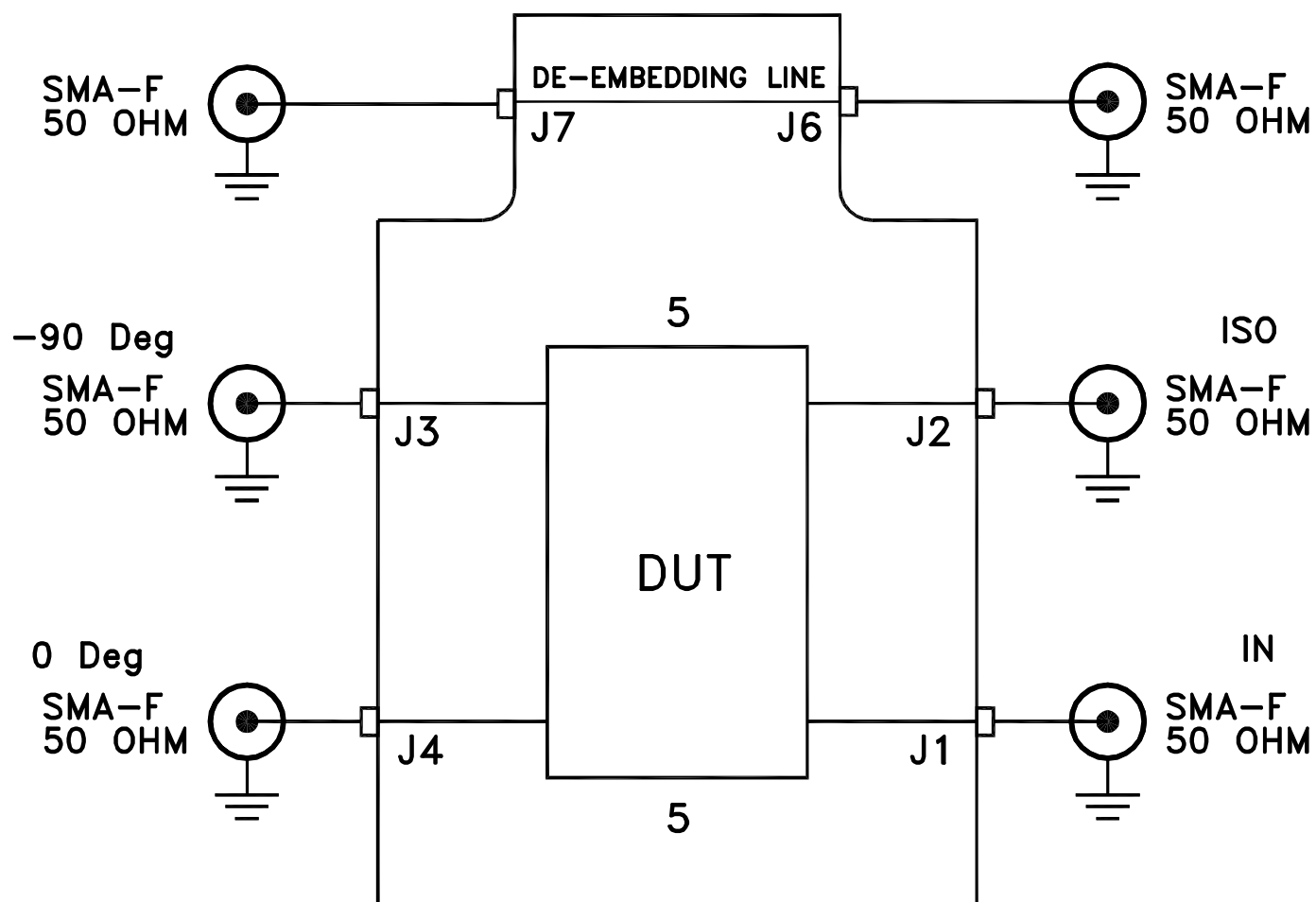
# Evaluation Board and Circuit



**TB-884+**

## NOTES:

1. SMA F JACK CONNECTORS.
2. PCB MATERIAL: ROGERS RO4003C OR EQUIVALENT, DIALECTRIC CONSTANT=3.5, DIALECTRIC THICKNESS=.032 INCH.



TB-884+  
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