Surface Mount

Power Splitter/Combiner

SYPJ-2-33+

2 Way-180° 50Ω 500 to 3000 MHz

CASE STYLE:AH202-1

The Big Deal

- Low amplitude unbalance, 0.5 dB typ.
- Low phase unbalance, 2° typ.

Product Overview

Mini-Circuits SYPJ-2-33+ is a wideband, 2 way, 180° surface mount splitter/combiner. This model provides very low amplitude and phase unbalance with good isolation and insertion loss over the full frequency range. It handles up to 0.5W of input power and comes in a small plastic case with excellent thermal performance (- 40°C to 85°C operating).

Key Features

Feature	Advantages
Wideband	Wide frequency coverage from 500 to 3000 MHz supports many applications.
10 MHz signal pass at port 2	Provides 10 MHz control signal.
Low AU and PU	SYPJ-2-33+ produces nearly equal output signals.
Good insertion loss: •1.4 dB typ, 500 – 2000 MHz • 2.1 dB typ., 3000 – 3000 MHz	Well matched for 50Ω systems.
Good isolation •17 dB typ., 500 – 2000 MHz • 25 dB typ., 2000 – 3000 MHz	Good isolation over the entire band minimizes effect of load changes at one output port on another output port.
0.5W max. input power	High power handling accommodates a wide range of system power requirements.
Small size, 0.38 x 0.50 x 0.25 in.	Accommodates dense PCB layouts.

*Does not include coupling 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/MCLStore/terms.jsp

Surface Mount

Power Splitter/Combiner

SYPJ-2-33+

2 Way-180° 50Ω 500 to 3000 MHz

CASE STYLE: AH202-1

+RoHS Compliant

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

Maximum Ratings

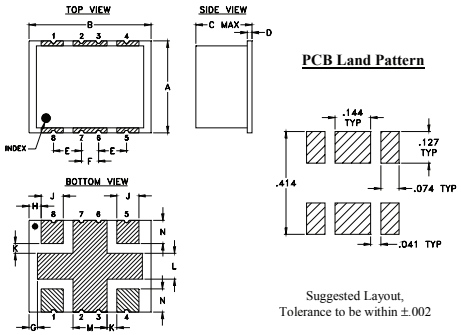
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Power Input (as a splitter)	0.5W max.
Internal Dissipation	0.25W max.

Permanent damage may occur if any of these limits are exceeded.

Pin Connections

SUM PORT	8
PORT 1 (180°)	5
PORT 2 (0°)	4
GROUND	1,2,3,6,7

Outline Drawing



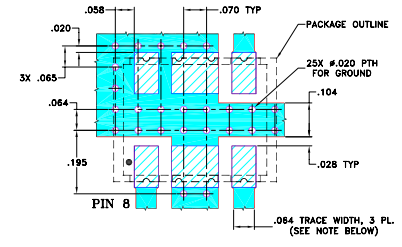
Suggested Layout,
Tolerance to be within ±.002

Outline Dimensions (inch / 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

Demo Board MCL P/N: TB-427
Suggested PCB Layout (PL-274)



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. 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

Features

- wideband, 500 to 3000 MHz
- low amplitude unbalance, 0.5 dB typ.
- low phase unbalance, 2.0 deg. typ.
- 10 MHz signal pass@ port 2: with 1.5 dB/max IL

Applications

- VHF/UHF
- cellular, GPS, PCS
- communication systems
- receivers & transmitters
- instrumentation
- CATV

Electrical Specifications at 25°C

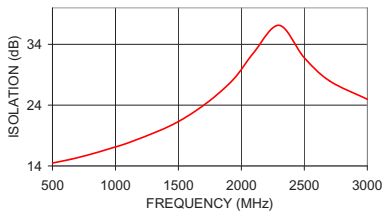
Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Frequency		500		3000	MHz
Insertion Loss (above theoretical 3.0 dB)	500-2000	—	1.4	2.2	dB
	2000-3000	—	2.1	3.2	
Isolation	500-2000	11.0	17	—	dB
	2000-3000	19	25	—	
Phase Unbalance (out of 180°C)	500-2000	—	2.0	9.0	Degree
	2000-3000	—	5.0	14.0	
Amplitude Unbalance	500-2000	—	0.8	1.2	dB
	2000-3000	—	0.3	0.9	
VSWR (Port S)	500-3000	—	1.7	—	:1
VSWR (Port 1-2)	500-3000	—	1.7	—	:1

Typical Performance Data

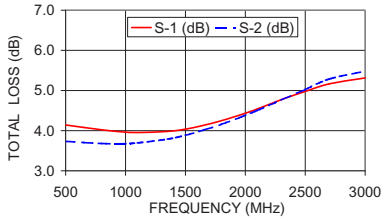
Frequency (MHz)	Total Loss[1] (dB)		Amplitude Unbalance (dB)	Isolation (dB)	Phase Unbalance (deg.)	VSWR S	VSWR 1	VSWR 2
	S-1	S-2						
500	4.14	3.74	0.81	14.47	0.29	1.88	1.30	1.38
650	4.08	3.70	0.75	15.12	0.76	1.75	1.30	1.38
800	4.02	3.68	0.68	15.90	1.12	1.61	1.29	1.36
950	3.97	3.67	0.61	16.82	1.42	1.46	1.28	1.31
1100	3.95	3.69	0.52	17.79	1.61	1.32	1.27	1.26
1350	3.98	3.79	0.38	19.82	1.81	1.14	1.29	1.17
1500	4.04	3.88	0.31	21.30	1.88	1.13	1.32	1.13
1650	4.13	4.01	0.24	23.25	1.89	1.21	1.37	1.15
1800	4.25	4.16	0.18	25.60	1.86	1.31	1.43	1.20
1950	4.39	4.32	0.12	28.54	1.80	1.43	1.50	1.28
2100	4.54	4.50	0.08	32.70	1.78	1.56	1.58	1.37
2300	4.77	4.76	0.02	37.13	1.76	1.69	1.66	1.48
2500	4.98	5.03	0.10	31.79	1.66	1.76	1.69	1.57
2700	5.17	5.29	0.24	27.99	1.83	1.79	1.65	1.63
3000	5.31	5.48	0.33	24.97	3.08	1.73	1.52	1.58

1. Total Loss = Insertion Loss + 3dB splitter theoretical loss.

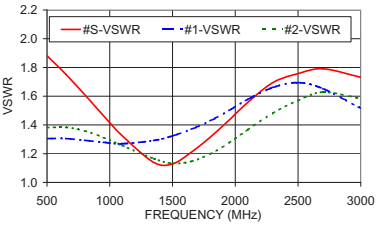
SYPJ-2-33+
ISOLATION



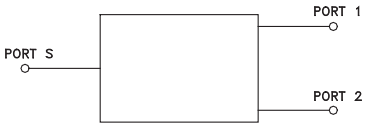
SYPJ-2-33+
TOTAL LOSS



SYPJ-2-33+
VSWR



Electrical Schematic



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/MCLStore/terms.jsp

2 Way-180° Power Splitter/Combiner SYPJ-2-33+

Typical Performance Data

FREQUENCY (MHz)	TOTAL LOSS[1] (dB) S-1	TOTAL LOSS[1] (dB) S-2	AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	PHASE UNBALANCE (deg.)
500.0	4.14	3.74	0.81	14.47	0.29
550.0	4.12	3.73	0.79	14.68	0.45
600.0	4.10	3.72	0.77	14.87	0.60
650.0	4.08	3.70	0.75	15.12	0.76
700.0	4.06	3.70	0.73	15.35	0.88
750.0	4.04	3.68	0.71	15.61	1.01
800.0	4.02	3.68	0.68	15.90	1.12
850.0	4.00	3.67	0.66	16.19	1.22
900.0	3.99	3.68	0.63	16.51	1.32
950.0	3.97	3.67	0.61	16.82	1.42
1000.0	3.97	3.68	0.58	17.13	1.48
1050.0	3.96	3.68	0.55	17.46	1.58
1100.0	3.95	3.69	0.52	17.79	1.61
1150.0	3.95	3.70	0.49	18.17	1.67
1200.0	3.95	3.72	0.46	18.53	1.72
1250.0	3.96	3.74	0.43	18.92	1.76
1300.0	3.97	3.76	0.41	19.38	1.80
1350.0	3.98	3.79	0.38	19.82	1.81
1400.0	3.99	3.81	0.36	20.29	1.83
1450.0	4.01	3.85	0.33	20.78	1.86
1500.0	4.04	3.88	0.31	21.30	1.88
1550.0	4.07	3.93	0.28	21.90	1.89
1600.0	4.10	3.97	0.26	22.53	1.88
1650.0	4.13	4.01	0.24	23.25	1.89
1700.0	4.17	4.06	0.22	23.99	1.89
1750.0	4.21	4.11	0.20	24.78	1.86
1800.0	4.25	4.16	0.18	25.60	1.86
1850.0	4.29	4.21	0.16	26.51	1.82
1900.0	4.33	4.26	0.14	27.47	1.79
1950.0	4.39	4.32	0.12	28.54	1.80
2000.0	4.43	4.38	0.11	29.82	1.76
2050.0	4.49	4.44	0.09	31.09	1.78
2100.0	4.54	4.50	0.08	32.70	1.78
2150.0	4.59	4.56	0.06	34.18	1.76
2200.0	4.65	4.63	0.04	35.85	1.77
2300.0	4.77	4.76	0.02	37.13	1.76
2400.0	4.88	4.90	0.04	34.32	1.63
2500.0	4.98	5.03	0.10	31.79	1.66
2600.0	5.07	5.15	0.16	29.90	1.69
2650.0	5.12	5.22	0.20	28.92	1.74
2700.0	5.17	5.29	0.24	27.99	1.83
2750.0	5.19	5.33	0.26	27.19	2.11
2800.0	5.23	5.37	0.27	26.73	2.18
2850.0	5.25	5.39	0.29	26.14	2.35
2900.0	5.27	5.43	0.32	25.75	2.53
3000.0	5.31	5.48	0.33	24.97	3.08

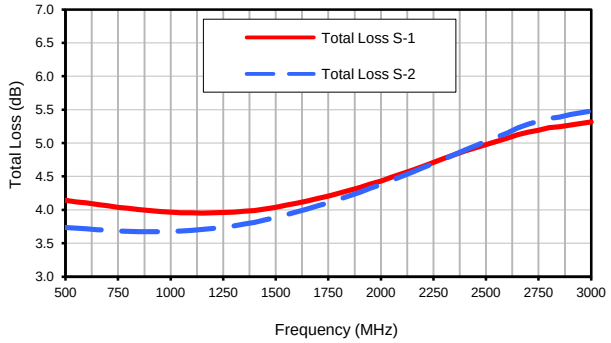
FREQUENCY (MHz)	VSWR (:1) S	VSWR (:1) 1	VSWR (:1) 2
500.0	1.88	1.30	1.38
550.0	1.84	1.31	1.39
600.0	1.80	1.31	1.39
650.0	1.75	1.30	1.38
700.0	1.71	1.30	1.38
750.0	1.66	1.30	1.37
800.0	1.61	1.29	1.36
850.0	1.56	1.29	1.34
900.0	1.51	1.28	1.33
950.0	1.46	1.28	1.31
1000.0	1.42	1.27	1.29
1050.0	1.37	1.27	1.28
1100.0	1.32	1.27	1.26
1150.0	1.28	1.27	1.24
1200.0	1.24	1.27	1.22
1250.0	1.20	1.28	1.20
1300.0	1.17	1.28	1.18
1350.0	1.14	1.29	1.17
1400.0	1.12	1.30	1.15
1450.0	1.12	1.31	1.14
1500.0	1.13	1.32	1.13
1550.0	1.15	1.34	1.13
1600.0	1.18	1.36	1.14
1650.0	1.21	1.37	1.15
1700.0	1.24	1.39	1.16
1750.0	1.28	1.41	1.18
1800.0	1.31	1.43	1.20
1850.0	1.35	1.46	1.22
1900.0	1.39	1.48	1.25
1950.0	1.43	1.50	1.28
2000.0	1.47	1.53	1.31
2050.0	1.51	1.55	1.34
2100.0	1.56	1.58	1.37
2150.0	1.59	1.60	1.40
2200.0	1.63	1.62	1.43
2300.0	1.69	1.66	1.48
2400.0	1.73	1.68	1.53
2500.0	1.76	1.69	1.57
2600.0	1.78	1.68	1.60
2650.0	1.78	1.66	1.62
2700.0	1.79	1.65	1.63
2750.0	1.78	1.63	1.63
2800.0	1.79	1.61	1.63
2850.0	1.77	1.60	1.62
2900.0	1.76	1.57	1.61
3000.0	1.73	1.52	1.58

[1]Total Loss = Insertion Loss + 3dB Splitter Loss

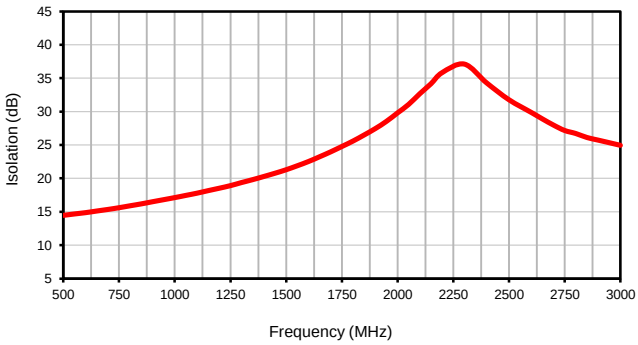
2 Way-180° Power Splitter/Combiner SYPJ-2-33+

Typical Performance Curves

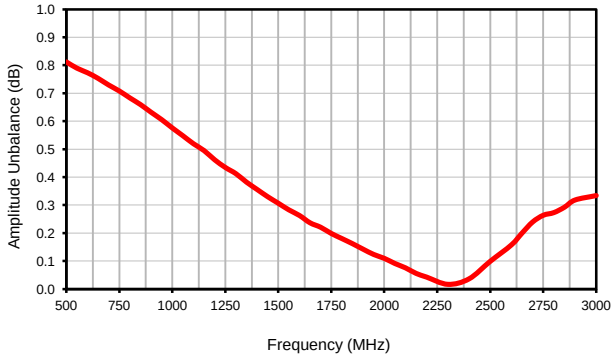
Total Loss



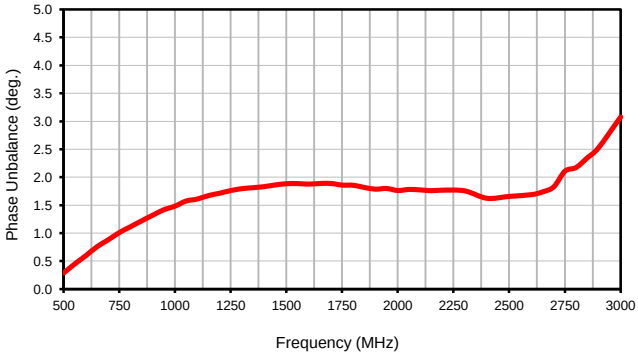
Isolation



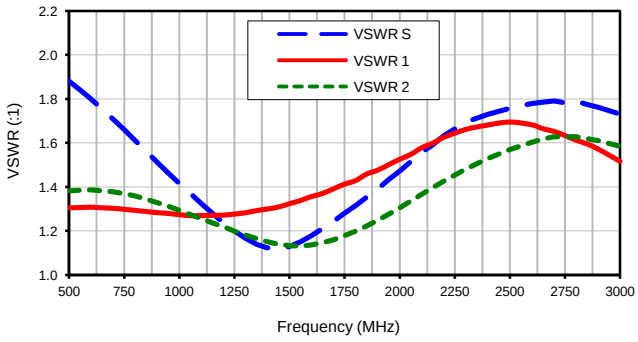
Amplitude Unbalance



Phase Unbalance



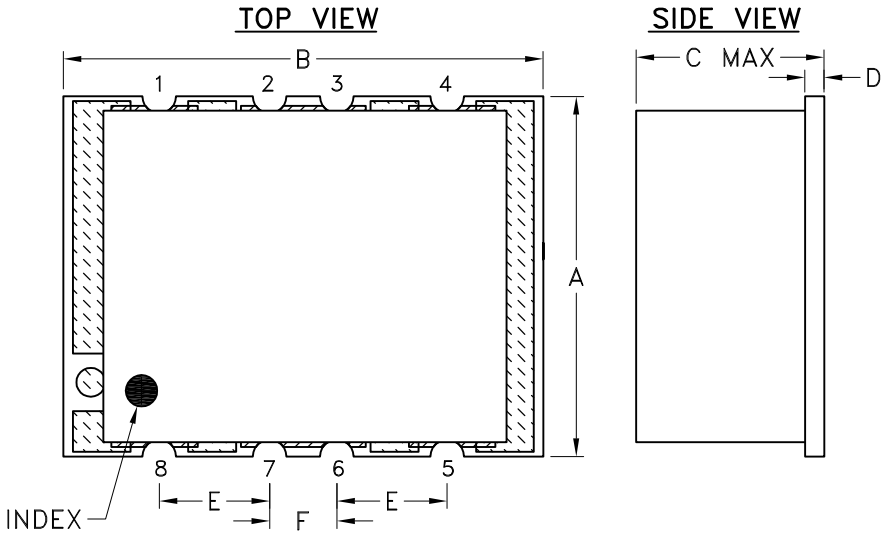
VSWR

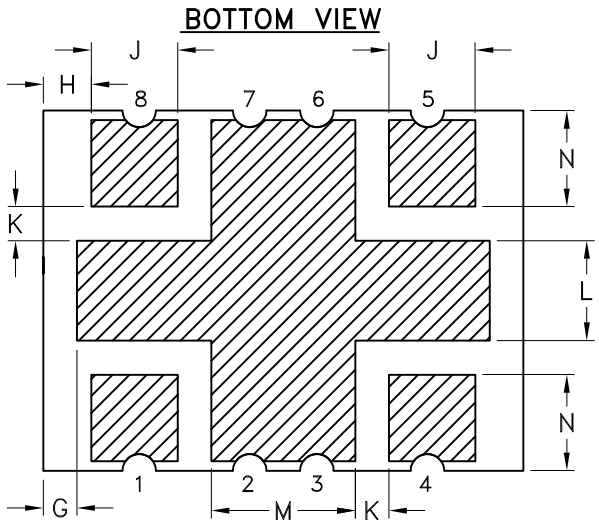


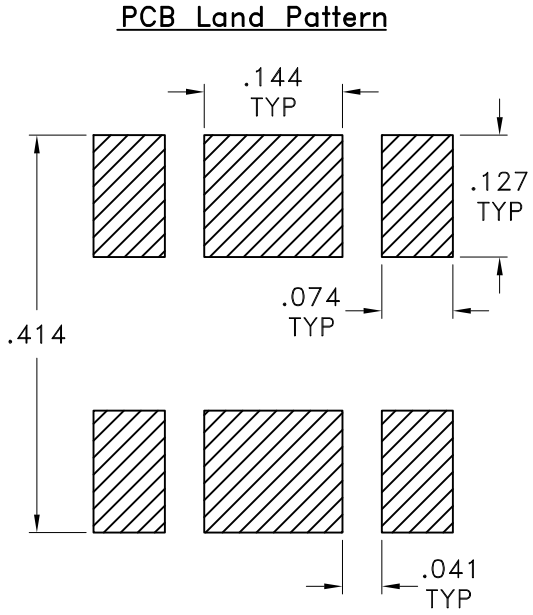
Case Style AH

Outline Dimensions

AH202-1







Suggested Layout,
Tolerance to be within ±.002

DENOTES METALLIZATION

DENOTES SOLDER RESIST

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.±.01; 3 Pl. ±.005

Notes:

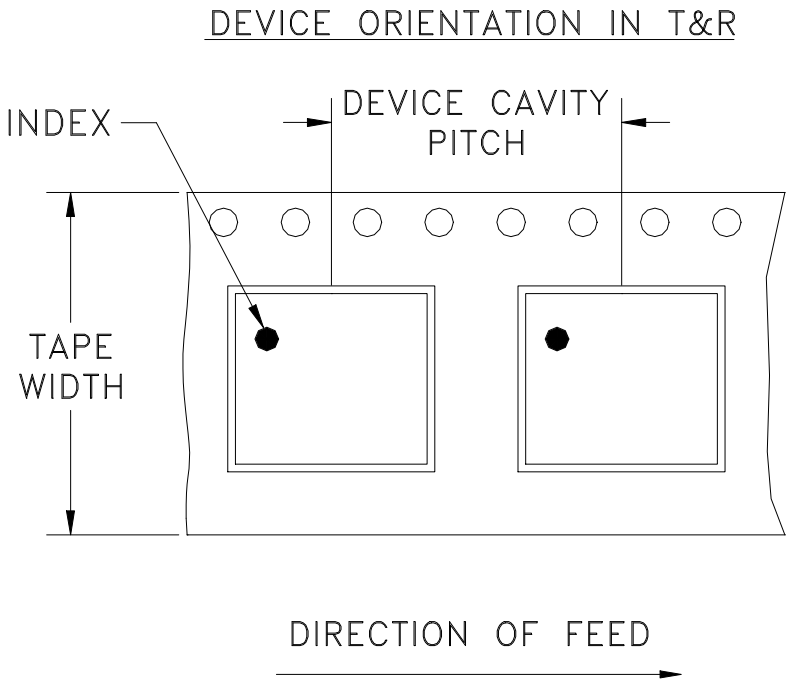
1. Case material: Nickel Silver alloy.
2. Base material: Printed wiring laminate.
3. Termination finish:

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.

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

Tape & Reel Packaging TR-F61



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

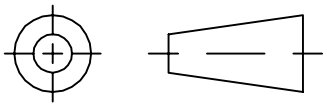
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

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

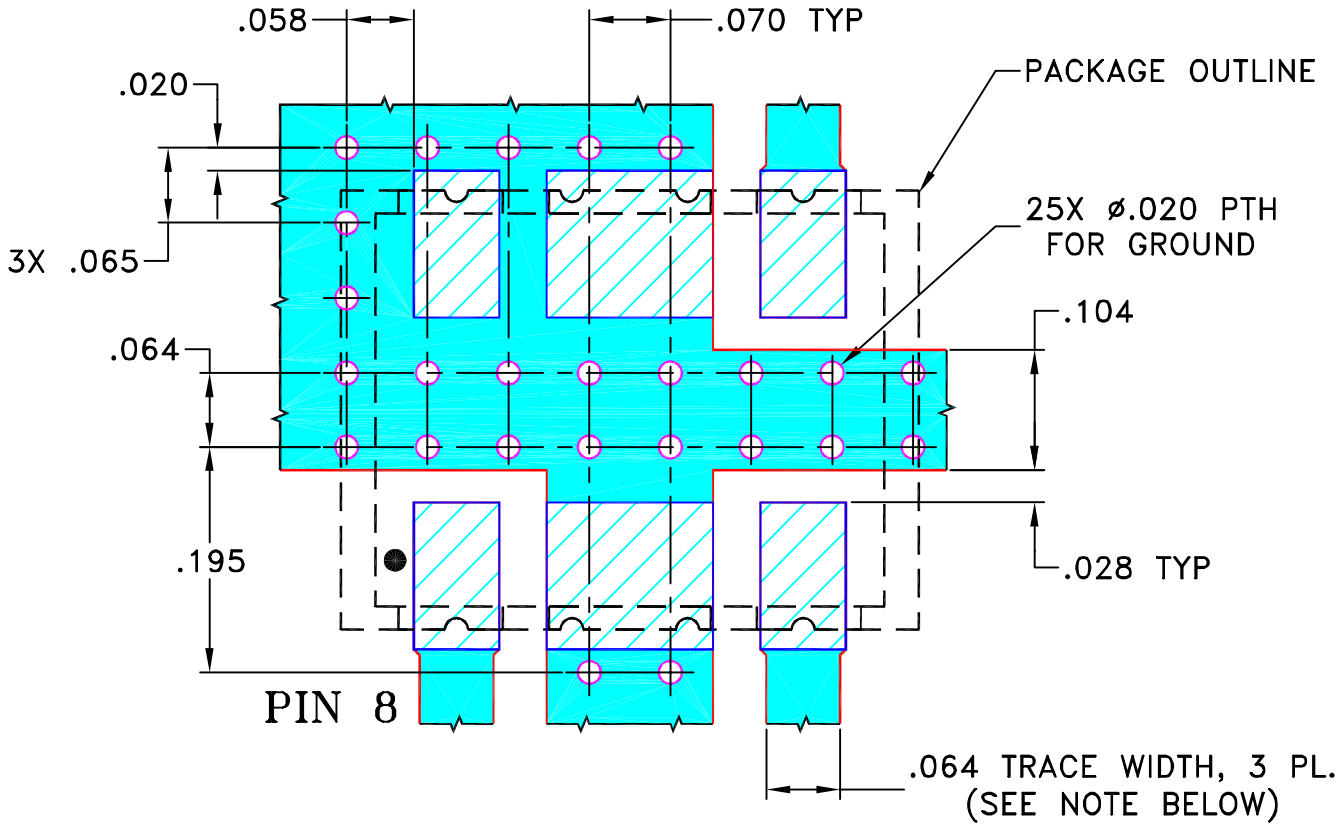
This document and its contents are the property of Mini-Circuits.

THIRD ANGLE PROJECTION



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M110938	NEW RELEASE	04/12/07	AV	HY

SUGGESTED MOUNTING CONFIGURATION FOR AH202-2 CASE STYLE, "sb" PIN CONNECTION



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. 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		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	AV	04/11/07
TOLERANCES ON:	CHECKED	IL	04/12/07
2 PL DECIMALS ±	APPROVED	HY	04/12/07
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.

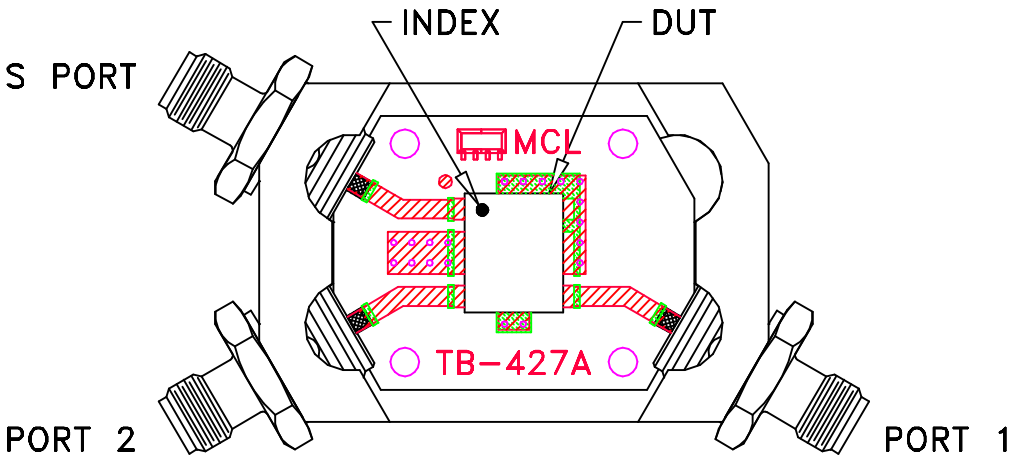
ASHEETA1.DWG REV:A DATE:01/12/95

Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

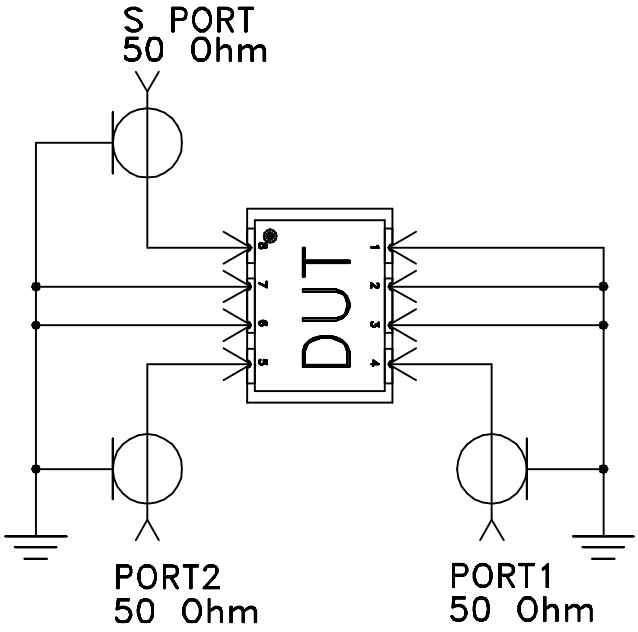
PL, sb, AH202-2, SYPS-2, TB-427+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-274	OR
FILE: 98PL274	SCALE: 6:1	SHEET: 1 OF 1	

Evaluation Board and Circuit



TB-427+



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or its equivalent, Dielectric Constant=3.5, Thickness=.030"

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.