

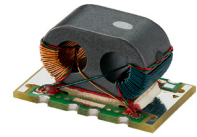


### THE BIG DEAL

- High power handling, up to 80W
- Low mainline loss, 0.15 dB typ.
- High directivity, 20 dB typ.
- Excellent VSWR, 1.12:1 typ.

### APPLICATIONS

- Military mobile
- Signal monitoring



Generic photo used for illustration purposes only

CASE STYLE: AH1647-5

#### +RoHS Compliant

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

### PRODUCT OVERVIEW

Mini-Circuits' SYBDC-20-61WHP+ surface mount bi-directional coupler provides high power handling up to 80W and low mainline loss of 0.15 dB typically for applications from 0.2 to 60 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 0.433 x 0.690 x 0.400 ", accommodating dense circuit board layouts.

### KEY FEATURES

Feature	Advantages
High power handling, 80W	Usable in many systems with high-power requirements
Low mainline loss, 0.15 dB typ.	Provides excellent through-path signal power transmission
Good directivity, 20 dB typ.	High directivity allows accurate signal sampling through the coupled port with minimal measurement error
Excellent VSWR, 1.12 dB typ. (input/output/coupling)	Provides excellent matching in 50Ω systems with minimal signal reflection
Small size, 0.433 x 0.690 x 0.400 "	Provides high power capability while saving space in systems with tight layouts



# SURFACE MOUNT

# Bi-Directional Coupler SYBDC-20-61WHP+

50Ω 20 dB Coupling 0.2 to 60 MHz 80 Watt

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

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		0.2		60	MHz
Mainline Loss (above theoretical 0.044 dB)	1-30	–	0.08	0.25	dB
	0.2-60	–	0.15	0.30	
Coupling	0.2-60	19.5	20.5	21.5	dB
Coupling Flatness(±)	0.2-60	–	0.05	0.2	dB
Directivity	1-30	20	25	–	dB
	0.2-60	15	20	–	
Return Loss (Input)	0.2-60	18	25	–	dB
Return Loss (Output)	0.2-60	18	25	–	dB
Return Loss (Coupled)	1-30	18	24	–	dB
Input Power <sup>2</sup>	0.2-60	–	–	80	W

1. Measured on Mini-Circuits board TBSYBDC2061WHP+ with test board loss deducted.

2. The user must provide adequate means of heat removal to limit the temperature of ground connections 2,3,6,7 to 65°C, in order to ensure proper performance.

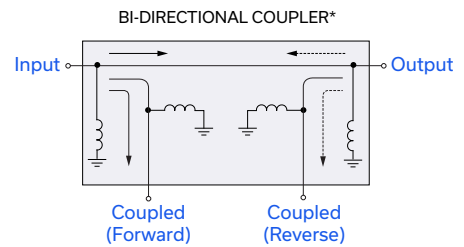
At 25°C ambient temperature this requires thermal resistance of the user's PC board heat sink to be 8°C/W or less when the unit is driven at maximum specified RF input power, 80W. At higher ambient temperature, with the same heat sink. Input power in watts must not exceed 80W x (65°C-Tambient)÷40°C.

### MAXIMUM RATINGS\*

Parameter	Ratings
Operating Temperature	-40°C to 65°C
Storage Temperature	-55°C to 100°C

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



## SURFACE MOUNT

# Bi-Directional Coupler SYBDC-20-61WHP+

Mini-Circuits

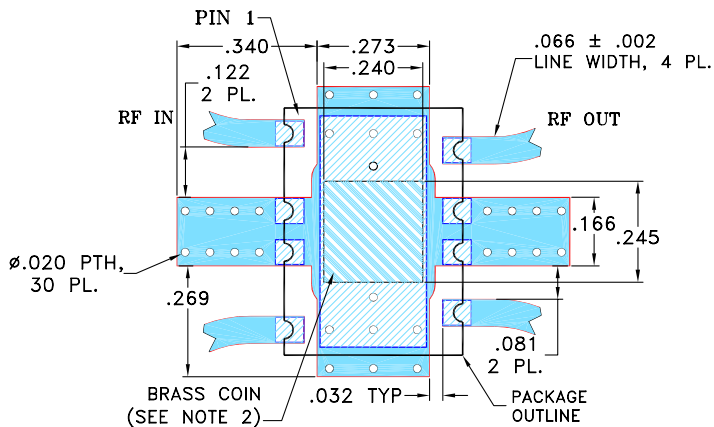
50Ω 20 dB Coupling 0.2 to 60 MHz 80 Watt

### PAD CONNECTIONS

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

PRODUCT MARKING: N/A

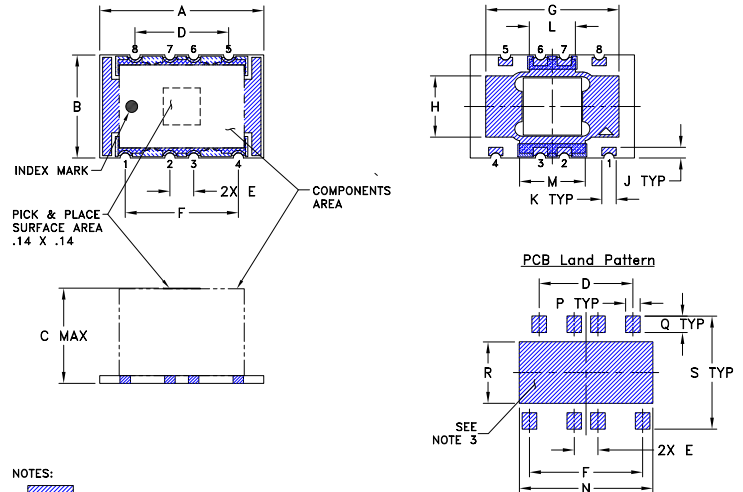
### SUGGESTED PCB LAYOUT (PL-351)



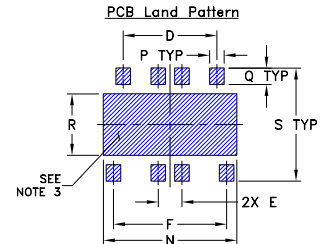
- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS  $.030" \pm .002"$ ; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.  
 2. SUGGEST TO PROVIDE BRASS COIN FOR BETTER HEAT TRANSFER FROM THE UNIT. OTHERWISE PROVIDE ARRAY OF THERMAL VIAS ADEQUATE TO LIMIT TEMPERATURE OF GROUND CONNECTIONS UNDER THE UNIT TO 65°C.  
 3. 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
- DENOTES BRASS COIN.

### OUTLINE DRAWING



- NOTES:  
 1. DENOTES METALLIZATION  
 2. DENOTES SOLDER RESIST  
 3. GROUND METALLIZATION MUST BE PROVIDED WITH THE MAXIMUM NUMBER OF PTH'S FOR BETTER THERMAL TRANSFER.



Suggested Layout, Tolerance to be within  $\pm .002$

### OUTLINE DIMENSIONS (Inches mm)

A	B	C	D	E	F	G	H	J
.690	.433	.400	.394	.100	.476	.560	.257	.045
17.53	11.00	10.16	10.01	2.54	12.09	14.22	6.53	1.14
K	L	M	N	P	Q	R	S	wt
.060	.194	.276	.561	.061	.069	.258	.475	grams
1.52	4.93	7.01	14.25	1.55	1.75	6.55	12.07	3.40

### TAPE & REEL INFORMATION: F109



# SURFACE MOUNT

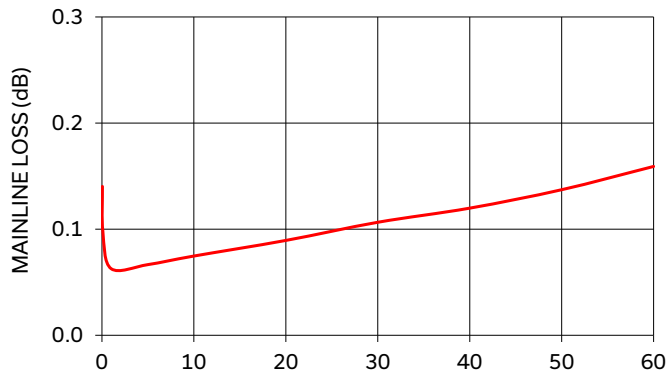
# Bi-Directional Coupler SYBDC-20-61WHP+

50Ω 20 dB Coupling 0.2 to 60 MHz 80 Watt

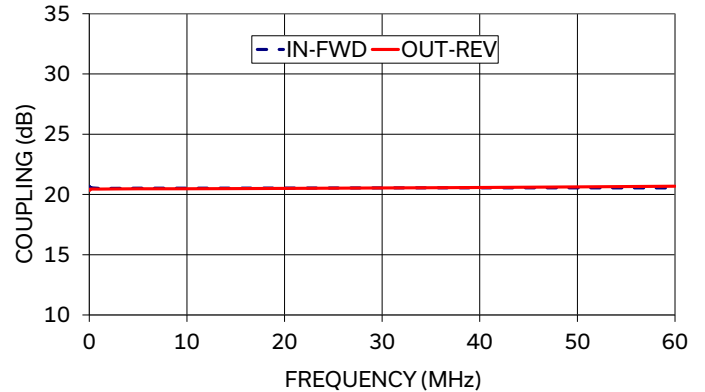
### TYPICAL PERFORMANCE DATA

Frequency (MHz)	Mainline 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
0.05	0.14		20.66	20.34	17.89	17.76	18.96	18.96	18.97	18.73
0.10	0.10		20.59	20.44	23.77	23.43	23.87	23.79	23.81	23.54
1	0.06		20.51	20.45	47.62	48.12	39.34	40.90	40.06	40.97
5	0.07		20.52	20.47	42.32	49.28	38.61	40.38	39.84	40.57
10	0.07		20.52	20.47	36.19	38.17	36.07	36.05	37.41	37.02
20	0.09		20.53	20.50	29.68	30.97	31.20	30.98	32.53	31.96
30	0.11		20.54	20.54	25.90	27.21	28.20	27.80	29.39	28.98
40	0.12		20.55	20.58	23.09	24.39	25.89	25.55	27.17	26.77
50	0.14		20.55	20.63	20.87	22.05	24.11	23.73	25.39	24.98
60	0.16		20.54	20.68	18.98	20.19	22.63	22.27	23.83	23.49

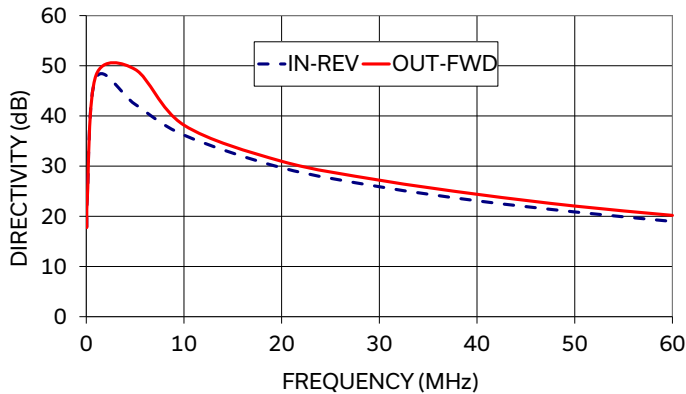
SYBDC-20-61WHP+  
MAINLINE LOSS



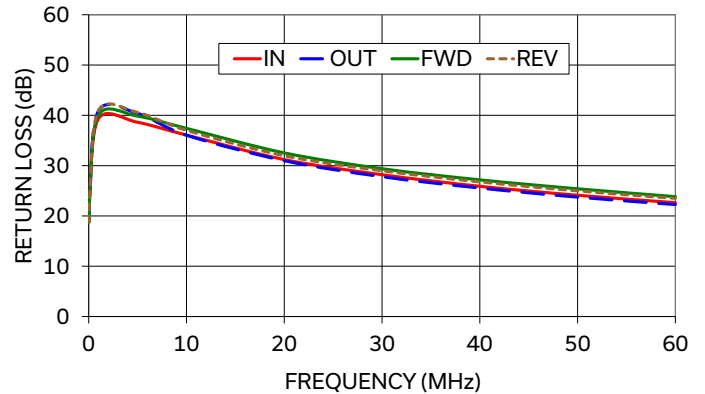
SYBDC-20-61WHP+  
COUPLING



SYBDC-20-61WHP+  
DIRECTIVITY



SYBDC-20-61WHP+  
RETURN LOSS



- 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)

