



## SURFACE MOUNT

# Bi-Directional Coupler **SYBDC-15-13HP+**



50Ω 15 dB Coupling 100 to 1000 MHz 10 Watt

### THE BIG DEAL

- High power handling, 10 W
- Full decade bandwidth
- Low mainline loss, 0.75 dB typ.
- High directivity, 23 dB typ.
- Excellent VSWR, 1.15:1 typ.



Generic photo used for illustration purposes only

CASE STYLE: AH202-1

### APPLICATIONS

- VHF/UHF
- Signal monitoring
- Communications
- Military mobile
- Cellular

### +RoHS Compliant

The +Suffix identifies RoHS Compliance. See our website for methodologies and qualifications

### PRODUCT OVERVIEW

Mini-Circuits' SYBDC-15-13HP+ surface mount bi-directional coupler provides high power handling up to 10W and low mainline loss of 0.75 dB typically for applications from 100 to 1000 MHz. The coupler features core and wire construction mounted on an 8-lead printed laminate base with wrap-around terminations for excellent solderability. The unit measures 0.38 x 0.50 x 0.25", accommodating dense circuit board layouts.

### KEY FEATURES

Feature	Advantages
High power handling, 10W	Usable in many systems with high-power requirements
Low mainline loss, 0.75 dB	Provides excellent through-path signal power transmission.
Good directivity, 23 dB typ.	High directivity allows accurate signal sampling through the coupled port with minimal measurement error.
Excellent VSWR, 1.15:1 dB typ. (input/output/coupling)	Provides excellent matching in 50Ω systems with minimal signal reflection.
Small size, 0.38 x 0.50 x 0.25"	Provides high power capability while saving space in systems with tight layouts.





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### ELECTRICAL SPECIFICATIONS AT 25°C<sup>1</sup>

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		100		1000	MHz
Mainline Loss <sup>2</sup>	100-500	—	0.65	0.9	
	500-1000	—	0.75	1.1	
Nominal Coupling	100-1000	—	15.8±1.0	—	dB
Coupling Flatness (±)	100-500	—	0.3	0.5	dB
	100-1000	—	0.7	1.0	dB
Directivity	100-500	18	23	—	dB
	500-1000	15	20	—	dB
Return Loss (Input)	100-1000	18	21	—	dB
Return Loss (Output)	100-1000	18	22	—	dB
Return Loss (Coupling)	100-1000	18	22	—	dB
Input Power <sup>3</sup>	100-1000	—	—	10	W

1. Tested on Evaluation Board TB-SYBDC1513HP+

2. Mainline Loss includes theoretical power loss at coupled port.

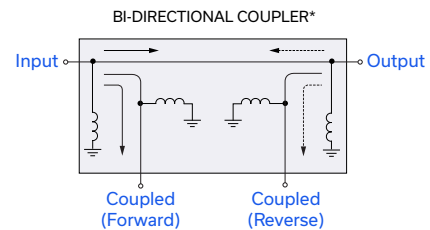
3. The user must provide adequate means of heat removal to limit the temperature of ground connections 2,3,6,7 to 85°C, in order to ensure proper performance. At 25°C ambient temperature this requires thermal resistance of the user's PC board heat sink to be 27°C/W or less when the unit is driven at maximum specified RF input power, 10W. At higher ambient temperature, with the same heat sink. Input power in watts must not exceed 10W x (85°C - Tambient) = 60°C.

### MAXIMUM RATINGS

Parameter	Ratings
Operating temperature	-40°C to 85°C*
Storage temperature	-55°C to 100°C

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

### ELECTRICAL SCHEMATIC



\*Electrical schematic is for Bi-Directional coupler with internal transformer(s) that routes DC from all ports to ground



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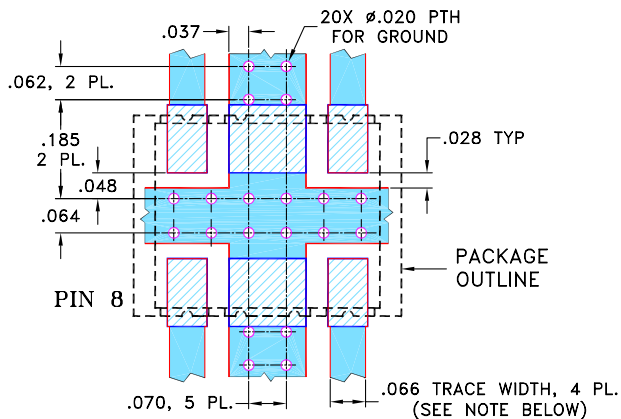
### PAD CONNECTIONS

INPUT	8
OUTPUT	1
COUPLED (FORWARD)	5
COUPLED (REVERSE)	4
GROUND	2, 3, 6, 7

### PRODUCT MARKING: SYBDC-15-13HP

Marking may contain other features or characters for internal lot control

### SUGGESTED PCB LAYOUT (PL-246)

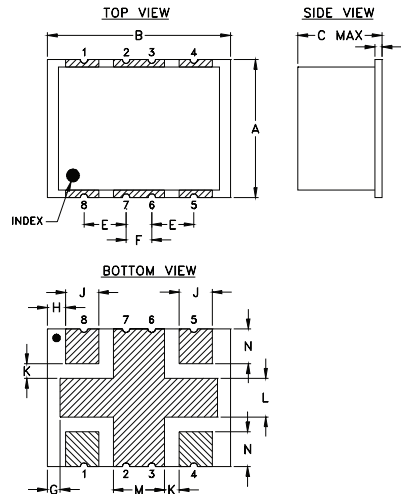


#### NOTES:

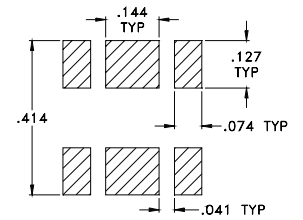
- TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

### OUTLINE DRAWING



### PCB Land Pattern



Suggested Layout,  
Tolerance to be within ±.002

### OUTLINE DIMENSIONS (Inches/mm)

A	B	C	D	E	F	G
.38	.50	.25	.020	.115	.070	.035
9.65	12.70	6.35	0.51	2.92	1.78	0.89
H	J	K	L	M	N	wt
.050	.090	.040	.105	.140	.095	grams
1.27	2.29	1.02	2.67	3.56	2.41	0.80

### TAPE AND REEL INFORMATION: F61



**SURFACE MOUNT**

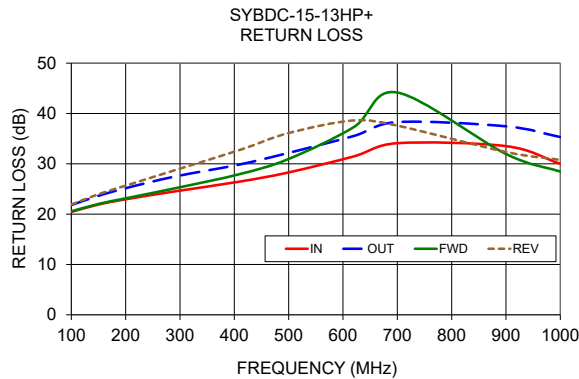
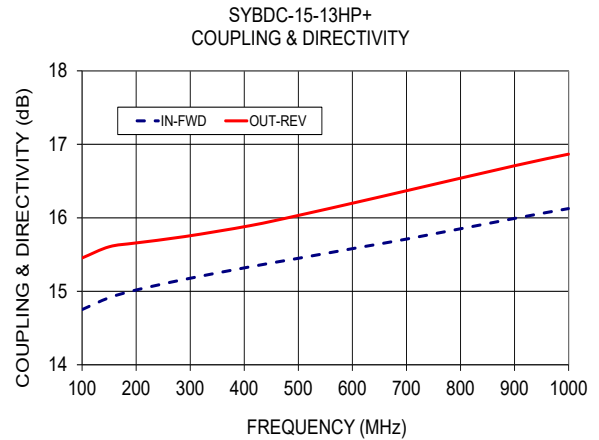
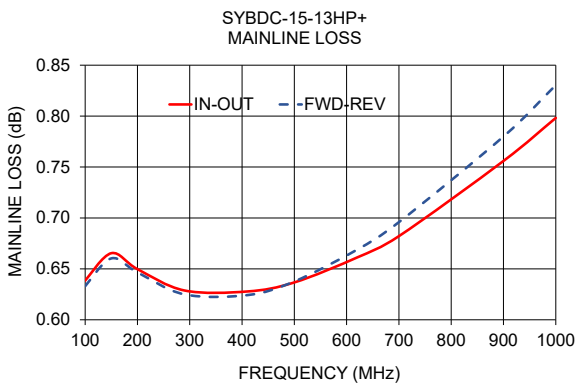
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### TYPICAL PERFORMANCE DATA

Frequency (MHz)	Mainline Loss (dB)	Coupling (dB)		Directivity (dB)		Return Loss (dB)			
		In-Out	In-Cpl Fwd	Out-Cpl Rev	Out-Cpl Fwd	In-Cpl Rev	In	Out	Cpl Fwd
100	0.64	14.75	15.45	20.70	21.60	20.44	21.80	20.56	21.89
150	0.67	14.91	15.61	21.82	22.76	21.91	23.64	22.02	23.97
200	0.65	15.02	15.66	22.93	23.67	22.95	25.16	23.15	25.66
290	0.63	15.16	15.74	23.63	24.79	24.51	27.46	25.12	28.71
410	0.63	15.33	15.89	24.05	25.27	26.47	29.87	27.95	32.75
500	0.64	15.45	16.03	24.28	25.59	28.29	32.18	30.96	36.11
620	0.66	15.61	16.23	24.38	25.58	31.48	35.53	37.31	38.63
700	0.68	15.71	16.37	24.19	25.65	34.10	38.30	44.17	37.59
900	0.76	15.99	16.71	23.48	25.04	33.51	37.45	31.96	32.36
1000	0.80	16.13	16.87	23.11	24.80	30.00	35.32	28.45	30.78



- 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/terms/viewterm.html](http://www.minicircuits.com/terms/viewterm.html)

