SURFACE MOUNT

Bi-Directional Coupler SYBDC-20-61WHP+

50Ω 20 dB Coupling 0.2 to 60 MHz 80 Watt

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.

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

APPLICATIONS

- Military mobile
- Signal monitoring

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

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ELECTRICAL SPECIFICATIONS[1] 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 0.2-60	— —	0.08 0.15	0.25 0.30	dB
Coupling	0.2-60	19.5	20.5	21.5	dB
Coupling Flatness(±)	0.2-60	—	0.05	0.2	dB
Directivity	1-30 0.2-60	20 15	25 20	— —	dB
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[2]	0.2-60	—	—	80	W

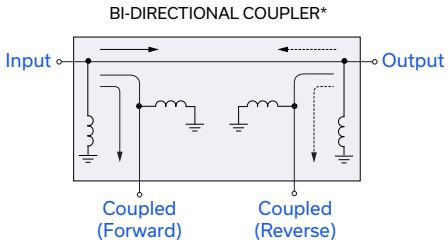
1. Measured on Mini-Circuits board TBSYBDC2061WHP+ with test board loss deducted.
2. The user must provide adequate means of heat removal to limit the temperature of ground connections 2,3,6,7 to 65°C, in order to ensure proper performance. At 25°C ambient temperature this requires thermal resistance 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

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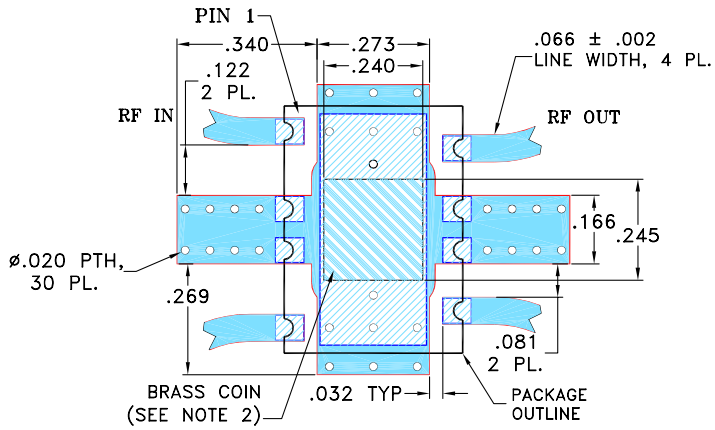
PAD CONNECTIONS

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

PRODUCT MARKING: N/A

SUGGESTED PCB LAYOUT (PL-351)



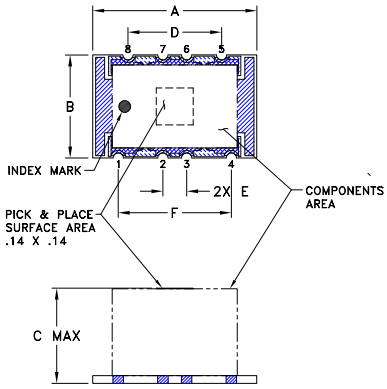
NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. SUGGEST TO PROVIDE BRASS COIN FOR BETTER HEAT TRANSFER FROM THE UNIT. OTHERWISE PROVIDE ARRAY OF THERMAL VIAS ADEQUATE TO LIMIT TEMPERATURE OF GROUND CONNECTIONS UNDER THE UNIT TO 65°C.
3. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

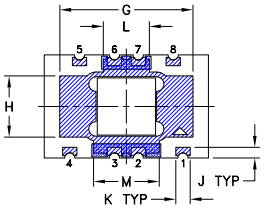
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

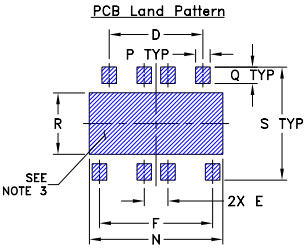
DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

DENOTES BRASS COIN.

OUTLINE DRAWING







Suggested Layout,
Tolerance to be within ±.002

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.

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

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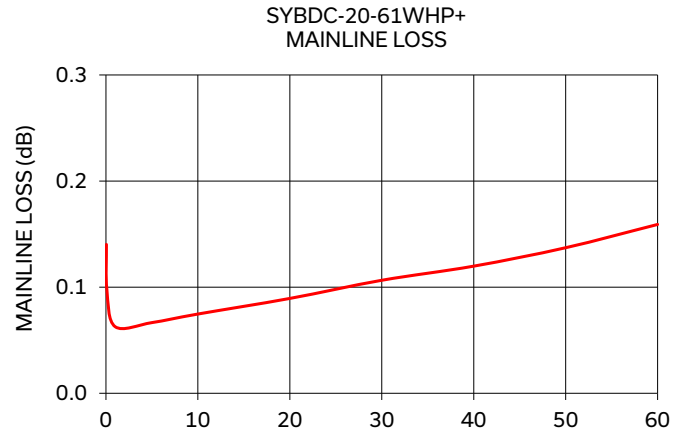
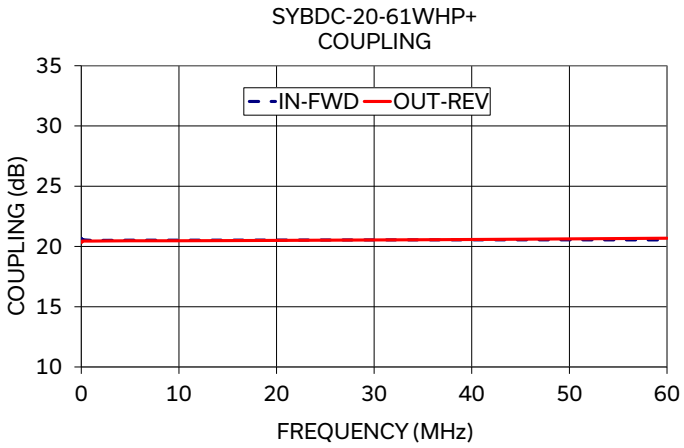
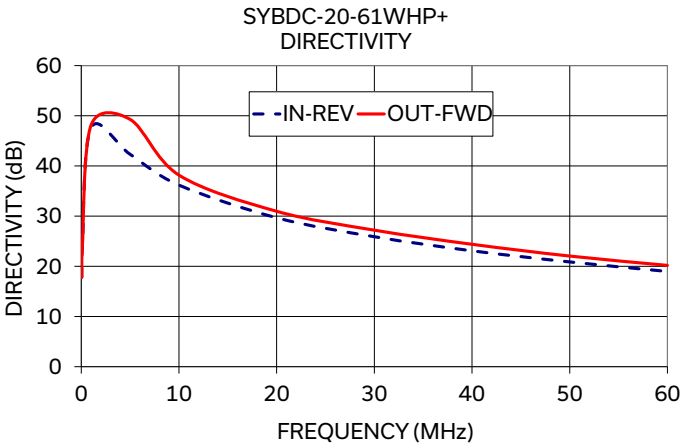
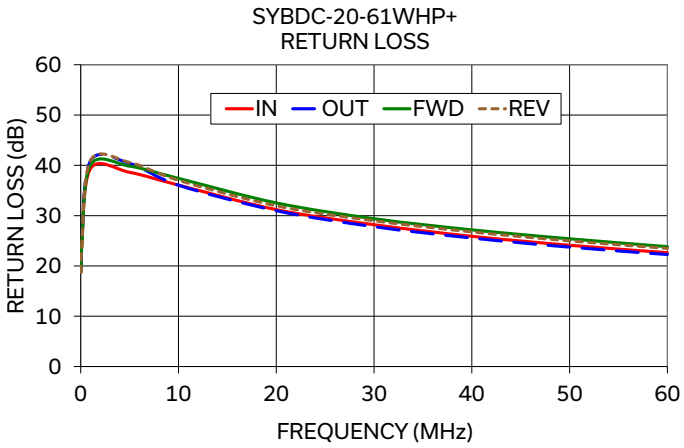
TYPICAL PERFORMANCE DATA

Frequency (MHz)	Mainline Loss (dB)	Coupling (dB)		Directivity (dB)		Return Loss (dB)			
	In-Out	In-Cpl Fwd	Out-Cpl Rev	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









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.

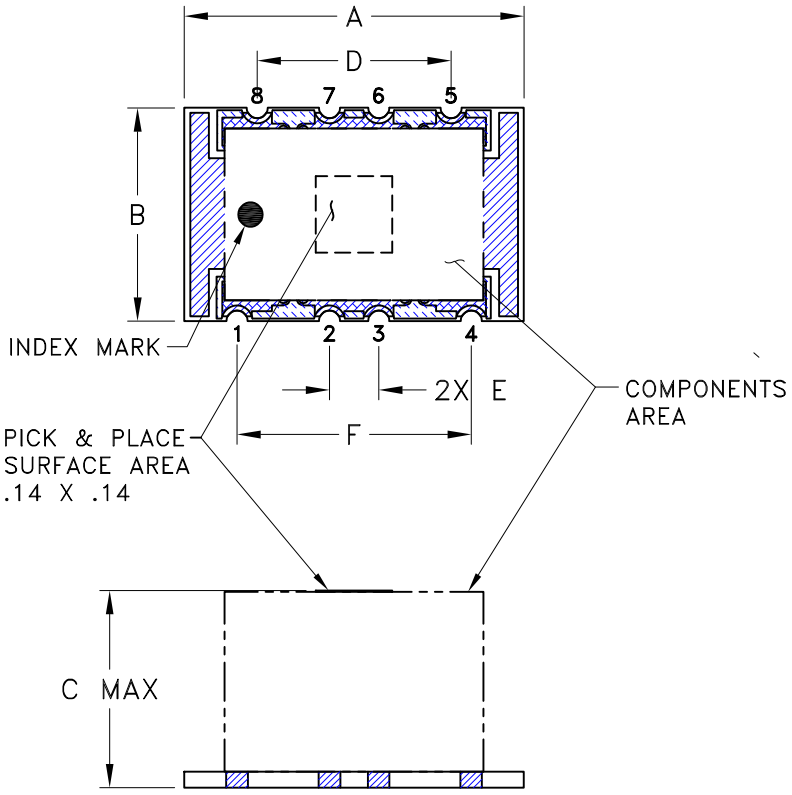
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

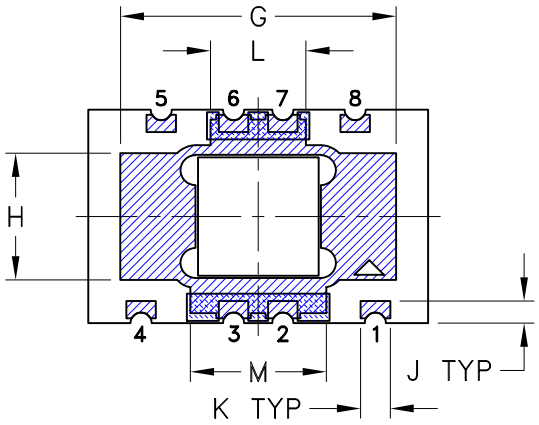
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard. Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/terms/viewterm.html

Case Style AH

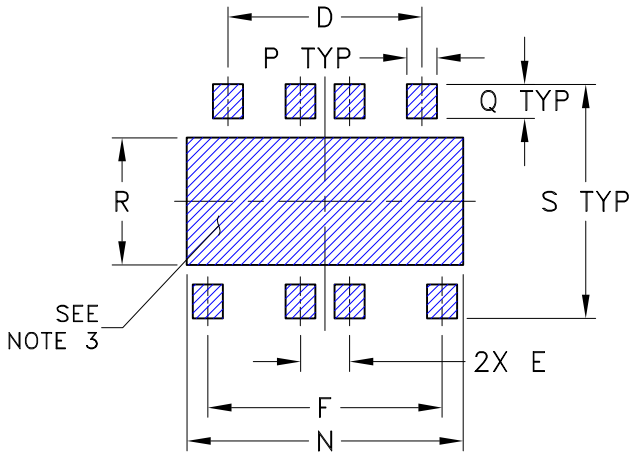
Outline Dimensions

AH1647-5





PCB Land Pattern



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NOTES:

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CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
AH1647-5	.690 (17.53)	.433 (11.00)	.400 (10.17)	.394 (10.01)	.100 (2.54)	.476 (12.09)	.560 (14.22)	.257 (6.53)	.045 (1.14)	.060 (1.52)	.194 (4.93)	.276 (7.01)	.561 (14.25)

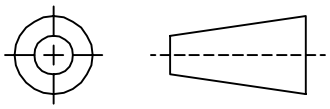
CASE #	P	Q	R	S	WT, GRAM
AH1647-5	.061 (1.55)	.069 (1.75)	.258 (6.55)	.475 (12.06)	3.4

Dimensions are in inches (mm). Tolerances: 2 Pl.±.01(.25); 3 Pl.±.005(.127)

Notes:

1. Base material: Printed wiring laminate;
2. Termination finish: TIN HAL LEAD FREE.

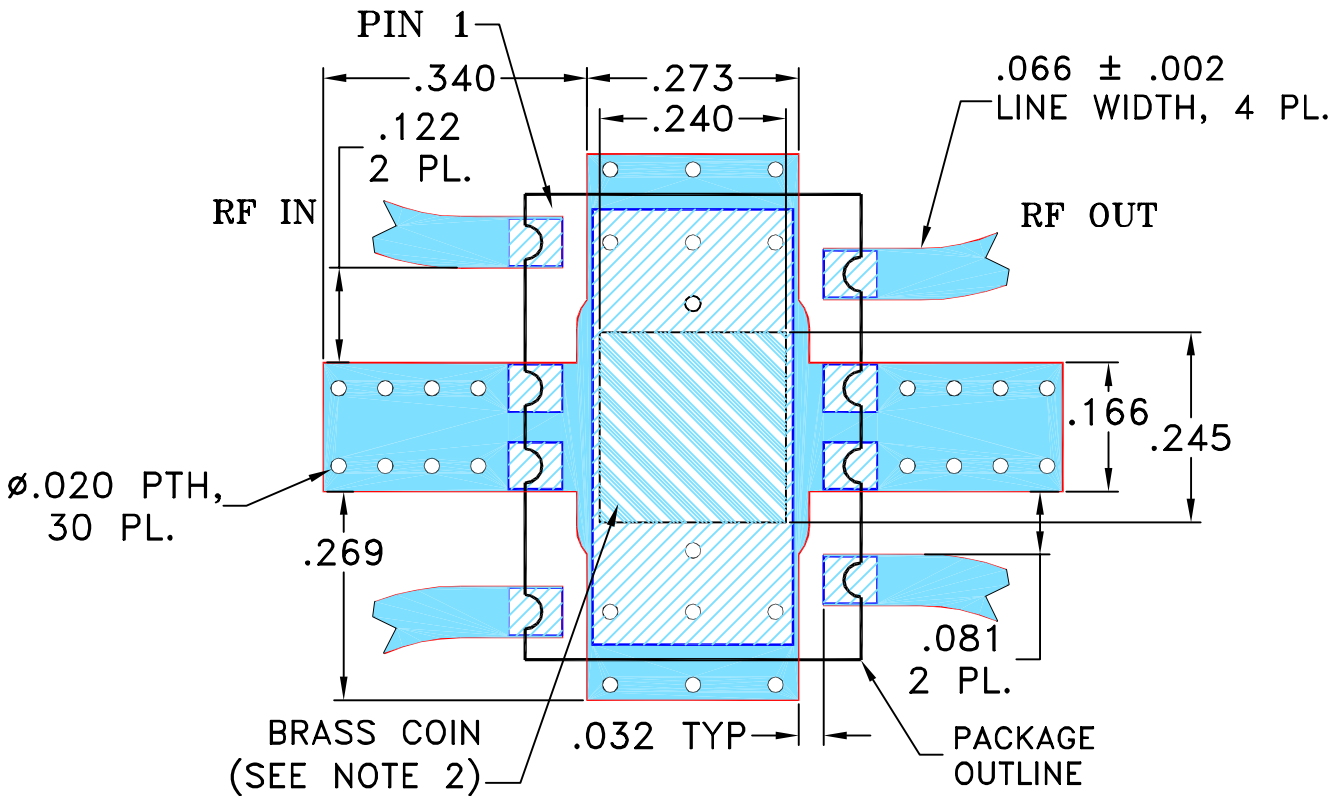
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M133287	NEW RELEASE	08/26/11	GF	WP

SUGGESTED MOUNTING CONFIGURATION FOR AH1647 CASE STYLE, "08DC05" PIN CODE



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DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

DENOTES BRASS COIN.

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	GF	08/22/11
TOLERANCES ON:	CHECKED	IL	08/25/11
2 PL DECIMALS ±	APPROVED	WP	08/26/11
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

ASHEETA1.DWG REV:A DATE:01/12/95

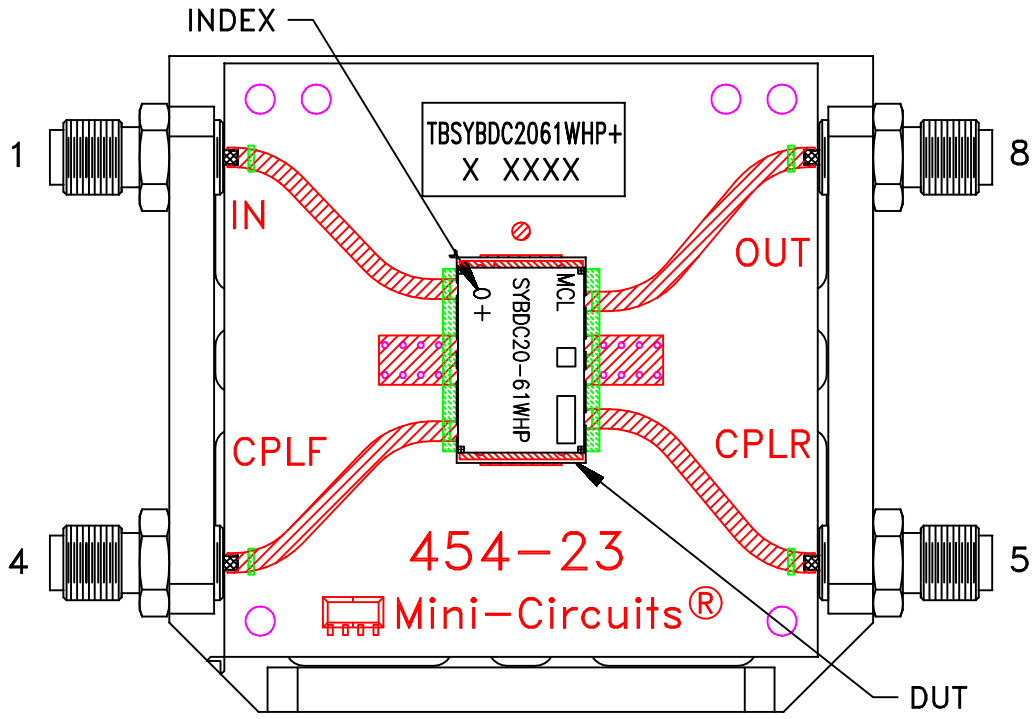
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, 08DC05, AH1647, TB-630+

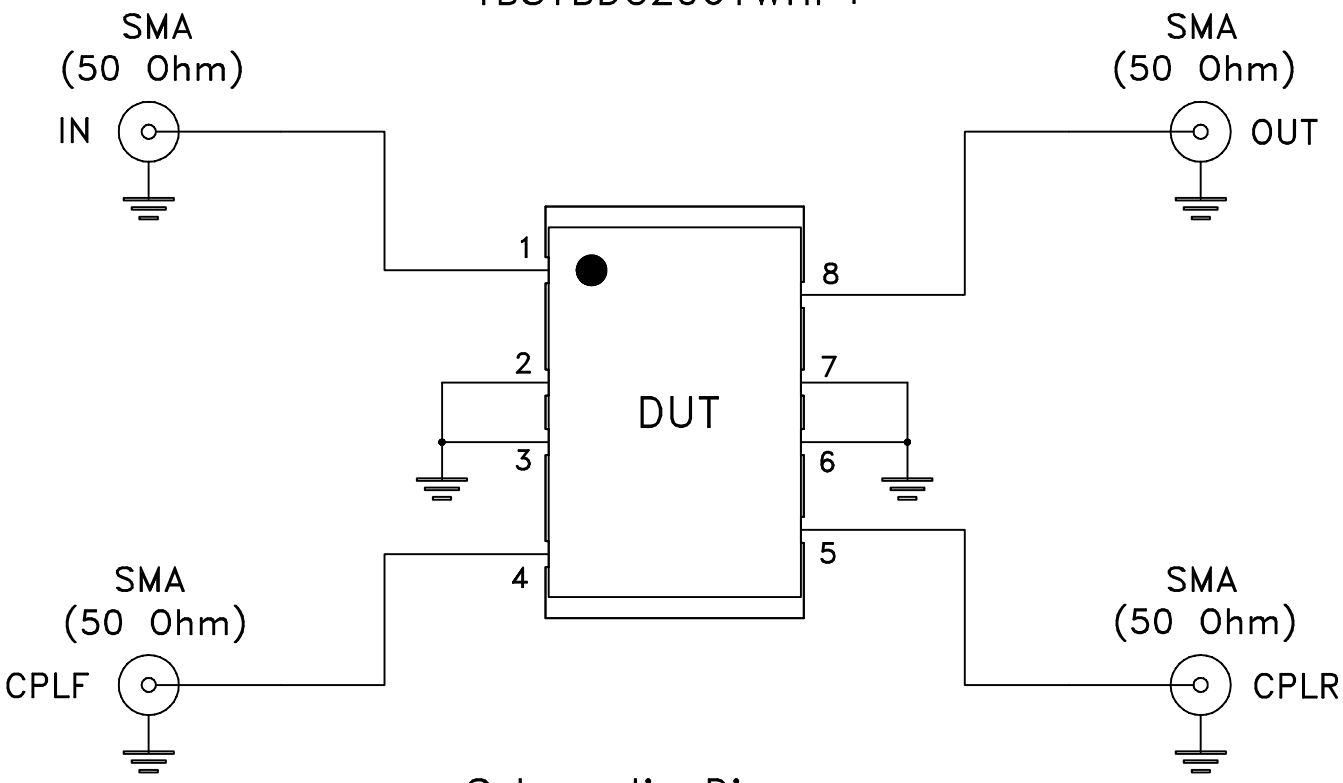
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-351	OR

FILE:	SCALE:	SHEET:
98PL351	4:1	1 OF 1

Evaluation Board and Circuit



TBSYBDC2061WHP+



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350 or equivalent.
   Dielectric Constant=3.5, Thickness=.030 inch.

Mini-Circuits®

Mini-Circuits

Environmental Specifications ENV02T1

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, 95% Coverage
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215