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 80 W
- 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 80 W 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 0.433x0.690x0.400 ", accommodating dense circuit board layouts.

KEY FEATURES

Feature	Advantages
High Power Handling, 80 W	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, 0.433x0.690x0.400 "	Provides high power capability while saving space in systems with tight layouts.

REV. B
ECO-015468
SYBDC-20-61WHP+
MCL NY
251104

SURFACE MOUNT

Bi-Directional Coupler SYBDC-20-61WHP+

50Ω 20 dB Coupling 0.2 to 60 MHz 80 Watt

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

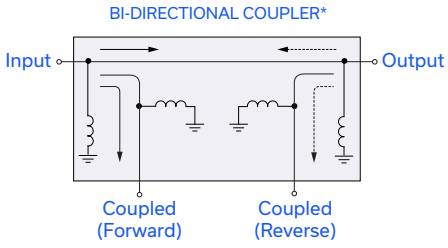
1. Measured on Mini-Circuits board TBSYBDC2061WHP+ with test board loss deducted.
2. The user must provide adequate means of heat removal to limit the temperature of ground connections 2,3,6,7 to +65°C, in order to ensure proper performance.
At +25°C ambient temperature this requires thermal resistance 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, 80 W.
At higher ambient temperature, with the same heat sink. Input power in watts must not exceed 80 W x (+65°C - Tambient) ÷ +40°C.

ABSOLUTE 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+

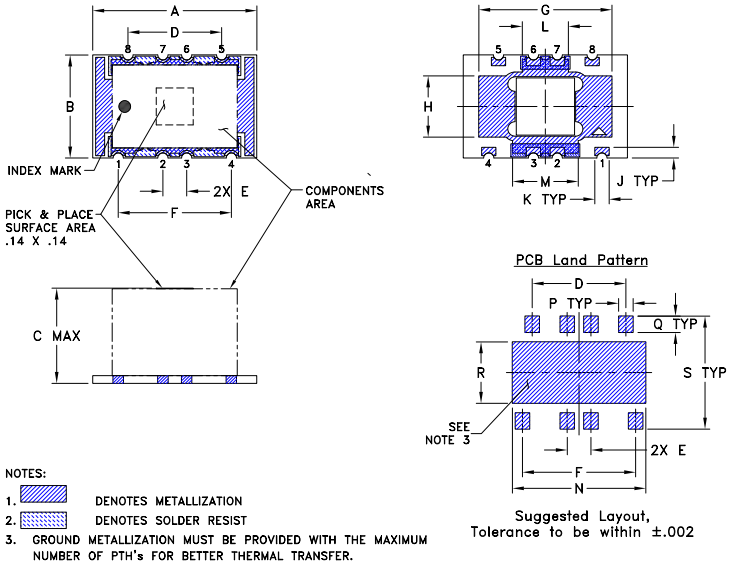
50Ω 20 dB Coupling 0.2 to 60 MHz 80 Watt

PAD CONNECTIONS

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

PRODUCT MARKING: N/A

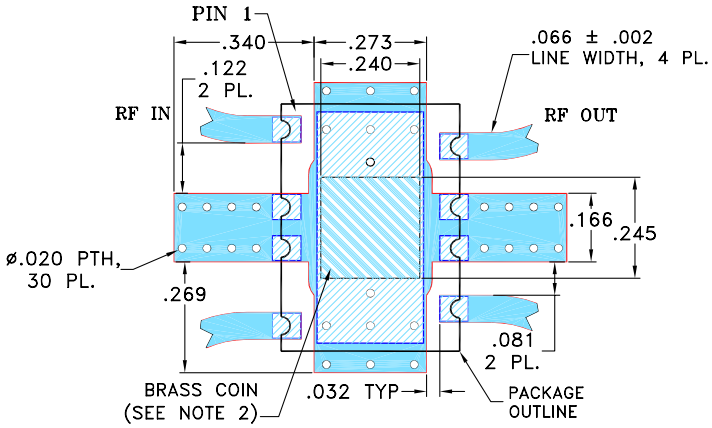
OUTLINE DRAWING



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.

EVAL BOARD MCL P/N: TBSYBDC2061WHP+

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 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

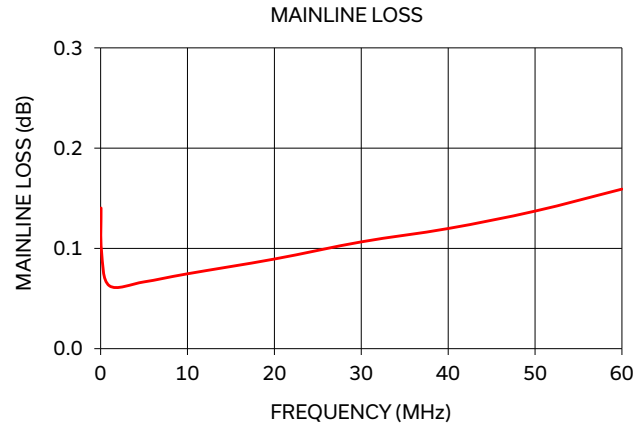
SURFACE MOUNT

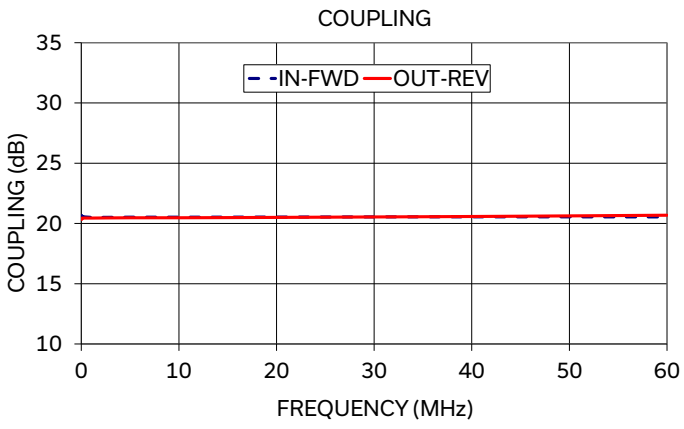
Bi-Directional Coupler SYBDC-20-61WHP+

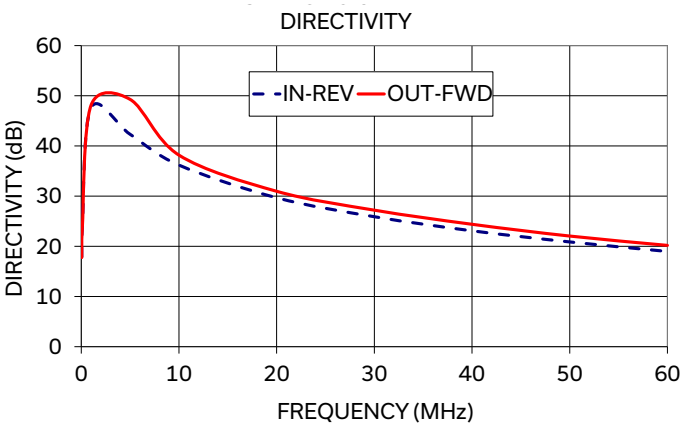
50Ω 20 dB Coupling 0.2 to 60 MHz 80 Watt

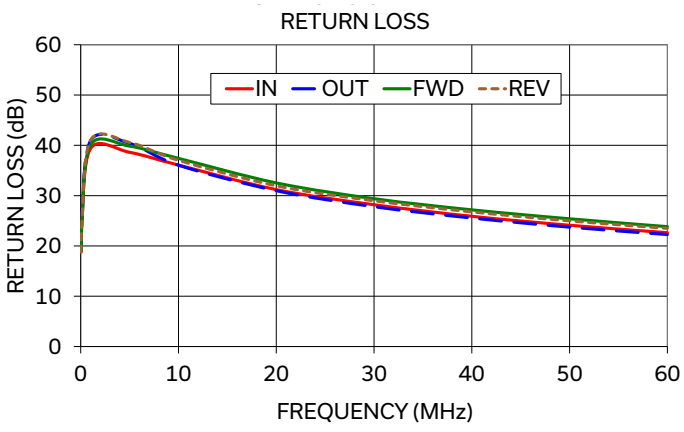
TYPICAL PERFORMANCE DATA

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









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.

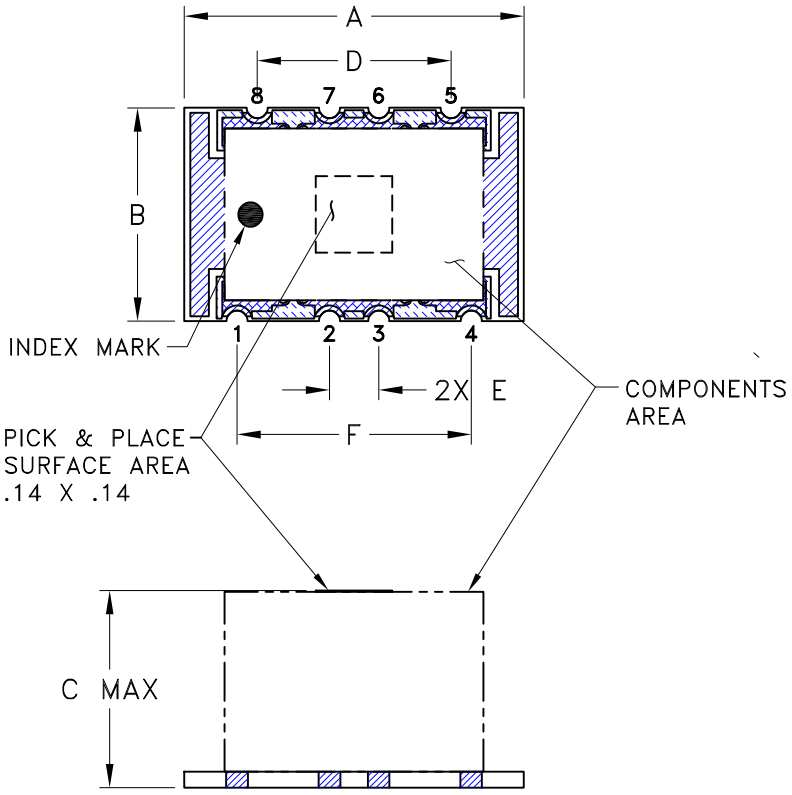
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

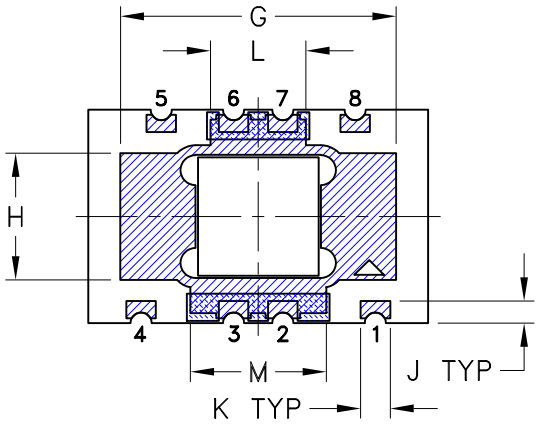
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard. Terms and the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

Case Style AH

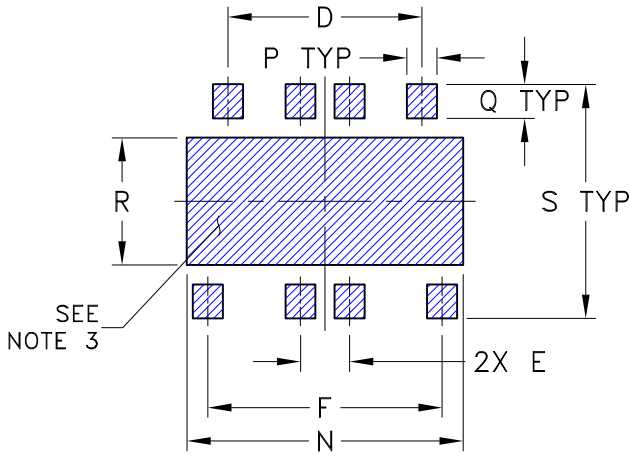
Outline Dimensions

AH1647-5





PCB Land Pattern



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.

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.

Mini-Circuits®
ISO 9001 ISO 14001 CERTIFIED

ALL NEW minicircuits.com

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site

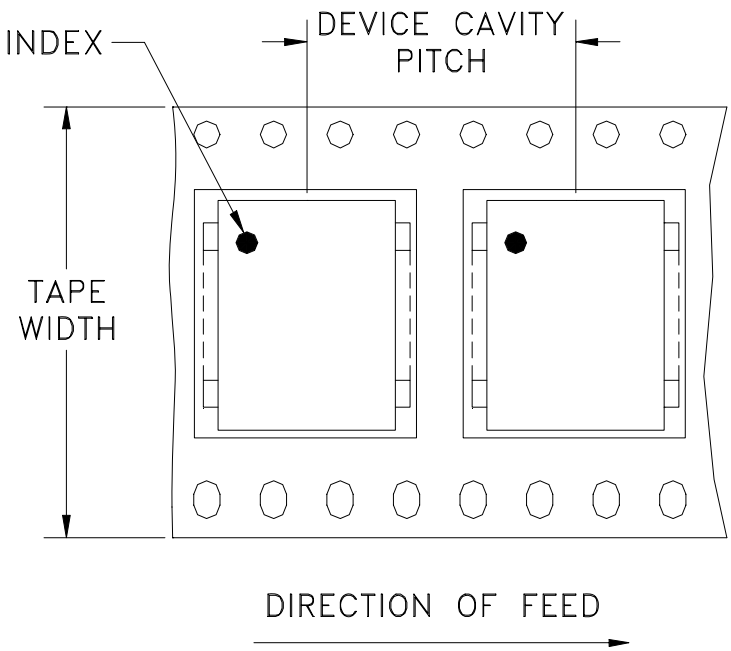
The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS

This document and its contents are the property of Mini-Circuits

Tape & Reel Packaging TR-F109

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
32	16	13	200

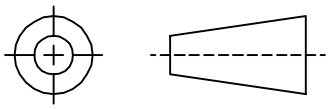
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

This document and its contents are the property of Mini-Circuits.

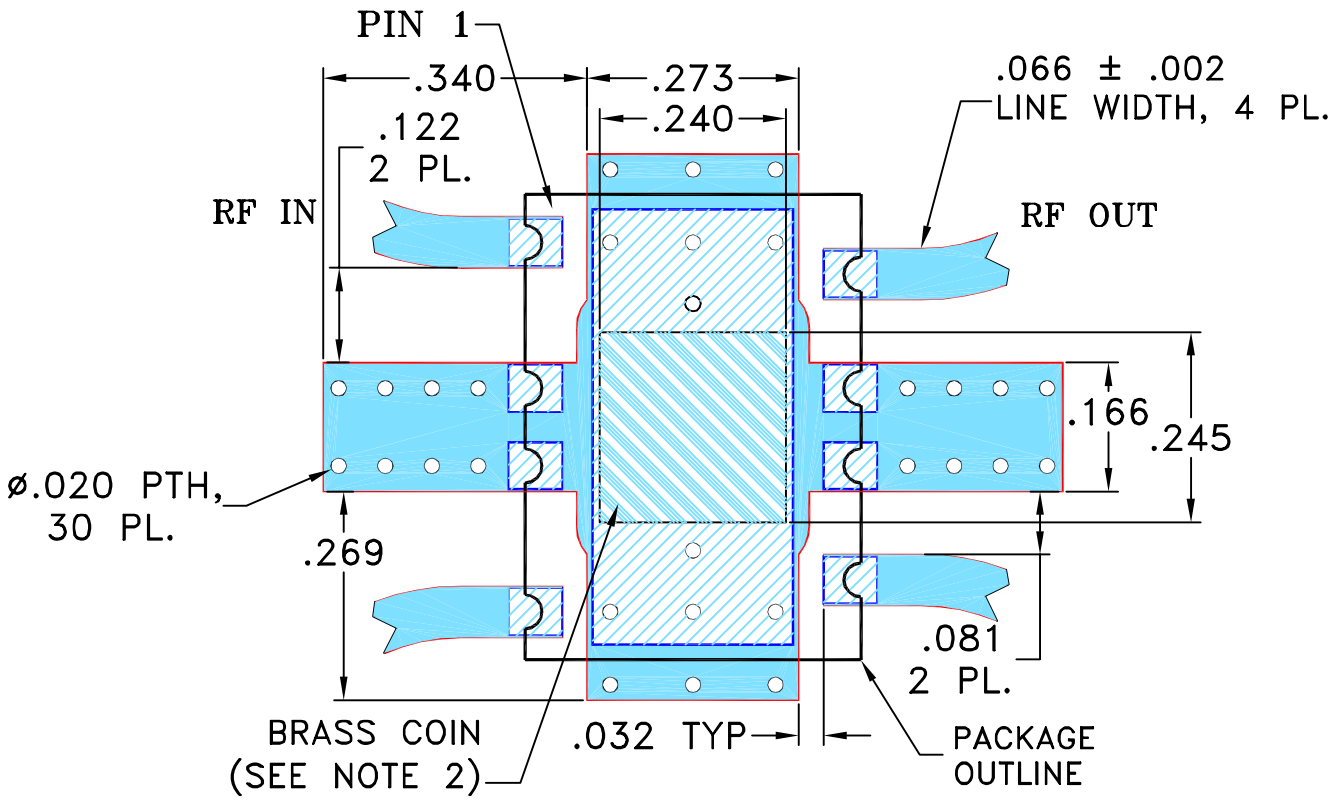
THIRD ANGLE PROJECTION



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



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.

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 ±			

Mini-Circuits®
THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE , MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.

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

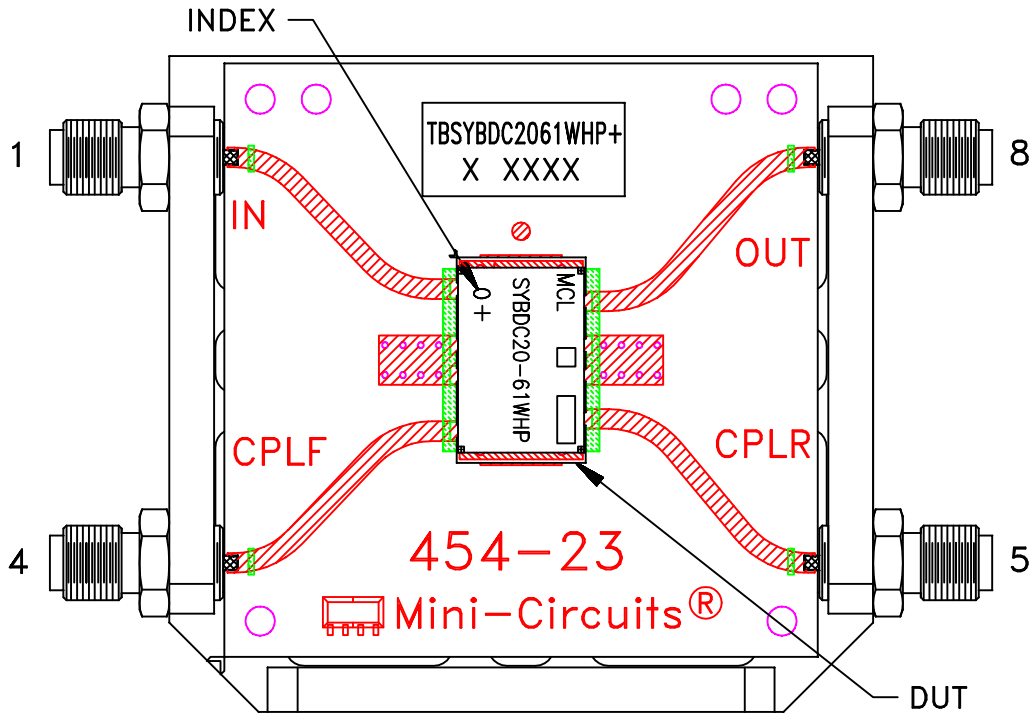
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, 08DC05, AH1647, TB-630+

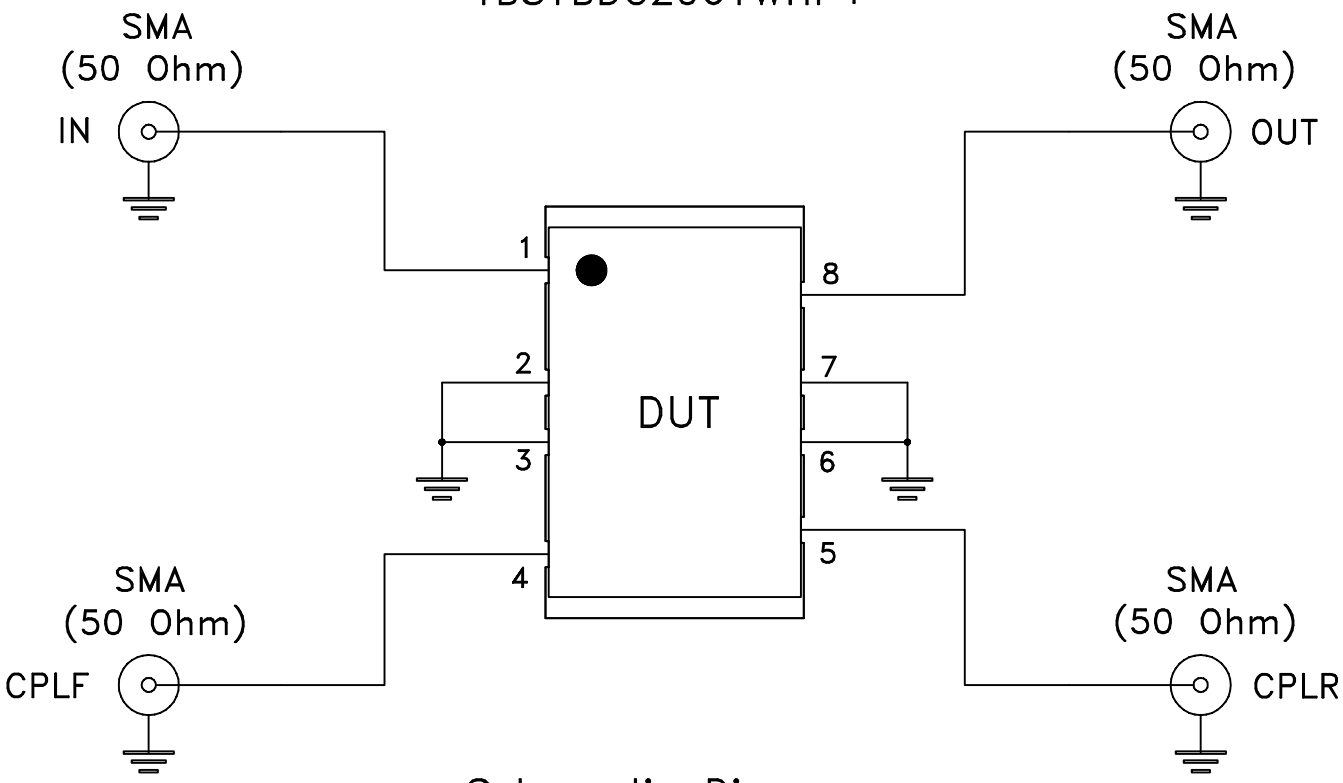
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-351	OR

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®

THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF 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

This document and its contents are the property of Mini-Circuits.