



Mini-Circuits

SURFACE MOUNT

Bi-Directional Coupler **SYBDC-27-82VHP+**

50Ω 27 dB Coupling 30 to 840 MHz 100 Watt

THE BIG DEAL

- High Power Handling, Up to 100 W
- Low Mainline Loss, 0.14 dB Typ.
- High Directivity, 20 dB Typ.
- Excellent VSWR, 1.12:1 Typ.



Generic photo used for illustration purposes only

CASE STYLE: AH202-1

APPLICATIONS

- VHF/UHF
- Signal Monitoring
- Communications

+RoHS Compliant

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

PRODUCT OVERVIEW

Mini-Circuits' SYBDC-27-82VHP+ surface mount bi-directional coupler provides high power handling up to 100 W and low mainline loss of 0.14 dB typically for applications from 30 to 840 MHz. The coupler features core and wire construction mounted on an 8-lead printed laminate base with wraparound terminations for excellent solderability. The unit measures 0.38x0.50x0.25", accommodating dense circuit board layouts.

KEY FEATURES

Feature	Advantages
High Power Handling, 100 W	Usable in many systems with high-power requirements.
Low Mainline Loss, 0.14 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, 0.38x0.50x0.25"	Provides high power capability while saving space in systems with tight layouts.





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50Ω 27 dB Coupling 30 to 840 MHz 100 Watt

ELECTRICAL SPECIFICATIONS AT +25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		30		840	MHz
Mainline Loss ¹	30-50		0.25	0.35	dB
	50-512		0.15	0.30	
	512-700		0.25	0.35	
	700-840		0.4	0.5	
Nominal Coupling	30-512		26.5±1		dB
	512-700		25.2±0.9		
	700-840		23.5±1.3		
Coupling Flatness (±)	30-260		±0.4	±0.6	dB
	260-512		±0.7	±1	
	512-700		±0.7	±1	
	700-840		±1	±1.5	
Directivity	30-512	15	22		dB
	512-700	13	20		
	700-840	10	16		
Return Loss (Input)	30-100	12	18		dB
	100-840	17	24		
Return Loss (Output)	30-100	12	18		dB
	100-840	17	24		
Return Loss (Coupled)	30-100	12	18		dB
	100-840	17	24		
Input Power ^{2,3}	30-512			100	W
	512-600			90	
	600-700			60	
	700-800			30	
	800-840			20	

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

2. At +25°C case temperature. Derate linearly to 75 W from 30-512 MHz, 60 W from 512-600 MHz, 35 W from 600-700 MHz, 20 W from 700-800 MHz, 15 W from 800-840 MHz, at +85°C case temperature.

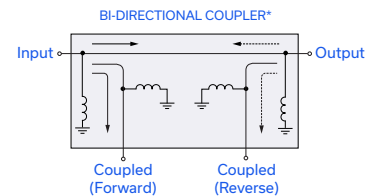
3. Output load VSWR 2.0 max. Max 500 ms duration with any VSWR, including output open or short.

ABSOLUTE MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-40°C to +85°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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PAGE 2 OF 4



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SURFACE MOUNT

Bi-Directional Coupler SYBDC-27-82VHP+

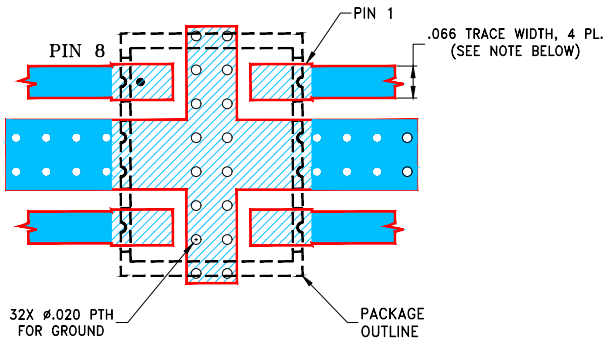
50Ω 27 dB Coupling 30 to 840 MHz 100 Watt

PAD CONNECTIONS

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

PRODUCT MARKING: N/A

EVAL BOARD MCL P/N: TBSYBDC2782VHP+ SUGGESTED PCB LAYOUT (PL-723)

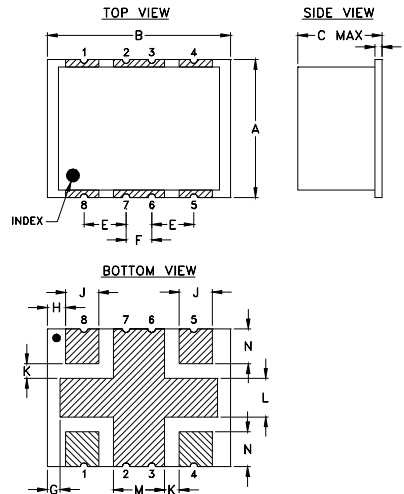


NOTES:

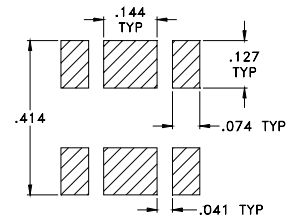
- TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030"±.002";
COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

- 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



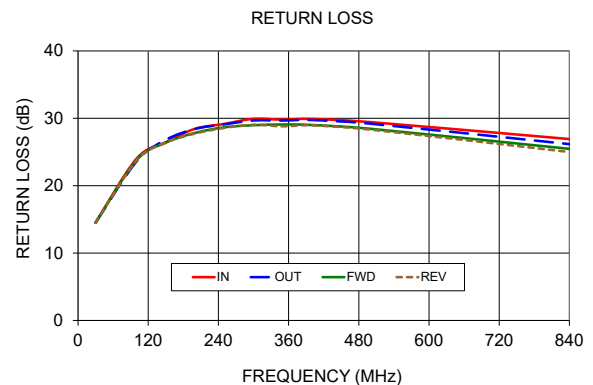
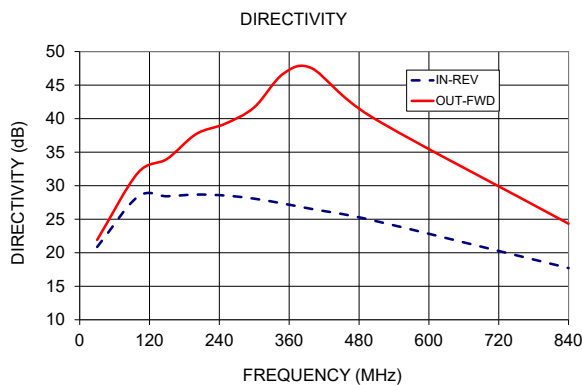
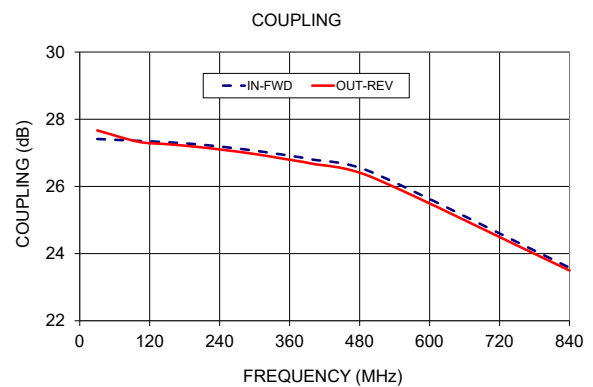
SURFACE MOUNT

Bi-Directional Coupler SYBDC-27-82VHP+

50Ω 27 dB Coupling 30 to 840 MHz 100 Watt

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	Cpl Rev
30	0.24	27.41	27.67	20.86	21.92	14.53	14.49	14.50	14.47
100	0.10	27.36	27.33	28.36	31.92	24.01	23.60	23.78	23.73
150	0.10	27.32	27.26	28.42	33.98	26.45	26.79	26.38	26.40
200	0.10	27.26	27.18	28.68	37.70	28.44	28.41	27.83	27.74
250	0.10	27.17	27.08	28.53	39.24	29.17	29.10	28.66	28.57
300	0.10	27.06	26.97	28.06	41.69	29.92	29.67	28.97	29.04
350	0.11	26.94	26.82	27.32	46.71	29.80	29.66	29.08	28.81
400	0.11	26.80	26.67	26.50	47.46	29.91	29.74	29.01	28.95
500	0.13	26.43	26.28	24.90	40.34	29.43	29.20	28.44	28.32
840	0.27	23.58	23.50	17.71	24.33	26.92	26.17	25.47	25.00



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

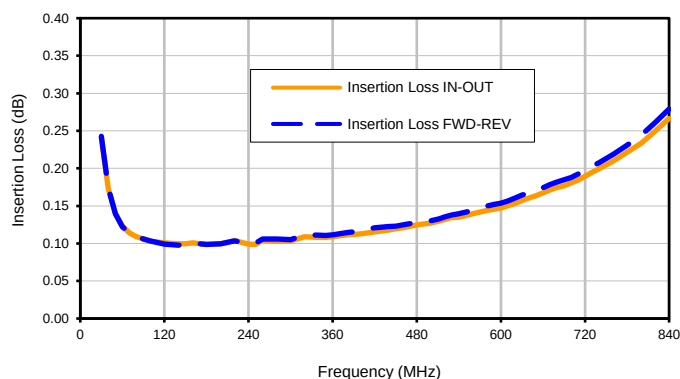
SYBDC-27-82VHP+

Typical Performance Data

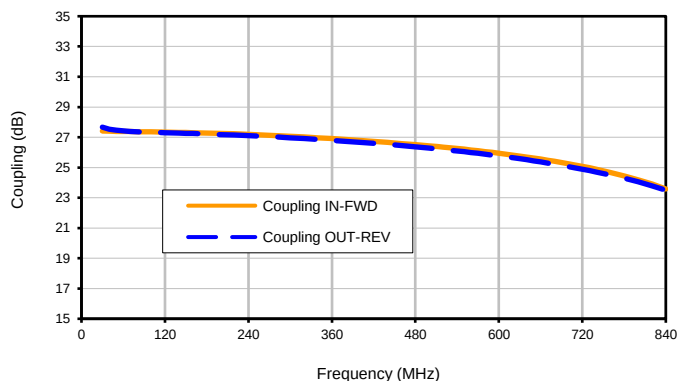
FREQ. (MHz)	INSERTION LOSS		COUPLING		DIRECTIVITY		RETURN LOSS			
	(dB)		(dB)		(dB)		(dB)			
	IN-OUT	FWD-REV	IN-FWD	OUT-REV	IN-REV	OUT-FWD	IN	OUT	FWD	REV
30	0.24	0.24	27.41	27.67	20.86	21.92	14.53	14.49	14.50	14.47
40	0.17	0.17	27.40	27.53	22.85	24.36	16.86	16.83	16.81	16.79
50	0.14	0.14	27.39	27.46	24.33	26.22	18.66	18.62	18.59	18.57
60	0.12	0.12	27.38	27.42	25.42	27.78	20.10	20.06	20.02	19.99
70	0.11	0.11	27.38	27.39	26.28	29.11	21.32	21.28	21.20	21.17
80	0.11	0.11	27.37	27.37	26.94	30.19	22.31	22.33	22.18	22.17
90	0.11	0.11	27.36	27.35	27.54	31.15	23.21	23.14	23.04	22.99
100	0.10	0.10	27.36	27.33	28.36	31.92	24.01	23.60	23.78	23.73
120	0.10	0.10	27.35	27.30	28.59	33.66	25.29	25.25	25.45	25.04
140	0.10	0.10	27.33	27.27	28.44	34.23	26.19	26.53	26.35	26.04
150	0.10	0.10	27.32	27.26	28.42	33.98	26.45	26.79	26.38	26.40
160	0.10	0.10	27.30	27.25	28.51	34.65	26.86	27.12	26.62	26.77
180	0.10	0.10	27.28	27.21	28.72	36.66	27.94	27.84	27.35	27.33
200	0.10	0.10	27.26	27.18	28.68	37.70	28.44	28.41	27.83	27.74
220	0.10	0.10	27.23	27.14	28.58	38.64	28.72	28.81	28.25	28.04
240	0.10	0.10	27.19	27.10	28.59	39.06	29.08	29.02	28.53	28.41
250	0.10	0.10	27.17	27.08	28.53	39.24	29.17	29.10	28.66	28.57
260	0.10	0.11	27.15	27.06	28.48	39.52	29.28	29.20	28.72	28.70
280	0.10	0.11	27.11	27.01	28.26	40.51	29.62	29.50	28.92	29.01
300	0.10	0.11	27.06	26.97	28.06	41.69	29.92	29.67	28.97	29.04
320	0.11	0.11	27.02	26.92	27.80	43.58	29.70	29.74	29.19	28.90
340	0.11	0.11	26.97	26.86	27.49	46.23	29.90	29.77	29.11	28.84
350	0.11	0.11	26.94	26.82	27.32	46.71	29.80	29.66	29.08	28.81
360	0.11	0.11	26.92	26.79	27.06	47.48	29.72	29.62	29.04	28.83
380	0.11	0.11	26.86	26.73	26.75	48.45	29.77	29.65	29.11	28.99
400	0.11	0.12	26.80	26.67	26.50	47.46	29.91	29.74	29.01	28.95
420	0.12	0.12	26.73	26.60	26.24	47.24	29.76	29.75	29.04	28.90
440	0.12	0.12	26.66	26.53	25.94	46.63	29.87	29.68	28.88	28.73
450	0.12	0.12	26.62	26.49	25.75	45.42	29.65	29.51	28.84	28.56
460	0.12	0.12	26.59	26.45	25.60	44.46	29.61	29.36	28.63	28.48
480	0.12	0.13	26.51	26.37	25.25	42.48	29.46	29.22	28.54	28.46
500	0.13	0.13	26.43	26.28	24.90	40.34	29.43	29.20	28.44	28.32
512	0.13	0.13	26.38	26.23	24.66	39.20	29.41	29.21	28.33	28.28
520	0.13	0.14	26.34	26.19	24.48	38.63	29.40	29.19	28.32	28.24
530	0.13	0.14	26.30	26.14	24.31	38.23	29.40	29.19	28.31	28.19
540	0.14	0.14	26.25	26.09	24.13	37.48	29.28	29.13	28.28	28.05
550	0.14	0.14	26.21	26.04	23.92	36.70	29.17	28.94	28.13	27.93
560	0.14	0.14	26.16	25.99	23.75	36.01	28.99	28.73	27.98	27.84
570	0.14	0.15	26.11	25.94	23.56	35.41	28.89	28.61	27.92	27.75
580	0.14	0.15	26.06	25.88	23.35	35.02	28.82	28.47	27.89	27.64
590	0.15	0.15	26.00	25.82	23.14	34.22	28.71	28.50	27.80	27.55
600	0.15	0.15	25.94	25.77	22.94	33.65	28.62	28.42	27.73	27.51
610	0.15	0.16	25.88	25.71	22.75	33.14	28.56	28.39	27.60	27.49
620	0.15	0.16	25.82	25.64	22.54	32.63	28.56	28.37	27.54	27.51
630	0.16	0.16	25.76	25.58	22.34	32.32	28.59	28.39	27.53	27.45
640	0.16	0.17	25.70	25.51	22.11	31.98	28.61	28.33	27.47	27.34
650	0.16	0.17	25.63	25.44	21.89	31.48	28.50	28.15	27.33	27.20
660	0.17	0.17	25.56	25.37	21.66	30.87	28.34	27.98	27.17	27.10
670	0.17	0.18	25.49	25.29	21.43	30.51	28.23	27.80	27.05	26.95
680	0.17	0.18	25.41	25.21	21.22	30.01	28.13	27.69	26.99	26.79
690	0.18	0.18	25.33	25.13	20.99	29.54	28.02	27.59	26.91	26.67
700	0.18	0.19	25.25	25.05	20.77	29.04	27.92	27.49	26.76	26.56
710	0.18	0.19	25.16	24.97	20.56	28.55	27.80	27.41	26.66	26.51
720	0.19	0.20	25.08	24.88	20.34	28.15	27.76	27.41	26.61	26.45
730	0.19	0.20	24.98	24.79	20.11	27.81	27.81	27.34	26.64	26.39
740	0.20	0.21	24.89	24.70	19.89	27.39	27.80	27.29	26.61	26.28
760	0.21	0.22	24.68	24.50	19.43	26.68	27.60	26.96	26.36	26.03
780	0.22	0.23	24.45	24.28	19.00	26.20	27.44	26.74	26.09	25.74
800	0.23	0.24	24.20	24.05	18.53	25.42	27.14	26.49	25.73	25.49
820	0.25	0.26	23.91	23.79	18.14	24.82	26.94	26.31	25.52	25.27
840	0.27	0.28	23.58	23.50	17.71	24.33	26.92	26.17	25.47	25.00

Typical Performance Curves

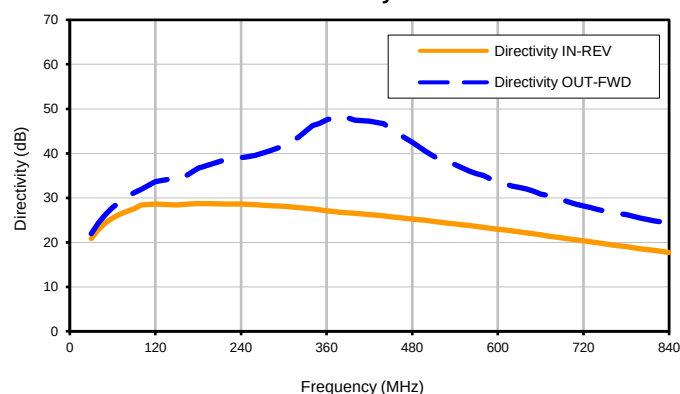
Insertion Loss



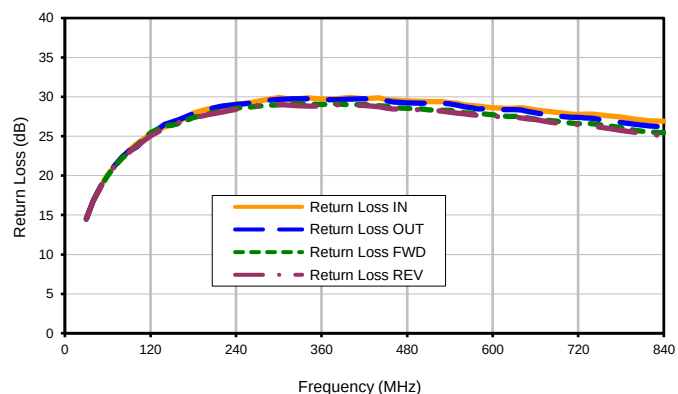
Coupling



Directivity

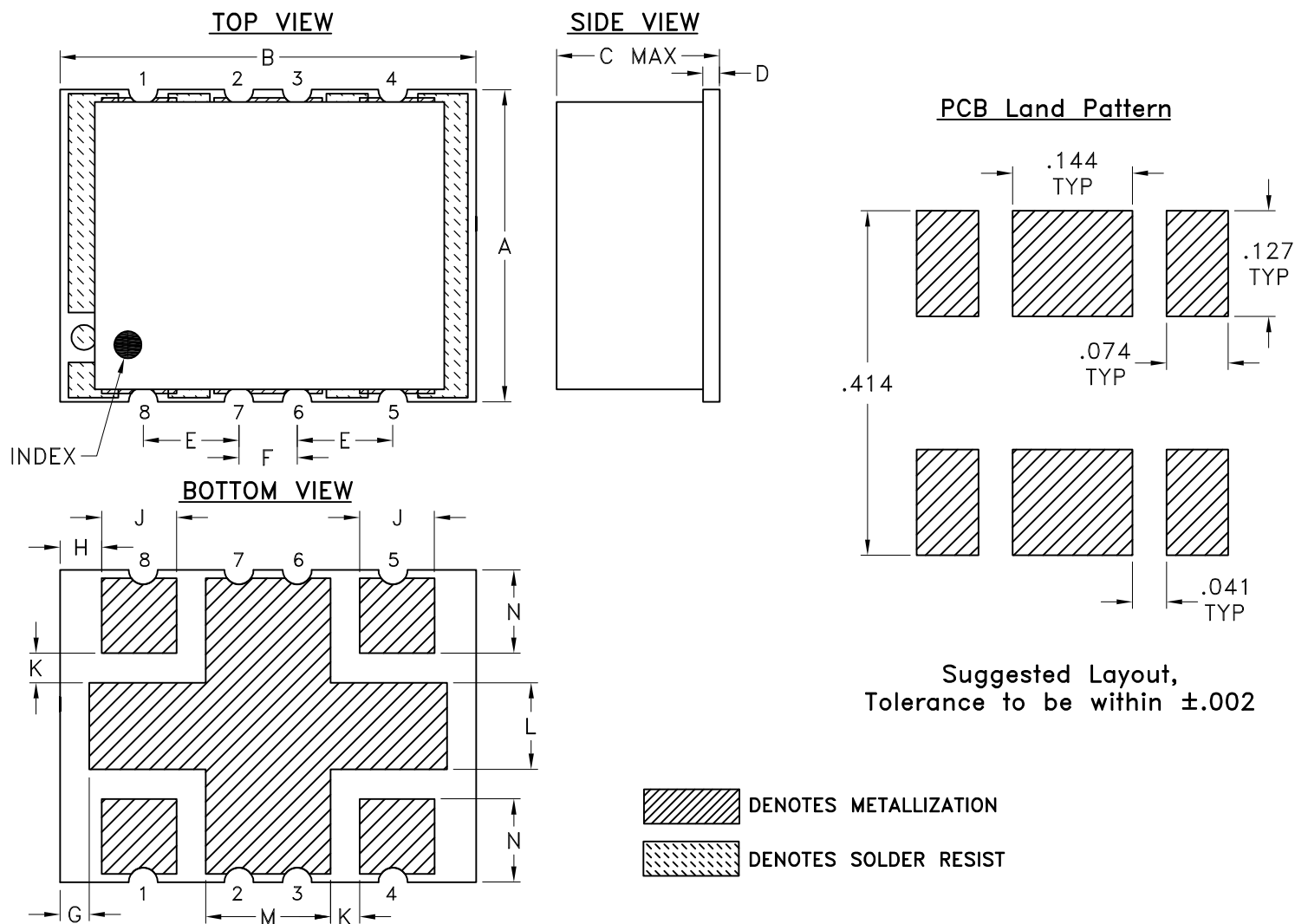


Return Loss



Outline Dimensions

AH202-1



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N	WT, GRAM
AH202-1	.38 (9.65)	.50 (12.70)	.25 (6.35)	.020 (0.51)	.115 (2.92)	.070 (1.78)	.035 (0.89)	.050 (1.27)	.090 (2.29)	.040 (1.02)	.105 (2.67)	.140 (3.56)	.095 (2.41)	.80

Dimensions are in inches (mm). Tolerances: 2 Pl. ± 0.01 ; 3 Pl. ± 0.005

Notes:

- Case material: Nickel Silver alloy.
- Base material: Printed wiring laminate.
- Termination finish:

For RoHS 3-5 μ inch (.08-.13 microns) Gold over 120-240 μ inch (3.05-6.10 microns) Nickel plate.

All models, (+) suffix.

For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

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ISO 9001 ISO 14001 CERTIFIED

ALL NEW
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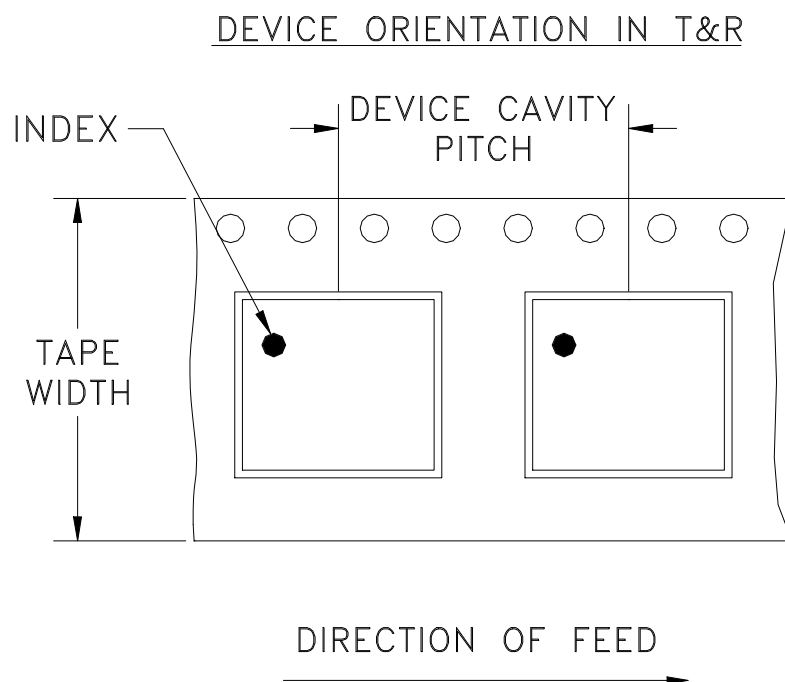
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RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F61



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
24	12	13	200

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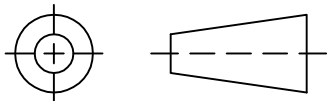
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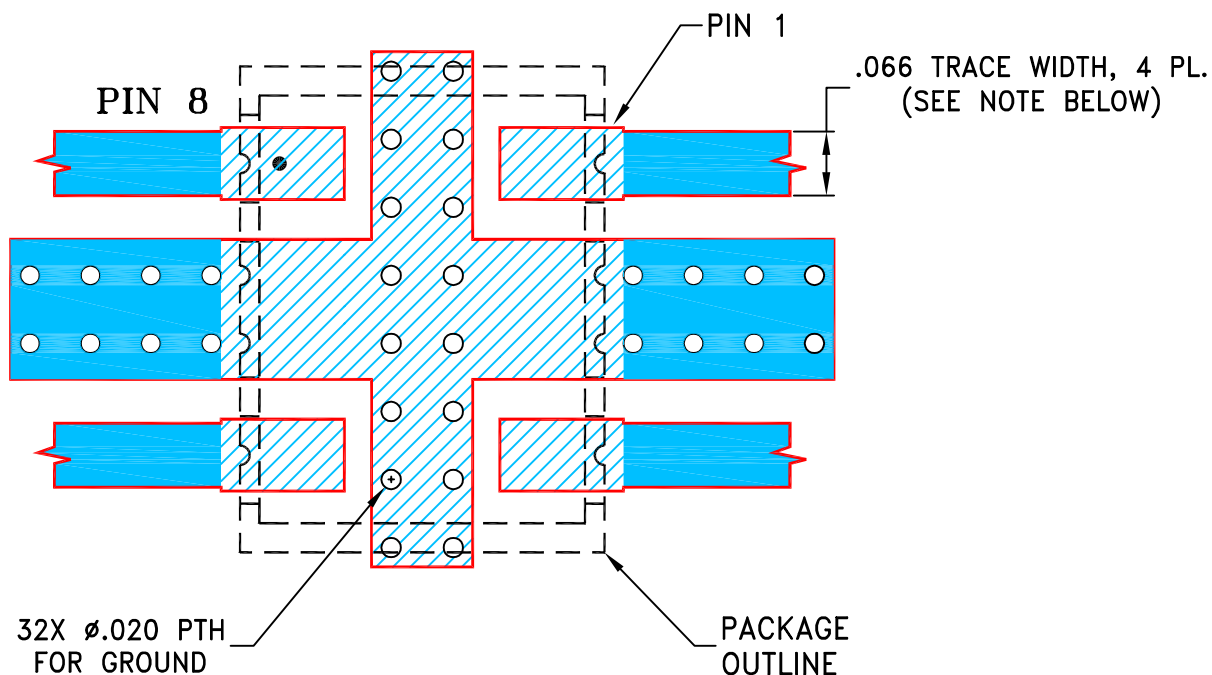
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-010817	NEW RELEASE	11/29/21	ITG	IL

SUGGESTED MOUNTING CONFIGURATION FOR AH202-1 CASE STYLE

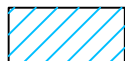


NOTES:

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- 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

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES
TOLERANCES ON:
2 PL DECIMALS $\pm$
3 PL DECIMALS $\pm .005$
ANGLES $\pm$
FRACTIONS $\pm$

INITIALS	DATE
DRAWN ITG	11/29/21
CHECKED GF	11/29/21
APPROVED IL	11/29/21



Mini-Circuits®

13 Neptune Avenue
Brooklyn NY 11235

PL, AH202-1, TBSYBDC2782VHP

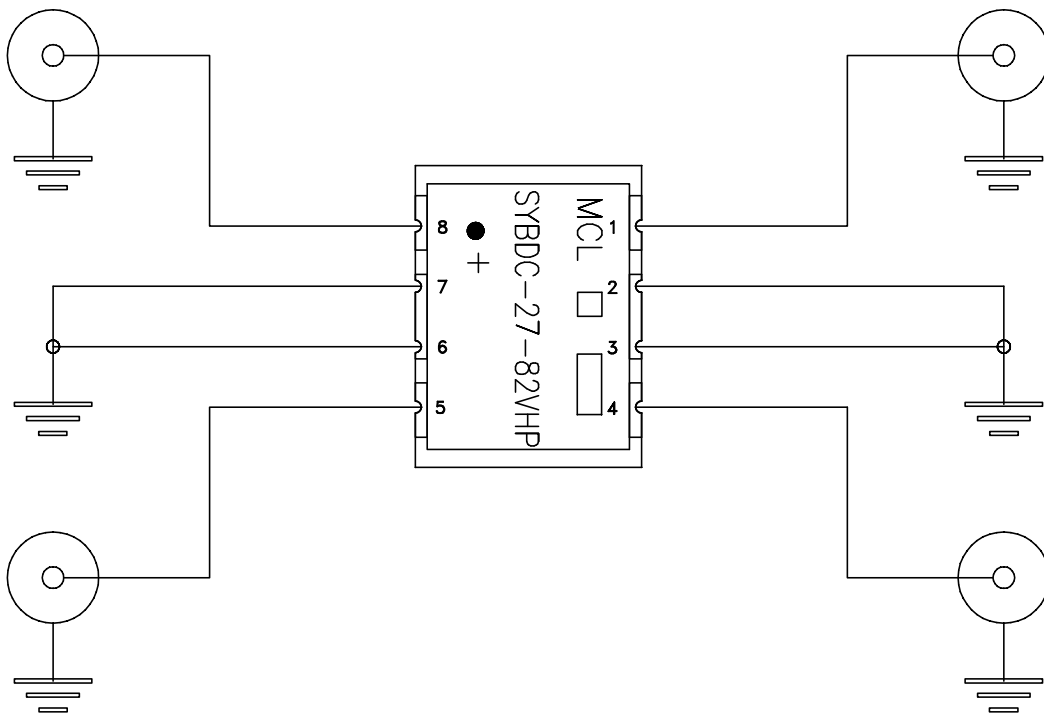
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ASHEETA1.DWG REV:A DATE:01/12/95

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-723	OR
FILE:	98PL723	SCALE:	5:1
SHEET:	1	OF	1

For Pin Connections refer to Data Sheet of the DUT

 Mini-Circuits®



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