

# 2 Way-90° Power Splitter

QCS-312+

50Ω 1700 to 3100 MHz



CASE STYLE: GE0805C-1

## The Big Deal

- High Power handling (8W)
- Low Unbalance, 0.5 dB & 4 deg. typ.
- Industry leading combination of size/bandwidth

## Product Overview

Mini-Circuits new 90° Power Splitter, model: QCS-312+, offers an industry leading combination of operating bandwidth and size; supporting nearly an octave band in a miniature EIA-0805 form factor. The outstanding phase and amplitude unbalance make this component a versatile building block for use in a variety of systems and sub-system designs.

## Key Features

Feature	Advantages
Small Size	Offered in the EIA-0805 package size, the QCS-312+ offers an industry leading combination of size, bandwidth and frequency. The small footprint (2.0mm x 1.25mm) allows for reduced parasitics in systems with improved performance and simplified layout.
Low Phase and Amplitude Unbalance	Supporting 4 deg. and 0.5 dB unbalance make this 90° hybrid applicable for use in higher level integrated components such as image reject mixers, single sideband modulators, phase shifters, variable attenuators, and balance amplifiers.
High Power Handling	Capable of operating up to 8W, the LTCC construction of the QCS-312+ makes this 90° hybrid a robust, rugged product that can be used effectively in either the transmit or receive paths.

### 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.  
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/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)



# Power Splitter/Combiner

QCS-312+

2 Way-90° 50Ω 1700 to 3100 MHz



CASE STYLE: GE0805C-1

## Maximum Ratings

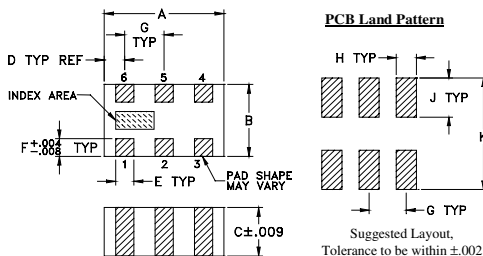
Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
Power Input (as a splitter)	15W* max.

\*Derate linearly to 7W at 100°C ambient.  
Permanent damage may occur if any of these limits are exceeded.

## Pin Connections

SUM PORT	1
PORT 1 (0°)	4
PORT 2 (+90°)	6
GROUND	2,5
50 OHM TERM EXTERNAL	3

## Outline Drawing



## Outline Dimensions (inch/mm)

A	B	C	D	E	F
.079	.049	.033	.014	.012	.012
2.01	1.24	0.84	0.36	0.30	0.30
G	H	J	K	wt	
.026	.014	.039	.110	grams	
0.66	0.36	1.00	2.80	.008	

## Features

- Low insertion loss, 0.5 dB typ.
- High isolation, 25 dB typ.
- Miniature size, 0.079"x0.049"x0.033"
- LTCC construction
- High power

## Applications

- Balanced amplifiers
- Modulators
- DCS, PCS, UMTS
- ISM
- WiMAX
- Phase Shifter
- Attenuator

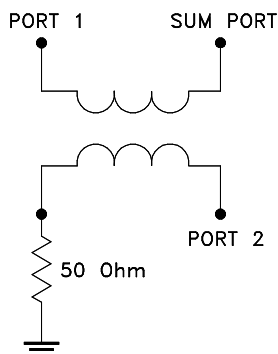
**+RoHS Compliant**  
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Available Tape and Reel at no extra cost  
Reel Size: 7" Devices/Reel: 20, 50, 100, 200, 500, 1000, 2000

## Electrical Specifications at 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Frequency		1700		3100	MHz
Insertion Loss (Avg. Of Coupled Outputs) above 3 dB	1700-1850		0.4	0.6	dB
	1850-1990		0.4	0.6	
	1990-2170		0.5	0.7	
	2170-2400		0.5	0.7	
	2400-2700		0.5	0.7	
Isolation	1700-1850	17	23	dB	
	1850-1990	18	24		
	1990-2170	18	25		
	2170-2400	18	25		
	2400-2700	18	25		
Phase Unbalance	1700-1850		2.0	7.0	Degree
	1850-1990		2.0	7.0	
	1990-2170		2.0	7.0	
	2170-2400		2.0	7.0	
	2400-2700		2.0	7.0	
Amplitude Unbalance	1700-1850		0.6	1.2	dB
	1850-1990		0.2	0.7	
	1990-2170		0.5	1.0	
	2170-2400		0.5	1.0	
	2400-2700		0.5	1.0	
VSWR	1700-3100		1.2		:1

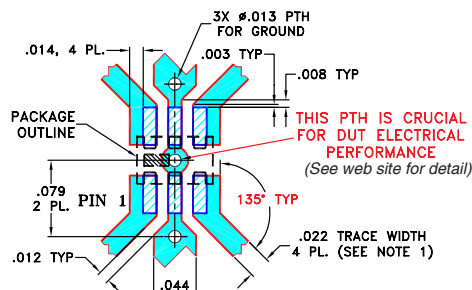
## Electrical Schematic



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## Demo Board MCL P/N: TB-489-312+ Suggested PCB Layout (PL-304)



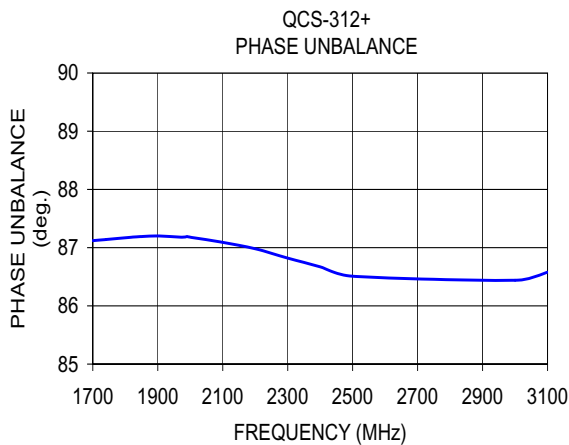
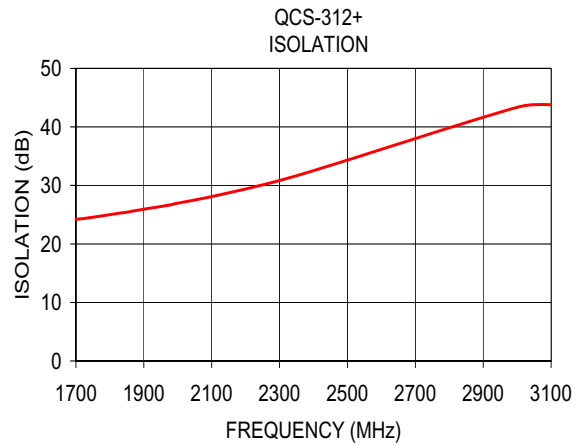
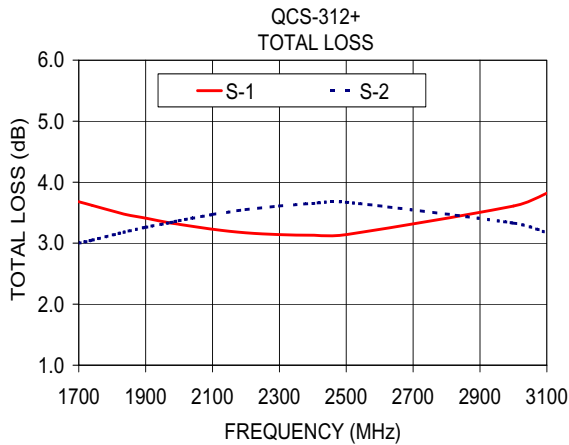
### NOTES:

- TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010" ± .001"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
  - 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 SOLDER MASK

## Typical Performance Data

Frequency (MHz)	Total Loss <sup>1</sup> (dB)		Amplitude Unbalance (dB)	Isolation (dB)	Phase Unbalance (deg.)	VSWR S	VSWR 1	VSWR 2
	S-1	S-2						
1700.00	3.68	3.00	0.69	24.22	87.12	1.01	1.30	1.02
1740.00	3.62	3.05	0.57	24.46	87.14	1.01	1.29	1.01
1820.00	3.50	3.16	0.34	25.20	87.18	1.02	1.28	1.02
1850.00	3.46	3.20	0.27	25.42	87.19	1.03	1.27	1.02
1900.00	3.41	3.26	0.14	25.94	87.20	1.03	1.26	1.03
1975.00	3.33	3.34	0.02	26.65	87.18	1.04	1.25	1.05
1990.00	3.32	3.36	0.05	26.85	87.19	1.04	1.24	1.05
2000.00	3.31	3.37	0.07	26.96	87.18	1.05	1.24	1.05
2100.00	3.23	3.47	0.24	28.10	87.09	1.06	1.22	1.07
2200.00	3.17	3.55	0.37	29.40	86.98	1.07	1.20	1.09
2300.00	3.14	3.61	0.47	30.83	86.82	1.08	1.17	1.11
2400.00	3.13	3.65	0.52	32.53	86.67	1.09	1.15	1.13
2500.00	3.14	3.67	0.52	34.34	86.51	1.10	1.13	1.14
3000.00	3.61	3.33	0.28	43.36	86.44	1.09	1.04	1.11
3100.00	3.82	3.17	0.65	43.80	86.58	1.07	1.04	1.08

1. Total Loss = Insertion Loss + 3dB splitter loss.



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