

High Power

2 Way-90° Power Splitter

QCH-451

50Ω 2 Way-90° Up to 250W* 225 to 450 MHz

The Big Deal

- High power handling up to 250W
- Wide bandwidth
- Excellent Amplitude Unbalance, ± 0.25 dB
- Excellent Phase Unbalance, ± 1.4 deg



CASE STYLE: PQ2185

Product Overview

Mini-Circuits new 2-way 90° power splitter, QCH-451 capable of handling up to 250W with amplitude unbalance of ± 0.25 dB typ and phase unbalance of ± 1.4 deg. typ. Operating over a frequency range of 225 to 450 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 (1.26 x 0.5 x 0.078") and includes wrap-around terminations for good solderability and easy visual inspection.

Key Features

Feature	Advantages
Wide bandwidth	The QCH-451 wide band width (225 - 450 MHz) makes it suitable for a wide range of applications.
High power handling: 250W @ +85°C 200W @ +105°C	Usable in many systems with high-power requirements such as antenna feeds, power amplifiers, and others that require balanced high power outputs.
Excellent Phase and Amplitude Unbalance: • ± 0.25 dB Amplitude Unbalance • $\pm 1.4^\circ$ Phase Unbalance	QCH-451 produces nearly equal signals with 90° phase shift - ideal for I/Q systems, balanced amplifiers, antenna feeds, phase shifters, and many more applications.

*See power derating on page 2



High Power
Power Splitter/Combiner

QCH-451

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Maximum Ratings

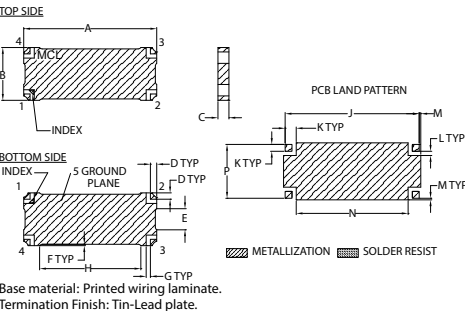
Table with 2 columns: Parameter, Value. Rows: Operating Temperature, case**, -55°C to 105°C; Storage Temperature, -55°C to 105°C; Power Input*, 250W @ +85°C, case

*Derate to 230W at +95°C and 200W at +105°C case temperature
**Case temperature is defined as temperature on base plate.
Permanent damage may occur if any of these limits are exceeded.

Pad Connections***

Table with 2 columns: Parameter, Value. Rows: SUM, 1; ISOLATION, 2; PORT 1 (0°), 3; PORT 2 (+90°), 4; GROUND, 5

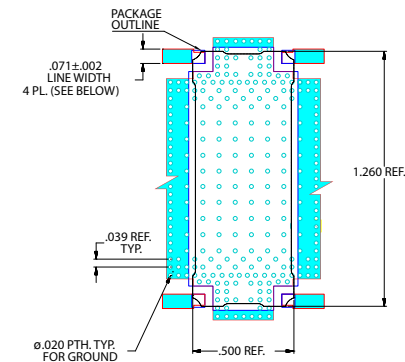
***Model is symmetrical and all ports are interchangeable, see port function table.



Outline Dimensions (inch/mm)

Table with 2 rows of dimensions. Row 1: A, B, C, D, E, F, G. Row 2: H, J, K, L, M, N, P. Units: inch/mm and grams.

Demo Board MCL P/N: TB-914
Suggested PCB Layout (PL-529)



NOTES:
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4003C WITH DIELECTRIC THICKNESS 0.032±0.015". COPPER: 1 OZ. EACH SIDE.
FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
[Symbol] DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
[Symbol] DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

Features

- high power, up to 250W
- wide bandwidth
- excellent amplitude unbalance, ±0.25 dB Typ
- excellent phase unbalance, ±1.4 deg Typ

Applications

- Balanced amplifiers
- I&Q Modulators
- Defense and military

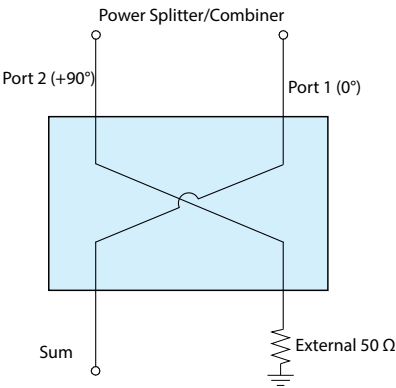


CASE STYLE: PQ2185

Electrical Specifications @ +25°C

Table with 6 columns: Parameter, Condition (MHz), Min., Typ., Max., Units. Rows: Frequency Range, Insertion Loss, Isolation, Phase Unbalance, Amplitude Unbalance, VSWR, Input RF Power, Thermal Resistance.

Electrical Schematic



Port Function Configurations

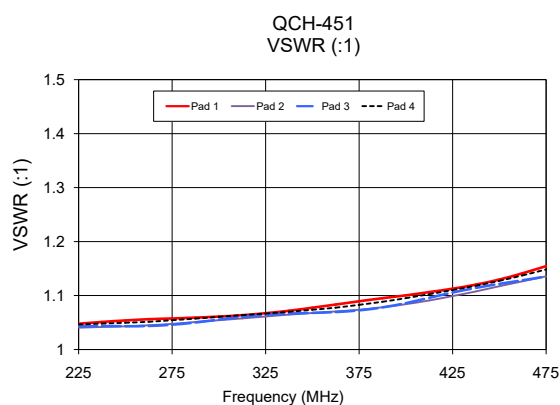
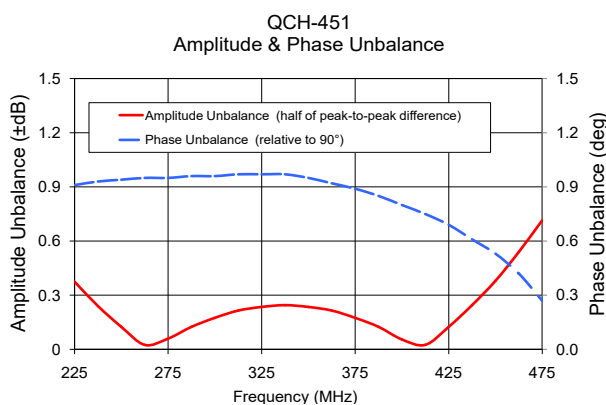
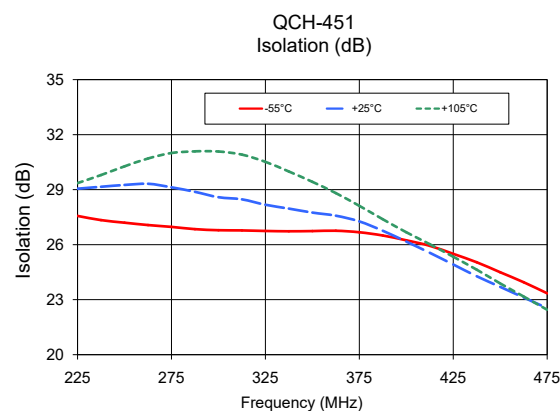
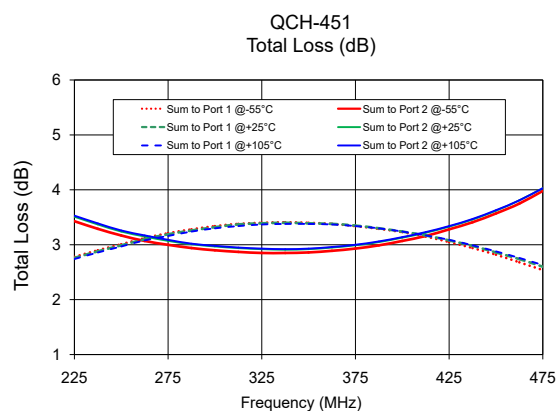
Table with 4 columns: Sum, Isolation, Port 1 (0°), Port 2 (90°). Rows show the mapping of ports for different configurations.

Typical Performance Data ¹

FREQUENCY (MHz)	Total Loss ² (dB)			Total Loss ² (dB)			Amplitude Unbalance (±dB) @ Sum=1	Isolation (dB)			Phase Unbalance (deg) Relative to 90° @ Sum=1	VSWR (:1)			
	Sum to Port 1 @ Sum=1			Sum to Port 2 @ Sum=1				Sum to Isolation @ Sum=1				Pad 1	Pad 2	Pad 3	Pad 4
	-55°C	+25°C	+105°C	-55°C	+25°C	+105°C		-55°C	+25°C	+105°C					
225.0	2.78	2.76	2.74	3.43	3.51	3.53	0.38	27.57	29.05	29.36	0.91	1.05	1.04	1.04	1.05
237.5	2.90	2.88	2.86	3.29	3.37	3.39	0.24	27.34	29.16	29.80	0.93	1.05	1.04	1.04	1.05
250.0	3.01	2.99	2.97	3.17	3.24	3.26	0.13	27.20	29.26	30.27	0.94	1.05	1.04	1.04	1.05
262.5	3.12	3.10	3.08	3.07	3.15	3.17	0.03	27.07	29.32	30.70	0.95	1.06	1.05	1.04	1.05
275.0	3.21	3.19	3.16	3.00	3.07	3.09	0.06	26.97	29.13	31.00	0.95	1.06	1.05	1.05	1.05
287.5	3.28	3.26	3.24	2.94	3.01	3.02	0.13	26.85	28.88	31.09	0.96	1.06	1.05	1.05	1.06
300.0	3.34	3.32	3.30	2.90	2.97	2.98	0.18	26.79	28.59	31.08	0.96	1.06	1.05	1.06	1.06
312.5	3.38	3.37	3.34	2.87	2.94	2.95	0.22	26.78	28.47	30.91	0.97	1.06	1.06	1.06	1.06
325.0	3.40	3.39	3.37	2.85	2.92	2.93	0.24	26.75	28.18	30.52	0.97	1.07	1.06	1.06	1.07
337.5	3.41	3.40	3.38	2.85	2.91	2.92	0.25	26.73	27.97	29.99	0.97	1.07	1.06	1.07	1.07
350.0	3.40	3.39	3.38	2.86	2.92	2.93	0.24	26.74	27.75	29.43	0.95	1.08	1.07	1.07	1.07
362.5	3.38	3.38	3.37	2.89	2.95	2.96	0.22	26.76	27.58	28.81	0.92	1.08	1.07	1.07	1.08
375.0	3.34	3.35	3.34	2.93	2.99	3.00	0.18	26.68	27.27	28.12	0.89	1.09	1.07	1.07	1.08
387.5	3.29	3.30	3.30	2.99	3.05	3.06	0.13	26.50	26.76	27.39	0.85	1.10	1.08	1.08	1.09
400.0	3.23	3.24	3.24	3.07	3.13	3.14	0.06	26.24	26.17	26.68	0.80	1.10	1.08	1.09	1.10
412.5	3.15	3.17	3.17	3.16	3.22	3.23	0.03	25.94	25.56	26.03	0.75	1.11	1.09	1.10	1.10
425.0	3.05	3.08	3.09	3.28	3.33	3.34	0.13	25.50	24.92	25.34	0.69	1.11	1.10	1.11	1.11
437.5	2.94	2.98	2.99	3.41	3.46	3.47	0.25	25.04	24.28	24.64	0.61	1.12	1.11	1.11	1.12
450.0	2.82	2.86	2.88	3.57	3.62	3.63	0.38	24.50	23.70	23.89	0.53	1.13	1.12	1.12	1.13
462.5	2.68	2.74	2.76	3.75	3.81	3.81	0.54	23.95	23.12	23.17	0.42	1.14	1.13	1.13	1.14
475.0	2.54	2.60	2.63	3.98	4.03	4.03	0.72	23.35	22.54	22.45	0.27	1.15	1.14	1.14	1.15

1. Data at +25°C unless specified otherwise.

2. Total loss is the loss from Sum to each coupled port including the 3dB theoretical split.



Additional Notes

- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
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