

DC Pass, High Power

# Bi-Directional Coupler

BDCH-20-272

50Ω 20dB Coupling 150W\* 700 to 2700 MHz

## The Big Deal

- High power handling, up to 150W
- Low insertion loss, 0.2 dB Typ
- Excellent return loss, 25 dB Typ (all ports)



CASE STYLE: PQ2098

## Product Overview

Mini-Circuits BDCH-20-272 high-power bi-directional coupler provides high power handling up to 150W and insertion loss of 0.2 dB Typ. Covering frequencies from 700 to 2700 MHz, it supports a wide variety of applications from military to various cellular base station applications and more.

Excellent return loss at all ports of 25 dB typical provides superb matching over the full frequency range. The coupler is designed into an open printed laminate (0.5 x 1.0 x 0.051") with wrap-around terminations for good solderability and easy visual inspection.

## Key Features

Feature	Advantages
Low insertion loss, 0.2 dB typ.	Used primarily in high power transmission applications, the excellent through-path signal loss maximizes the power transmitted to the antenna.
High power handling, up to 150W	Usable in many systems with high-power requirements such as antenna feeds, power amplifiers, and others that require sampling a high power RF signal.
Excellent return loss, 25 dB typ. (all ports)	Provides excellent matching for 50Ω systems.
Good Coupling flatness (±0.5 dB typ at 800-2500 MHz)	Flat coupling values across the frequency range allows accurate signal sampling through the coupled port with minimal measurement error.
DC current passing up to 2.5 A	Suitable for use in systems requiring DC voltage on the RF line, such as supplying bias to remote circuit via the antenna cable.

\*See power derating on page 2



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## Maximum Ratings

Operating Temperature, case**	-55°C to 105°C
Storage Temperature	-55°C to 105°C
DC Current	2.5A
RF power *	150W @+85°C, case

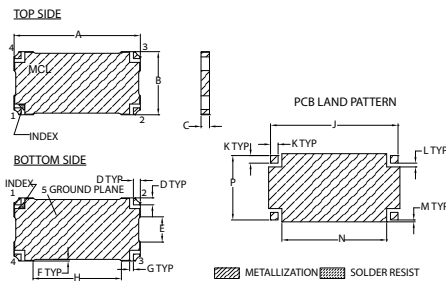
\*Derates to 120W at 95°C and 90W@105°C case temperature  
 \*\*Case temperature is defined as temperature on base plate.  
 Permanent damage may occur if any of these limits are exceeded.

## Pad Connections\*\*

INPUT	1
OUTPUT	2
COUPLED FORWARD	4
COUPLED REVERSE	3
GROUND	5

\*\*Model is Bi-directional and all ports are interchangeable, see port function table.

## Outline Drawing

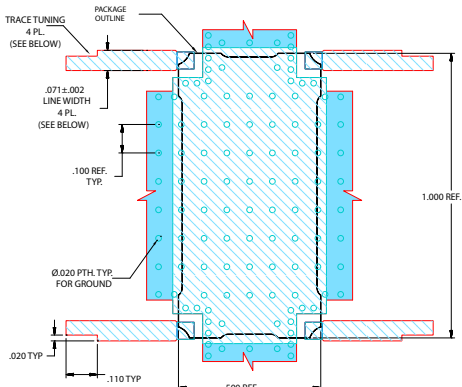


Base material: Printed wiring laminate.  
 Termination Finish: Tin-Lead plate.

## Outline Dimensions (inch/mm)

A	B	C	D	E	F	G	H
1.000	0.500	.051	.055	.200	.013	.030	0.700
25.40	12.70	1.30	1.40	5.08	0.33	0.76	17.78
J	K	L	M	N	P	wt.	
1.010	.060	.030	.015	.830	.510	grams	
25.65	1.52	0.76	0.38	21.08	12.95	2.0	

## Demo Board MCL P/N: TB-863-1 Suggested PCB Layout (PL-538)



- NOTES:
- TRACE WIDTH IS SHOWN FOR ROGERS RO4003C WITH DIELECTRIC THICKNESS. 0.032"±.0015" COPPER: 1 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
  - BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
  - TRACE TUNING IN RF LINES MAY BE NEEDED TO ACHIEVE SPECIFIED PERFORMANCE.
- Legend:  
 [Blue hatched] DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)  
 [Red hatched] DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

## Features

- low insertion loss, 0.2 dB Typ.
- excellent return loss, 25 dB Typ
- high power, up to 150W
- DC current pass through input to output

## Applications

- VHF/UHF high power radio
- transmission signal monitoring
- antenna reflection monitoring
- wireless transmitters
- distributed antenna systems (DAS)



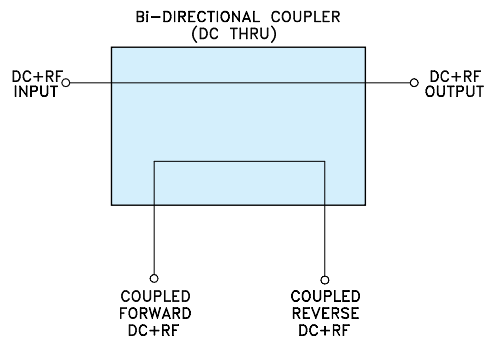
CASE STYLE: PQ2098

## Electrical Specifications @ +25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units	
Frequency Range		700		2700	MHz	
Insertion Loss <sup>1</sup>	700 - 2700	—	0.2	0.35	dB	
Coupling	700 - 2700	—	21±1	—	dB	
Coupling Flatness	700 - 2700	—	±1.0	—	dB	
	800 - 2500	—	±0.5	—		
Directivity	700 - 2700	15	21	—	dB	
Return Loss (Input)	700 - 2700	20.5	25	—	dB	
Return Loss (Output)	700 - 2700	20.5	25	—	dB	
Return Loss (Coupling)	700 - 2700	20.5	25	—	dB	
Input RF Power	@+85°C, case	700 - 2700	—	—	150	W
	@+95°C, case	700 - 2700	—	—	120	
	@+105°C, case	700 - 2700	—	—	90	
Thermal Resistance	700 - 2700	—	0.5	—	°C/W	

1. Does not include theoretical loss, nominal theoretical loss 0.03 dB

## Electrical Schematic



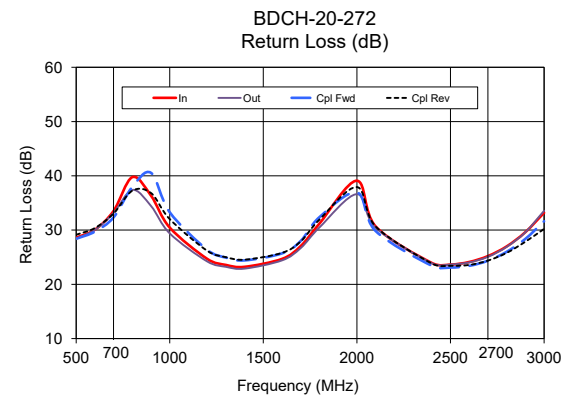
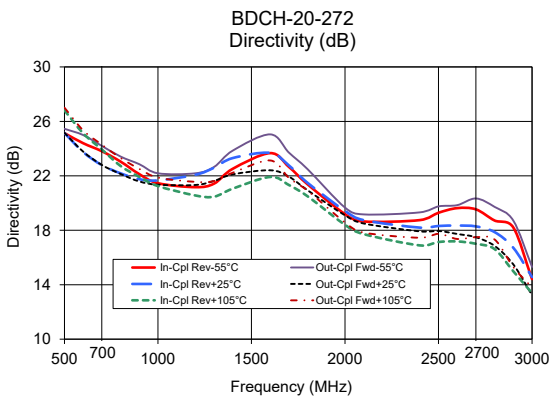
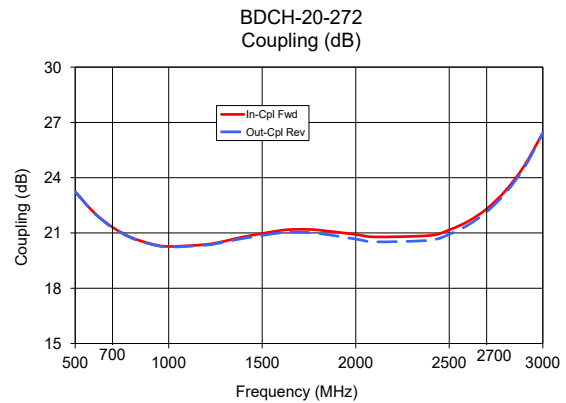
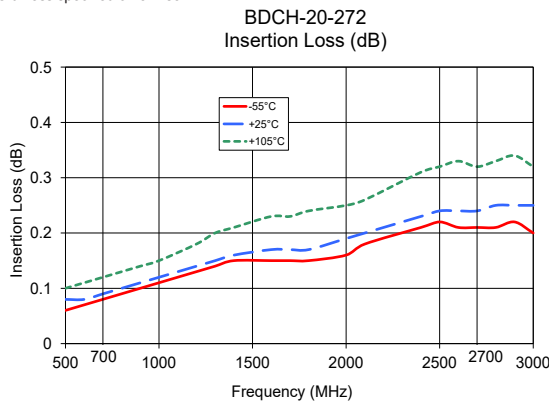
## Port Function Configurations

Input	Output	Coupled Forward	Coupled Reverse
1	2	4	3
2	1	3	4
3	4	2	1
4	3	1	2

## Typical Performance Data \*

FREQUENCY (MHz)	Insertion Loss (dB)			Coupling (dB)		Directivity (dB)						Return Loss (dB)			
	In - Out			In - Cpl Fwd	Out - Cpl Rev	In - Cpl Rev			Out - Cpl Fwd			In	Out	Cpl Fwd	Cpl Rev
	-55°C	+25°C	+105°C			-55°C	+25°C	+105°C	-55°C	+25°C	+105°C				
500.0	0.06	0.08	0.10	23.25	23.23	25.14	25.15	26.82	25.46	25.16	27.01	28.59	28.39	28.39	29.13
600.0	0.07	0.08	0.11	22.12	22.09	24.40	23.75	25.13	25.00	23.78	25.34	30.07	30.04	29.71	30.37
<b>700.0</b>	<b>0.08</b>	<b>0.09</b>	<b>0.12</b>	<b>21.31</b>	<b>21.28</b>	<b>23.81</b>	<b>22.79</b>	<b>23.94</b>	<b>24.20</b>	<b>22.80</b>	<b>24.29</b>	<b>33.52</b>	<b>33.17</b>	<b>32.34</b>	<b>33.06</b>
800.0	0.09	0.10	0.13	20.76	20.73	23.05	22.19	22.73	23.42	22.14	23.31	39.76	37.40	37.94	37.25
900.0	0.10	0.11	0.14	20.43	20.40	22.13	21.76	21.93	22.86	21.59	22.51	36.35	34.43	40.54	36.82
1000.0	0.11	0.12	0.15	20.27	20.24	21.46	21.67	21.25	22.19	21.35	21.87	30.46	29.38	33.28	32.01
1200.0	0.13	0.14	0.18	20.38	20.34	21.17	22.08	20.56	22.19	21.33	21.56	24.69	24.22	26.36	26.17
1300.0	0.14	0.15	0.20	20.56	20.51	21.43	22.60	20.47	22.66	21.63	21.62	23.57	23.23	24.93	25.00
1400.0	0.15	0.16	0.21	20.79	20.71	22.52	23.31	21.06	23.86	22.11	22.23	23.22	22.90	24.41	24.54
1600.0	0.15	0.17	0.23	21.14	21.01	23.67	23.69	21.92	25.05	22.41	23.13	24.68	24.42	25.71	25.80
1700.0	0.15	0.17	0.23	21.20	21.04	22.66	22.77	21.33	23.71	21.94	21.85	27.06	26.70	28.00	27.92
1800.0	0.15	0.17	0.24	21.16	20.98	21.38	21.49	20.50	22.49	20.94	20.91	31.20	30.50	32.38	31.94
2000.0	0.16	0.19	0.25	20.92	20.67	19.19	19.43	18.40	19.67	19.10	18.57	39.10	36.62	36.94	37.92
2100.0	0.18	0.20	0.26	20.79	20.52	18.65	18.75	17.72	19.17	18.50	17.83	30.68	30.43	29.83	30.65
2400.0	0.21	0.23	0.31	20.87	20.61	18.75	18.20	16.89	19.32	17.92	17.45	23.94	23.88	23.43	23.83
2500.0	0.22	0.24	0.32	21.17	20.93	19.29	18.32	17.14	19.76	17.95	17.74	23.64	23.67	23.10	23.41
2600.0	0.21	0.24	0.33	21.63	21.43	19.63	18.35	17.18	19.85	17.73	17.36	24.11	24.04	23.41	23.57
<b>2700.0</b>	<b>0.21</b>	<b>0.24</b>	<b>0.32</b>	<b>22.31</b>	<b>22.15</b>	<b>19.54</b>	<b>18.29</b>	<b>17.01</b>	<b>20.34</b>	<b>17.49</b>	<b>17.49</b>	<b>25.20</b>	<b>25.07</b>	<b>24.35</b>	<b>24.37</b>
2800.0	0.21	0.25	0.33	23.29	23.16	18.72	17.87	16.62	19.72	16.85	17.32	26.98	26.91	25.99	25.79
2900.0	0.22	0.25	0.34	24.63	24.53	18.21	16.72	14.99	18.71	15.49	15.29	29.61	29.60	28.37	27.85
3000.0	0.20	0.25	0.32	26.43	26.40	14.42	14.57	13.39	15.31	13.23	13.80	33.19	33.56	31.63	30.21

\* Data at +25°C unless specified otherwise.



### 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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