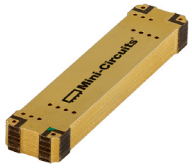
High Power

2 Way-90° Power Splitter

QCH-652+

50Ω 2 Way-90° Up to 60W* 1000 to 6500 MHz



CASE STYLE: PQ2181

The Big Deal

- High power handling up to 60W
- Ultra wide bandwidth
- Good Amplitude Unbalance, 0.80 dB
- Good Phase Unbalance, ±5 deg

Product Overview

Mini-Circuits' new 2-way 90° power splitter, QCH-652+ capable of handling up to 60W with amplitude unbalance of 0.80 dB typ and phase unbalance of ±5 deg. typ. Operating over a frequency range of 1000 to 6500 MHz, the good 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.

Key Features

Feature	Advantages
Ultra wide bandwidth	The QCH-652+ wide band width (1000 - 6500 MHz) makes it suitable for a wide range of applications.
High power handling: 60W @ +85°C 40W @ +105°C	Usable in many systems with high-power requirements such as antenna feeds, power amplifiers, and others that require balanced high power outputs.
Good Phase and Amplitude Unbalance: • 0.80 dB Amplitude Unbalance • ±5° Phase Unbalance	QCH-652+ produces nearly equal signals with 90° phase shift - ideal for I/Q systems, balanced amplifiers, antenna feeds, phase shifters, and many more applications.

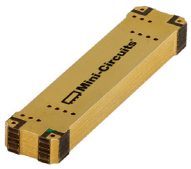
*See power derating on page 2

High Power

Power Splitter/Combiner

QCH-652+

50Ω 2 Way-90° Up to 60W* 1000 to 6500 MHz



CASE STYLE: PQ2181

Maximum Ratings

Operating Temperature, case**	-55°C to 105°C
Storage Temperature	-55°C to 105°C
Power Input*	60W @+85°C, case

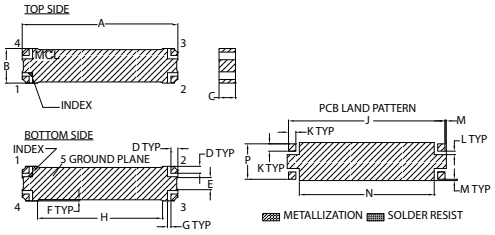
*Derate to 50W at +95°C and 40W at +105°C case temperature
**Case temperature is defined as temperature on base plate.
Permanent damage may occur if any of these limits are exceeded.

Pad Connections***

SUM	1
ISOLATION	2
PORT 1 (0°)	3
PORT 2 (+90°)	4
GROUND	5

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

Outline Drawing



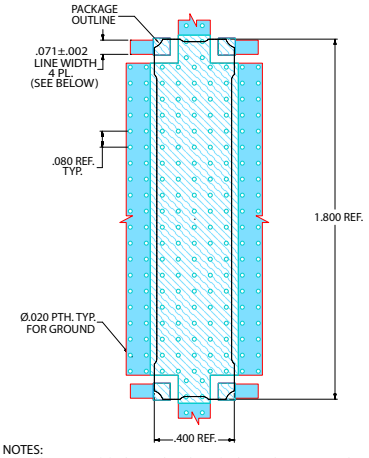
Base material: Printed wiring laminate.
Termination Finish: 2-5 µinch (0.05-0.13 microns) Immersion Gold

Outline Dimensions (inch / mm)

A	B	C	D	E	F	G
1.800	**.400**	**.190**	**.080**	**.140**	**.013**	**.040**
45.72	10.16	4.83	2.03	3.56	0.33	1.02

H	J	K	L	M	N	P	wt.
1.446	**1.810**	**.085**	**.040**	**.015**	**1.560**	**.410**	grams
36.73	45.97	2.16	1.02	0.38	39.62	10.41	1.0

Demo Board MCL P/N: TB-998+
Suggested PCB Layout (PL-539)



NOTES:
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4003C WITH DIELECTRIC THICKNESS. 0.032"±.003", 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.

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

DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

Features

- high power, up to 60W
- ultra wide bandwidth
- good amplitude unbalance, 0.80 dB Typ
- good phase unbalance, ±5 deg Typ

Applications

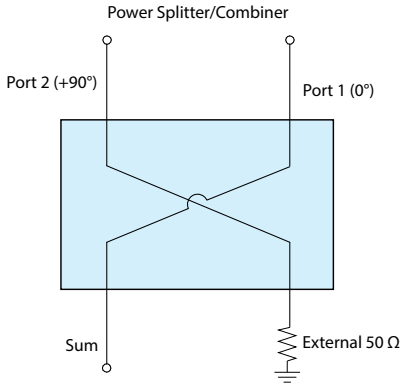
- Balanced amplifiers
- I&Q Modulators
- Defense and military

+RoHS Compliant
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Electrical Specifications @ +25°C

Parameter		Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range			1000		6500	MHz
Insertion Loss (Avg. of Coupled outputs less 3 dB)		1000 - 6500	—	0.60	1.20	dB
Isolation		1000 - 6500	13.5	19	—	dB
Phase Unbalance		1000 - 6500	—	±5	—	deg
Amplitude Unbalance (Peak-to-Peak)		1000 - 6400	—	0.80	1.60	dB
		6400 - 6500	—	1.10	1.80	
VSWR		1000 - 6500	—	1.20	1.60	:1
Input RF Power	**@+85°C, case**	1000 - 6500	—	—	60	W
	@+95°C, case	1000 - 6500	—	—	50	
	@+105°C, case	1000 - 6500	—	—	40	
Thermal Resistance		1000 - 6500	—	1	—	°C/W

Electrical Schematic



Port Function Configurations

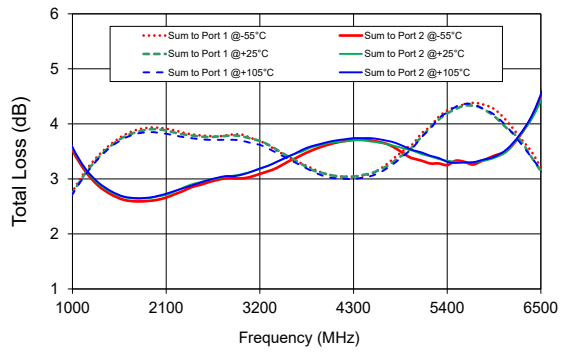
Config.	Sum	Isolation	Port 1 (0°)	Port 2 (90°)
A	1	2	3	4
B	2	1	4	3
C	3	4	1	2
D	4	3	2	1

Typical Performance Data [1]

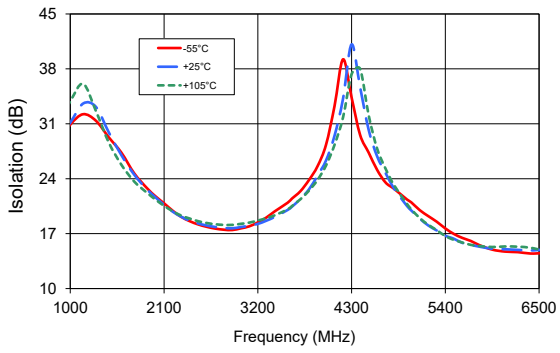
Frequency (MHz)	Total Loss [2] (dB) Sum to Port 1			Total Loss [2] (dB) Sum to Port 2			Amplitude Unbalance (dB) Peak-Peak	Phase Unbalance (deg) Relative to 90°	Isolation (dB) Sum to Isolation			VSWR (:1)			
	-55°C	+25°C	+105°C	-55°C	+25°C	+105°C			-55°C	+25°C	+105°C	Sum	Port 1	Port 2	Iso
1000	2.77	2.74	2.72	3.52	3.56	3.58	0.82	0.33	30.90	31.16	33.87	1.04	1.04	1.06	1.06
1300	3.42	3.38	3.36	2.88	2.92	2.94	0.47	0.44	31.39	33.16	32.64	1.05	1.03	1.05	1.05
1600	3.79	3.76	3.73	2.62	2.67	2.68	1.09	0.59	27.31	26.99	25.77	1.11	1.08	1.11	1.08
1900	3.93	3.90	3.85	2.60	2.65	2.66	1.25	0.81	22.79	22.62	22.21	1.17	1.14	1.15	1.12
2200	3.88	3.84	3.79	2.72	2.77	2.78	1.07	0.61	19.93	19.81	19.87	1.19	1.18	1.17	1.17
2500	3.79	3.77	3.72	2.89	2.94	2.93	0.83	-0.91	18.17	18.30	18.59	1.22	1.22	1.22	1.24
2800	3.79	3.78	3.71	3.01	3.04	3.05	0.75	-1.99	17.50	17.73	18.12	1.27	1.26	1.25	1.29
3100	3.74	3.73	3.65	3.04	3.13	3.13	0.60	-1.35	17.93	18.01	18.41	1.31	1.27	1.27	1.30
3400	3.51	3.53	3.47	3.20	3.31	3.31	0.22	-0.15	19.85	19.14	19.35	1.28	1.21	1.23	1.26
3600	3.35	3.35	3.31	3.36	3.45	3.45	0.09	-0.04	21.46	20.43	20.51	1.23	1.14	1.19	1.21
3800	3.20	3.17	3.15	3.51	3.57	3.59	0.40	-0.46	23.83	22.64	22.48	1.17	1.07	1.14	1.16
4000	3.08	3.08	3.03	3.62	3.65	3.67	0.56	-1.11	28.32	26.32	25.68	1.11	1.05	1.10	1.11
4300	3.04	3.04	3.00	3.71	3.70	3.74	0.66	-1.65	34.36	41.12	37.32	1.03	1.09	1.15	1.04
4600	3.17	3.16	3.11	3.67	3.66	3.72	0.50	-2.15	25.12	26.85	27.83	1.04	1.20	1.26	1.14
4900	3.52	3.47	3.44	3.44	3.55	3.58	0.08	-2.45	21.95	21.13	21.47	1.14	1.34	1.32	1.27
5200	3.95	3.93	3.91	3.28	3.41	3.42	0.52	-2.37	19.23	18.04	18.13	1.29	1.42	1.37	1.37
5500	4.31	4.27	4.31	3.33	3.31	3.29	0.95	-1.24	16.96	16.35	16.21	1.46	1.40	1.43	1.43
5800	4.36	4.29	4.29	3.32	3.32	3.34	0.98	-0.18	15.53	15.34	15.43	1.55	1.28	1.41	1.41
6100	4.05	3.92	3.95	3.51	3.50	3.54	0.43	-0.53	14.71	15.01	15.37	1.52	1.14	1.30	1.38
6400	3.47	3.37	3.37	4.15	4.11	4.17	0.76	-2.02	14.46	14.86	15.20	1.43	1.11	1.17	1.34
6500	3.21	3.14	3.16	4.50	4.42	4.53	1.29	-2.71	14.41	14.94	15.00	1.39	1.14	1.17	1.31

1. Data corresponds to Configuration A at +25°C unless specified otherwise.
2. Total loss is the loss from Sum to each coupled port including the 3dB theoretical split.

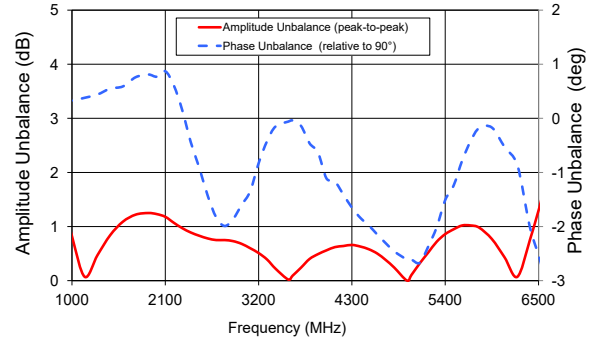
QCH-652+
Total Loss (dB)



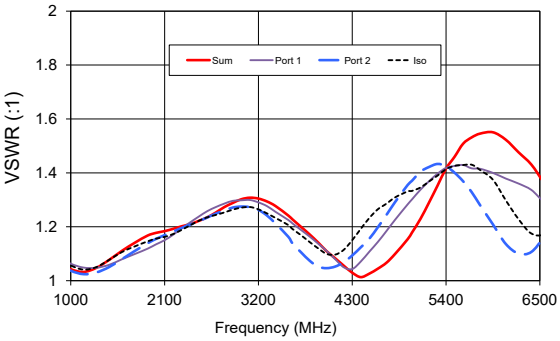
QCH-652+
Isolation (dB)



QCH-652+
Amplitude & Phase Unbalance



QCH-652+
VSWR (:1)



Additional Notes

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

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