SURFACE MOUNT

Directional Coupler

SYD-20-33+

50Ω 30 to 3000 MHz

FEATURES

- Wideband, 30-3000 MHz
- Low mainline loss, 1.6 dB typ.
- Excellent VSWR, 1.15:1 typ; all ports
- Good flatness, ±0.6 dB typ.

Generic photo used for illustration purposes only

CASE STYLE: AH202

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

APPLICATIONS

- VHF/UHF receivers/transmitters
- Cellular, PCS, PCN, UMTS
- ISM
- GPS
- Instrumentation

ELECTRICAL SPECIFICATIONS AT 25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		30		3000	MHz
Mainline Loss[1]	30-3000	—	1.6	2.5	dB
	800-1000	—	1.1	1.5	
	1700-2000	—	1.3	1.8	
	2300-2700	—	1.5	2.1	
Coupling Nominal	30-3000	—	20.8±0.8	—	dB
	800-1000	—	21.5±0.5	—	
	1700-2000	—	21.1±0.6	—	
	2300-2700	—	20.8±0.7	—	
Coupling Flatness(±)	30-3000	—	1.4	—	dB
	800-1000	—	0.3	—	
	1700-2000	—	0.5	—	
	2300-2700	—	0.5	—	
Directivity	30-3000	9	15	—	dB
	800-1000	14	17	—	
	1700-2000	15	20	—	
	2300-2700	11	16	—	
VSWR	30-3000	—	1.20	—	:1
	800-1000	—	1.10	—	
	1700-2000	—	1.15	—	
	2300-2700	—	1.20	—	
Input Power	30-3000	—	—	1	W

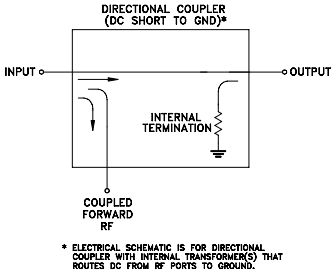
1. Mainline loss includes theoretical power loss at coupled port.

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



SURFACE MOUNT

Directional Coupler

SYD-20-33+

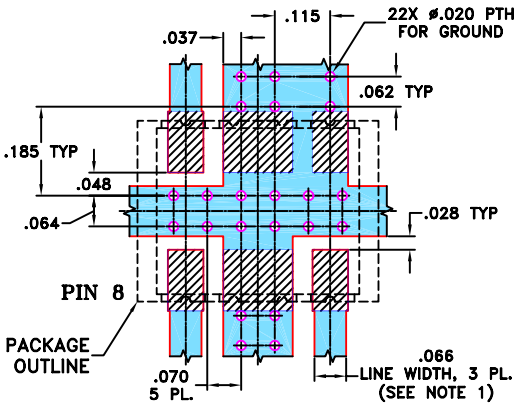
50Ω 30 to 3000 MHz

PAD CONNECTIONS

INPUT	8
OUTPUT	1
COUPLED	5
GROUND	2, 3,4,6, 7

PRODUCT MARKING: N/A

SUGGESTED PCB LAYOUT (PL-160)

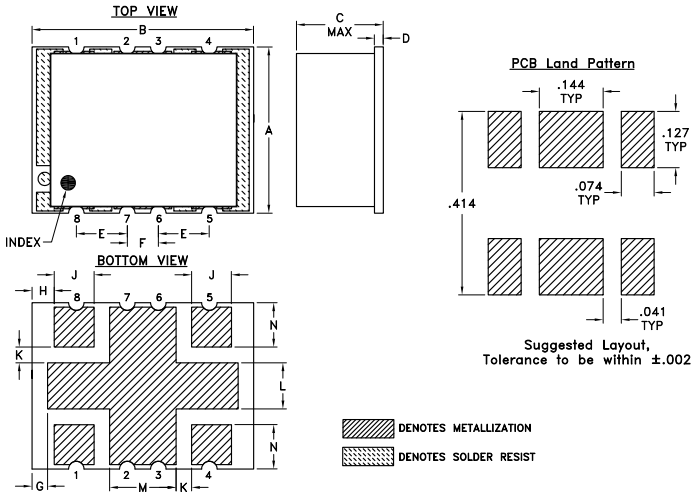


NOTE:
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350 WITH DIELECTRIC THICKNESS .030 ± .002. COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT

DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

OUTLINE DRAWING



OUTLINE DIMENSIONS (Inches / mm)

A	B	C	D	E	F	G	H
.38	.50	.25	.020	.115	.070	.035	.050
9.65	12.70	6.35	0.51	2.92	1.78	0.89	1.27

J	K	L	M	N			wt
.090	.040	.105	.140	.095			grams
2.29	1.02	2.67	3.56	2.41			0.80

TAPE & REEL INFORMATION: F61

SURFACE MOUNT

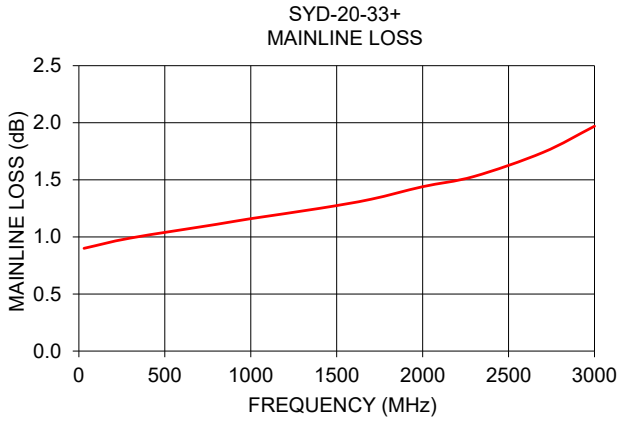
Directional Coupler

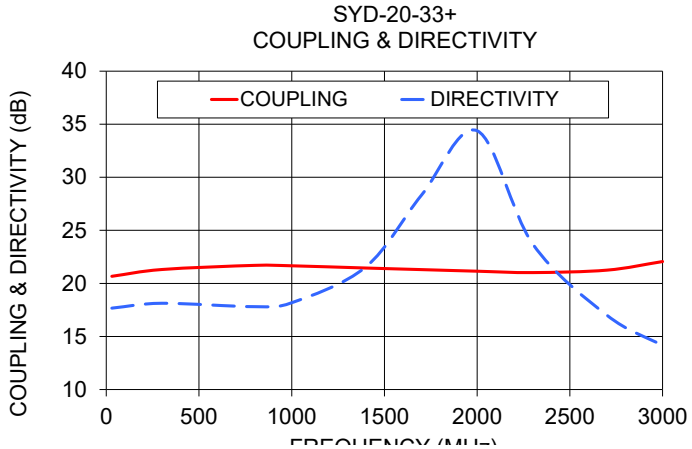
SYD-20-33+

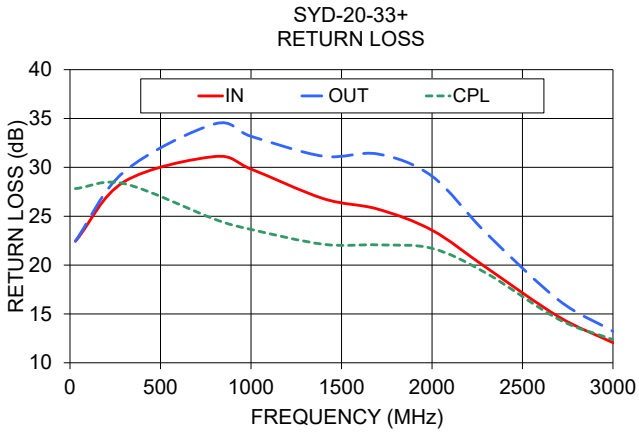
50Ω 30 to 3000 MHz

TYPICAL PERFORMANCE DATA

Frequency (MHz)	Mainline Loss (dB) In-Out	Coupling (dB) In-Cpl	Directivity (dB)	Return Loss (dB) In	Return Loss (dB) Out	Return Loss (dB) Cpl
30.00	0.90	20.67	17.67	22.43	22.47	27.83
300.00	0.99	21.31	18.13	28.54	29.57	28.33
800.00	1.11	21.70	17.81	31.11	34.45	24.69
1000.00	1.16	21.66	18.18	29.83	33.18	23.65
1400.00	1.25	21.45	21.56	26.80	31.14	22.13
1700.00	1.33	21.30	28.32	25.73	31.37	22.07
2000.00	1.44	21.15	34.38	23.57	29.10	21.71
2300.00	1.53	21.02	23.71	19.74	23.26	19.17
2700.00	1.74	21.25	17.00	14.71	16.41	14.45
3000.00	1.97	22.06	14.14	12.06	13.23	12.37







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

Directional Coupler SYD-20-33+

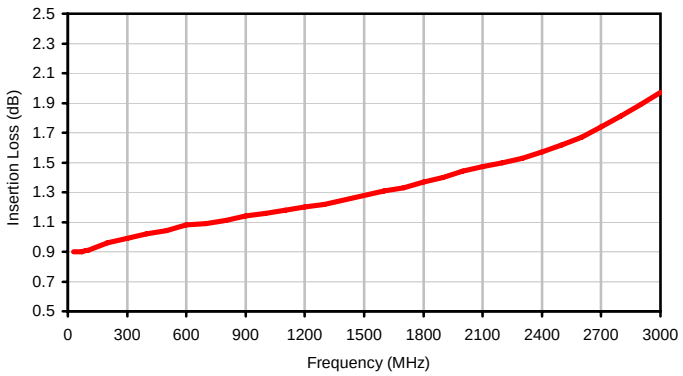
Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)	COUPLING (dB)	DIRECTIVITY (dB)	RETURN LOSS (dB)		
				IN	OUT	CPL
30.0	0.90	20.67	17.67	22.43	22.47	27.83
50.0	0.90	20.76	18.16	24.36	24.50	29.55
70.0	0.90	20.83	18.34	25.47	25.73	30.16
90.0	0.91	20.88	18.42	26.28	26.65	30.43
100.0	0.91	20.91	18.44	26.66	27.04	30.51
200.0	0.96	21.13	18.35	28.16	28.95	29.46
300.0	0.99	21.31	18.13	28.54	29.57	28.33
400.0	1.02	21.47	18.02	29.19	30.51	27.50
500.0	1.04	21.58	17.88	30.03	31.78	26.69
600.0	1.08	21.58	17.26	30.76	33.00	26.06
700.0	1.09	21.68	17.60	31.03	33.97	25.34
800.0	1.11	21.70	17.81	31.11	34.45	24.69
900.0	1.14	21.68	17.93	30.59	34.13	24.09
1000.0	1.16	21.66	18.18	29.83	33.18	23.65
1100.0	1.18	21.61	18.61	28.89	32.28	23.13
1200.0	1.20	21.56	19.27	28.07	31.67	22.73
1300.0	1.22	21.50	20.22	27.33	31.34	22.43
1400.0	1.25	21.45	21.56	26.80	31.14	22.13
1500.0	1.28	21.39	23.52	26.42	31.22	22.06
1600.0	1.31	21.34	25.45	26.12	31.27	22.08
1700.0	1.33	21.30	28.32	25.73	31.37	22.07
1800.0	1.37	21.25	32.55	25.20	31.11	22.09
1900.0	1.40	21.20	37.69	24.52	30.35	22.01
2000.0	1.44	21.15	34.38	23.57	29.10	21.71
2100.0	1.47	21.08	29.30	22.39	27.39	21.14
2200.0	1.50	21.03	25.99	21.10	25.37	20.28
2300.0	1.53	21.02	23.71	19.74	23.26	19.17
2400.0	1.57	21.00	21.64	18.42	21.20	17.93
2500.0	1.62	21.04	19.90	17.06	19.41	16.70
2600.0	1.67	21.11	18.34	15.83	17.79	15.50
2700.0	1.74	21.25	17.00	14.71	16.41	14.45
2800.0	1.81	21.45	15.82	13.71	15.16	13.57
2900.0	1.89	21.71	14.88	12.82	14.13	12.85
3000.0	1.97	22.06	14.14	12.06	13.23	12.37

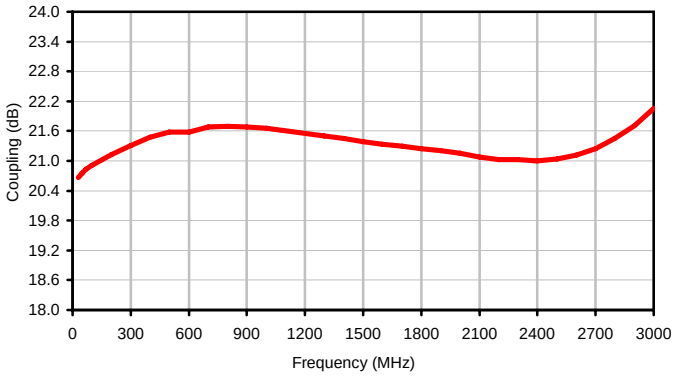
Directional Coupler SYD-20-33+

Typical Performance Curves

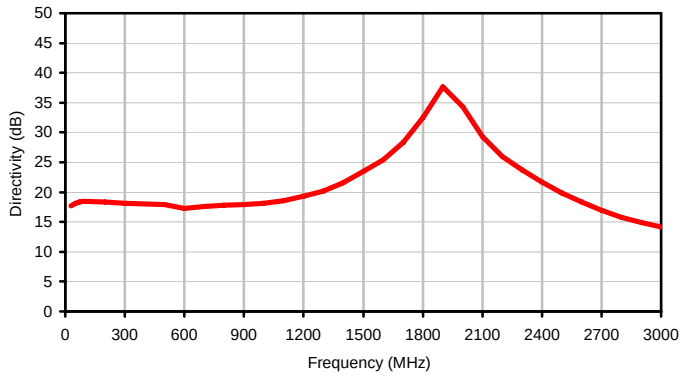
Insertion Loss



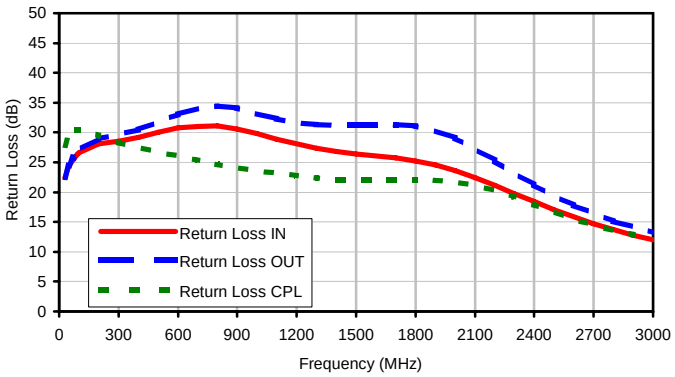
Coupling



Directivity



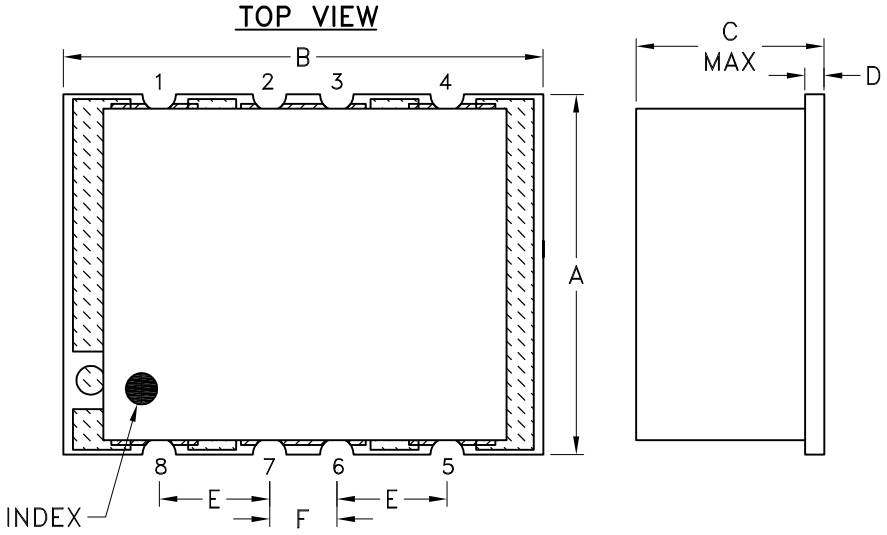
Return Loss

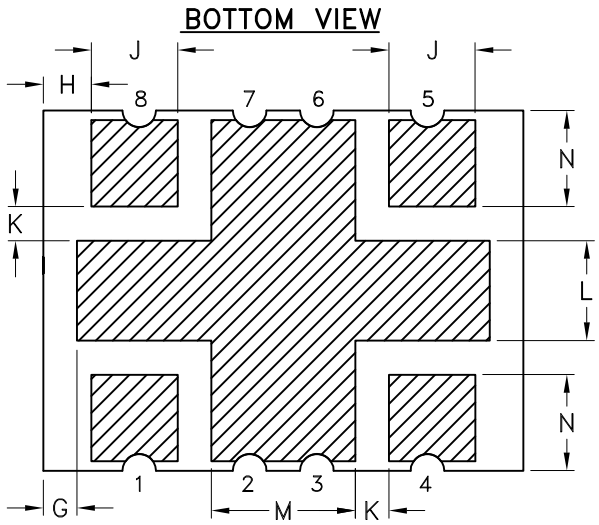


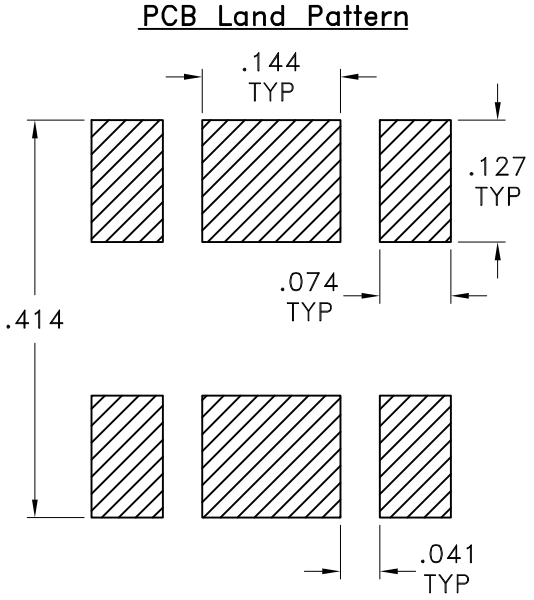
Case Style AH

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

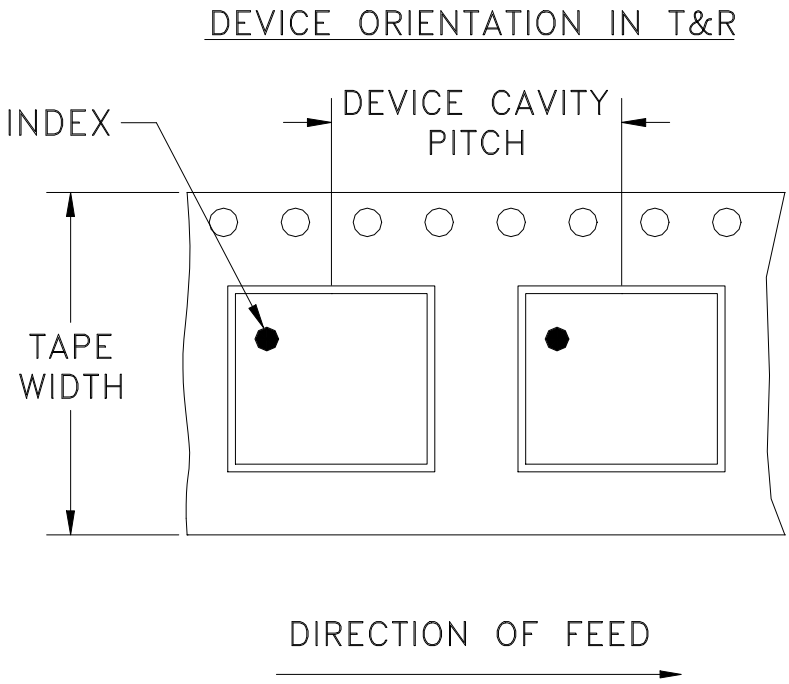
Notes:

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.

Tape & Reel Packaging TR-F61



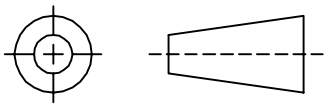
Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
24	12	13	200

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

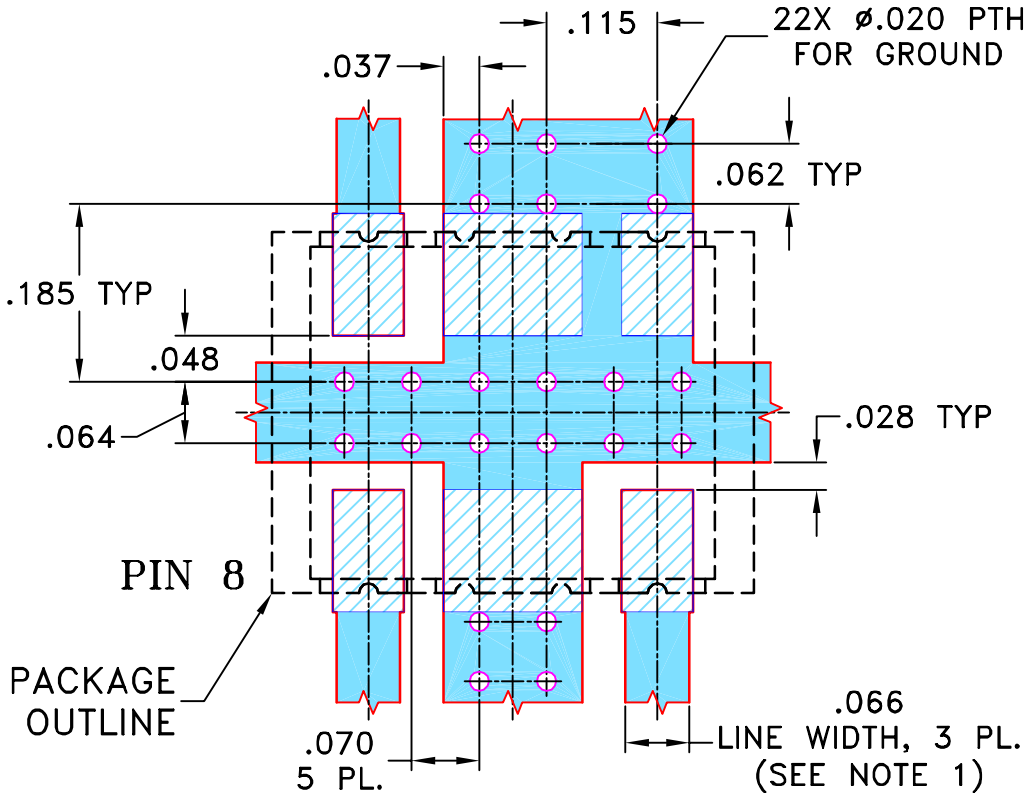
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

THIRD ANGLE PROJECTION



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M93215	NEW RELEASE	07/14/04	AV	WP
A	M102713	ADDED "...WITH SMOBC"	01/12/06	GF	IL

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



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

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	AV	07/02/04
TOLERANCES ON:	CHECKED	GF	07/14/04
2 PL DECIMALS ±	APPROVED	WP	07/14/04
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

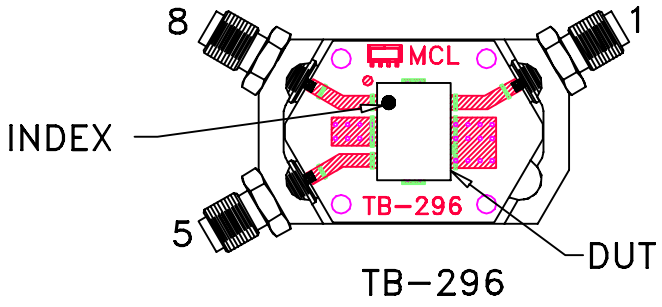
PL, pu, AH202, SYDC, TB-296

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-160	A

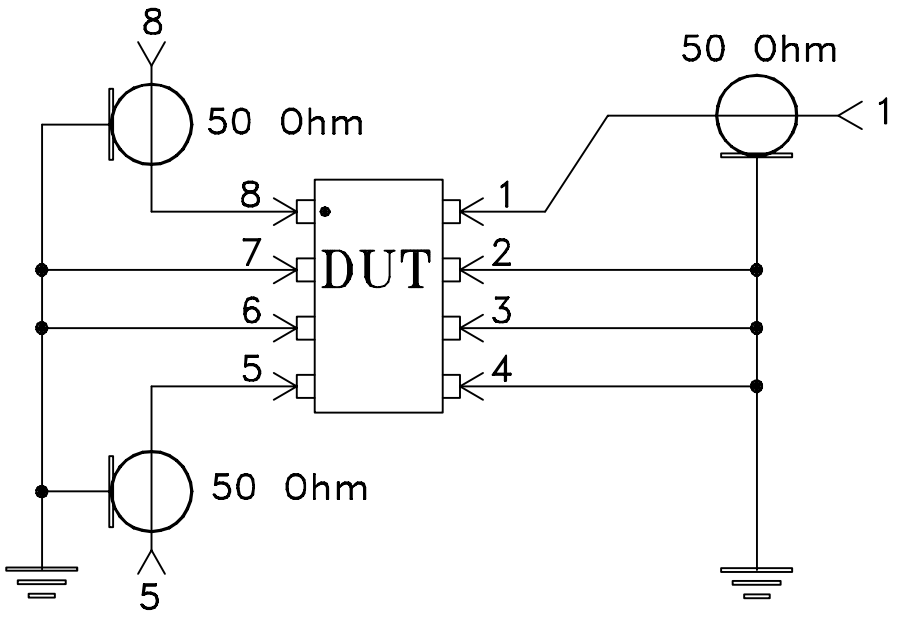
FILE:	SCALE:	SHEET:
98PL160	5:1	1 OF 1

Evaluation Board and Circuit

For Pin Connections refer to Data Sheet of the DUT



TB-296



Schematic Diagram

Notes:

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

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