

Surface Mount Directional Coupler

SYD-20-33+

50Ω 30 to 3000 MHz

Maximum Ratings

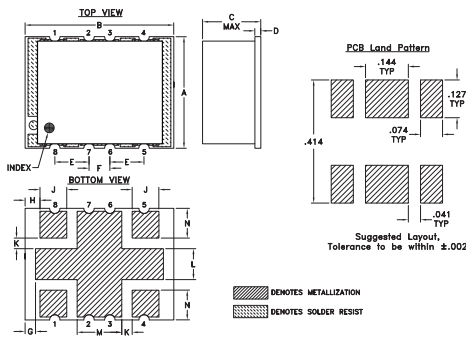
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C

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

Pin Connections

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

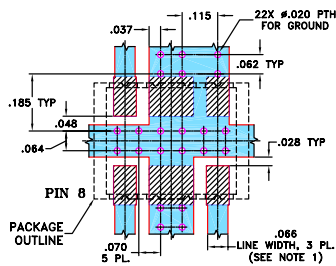
Outline Drawing



Outline Dimensions (inch/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		

Demo Board MCL P/N: TB-296 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

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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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.

Applications

- VHF/UHF receivers/transmitters
- cellular, PCS, PCN, UMTS
- ISM
- GPS
- instrumentation

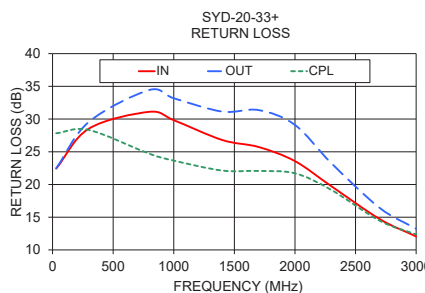
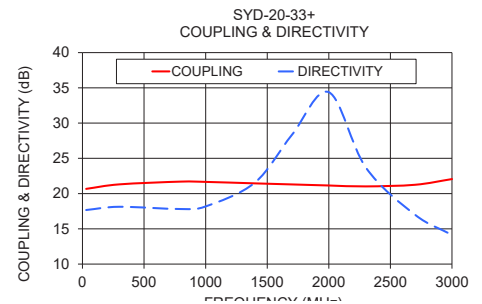
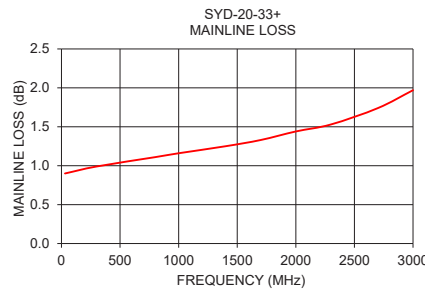
Directional Coupler Electrical Specifications

FREQ. (MHz)	COUPLING (dB)		MAINLINE LOSS ¹ (dB)		DIRECTIVITY (dB)		VSWR (:1)	POWER INPUT (W)
	Nom.	Flatness	Typ.	Max.	Typ.	Min.		
f_L - f_U								
30-3000	20.8±0.8	±1.4	1.6	2.5	15	9	1.20	1
800-1000	21.5±0.5	±0.3	1.1	1.5	17	14	1.10	1
1700-2000	21.1±0.6	±0.5	1.3	1.8	20	15	1.15	1
2300-2700	20.8±0.7	±0.5	1.5	2.1	16	11	1.20	1

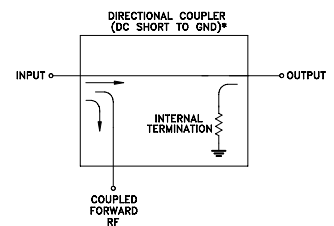
1. Mainline loss includes theoretical power loss at coupled port.

Typical Performance Data

Frequency (MHz)	Mainline Loss (dB)		Coupling (dB)	Directivity (dB)	Return Loss (dB)		
	In-Out	In-Cpl			In	Out	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	



Electrical Schematic



* ELECTRICAL SCHEMATIC IS FOR DIRECTIONAL COUPLER WITH INTERNAL TRANSFORMER(S) THAT ROUTES DC FROM RF PORTS TO GROUND.



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



ISO 9001 ISO 14001 AS 9100 CERTIFIED



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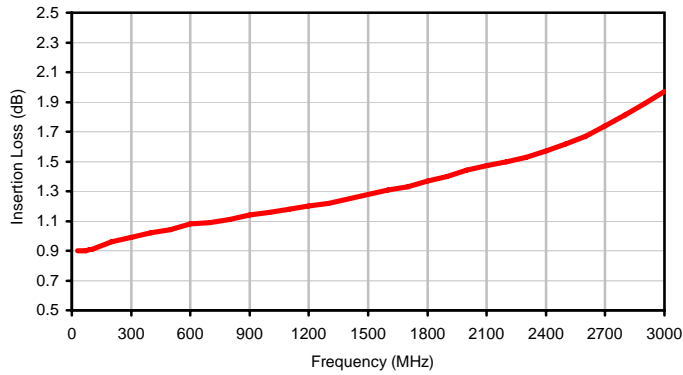


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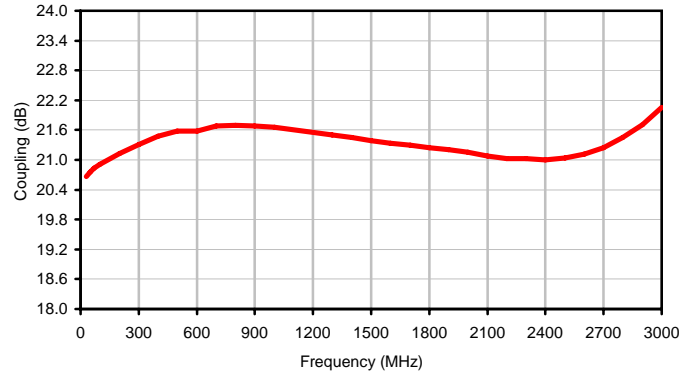
RF/MW MICROWAVE COMPONENTS

Typical Performance Curves

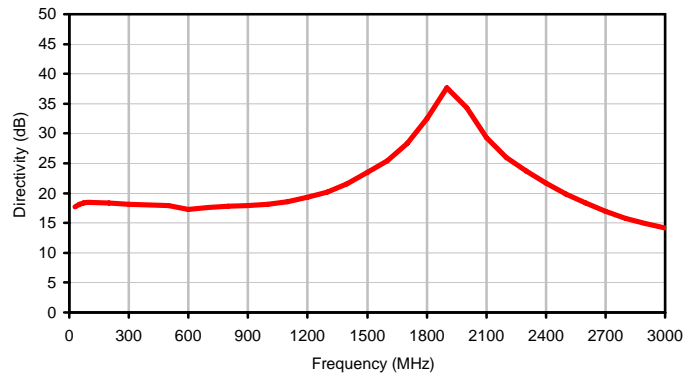
Insertion Loss



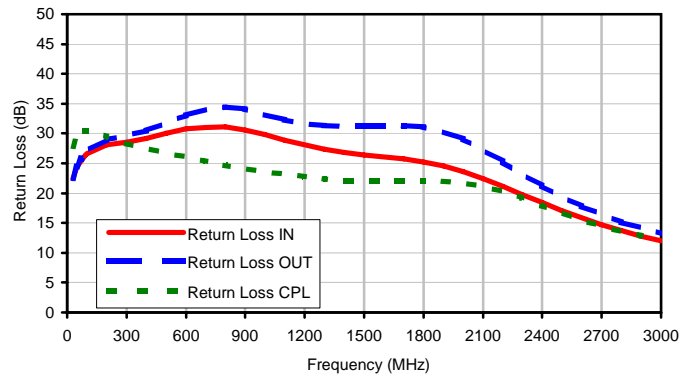
Coupling



Directivity

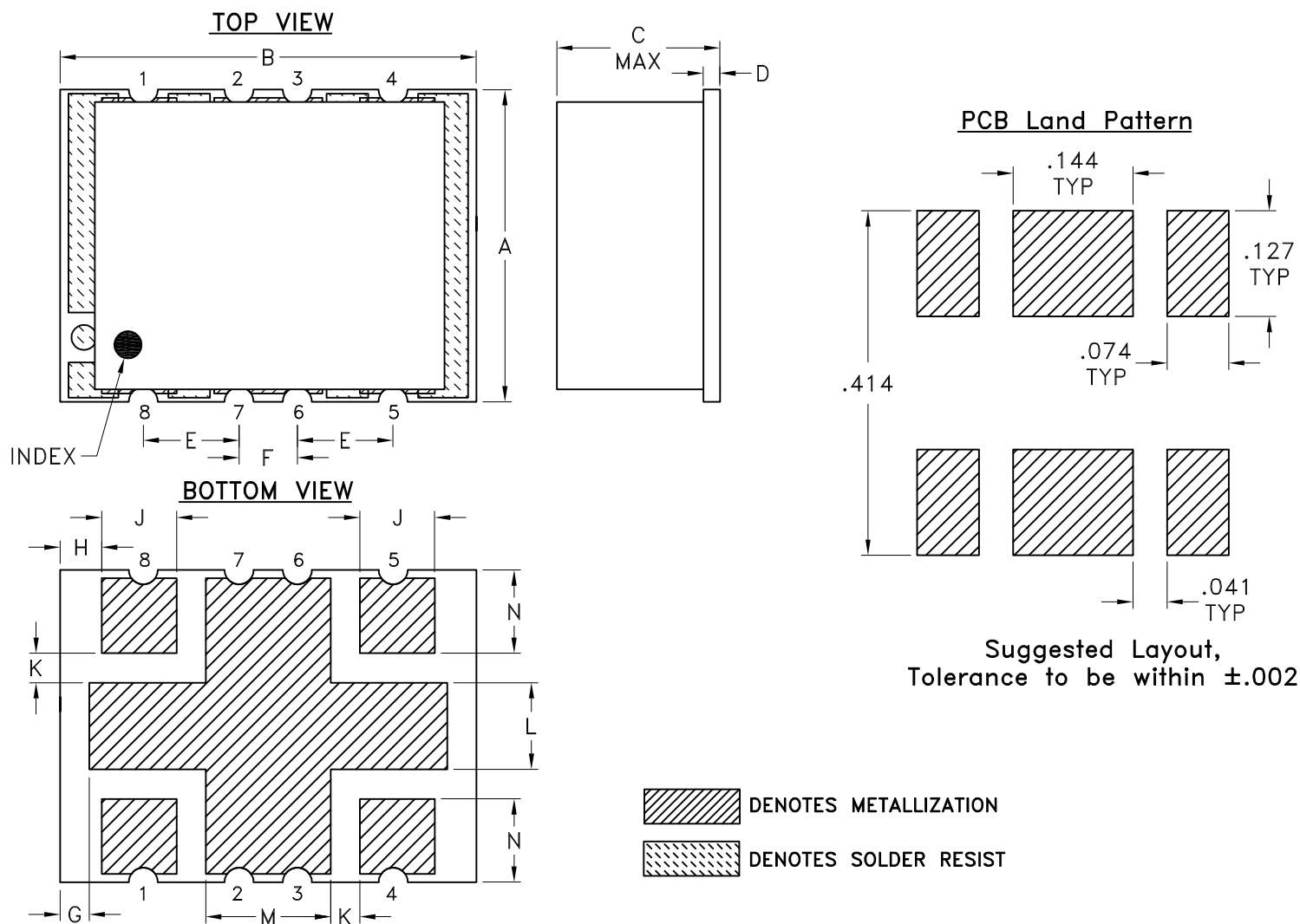


Return Loss



Outline Dimensions

AH202



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. $\pm .01$; 3 Pl. $\pm .005$

Notes:

- Case material: Plastic.
- 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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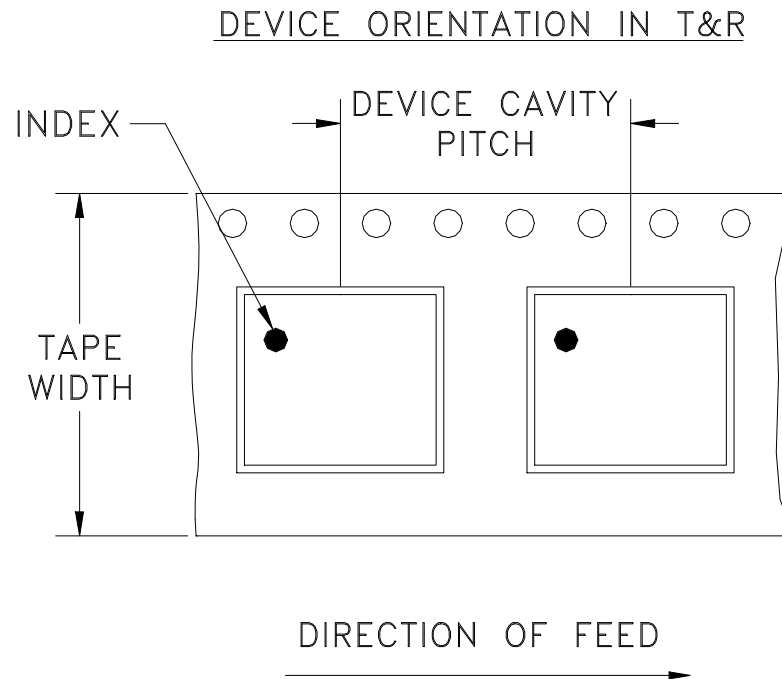
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RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F61



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

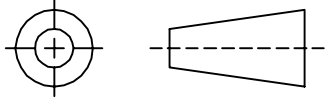
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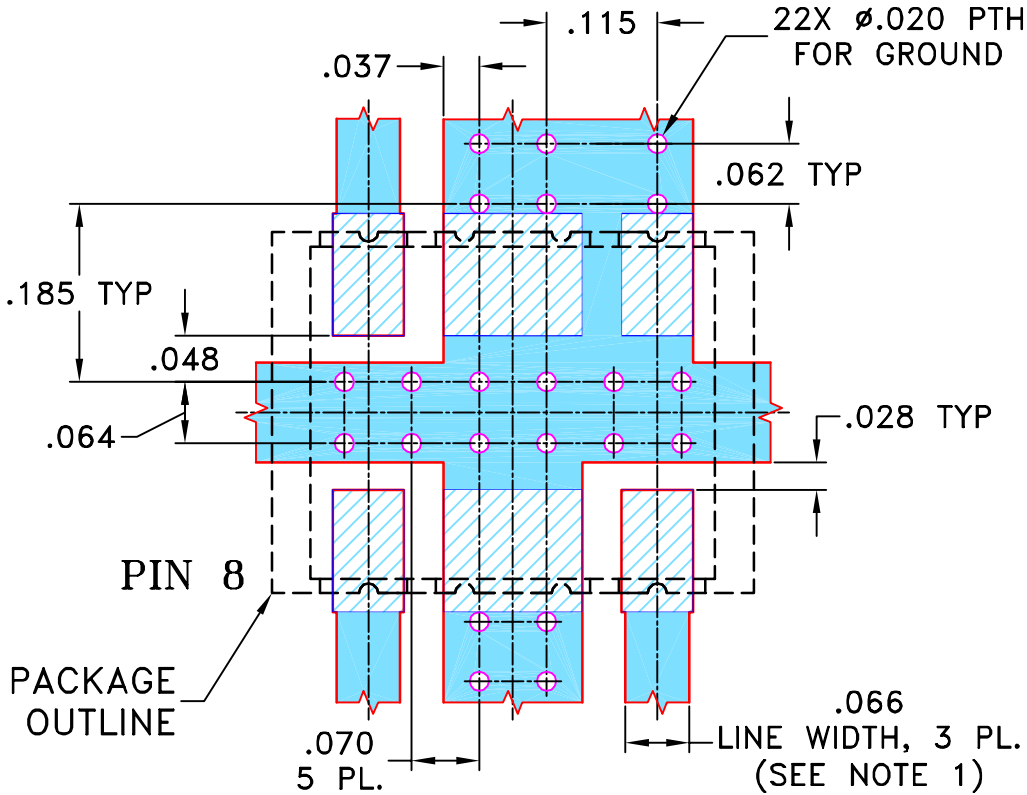
THIRD ANGLE PROJECTION



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:**
- TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS $.030" \pm .002"$; 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

UNLESS OTHERWISE SPECIFIED

INITIALS DATE

DIMENSIONS ARE IN INCHES

DRAWN AV 07/02/04

TOLERANCES ON:

CHECKED GF 07/14/04

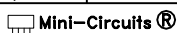
2 PL DECIMALS \pm

APPROVED WP 07/14/04

3 PL DECIMALS \pm .005

ANGLES \pm

FRACTIONS \pm



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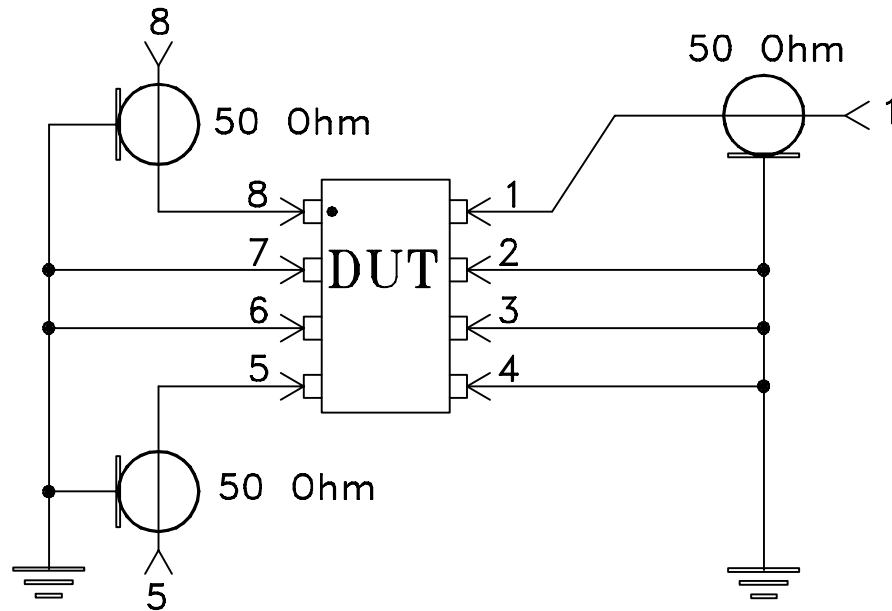
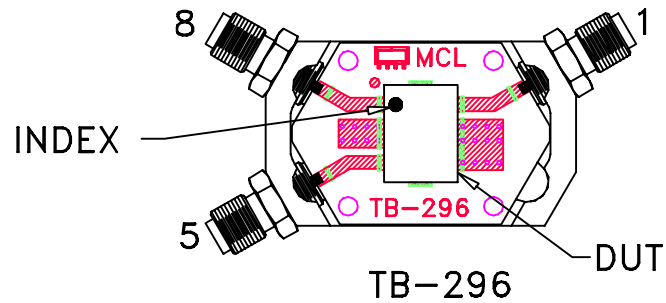
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PL, pu, AH202, SYDC, TB-296

SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-160	REV: A
FILE: 98PL160	SCALE: 5:1	SHEET: 1 OF 1	

Evaluation Board and Circuit

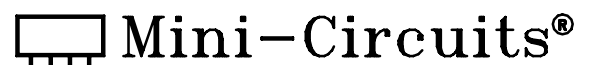
For Pin Connections refer to Data Sheet of the DUT



Schematic Diagram

Notes:

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



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