

Surface Mount

Power Splitter/Combiner

SYPS-2-22HP+

2 Way-0° 50Ω 2 to 200 MHz 5 Watt

The Big Deal

- High power handling, 5W as a splitter
- High IP2 (+80 dB) and IP3 (+60 dB) at 1W input
- Low insertion loss, 0.5 dB
- Low unbalance, 0.1 dB / 1°
- Good isolation, 22 dB



CASE STYLE: AH202-1

Product Overview

Mini-Circuits' SYPS-2-22HP+ is a surface-mount 2-way 0° splitter/combiner covering the 2 to 200 MHz frequency range, supporting bandwidth requirements for a wide range of RF/microwave systems. This model can handle up to 5W RF input power as a splitter and provides low insertion loss, high isolation, low amplitude unbalance, and low phase unbalance. The unit comes housed in a miniature, shielded, 8-lead package (0.38 x 0.50 x 0.25") with wrap-around terminations for excellent solderability.

Key Features

Feature	Advantages
High power handling, 5W	Supports a wide range of power requirements in a miniature package, minimizing space requirements.
High IP2, +80 dBm High IP3, +60 dBm	Minimizes second harmonic and third order intermodulation where multiple carriers may be present.
Low insertion loss, 0.5 dB (above 3 dB theoretical loss)	The combination of 5W power handling and low insertion loss makes this model a suitable candidate for distributing signals while maintaining excellent transmission of signal power.
High isolation, 22 dB	Minimizes interference between ports.
Low unbalance, 0.1 dB / 1°	Low unbalance provides nearly equal output signals, ideal for parallel path/multichannel systems.
Small size, 0.38 x 0.50 x 0.25"	Saves space in dense PCB layouts.

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-0° 50Ω 2 to 200 MHz 5 Watt

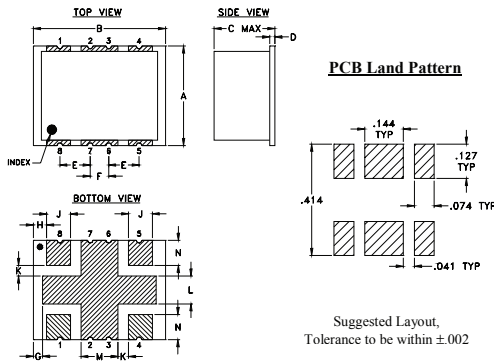
Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Power Input (as a splitter)	5W max.
Internal Dissipation	0.25W max.
Permanent damage may occur if any of these limits are exceeded.	

Pin Connections

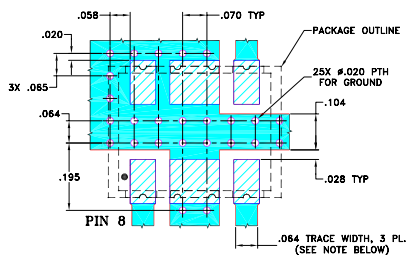
SUM PORT	8
PORT 1	5
PORT 2	4
GROUND	1,2,3,6,7

Outline Drawing



Outline Dimensions (inch)

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.
3. DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
4. DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

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Features

- high IP2, +80 dBm typ., IP3, +60 dBm at 1watt input
- low amplitude unbalance, 0.1 dB typ.
- low phase unbalance, 1.0 deg. typ.
- low insertion loss, 0.5 dB typ.

Applications

- VHF/UHF
- cellular, GPS, PCS
- communication systems
- instrumentation

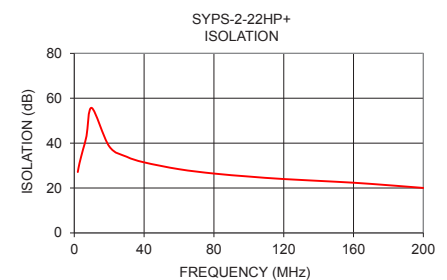
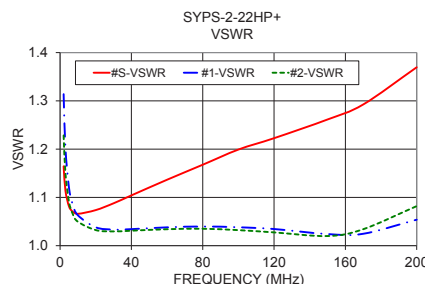
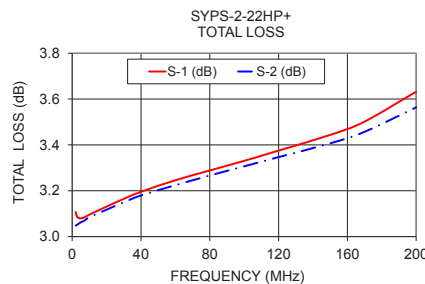
Electrical Specifications at 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Frequency		2		200	MHz
Insertion Loss (above theoretical 3.0 dB)	5-150	—	0.4	0.6	dB
	2-200	—	0.6	0.9	
Isolation	2-200	18	22	—	dB
Phase Unbalance	5-150	—	0.1	1.5	Degree
	2-200	—	1.5	4	
Amplitude Unbalance	2-200	—	0.1	0.25	dB
VSWR (Port S)	5-150	—	1.15	1.35	:1
	2-200	—	1.25	1.45	
VSWR (Port 1-2)	5-150	—	1.00	1.25	:1
	2-200	—	1.20	1.45	

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					
2	3.11	3.05	0.06	27.13	1.91	1.16	1.23
3	3.08	3.05	0.03	31.11	1.29	1.11	1.20
5	3.08	3.06	0.02	37.15	0.78	1.08	1.12
7	3.08	3.07	0.01	43.15	0.56	1.07	1.09
10	3.10	3.08	0.01	55.69	0.37	1.07	1.06
20	3.13	3.12	0.01	38.59	0.14	1.07	1.04
30	3.16	3.15	0.01	33.95	0.06	1.09	1.03
40	3.20	3.18	0.02	31.44	0.01	1.10	1.03
60	3.25	3.22	0.02	28.39	0.02	1.14	1.04
80	3.29	3.27	0.02	26.45	0.03	1.17	1.04
100	3.33	3.31	0.02	25.12	0.04	1.20	1.04
120	3.38	3.35	0.03	24.00	0.02	1.22	1.03
150	3.44	3.41	0.04	22.79	0.14	1.26	1.02
170	3.50	3.46	0.04	21.84	0.28	1.29	1.02
200	3.63	3.56	0.07	20.03	0.60	1.37	1.05

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



Electrical Schematic



Generic photo used for illustration purposes only

CASE STYLE: AH202-1

+RoHS Compliant

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

Available Tape and Reel at no extra cost

Reel Size	Devices/Reel
13"	200

2 Way-0° Power Splitter/Combiner

SYPS-2-22HP+

Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS ¹ (dB)		AMPLITUDE UNBALANCE (dB)	ISOLATION (dB) 1-2	PHASE UNBALANCE (deg.)	FREQUENCY (MHz)	VSWR (:1)		
	S-1	S-2					S	1	2
1	3.25	3.06	0.19	21.28	3.53	1	1.34	1.70	1.49
2	3.11	3.05	0.06	27.13	1.91	2	1.16	1.31	1.23
3	3.08	3.05	0.03	31.11	1.29	3	1.11	1.20	1.15
4	3.08	3.06	0.02	34.31	0.97	4	1.09	1.15	1.11
5	3.08	3.06	0.02	37.15	0.78	5	1.08	1.12	1.09
6	3.08	3.07	0.02	39.94	0.65	6	1.07	1.10	1.08
7	3.08	3.07	0.01	43.15	0.56	7	1.07	1.09	1.07
8	3.09	3.07	0.01	46.96	0.49	8	1.07	1.08	1.06
10	3.10	3.08	0.01	55.69	0.37	10	1.07	1.06	1.05
15	3.11	3.10	0.01	43.64	0.23	15	1.07	1.05	1.04
20	3.13	3.12	0.01	38.59	0.14	20	1.07	1.04	1.03
25	3.15	3.13	0.01	35.84	0.09	25	1.08	1.03	1.03
30	3.16	3.15	0.01	33.95	0.06	30	1.09	1.03	1.03
40	3.20	3.18	0.02	31.44	0.01	40	1.10	1.03	1.03
50	3.22	3.20	0.02	29.73	0.01	50	1.12	1.04	1.03
60	3.25	3.22	0.02	28.39	0.02	60	1.14	1.04	1.03
70	3.27	3.25	0.02	27.33	0.03	70	1.15	1.04	1.04
80	3.29	3.27	0.02	26.45	0.03	80	1.17	1.04	1.04
90	3.31	3.29	0.02	25.72	0.04	90	1.18	1.04	1.03
100	3.33	3.31	0.02	25.12	0.04	100	1.20	1.04	1.03
110	3.35	3.33	0.03	24.54	0.03	110	1.21	1.04	1.03
120	3.38	3.35	0.03	24.00	0.02	120	1.22	1.03	1.03
125	3.39	3.36	0.03	23.75	0.04	125	1.23	1.03	1.03
130	3.40	3.37	0.03	23.52	0.07	130	1.23	1.03	1.03
135	3.41	3.38	0.03	23.32	0.09	135	1.24	1.03	1.02
140	3.42	3.39	0.03	23.14	0.10	140	1.25	1.03	1.02
145	3.43	3.40	0.03	22.98	0.11	145	1.25	1.03	1.02
150	3.44	3.41	0.04	22.79	0.14	150	1.26	1.02	1.02
155	3.46	3.42	0.04	22.58	0.17	155	1.27	1.02	1.02
160	3.47	3.43	0.04	22.35	0.20	160	1.28	1.02	1.02
165	3.49	3.44	0.04	22.10	0.24	165	1.28	1.02	1.03
170	3.50	3.46	0.04	21.84	0.28	170	1.29	1.02	1.03
200	3.63	3.56	0.07	20.03	0.60	200	1.37	1.05	1.08
250	4.11	3.97	0.14	15.69	1.51	250	1.70	1.16	1.23

¹Total Loss = Insertion Loss + 3dB Splitter Loss



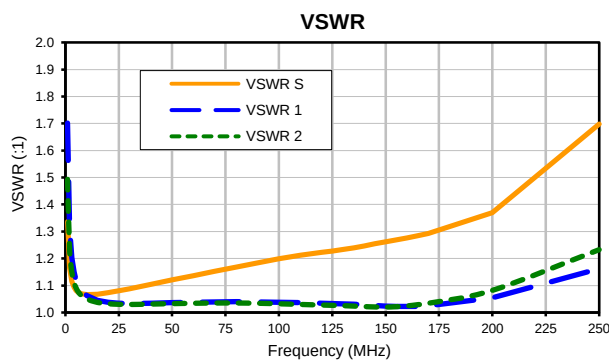
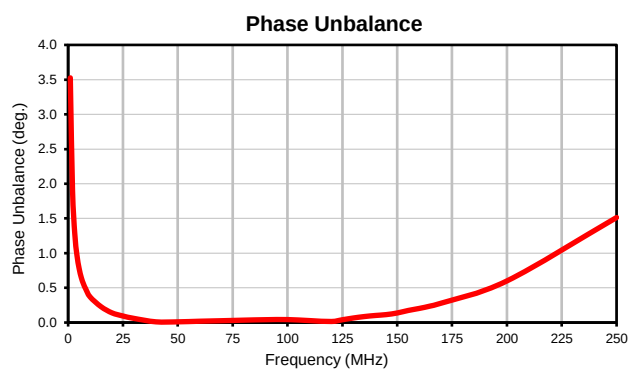
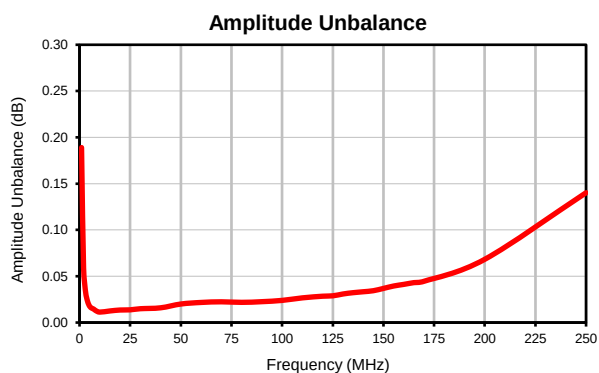
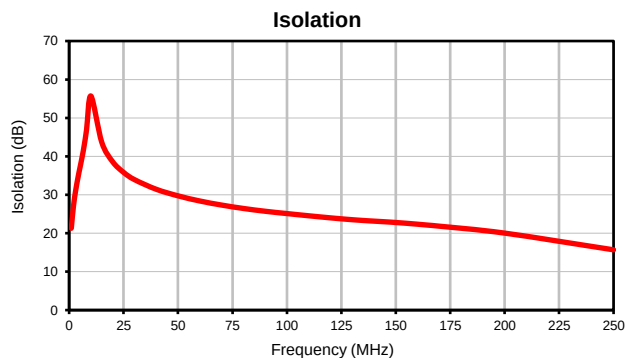
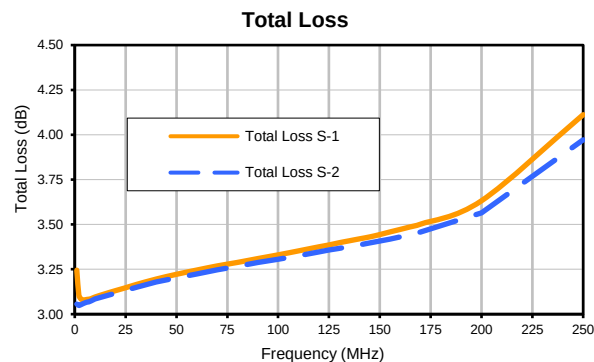
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 The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

IF/RF MICROWAVE COMPONENTS



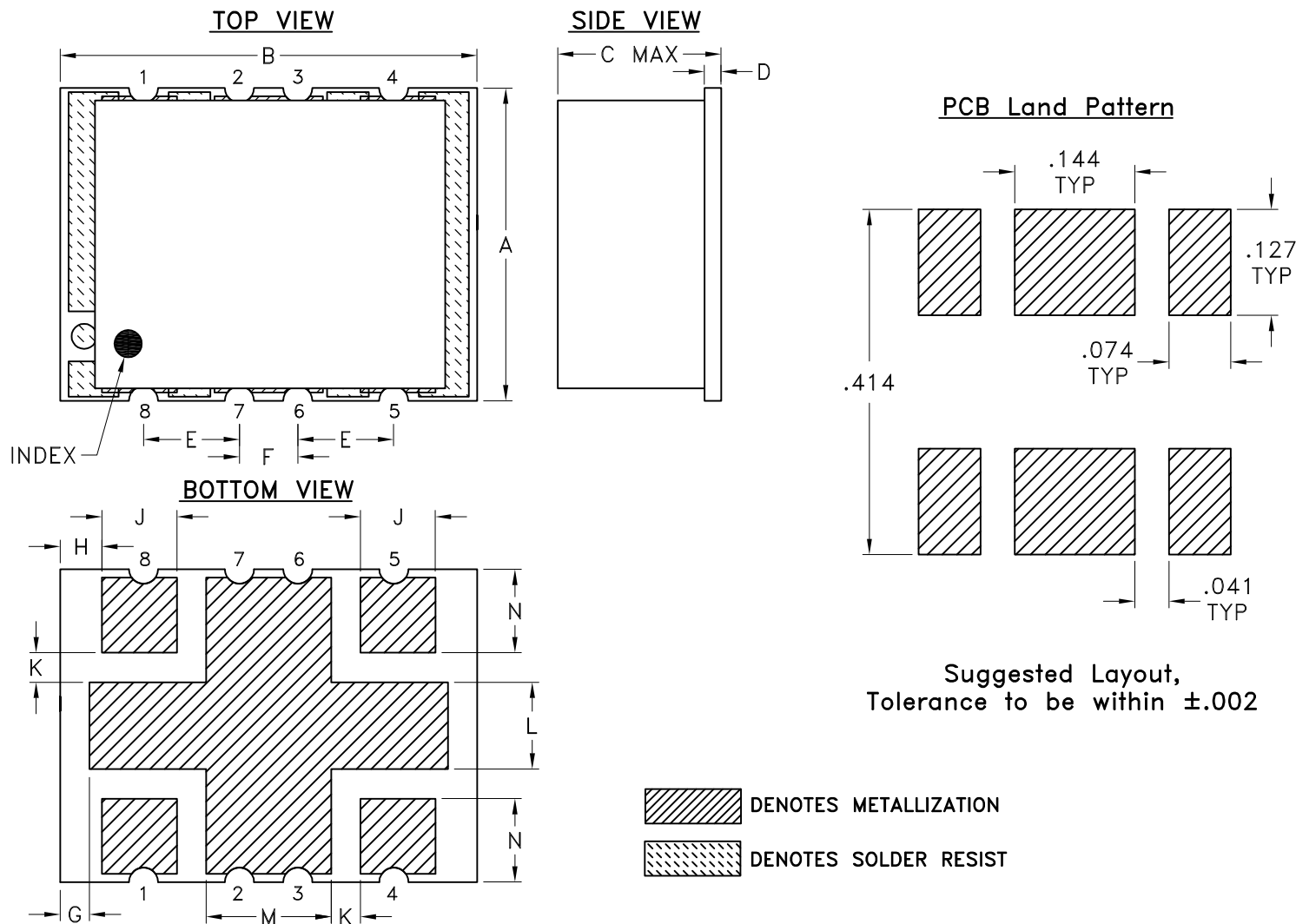
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SYPS-2-22HP+
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Page 1 of 1

Typical Performance Curves



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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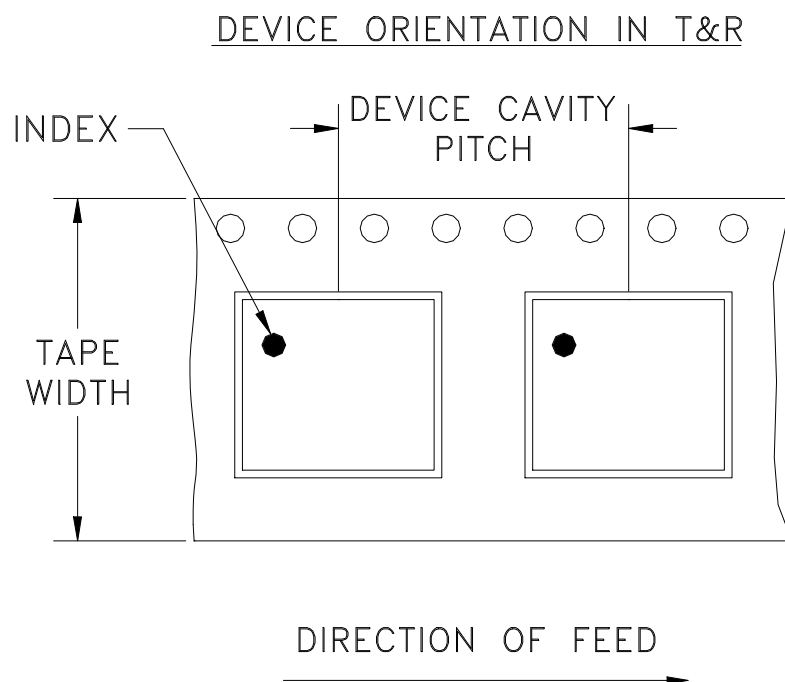
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RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F61



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

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



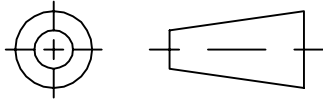
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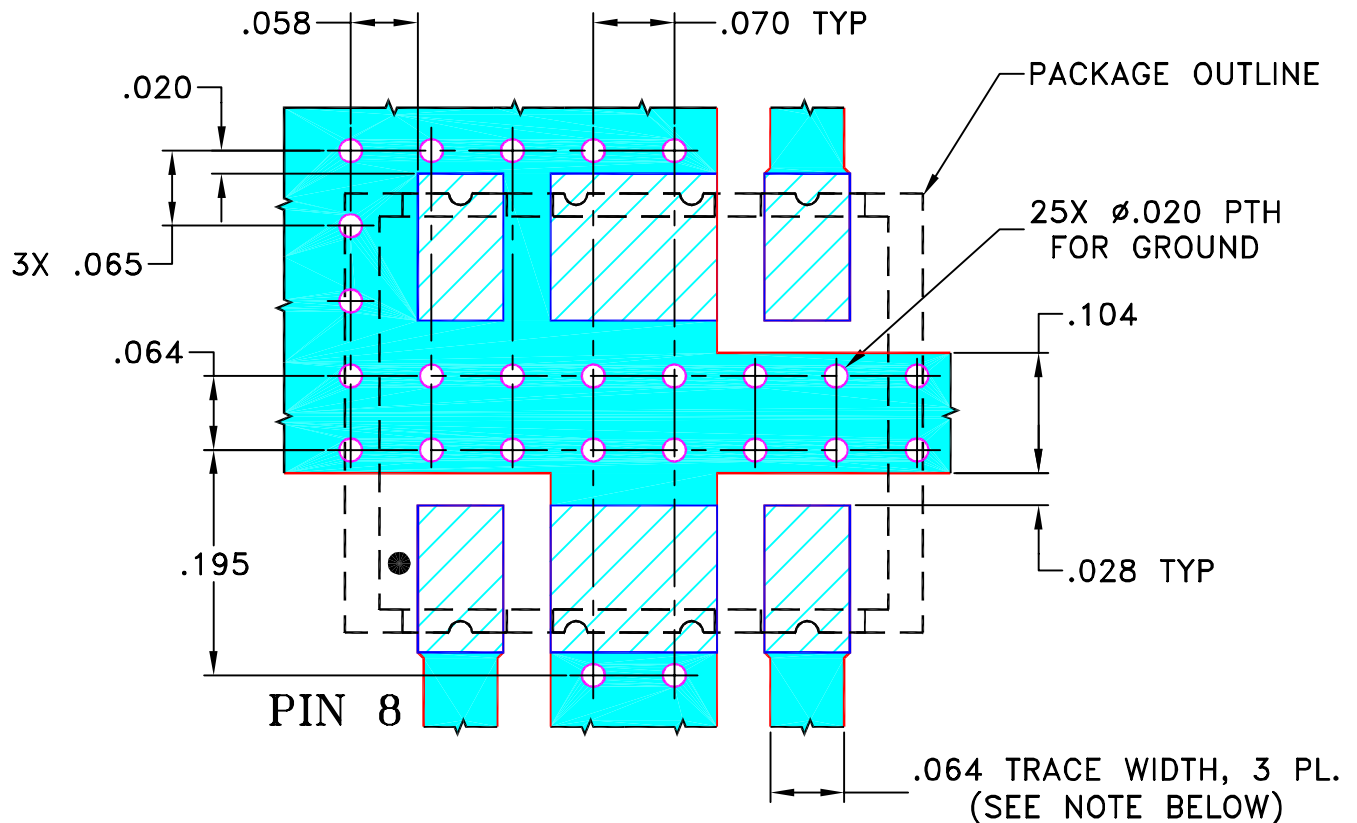
THIRD ANGLE PROJECTION



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" $\pm$.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 $\pm$

APPROVED

HY

04/12/07

3 PL DECIMALS $\pm$.005ANGLES $\pm$ FRACTIONS $\pm$

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

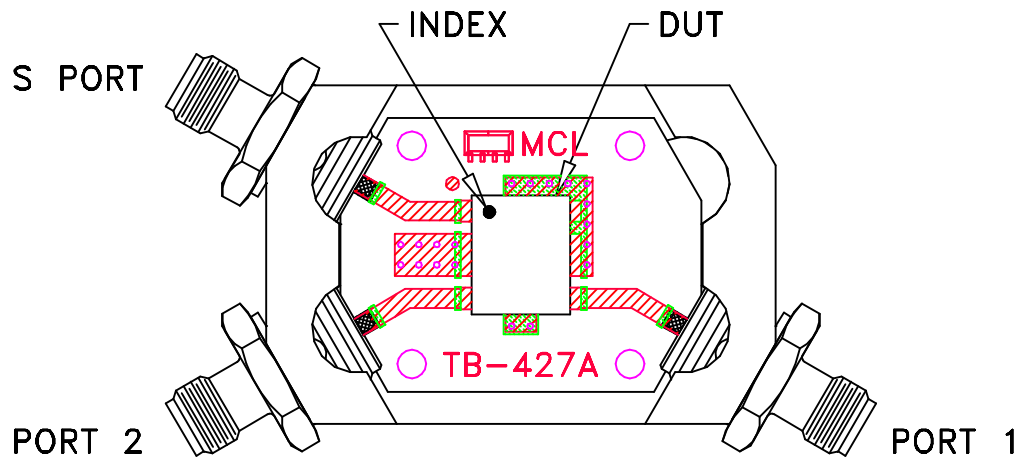
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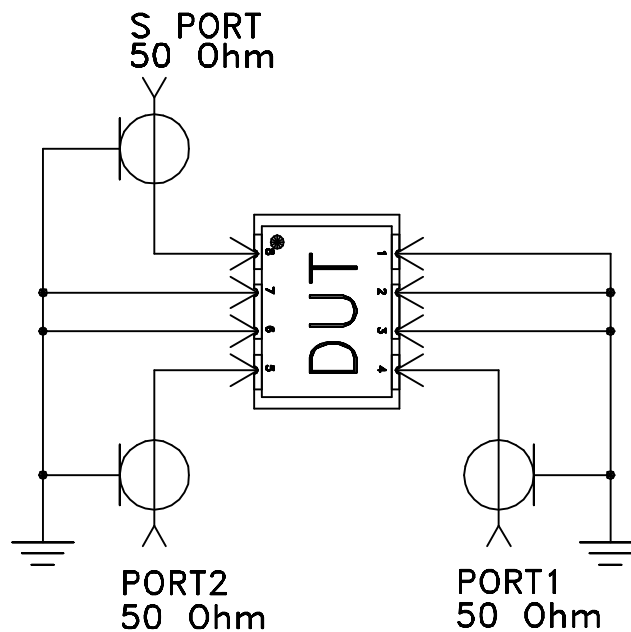
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Evaluation Board and Circuit



TB-427+



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or its equivalent, Dielectric Constant=3.5, Thickness=.030"

 **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