

DC Pass, High Power

# Bi-Directional Coupler

MBDC-20-63HP

50Ω 20dB Coupling 100W 2000 to 6000 MHz

## The Big Deal

- Wideband, 2000 to 6000 MHz
- High power handling, up to 100W
- High directivity, 16 dB min
- Low cost



## Product Overview

Mini-Circuits MBDC-20-63HP high-power bi-directional coupler provides high power handling up to 100W and mainline loss of 0.25 dB. Covering frequencies from 2000 to 6000 MHz, it supports a wide variety of applications from power amplifiers and antenna feeds to various digital communications and more. High directivity of over 16 dB provides accurate sampling from the coupled port, and 22 dB input/output return loss provides excellent matching over full frequency range. The coupler is designed into an open printed laminate (0.56 x 0.2 x 0.051") with wrap-around terminations for good solderability and easy visual inspection.

## Key Features

Feature	Advantages
Low mainline loss, 0.25 dB	Provides excellent through-path signal transmission.
High power handling, 100W	Usable in systems with a wide range of power requirements.
Good return loss, 18 dB min. (input and output)	Provides excellent matching for 50Ω systems.
High directivity, 16 dB min	High directivity allows accurate signal sampling through the coupled port with minimal measurement error.
DC current passing up to 100W total power.	Suitable for use in systems requiring DC current at later stages.



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CASE STYLE: PQ2099

## Maximum Ratings

Operating Temperature, case*	-55°C to 105°C
Storage Temperature	-55°C to 105°C
DC Current	2A
RF power	100W

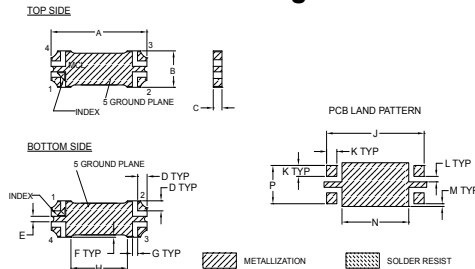
\*Case temperature is defined as temperature on base plate.  
Permanent damage may occur if any of these limits are exceeded.

## 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



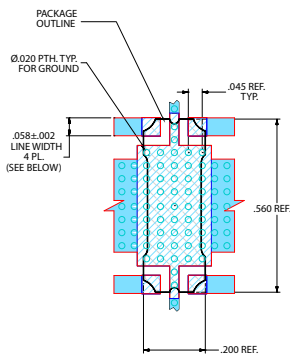
## Outline Dimensions (inch/mm)

A	B	C	D	E	F	G	H
.560	.200	.051	.055	.030	.013	.030	.330
14.22	5.08	1.30	1.40	0.76	0.33	0.76	8.38
J	K	L	M	N	P	wt.	
.570	.060	.030	.015	.390	.210	grams	
14.48	1.52	0.76	0.38	9.91	5.33	1.0	

Demo Board MCL P/N: TB-864

Suggested PCB Layout (PL-470)\*\*\*

\*\*\* Wraparound solder on ground pins may not be shown.



- NOTES:
- TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS. .020"±.0015" 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 SOLDERMASK

## Features

- high directivity, 16 dB min.
- good return loss, 18 dB min
- high power, up to 100W
- DC current pass through input to output

## Applications

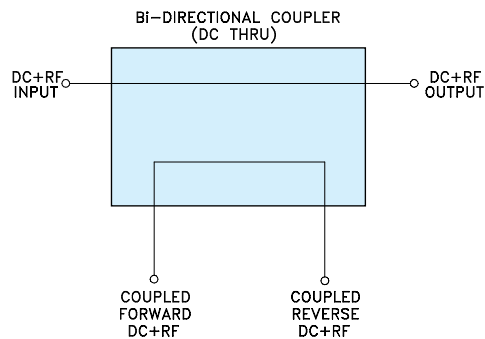
- Power Amplifiers
- Antenna Feeds
- Mobile satellite communication
- Digital communication applications including WiFi, Bluetooth, and Zigbee
- RFID

## Electrical Specifications @ +25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		2000		6000	MHz
Insertion Loss <sup>1</sup>	2000 - 6000	—	0.15	0.25	dB
Coupling	2000 - 6000	—	20.25±1.25	—	dB
Coupling Flatness (±)	2000 - 6000	—	2.0	—	dB
Directivity	2000 - 6000	16	23	—	dB
Return Loss (Input)	2000 - 6000	18	22	—	dB
Return Loss (Output)	2000 - 6000	18	22	—	dB
Return Loss (Coupling)	2000 - 6000	18	22	—	dB
Input RF Power <sup>2,3</sup>	2000 - 6000	—	—	100	W

- Does not include theoretical loss. Nominal theoretical loss 0.04 dB.
- Under all system conditions, with base plate maintained at 105°C.
- Without DC, with DC current of 2A derate to 50W.

## Electrical Schematic



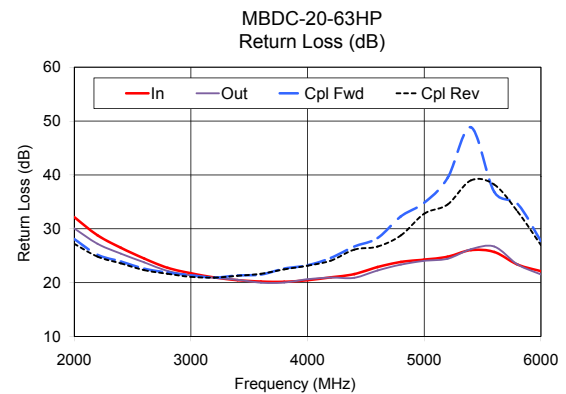
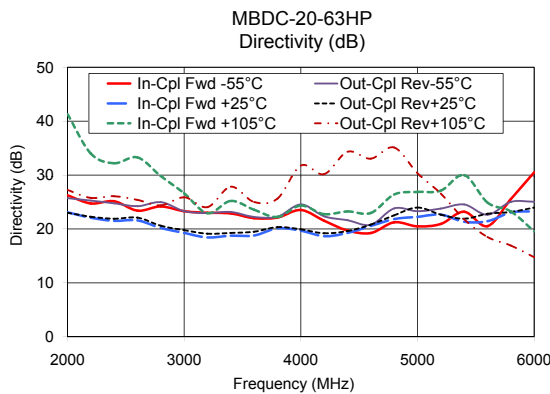
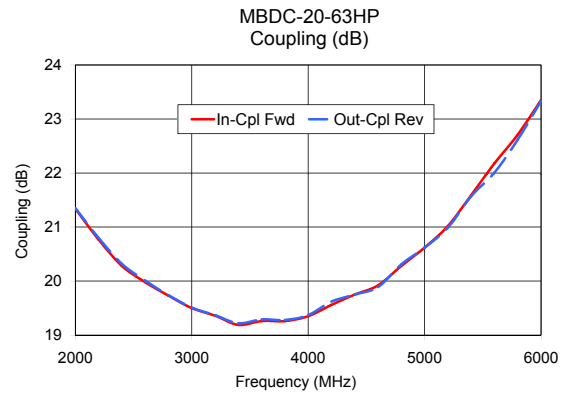
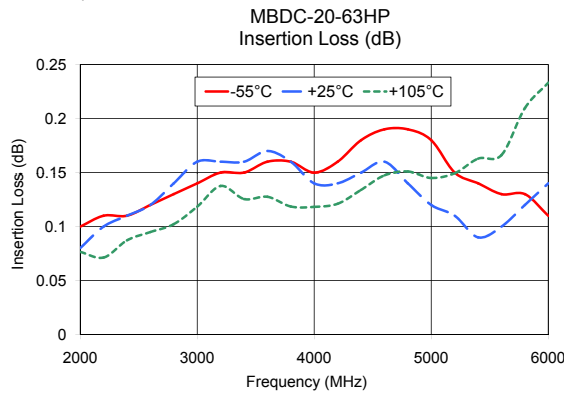
## Port function interchange

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 Fwd			Out-Cpl Rev			In	Out	Cpl Fwd	Cpl Rev
	-55°C	+25°C	+105°C			-55°C	+25°C	+105°C	-55°C	+25°C	+105°C				
2000.0	0.10	0.08	0.08	21.34	21.35	26.25	23.10	41.31	25.73	23.00	27.25	32.16	30.07	28.10	27.22
2200.0	0.11	0.10	0.07	20.77	20.80	24.74	22.09	34.00	25.27	22.27	25.77	28.79	27.21	25.18	24.83
2400.0	0.11	0.11	0.09	20.28	20.32	25.14	21.52	32.20	24.76	21.90	26.08	26.47	25.40	23.94	23.58
2600.0	0.12	0.12	0.09	19.98	20.01	23.40	21.60	33.28	24.23	22.10	25.39	24.48	23.77	22.59	22.33
2800.0	0.13	0.14	0.10	19.73	19.74	24.18	20.20	29.81	24.98	20.60	24.39	22.77	22.19	21.87	21.66
3000.0	0.14	0.16	0.12	19.50	19.51	23.29	19.28	26.63	23.32	19.78	25.88	21.75	21.37	21.36	21.07
3200.0	0.15	0.16	0.14	19.36	19.37	23.01	18.43	22.93	22.95	19.13	24.06	20.97	20.92	20.96	20.94
3400.0	0.15	0.16	0.13	19.19	19.22	22.88	18.75	25.21	23.16	19.27	27.84	20.46	20.54	21.34	21.29
3600.0	0.16	0.17	0.13	19.26	19.29	22.00	18.79	23.57	22.23	19.49	25.01	20.21	20.00	21.50	21.66
3800.0	0.16	0.16	0.12	19.26	19.28	22.13	20.12	22.23	22.28	20.34	25.64	20.17	20.03	22.62	22.47
4000.0	0.15	0.14	0.12	19.35	19.37	23.52	19.69	24.34	24.56	19.93	31.77	20.46	20.64	23.23	23.15
4200.0	0.16	0.14	0.12	19.56	19.62	21.54	18.67	22.75	22.35	19.22	30.18	21.00	20.96	24.61	24.09
4400.0	0.18	0.15	0.13	19.75	19.75	19.72	19.28	23.26	21.64	19.63	34.32	21.59	20.91	26.71	26.13
4600.0	0.19	0.16	0.15	19.92	19.89	19.26	20.56	22.97	20.79	20.82	33.05	22.91	22.27	28.28	26.70
4800.0	0.19	0.14	0.15	20.28	20.31	21.24	21.84	26.40	23.82	22.54	35.11	23.85	23.35	32.32	28.77
5000.0	0.18	0.12	0.14	20.62	20.62	20.49	22.26	26.87	23.30	23.98	30.35	24.29	24.06	34.83	32.81
5200.0	0.15	0.11	0.15	21.02	20.99	20.93	22.66	27.11	23.80	22.66	26.57	24.82	24.45	39.44	34.50
5400.0	0.14	0.09	0.16	21.59	21.57	23.20	21.34	29.99	24.55	21.90	21.80	26.05	26.21	48.84	38.98
5600.0	0.13	0.10	0.17	22.18	22.01	20.52	21.44	24.90	22.64	22.83	18.51	25.70	26.71	36.85	38.20
5800.0	0.13	0.12	0.21	22.71	22.62	25.53	23.05	23.26	25.03	23.16	16.93	23.36	23.38	34.62	33.20
6000.0	0.11	0.14	0.23	23.35	23.33	30.51	23.27	19.55	25.06	23.97	14.78	22.12	21.53	27.73	26.97

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



### 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.
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