

# 2 Way-90° Power Splitter

QCS-442+

50Ω 2800 to 4400 MHz



CASE STYLE: GE0805C-1

## The Big Deal

- High Power handling (8W)
- Low Unbalance, 0.5 dB & 3 deg. typ.
- Industry leading combination of size/bandwidth

## Product Overview

Mini-Circuits new 90° Power Splitter, model: QCS-442+, 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-442+ 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 3 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-442+ makes this 90° hybrid a robust, rugged product that can be used effectively in either the transmit or receive paths.



ISO 9001 ISO 14001 AS 9100 CERTIFIED

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 The Design Engineers Search Engine  Provides ACTUAL Data Instantly at [minicircuits.com](http://minicircuits.com)

IF/RF MICROWAVE COMPONENTS

For detailed performance specs  
& shopping online see web site

**Notes:** 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet 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-442+

2 Way-90° 50Ω 2800 to 4400 MHz



CASE STYLE: GE0805C-1  
PRICE: \$3.99 ea. QTY (20)

+ RoHS compliant in accordance with EU Directive (2002/95/EC)

The +Suffix has been added in order to identify RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications.

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

### 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

### Features

- Low insertion loss, 0.6 dB typ.
- High isolation, 23 dB typ.
- Miniature size, 0.079"x0.049"x0.033"
- LTCC construction
- High power

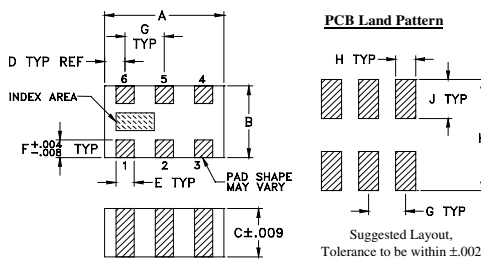
### Applications

- Balanced amplifiers
- Modulators
- WiMax
- Phase Shifter
- Attenuator

### Electrical Specifications at 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Frequency		2800		4400	MHz
Insertion Loss (Avg. Of Coupled Outputs) above 3 dB	2800-3300		0.5	0.7	dB
	3300-3400		0.5	0.7	
	3400-3600		0.5	0.7	
	3600-3800		0.5	0.7	
	3800-3900		0.6	0.8	
Isolation	2800-3300	19	25		dB
	3300-3400	18	24		
	3400-3600	17	23		
	3600-3800	16	22		
	3800-3900	16	21		
Phase Unbalance	2800-3300		3.0	7.0	Degree
	3300-3400		3.0	7.0	
	3400-3600		3.0	7.0	
	3600-3800		3.0	7.0	
	3800-3900		3.0	7.0	
Amplitude Unbalance	2800-3300		0.4	1.1	dB
	3300-3400		0.5	1.1	
	3400-3600		0.5	1.1	
	3600-3800		0.5	1.1	
	3800-3900		0.5	1.1	
VSWR	2800-4400		1.2		:1

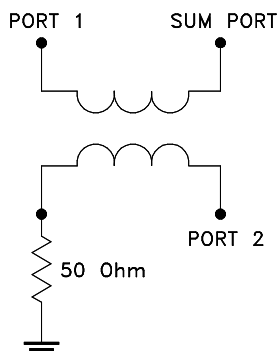
### Outline Drawing



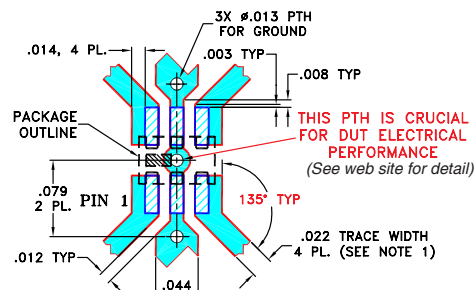
### Outline Dimensions (inch/mm)

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

### Electrical Schematic



### Demo Board MCL P/N: TB-489-442+ Suggested PCB Layout (PL-304)

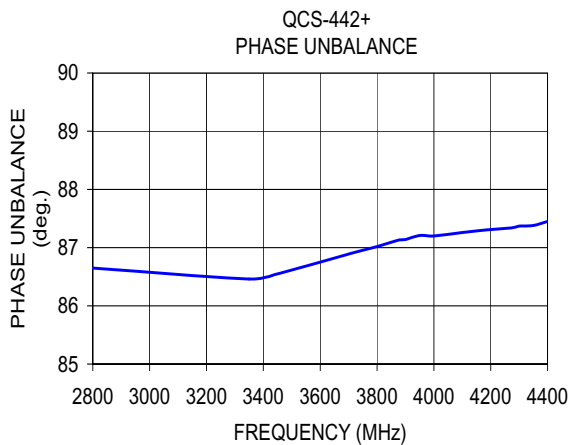
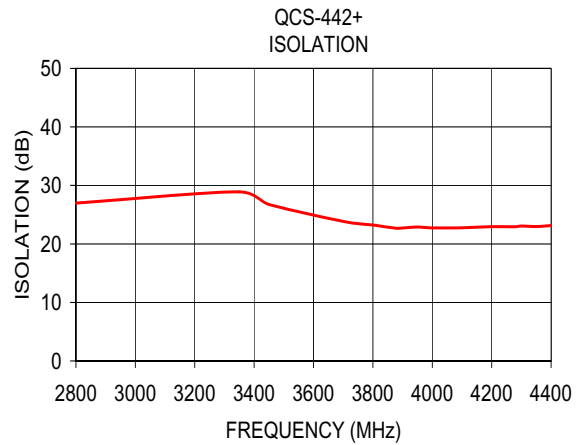
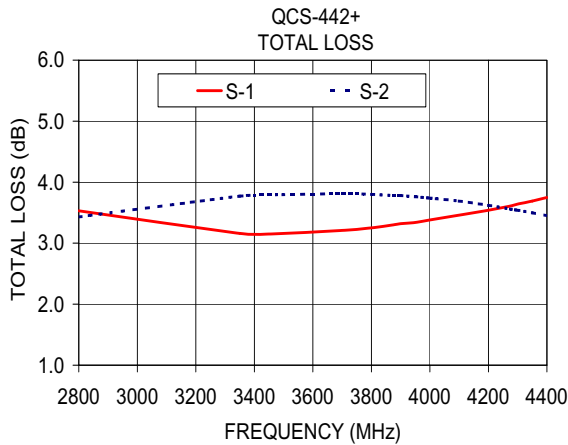


- NOTES:
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010" ± .001"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
  2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
  - ▨ DENOTES COPPER LAND PATTERN FREE OF 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						
2800.00	3.53	3.43	0.33	26.98	86.65	1.23	1.06	1.30
3350.00	3.16	3.77	0.61	28.91	86.46	1.16	1.19	1.18
3450.00	3.15	3.79	0.64	26.74	86.55	1.16	1.20	1.16
3700.00	3.21	3.81	0.60	23.85	86.89	1.19	1.21	1.12
3800.00	3.25	3.80	0.54	23.23	87.02	1.20	1.21	1.11
3875.00	3.30	3.78	0.49	22.70	87.13	1.21	1.20	1.10
3900.00	3.32	3.78	0.46	22.71	87.14	1.21	1.20	1.10
3950.00	3.34	3.76	0.41	22.90	87.21	1.20	1.19	1.09
4000.00	3.38	3.74	0.36	22.74	87.20	1.21	1.19	1.09
4100.00	3.46	3.69	0.23	22.77	87.26	1.21	1.18	1.08
4200.00	3.54	3.62	0.08	22.96	87.31	1.20	1.17	1.06
4275.00	3.61	3.56	0.05	22.94	87.34	1.20	1.17	1.05
4300.00	3.64	3.54	0.10	23.07	87.37	1.19	1.16	1.05
4350.00	3.69	3.50	0.20	22.97	87.38	1.20	1.16	1.04
4400.00	3.75	3.45	0.30	23.15	87.45	1.18	1.16	1.04

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



For detailed performance specs & shopping online see web site

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 The Design Engineers Search Engine  Provides ACTUAL Data Instantly at [minicircuits.com](http://minicircuits.com)

IF/RF MICROWAVE COMPONENTS

Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuits' applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet 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).