

High Power

# Bi-Directional Coupler

BDCN-20-13+

50Ω    20 dB Coupling    360 to 1000 MHz



CASE STYLE: FV1206-1

## The Big Deal

- High Power handling (15W)
- Industry leading combination of size/bandwidth

## Product Overview

Mini-Circuits new Bi-directional coupler BDCN-20-13+ offers an industry leading combination of operating bandwidth and size; The low insertion loss makes this component a versatile building block for use in a variety of systems and sub-system designs.

Feature	Advantages
Small Size	Offered in the FV1206-1 package size, the BDCN-20-13+ offers an industry leading combination of size, bandwidth and frequency. The small footprint (3.2mm x1.6mm) allows for reduced parasitics in systems with improved performance and simplified layout.
Low Loss	The .15 dB typical insertion loss make this design ideal for power monitoring, signal conditioning, and open circuit, fault protection circuits.
High Power handling	Capable of operating up to 15W, the LTCC construction of the BDCN-20-13+ makes this bi-directional coupler 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)



# Bi-Directional Coupler

**BDCN-20-13+**

50Ω 20 dB Coupling 360 to 1000 MHz

## Maximum Ratings

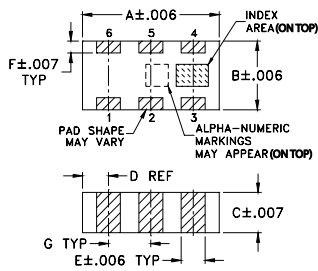
Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
DC Current	0.5A

Permanent damage may occur if any of these limits are exceeded.

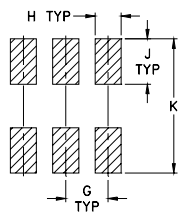
## Pin Connections

INPUT	1
OUTPUT	4
COUPLED (forward)	6
COUPLED (reverse)	3
GROUND	2,5

## Outline Drawing



### PCB Land Pattern

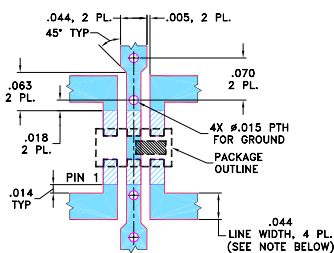


Suggested Layout, Tolerance to be within ±.002

## Outline Dimensions (inch/mm)

A	B	C	D	E	F
.126	.063	.035	.024	.022	.011
3.20	1.60	0.89	0.61	0.56	0.28
G	H	J	K	wt	
.039	.024	.042	.123	grams	
0.99	0.61	1.07	3.12	.020	

## Demo Board MCL P/N: TB-255+ Suggested PCB Layout (PL-131)



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" ± 0.0015"; 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

### Notes

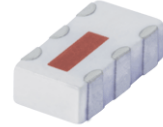
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## Features

- four-port coupler
- excellent VSWR, 1.2:1 typ., all ports
- ultra small size, hermetically sealed
- minimal variation with temperature variation
- protected by US Patent 7,049,905
- DC current through input to output 0.5A Max. at 1.0 watt RF input power

## Applications

- UHF communication



Generic photo used for illustration purposes only

CASE STYLE: FV1206-1

### +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

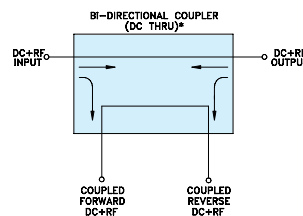
Reel Size	Devices/Reel
7"	20, 50, 100, 200, 500, 1000, 3000

## Electrical Specifications at 25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		360	—	1000	MHz
Mainline Loss (above theoretical 0.03 dB)	360-470 470-550 550-700 700-900 900-1000	—	0.15 0.17 0.20 0.25 0.25	0.25 0.30 0.35 0.40 0.40	dB
Coupling	360-470 470-550 550-700 700-900 900-1000	22.5 21.2 19.2 17.4 16.5	24.0 22.3 20.7 19.0 17.5	25.6 23.5 22.2 20.2 18.5	dB
Coupling Flatness(±)	360-470 470-550 550-700 700-900 900-1000	— — — — —	1.1 0.7 1.0 1.0 0.4	1.3 1.0 1.2 1.2 0.6	dB
Directivity	360-470 470-550 550-700 700-900 900-1000	10 10 10 10 11	12 12 12 12 13	— — — — —	dB
Return Loss (Input)	360-470 470-550 550-700 700-900 900-1000	25 25 22 20 20	33 31 30 27 26	— — — — —	dB
Return Loss (Output)	360-470 470-550 550-700 700-900 900-1000	25 25 22 20 20	31 30 28 26 25	— — — — —	dB
Return Loss (Coupling)	360-470 470-550 550-700 700-900 900-1000	25 25 25 20 20	35 34 33 31 30	— — — — —	dB
Input Power <sup>1</sup>	300-1000	—	—	16	W

1. Derate linearly 8W at 100°C

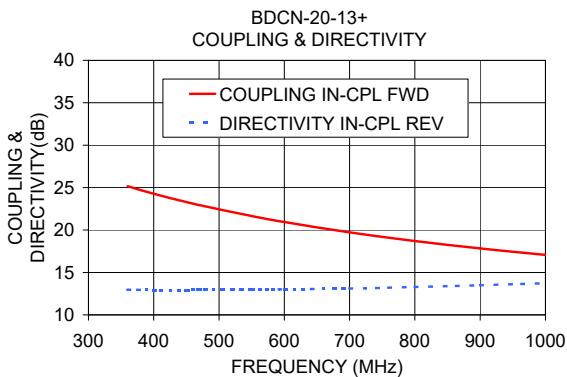
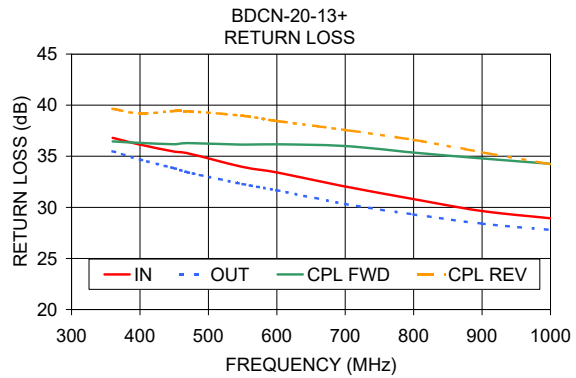
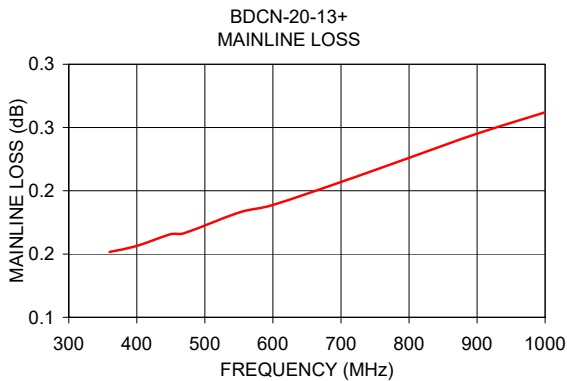
## Electrical Schematic



\* ELECTRICAL SCHEMATIC IS FOR BI-DIRECTIONAL COUPLER WITHOUT INTERNAL TRANSFORMERS AND RESISTORS.

## Typical Performance Data

Frequency (MHz)	Mainline Loss (dB)		Coupling (dB)		Directivity (dB)		Return Loss (dB)			
	In-Out	In-Cpl Fwd	In-Cpl Rev	Out-Cpl Rev	Out-Cpl Fwd	In-Cpl Rev	In	Out	Cpl Fwd	Cpl Rev
360.00	0.15	25.16	25.16	12.97	13.02	36.80	35.49	36.46	39.64	
400.00	0.16	24.27	24.27	12.92	12.98	36.14	34.67	36.31	39.19	
450.00	0.17	23.29	23.29	12.93	13.03	35.46	33.83	36.18	39.43	
470.00	0.17	22.94	22.94	12.95	13.03	35.29	33.43	36.28	39.41	
550.00	0.18	21.64	21.66	12.98	13.07	33.96	32.28	36.14	38.97	
600.00	0.19	20.95	20.94	13.02	13.10	33.41	31.67	36.17	38.45	
700.00	0.21	19.73	19.72	13.11	13.25	32.04	30.33	36.01	37.58	
800.00	0.23	18.70	18.70	13.29	13.45	30.81	29.31	35.36	36.60	
900.00	0.25	17.83	17.83	13.49	13.69	29.64	28.40	34.78	35.40	
1000.00	0.26	17.07	17.07	13.73	13.96	28.93	27.80	34.26	34.20	



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