SURFACE MOUNT

Power Splitter/Combiner SYPS-3-72-75+

75Ω 3 Way-0° 5 to 700 MHz

KEY FEATURES

- Low Insertion Loss 0.9 dB typ.
- Good Isolation, 24 dB typ.
- Wide Frequency Band, 5 to 700 MHz, usable 5-1000 MHz
- Low Amplitude Unbalance, 0.2 dB typ.
- Low Phase Unbalance, 1.3 deg. typ.

Generic photo used for illustration purposes only

APPLICATIONS

- CATV
- VHF/UHF
- Communication systems

FUNCTIONAL DIAGRAM

PRODUCT OVERVIEW

Mini-Circuits' SYPS-3-72-75+ is a 75Ω 3-way 0° surface mount splitter/combiner covering the 5 to 700 MHz frequency range, supporting bandwidth requirements for communication systems and equipment as well as other broadband applications. This model can handle up to 1W RF input power as a splitter and provides low insertion loss, high isolation, and low phase and amplitude unbalance. It comes housed in a miniature, 8-lead plastic package (0.38 x 0.50 x 0.25") with wrap-around terminations for excellent solderability and gold over nickel plate termination finish.

ELECTRICAL SPECIFICATIONS[1] AT +25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Frequency Range		5	—	700	MHz
Insertion Loss (above 4.8 dB)	5 - 700	—	0.9	1.4	dB
Isolation	5 - 300 300 - 700	21 16	25 23	— —	dB
Phase Unbalance (±)	5 - 700	—	1.3	3.0	Degree
Amplitude Unbalance (±)	5 - 700	—	0.2	0.4	dB
Return Loss (Port S)	5 - 700	18	25	—	dB
Return Loss (Port 1 and Port 2)	5 - 700	15	20	—	dB

1. Bi-directional can function as a splitter or as a combiner. Refer to S-Parameters for actual performance.

ABSOLUTE MAXIMUM RATINGS[2]

Operating Case Temperature		-40° C to +85° C
Storage Temperature		-55° C to +100° C
Input Power	**as splitter**	1 W
	as combiner per port	0.33 W
Internal Dissipation		0.15 W

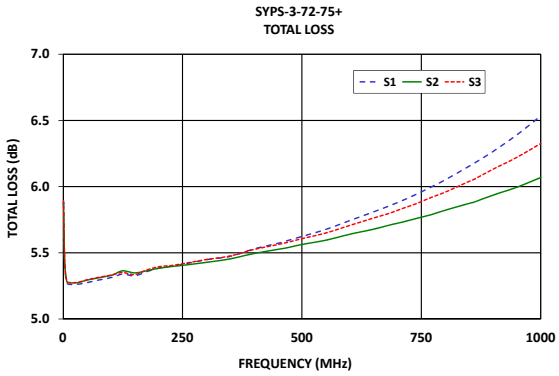
2. Permanent damage may occur if any of these limits are exceeded.

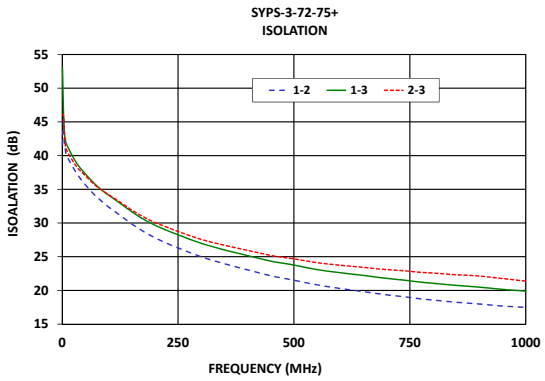
REV. A
ECO-023120
SYPS-3-72-75+
EDU4919
URJ/MCL NY
240920

Power Splitter/Combiner SYPS-3-72-75+

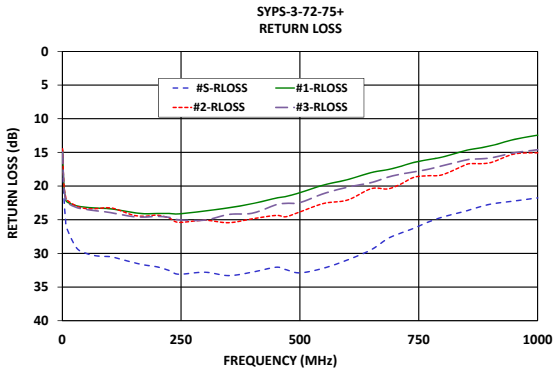
75Ω 3 Way-0° 5 to 700 MHz

TYPICAL PERFORMANCE GRAPHS AT +25°C





Total Loss = Insertion Loss + 4.8dB splitter loss.



SURFACE MOUNT

Power Splitter/Combiner SYPS-3-72-75+

75Ω 3 Way-0° 5 to 700 MHz

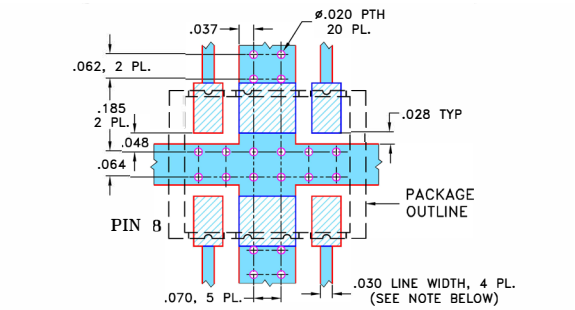
FUNCTIONAL DIAGRAM

Figure 1. SYPS-3-72-75+ Functional Diagram

PAD DESCRIPTION

Function	Pad Number	Description
Sum Port	8	Connects to Sum Port
Port 1	1	Connects to 1 Port
Port 2	4	Connects to 2 Port
Port 3	5	Connects to 3 Port
GROUND	2,3,6,7	Connects to Ground on PCB (See drawing PL-229)

SUGGESTED PCB LAYOUT (PL-229)



NOTE:

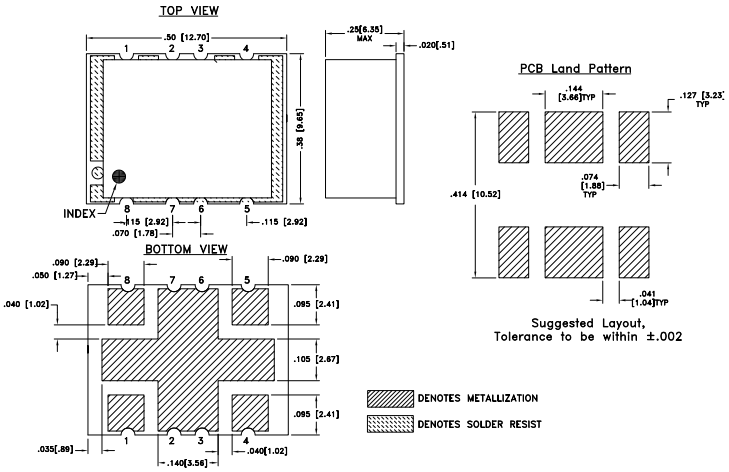
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

Figure 2. Suggested PCB Layout PL-229

CASE STYLE DRAWING



WT, GRAM : .80

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

PRODUCT MARKING*: SYPS-3-72-75

*Marking may contain other features or characters for internal lot control.

SURFACE MOUNT

Power Splitter/Combiner SYPS-3-72-75+

75Ω 3 Way-0° 5 to 700 MHz

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD.

Performance Data & Graphs	Data Graphs S-Parameter (S4P Files) Data Set (.zip file) De-embedded to device pads
Case Style	AH202 Lead Finish: Gold over Nickel
RoHS Status	Compliant
Tape and Reel	F61
Suggested Layout for PCB Design	PL-229
Evaluation Board	TB-SYPS-3-7275+ Gerber File
Environmental Rating	ENV02T1

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

3 Way-0° Power Splitter/Combiner SYPS-3-72-75+

Typical Performance Data

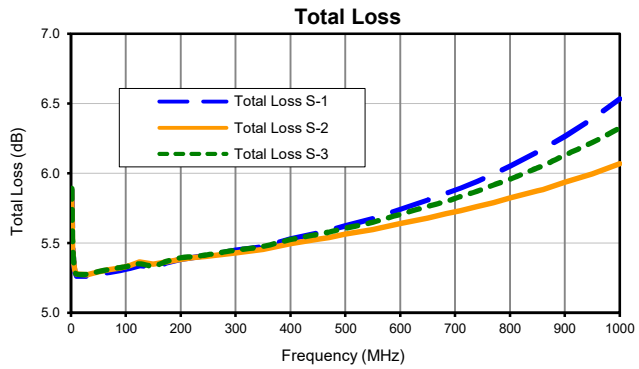
FREQ. (MHz)	TOTAL LOSS[1] (dB)			AMP. UNBAL. (dB)	ISOLATION (dB)			PHASE UNBAL. (deg.)
	S-1	S-2	S-3		1-2	1-3	2-3	
1	5.88	5.88	5.89	0.01	41.58	52.99	46.15	0.04
3	5.46	5.46	5.47	0.01	45.83	46.48	45.87	0.03
5	5.33	5.35	5.35	0.01	42.35	43.65	42.87	0.01
7	5.29	5.30	5.30	0.01	40.99	42.42	41.60	0.04
10	5.26	5.28	5.28	0.01	40.01	41.61	40.77	0.03
30	5.26	5.27	5.28	0.01	37.52	39.03	38.49	0.04
50	5.27	5.29	5.30	0.02	35.70	37.30	37.03	0.10
70	5.29	5.31	5.31	0.02	34.19	35.84	35.69	0.13
90	5.30	5.32	5.32	0.02	32.96	34.64	34.68	0.15
100	5.31	5.33	5.33	0.02	32.39	34.15	34.23	0.16
108	5.32	5.34	5.34	0.02	32.01	33.77	33.87	0.16
125	5.34	5.36	5.35	0.02	31.14	32.93	33.10	0.49
150	5.33	5.35	5.34	0.02	29.87	31.69	31.94	0.15
174	5.36	5.36	5.37	0.01	28.81	30.62	30.97	0.30
200	5.38	5.38	5.39	0.01	27.82	29.69	30.07	0.34
225	5.40	5.40	5.40	0.01	27.02	28.93	29.42	0.36
245	5.41	5.40	5.41	0.01	26.44	28.40	28.87	0.42
300	5.45	5.43	5.45	0.02	24.99	26.99	27.57	0.56
350	5.47	5.45	5.48	0.02	23.96	26.02	26.71	0.57
400	5.53	5.49	5.53	0.03	23.05	25.16	25.94	0.77
450	5.57	5.53	5.56	0.05	22.17	24.34	25.19	0.92
470	5.59	5.54	5.58	0.05	21.89	24.11	24.97	0.97
500	5.62	5.56	5.61	0.06	21.51	23.76	24.69	1.09
550	5.68	5.60	5.65	0.08	20.83	23.09	24.11	1.25
600	5.74	5.64	5.71	0.10	20.29	22.62	23.73	1.47
650	5.81	5.68	5.76	0.13	19.82	22.23	23.42	1.74
684	5.86	5.71	5.80	0.15	19.49	21.92	23.18	1.95
710	5.89	5.73	5.83	0.16	19.27	21.72	23.05	2.10
740	5.94	5.76	5.87	0.18	19.04	21.50	22.90	2.33
770	6.00	5.79	5.92	0.21	18.78	21.25	22.70	2.55
800	6.05	5.82	5.96	0.23	18.58	21.06	22.57	2.82
850	6.15	5.87	6.04	0.28	18.24	20.75	22.32	3.30
860	6.18	5.88	6.05	0.29	18.19	20.70	22.29	3.39
900	6.27	5.94	6.13	0.33	17.98	20.48	22.13	3.89
950	6.39	6.00	6.22	0.40	17.68	20.16	21.76	4.62
1000	6.53	6.07	6.33	0.46	17.48	19.89	21.38	5.45

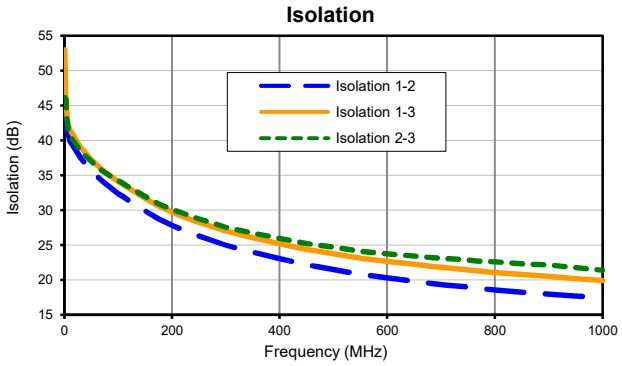
FREQ. (MHz)	RETURN LOSS (dB)			
	S	1	2	3
1	15.83	14.71	14.47	14.96
3	20.54	19.21	18.93	19.38
5	23.18	20.95	20.67	21.09
7	24.82	21.74	21.45	21.89
10	26.30	22.34	22.07	22.46
30	29.16	22.93	22.97	23.18
50	29.98	23.14	23.34	23.46
70	30.35	23.27	23.36	23.66
90	30.45	23.31	23.23	23.82
100	30.47	23.37	23.24	23.93
108	30.57	23.43	23.31	24.03
125	30.90	23.63	23.72	24.25
150	31.36	23.94	24.33	24.54
174	31.73	24.11	24.49	24.60
200	32.00	24.07	24.32	24.50
225	32.54	24.07	24.74	24.65
245	33.09	24.13	25.39	25.01
300	32.79	23.70	25.08	25.05
350	33.29	23.23	25.44	24.22
400	32.78	22.61	24.86	24.03
450	32.05	21.79	24.36	22.77
470	32.40	21.56	24.56	22.57
500	32.89	20.98	23.84	22.45
550	32.19	19.84	22.58	21.12
600	30.97	19.05	22.08	20.17
650	29.45	18.00	20.39	19.48
684	27.83	17.57	20.43	18.70
710	27.04	17.11	19.78	18.26
740	26.26	16.48	18.70	17.90
770	25.34	16.08	18.47	17.51
800	24.61	15.68	18.31	16.98
850	23.69	14.70	16.80	16.11
860	23.47	14.55	16.67	16.01
900	22.70	14.05	16.53	15.83
950	22.23	13.09	15.25	15.07
1000	21.76	12.44	15.06	14.61

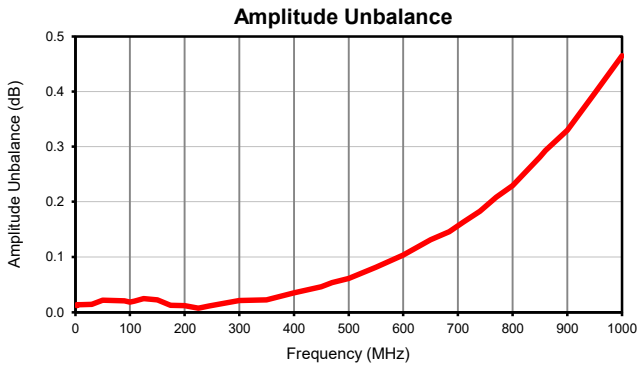
[1]Total Loss = Insertion Loss + 4.8dB Splitter Loss

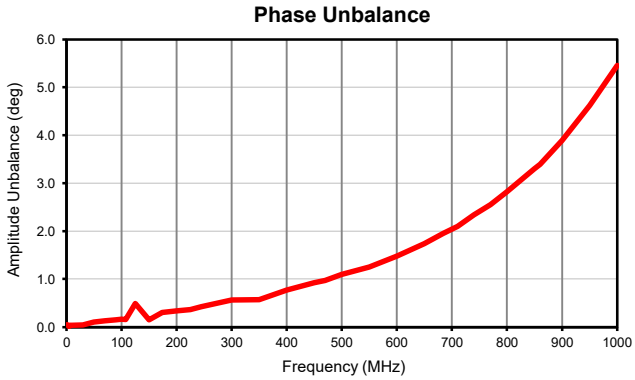
3 Way-0° Power Splitter/Combiner SYPS-3-72-75+

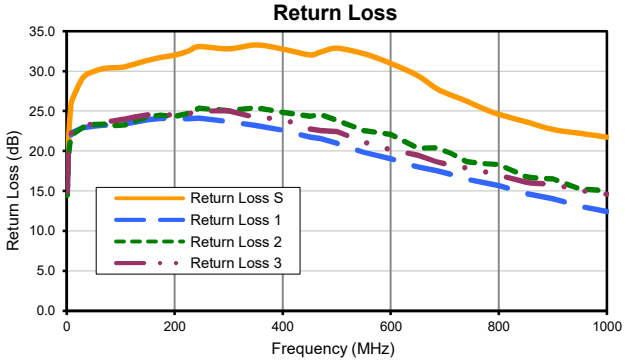
Typical Performance Curves







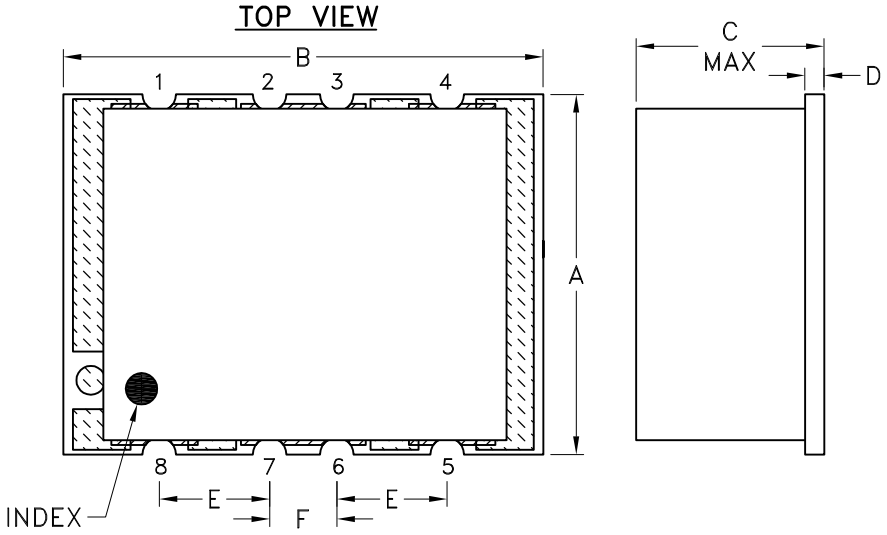


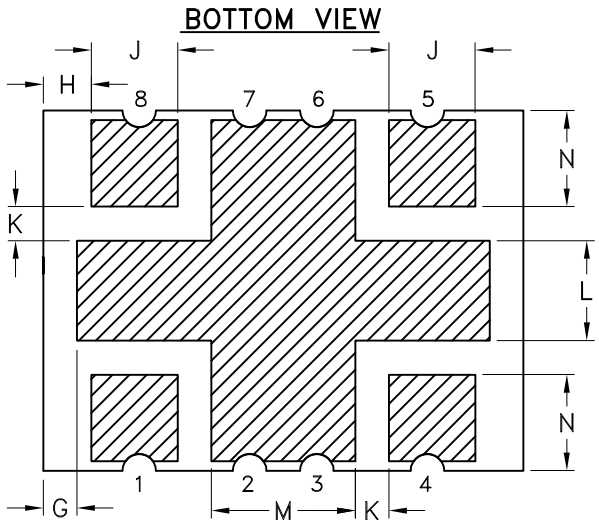


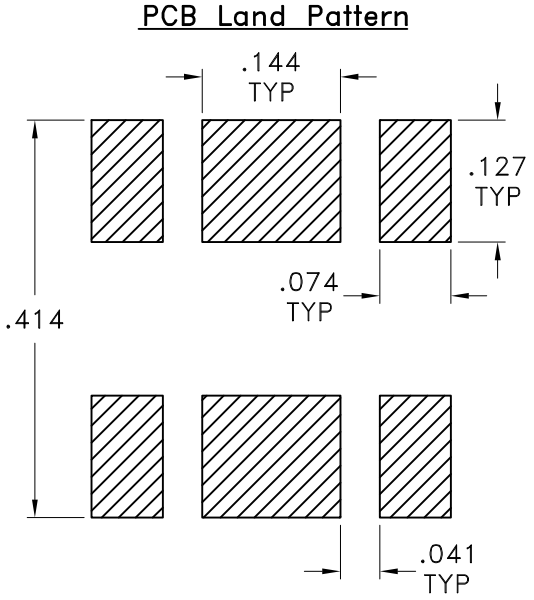
Case Style AH

Outline Dimensions

AH202







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	.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: Plastic.
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.

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RF/IF MICROWAVE COMPONENTS

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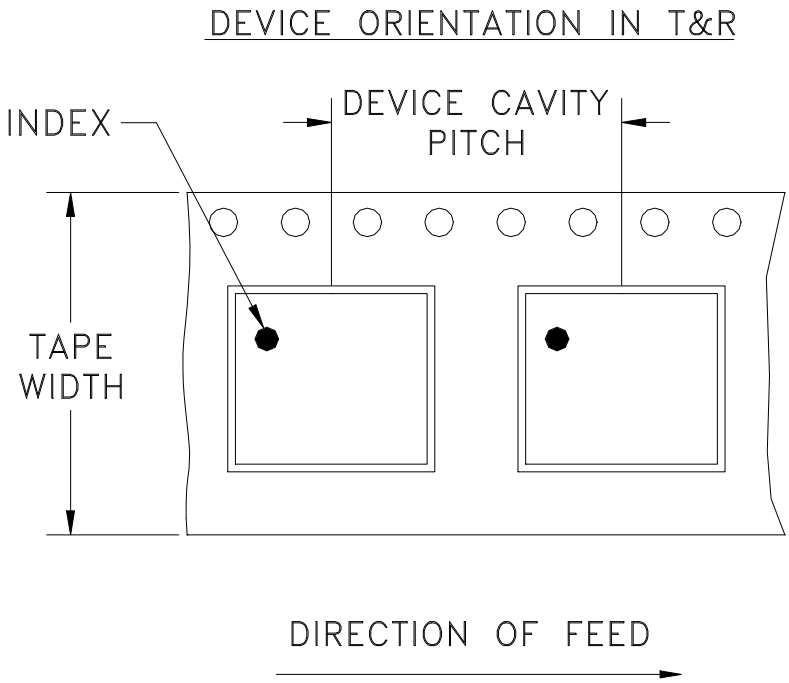
Tape & Reel Packaging TR-F61



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.

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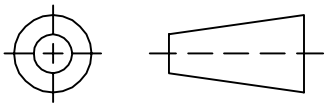
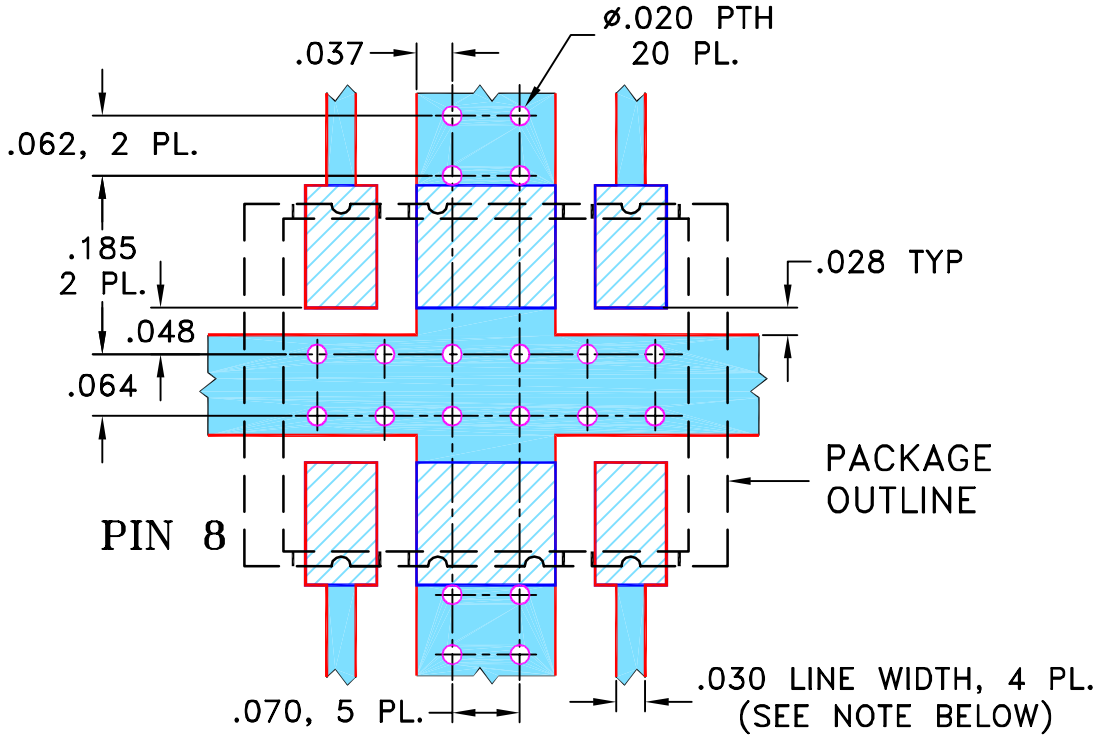
THIRD ANGLE PROJECTION



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M101377	NEW RELEASE	10/18/05	MMG	HY
A	M102713	ADDED "...WITH SMOBC"	01/12/06	GT	IL

SUGGESTED MOUNTING CONFIGURATION FOR AH202 CASE STYLE, "rd" PIN CONNECTION.



NOTE:

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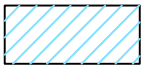
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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	MMG	10/17/05
TOLERANCES ON:	CHECKED	IL	10/18/05
2 PL DECIMALS ±	APPROVED	HY	10/18/05
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

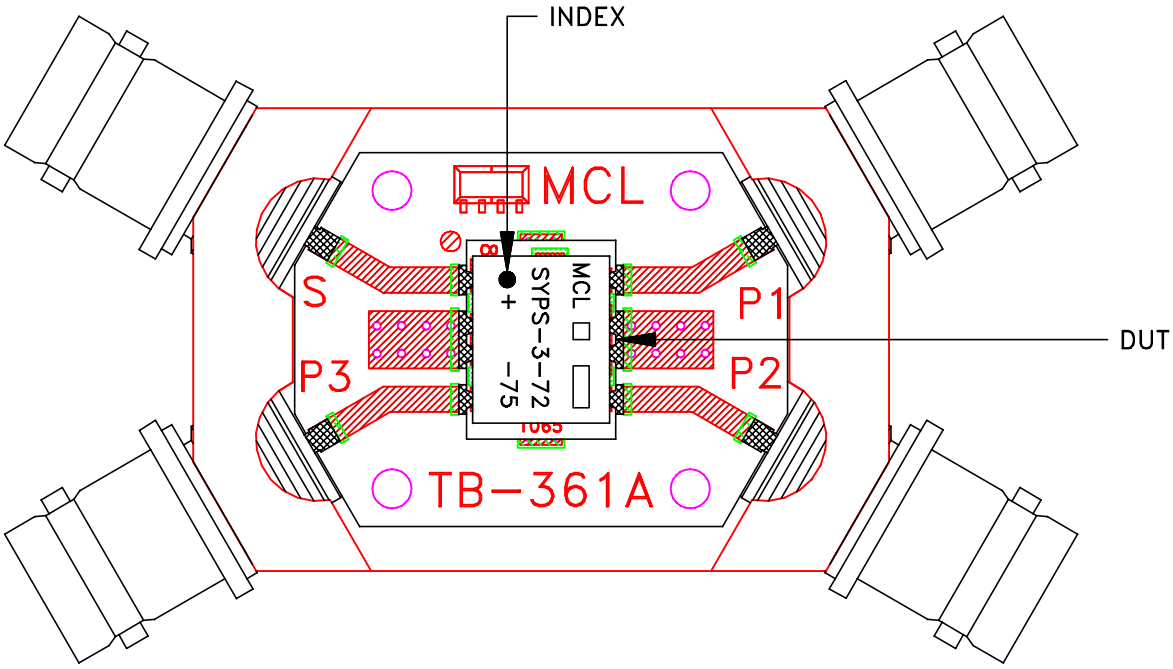
PL, rd, 75, AH202, SYPS-3, TB-361

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-229	A

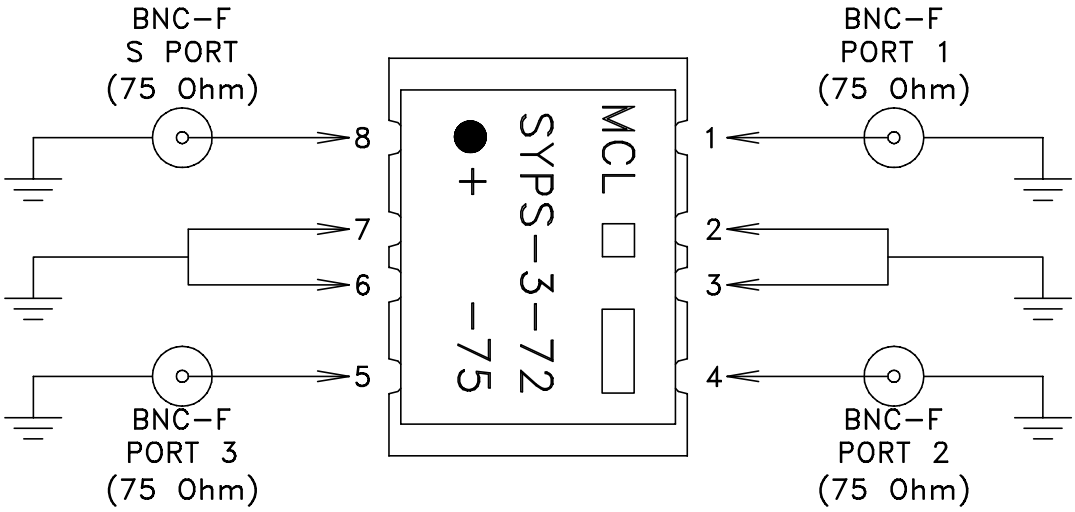
FILE:	SCALE:	SHEET:
98PL229	5:1	1 OF 1

Evaluation Board and Circuit

TB-SYPS-3-7275+



Schematic diagram



Notes:

1. PCB Material: ROGERS (RO4350B) OR Equivalent, Dielectric Constant=3.48±.05
Dielectric Thickness: .060±.004
2. 75 Ohm BNC Female Connectors.

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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

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