

Frequency Mixer

ADE-92LH+

Level 10 (LO Power +10 dBm) 400 to 900 MHz

The Big Deal

- Excellent IP3: +24dBm with reduced LO power (+10dBm)
- High LO-RF Isolation across the entire band
- Low cost, miniature size



CASE STYLE: CD636

Product Overview

The ADE-92LH+ is passive double balanced mixer featuring a FET quad in a ring configuration providing high dynamic range performance in a small, low cost, RoHS-compliant package. The ADE-92LH+ provides RF/LO response from 400 to 900 MHz and IF response from DC to 150 MHz. It is especially useful in systems where cost and performance are critical, such as GSM cellular system applications. This mixer is ideal for upconverter and downconverter applications and does not require external matching components or DC power.

Key Features

Feature	Advantages
High IP3, +24 dBm typ. with reduced LO power requirement.	Allows for improved dynamic range, a critical factor in receiver applications.
Low conversion loss, 7 dB typ.	Enables lower NF front ends, which can improve system sensitivity.
High LO to RF isolation, 40 dB typ.	Reduced levels of unwanted responses that can interfere with system performance.
Broadband matching	The IF port VSWR is less than 1.6 to 1 over the specified frequency range, which simplifies impedance matching with adjoining components.
Insensitive to LO power level variations	Allows the use of an LO amplifier with less stringent gain flatness, enabling the use of lower cost amplifiers.
Small package 0.310" x 0.220" x 0.162"	Enables high density packaging.

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/MCStore/terms.jsp



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Frequency Mixer

ADE-92LH+

Level 10 (LO Power +10 dBm) 400 to 900 MHz

Maximum Ratings

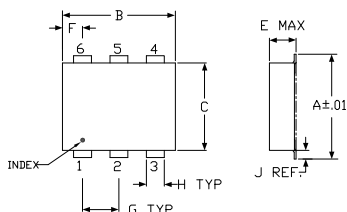
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	100 mW
IF Current	40 mA

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

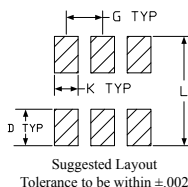
Pin Connections

LO	6
RF	3
IF	2
GROUND	1,4,5

Outline Drawing



PCB Land Pattern

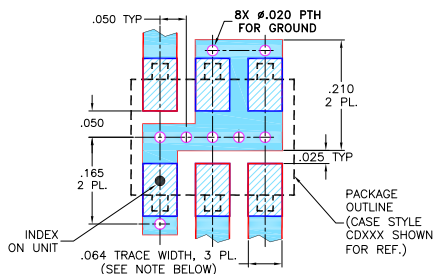


Outline Dimensions (inch mm)

A	B	C	D	E	F	G
.272	.310	.220	.100	.162	.055	.100
6.91	7.87	5.58	2.54	4.11	1.40	2.54

H	J	K	L	wt
.030	.026	.065	.300	grams
0.76	0.66	1.65	7.62	.25

Demo Board MCL P/N: TB-03 Suggested PCB Layout (PL-052)



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

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Features

- high IP3, 24 dBm typ.
- good L-R isolation, 40 dB typ.
- good L-I isolation, 26 dB typ.
- aqueous washable
- patent pending

Applications

- cellular
- GSM
- ISM

Electrical Specifications

FREQUENCY (MHz)	CONVERSION LOSS (dB)	LO-RF ISOLATION (dB)	LO-IF ISOLATION (dB)	IP3 at center band (dBm)
LO/RF $f_L - f_U$	$\bar{X}$ σ Max.	Typ. Min.	Typ. Min.	Typ.
400-900 DC-150*	6.8 0.1 9.5	40 31	26 18	24

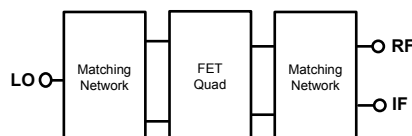
1 dB COMP.: +14 dBm typ.

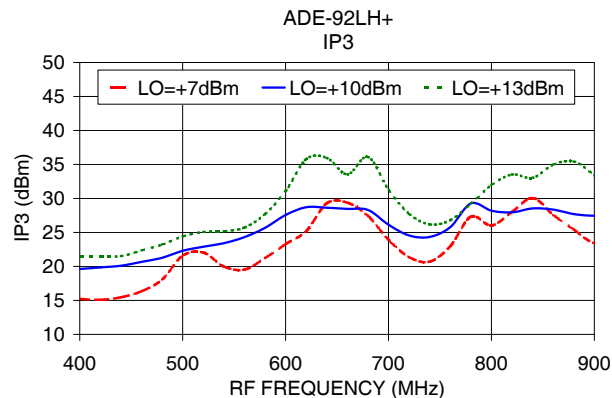
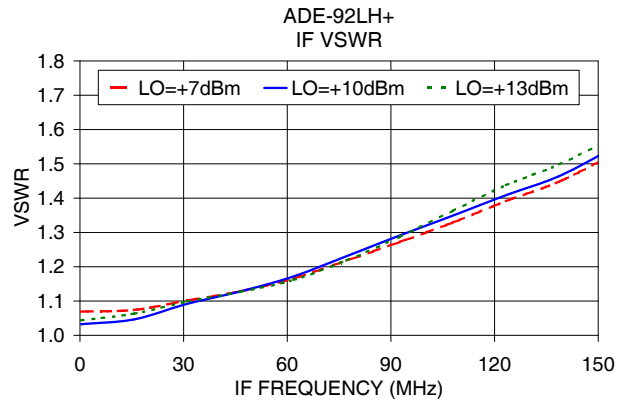
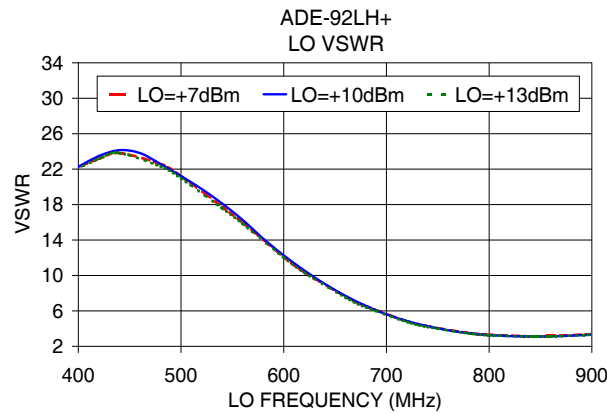
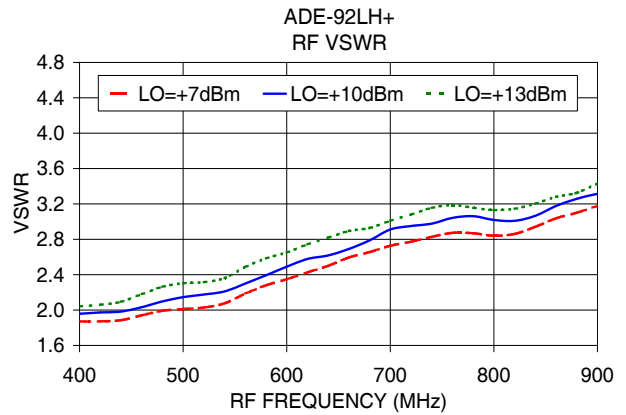
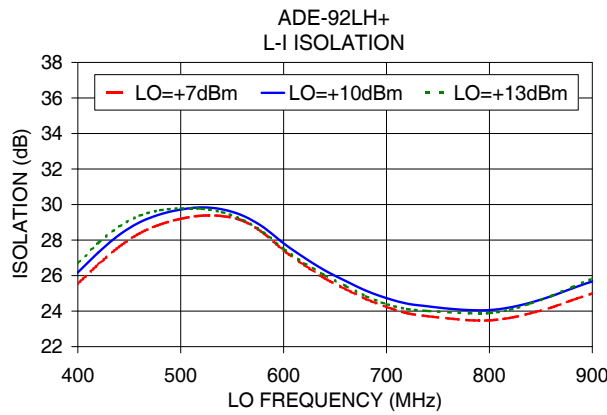
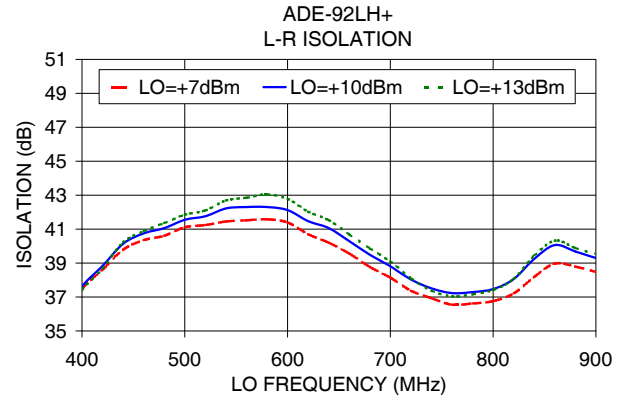
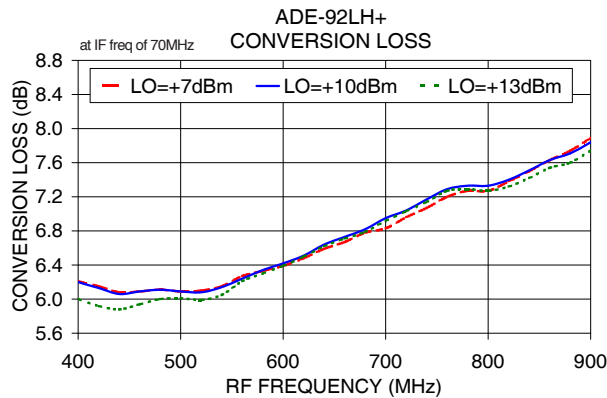
* Conversion Loss increases up to 10dB @ IF Frequency 120-150MHz.

Typical Performance Data

Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF PORT (:1)	VSWR LO PORT (:1)	IP3 (dBm)
RF	LO	LO +10dBm	LO +10dBm	LO +10dBm	LO +10dBm	LO +10dBm	LO +10dBm
400.10	470.10	6.20	40.91	29.23	1.96	23.19	19.62
420.10	490.10	6.13	41.31	29.59	1.97	21.89	19.85
460.10	530.10	6.09	41.99	29.79	2.03	18.94	20.67
500.10	570.10	6.09	42.30	29.06	2.15	15.20	22.3
520.10	590.10	6.08	42.21	28.27	2.18	13.20	22.9
540.10	610.10	6.14	41.80	27.41	2.21	11.41	23.42
580.10	650.10	6.34	40.68	26.00	2.39	8.37	25.68
600.10	670.10	6.42	39.89	25.43	2.49	7.13	27.57
620.10	690.10	6.51	39.15	24.94	2.58	6.08	28.71
640.10	710.10	6.64	38.42	24.58	2.62	5.23	28.63
680.10	750.10	6.82	37.37	24.21	2.79	4.05	28.3
700.10	770.10	6.95	37.26	24.10	2.91	3.65	26.13
740.10	810.10	7.17	37.77	24.14	2.98	3.21	24.34
760.10	830.10	7.29	38.66	24.35	3.04	3.13	25.79
780.10	850.10	7.33	39.66	24.66	3.06	3.12	29.27
800.10	870.10	7.33	39.87	25.06	3.02	3.17	28.2
840.10	910.10	7.51	39.14	25.81	3.07	3.37	28.53
860.10	930.10	7.63	38.82	25.96	3.18	3.51	28.36
880.10	950.10	7.71	38.55	25.93	3.26	3.66	27.7
900.10	970.10	7.84	38.38	25.96	3.31	3.83	27.45

Electrical Schematic





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Frequency Mixer

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Typical Performance Data

RF (MHz)	LO (MHz)	CONVERSION LOSS (dB)			LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
		@LO (dBm)				@LO (dBm)			@LO (dBm)		
		+7	+10	+13		+7	+10	+13	+7	+10	+13
200.1	270.1	11.48	11.36	10.96	200.1	26.09	25.85	25.63	16.87	17.12	17.30
220.1	290.1	10.44	10.25	9.91	220.1	25.00	24.94	24.86	16.21	16.51	16.71
240.1	310.1	9.30	9.10	8.72	240.1	24.47	24.47	24.38	16.42	16.75	16.98
260.1	330.1	8.18	8.11	7.68	260.1	24.69	24.70	24.59	17.19	17.55	17.80
280.1	350.1	7.55	7.53	7.12	280.1	25.55	25.57	25.47	18.29	18.65	18.93
300.1	370.1	7.11	7.10	6.75	300.1	26.95	26.97	26.91	19.47	19.88	20.17
320.1	390.1	6.86	6.82	6.54	320.1	28.78	28.84	28.79	20.88	21.35	21.71
340.1	410.1	6.62	6.57	6.32	340.1	31.40	31.60	31.67	22.34	22.88	23.31
360.1	430.1	6.42	6.40	6.18	360.1	33.71	33.92	33.91	23.56	24.12	24.58
380.1	450.1	6.30	6.29	6.09	380.1	35.64	35.83	35.69	24.60	25.20	25.72
400.1	470.1	6.21	6.20	6.00	400.1	37.48	37.63	37.43	25.56	26.19	26.72
420.1	490.1	6.15	6.13	5.92	420.1	38.62	38.84	38.68	26.64	27.31	27.85
440.1	510.1	6.08	6.06	5.88	440.1	39.79	40.14	40.22	27.62	28.29	28.76
460.1	530.1	6.09	6.09	5.94	460.1	40.35	40.75	40.88	28.38	29.00	29.37
480.1	550.1	6.11	6.11	6.00	480.1	40.61	41.06	41.36	28.88	29.45	29.68
500.1	570.1	6.09	6.09	6.01	500.1	41.11	41.55	41.85	29.20	29.72	29.78
520.1	590.1	6.10	6.08	5.99	520.1	41.24	41.76	42.10	29.37	29.84	29.76
540.1	610.1	6.15	6.14	6.05	540.1	41.45	42.22	42.69	29.35	29.73	29.57
560.1	630.1	6.27	6.24	6.21	560.1	41.52	42.30	42.85	29.09	29.38	29.14
580.1	650.1	6.33	6.34	6.30	580.1	41.58	42.30	43.04	28.40	28.73	28.45
600.1	670.1	6.39	6.42	6.39	600.1	41.39	42.12	42.78	27.41	27.81	27.50
620.1	690.1	6.48	6.51	6.50	620.1	40.70	41.47	42.03	26.59	27.01	26.70
640.1	710.1	6.59	6.64	6.62	640.1	40.20	41.06	41.53	25.84	26.29	26.02
660.1	730.1	6.67	6.73	6.71	660.1	39.56	40.29	40.69	25.24	25.70	25.42
680.1	750.1	6.78	6.82	6.79	680.1	38.77	39.49	39.86	24.68	25.15	24.84
700.1	770.1	6.83	6.95	6.92	700.1	38.14	38.81	39.09	24.23	24.73	24.39
720.1	790.1	6.96	7.04	7.03	720.1	37.37	38.03	38.11	23.88	24.42	24.12
740.1	810.1	7.07	7.17	7.14	740.1	36.93	37.51	37.37	23.71	24.27	24.01
760.1	830.1	7.20	7.29	7.27	760.1	36.55	37.23	37.04	23.59	24.14	23.94
780.1	850.1	7.27	7.33	7.29	780.1	36.62	37.29	37.16	23.49	24.06	23.88
800.1	870.1	7.27	7.33	7.27	800.1	36.76	37.47	37.42	23.48	24.06	23.89
820.1	890.1	7.38	7.40	7.32	820.1	37.21	38.06	38.07	23.62	24.21	24.08
840.1	910.1	7.50	7.51	7.42	840.1	38.19	39.25	39.44	23.88	24.48	24.42
860.1	930.1	7.63	7.63	7.54	860.1	38.97	40.06	40.32	24.20	24.84	24.85
880.1	950.1	7.74	7.71	7.60	880.1	38.79	39.68	39.89	24.61	25.27	25.34
900.1	970.1	7.89	7.84	7.74	900.1	38.48	39.30	39.54	24.99	25.67	25.82
920.1	990.1	8.06	7.99	7.86	920.1	38.20	38.98	39.29	25.27	25.95	26.19
940.1	1010.1	8.19	8.11	7.96	940.1	38.06	38.66	39.06	25.35	25.96	26.22
960.1	1030.1	8.35	8.25	8.09	960.1	37.99	38.44	38.94	25.39	25.90	26.11
980.1	1050.1	8.51	8.38	8.20	980.1	37.88	38.32	38.87	25.64	26.02	26.19
1000.1	1070.1	8.72	8.58	8.40	1000.1	38.06	38.47	39.05	26.01	26.34	26.46
1020.1	1090.1	8.89	8.74	8.55	1020.1	38.21	38.69	39.19	26.52	26.75	26.84
1040.1	1110.1	9.06	8.90	8.69	1040.1	38.49	39.04	39.42	27.07	27.28	27.35
1060.1	1130.1	9.23	9.06	8.84	1060.1	38.76	39.19	39.53	27.66	27.86	27.87
1080.1	1150.1	9.46	9.27	9.04	1080.1	39.27	39.63	40.03	28.14	28.35	28.32
1100.1	1170.1	9.73	9.52	9.28	1100.1	39.99	40.10	40.56	28.60	28.85	28.76
1120.1	1190.1	9.92	9.71	9.48	1120.1	40.74	40.45	40.85	29.09	29.37	29.26
1140.1	1210.1	10.11	9.88	9.64	1140.1	41.50	40.82	41.22	29.64	29.96	29.81
1160.1	1230.1	10.32	10.07	9.81	1160.1	41.88	41.39	41.68	30.27	30.44	30.33
1180.1	1250.1	10.55	10.30	10.03	1180.1	42.37	42.25	42.34	30.76	30.81	30.74
1200.1	1270.1	10.80	10.56	10.29	1200.1	42.71	42.60	42.58	31.21	31.31	31.22

REV. X2
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IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED • RoHS compliant

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The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Typical Performance Data

RF (MHz)	LO (MHz)	IP3 Input (dBm)		
		@LO (dBm)	@LO (dBm)	@LO (dBm)
		+7	+10	+13
200.1	270.1	15.94	17.93	22.67
220.1	290.1	22.04	18.62	27.97
240.1	310.1	18.34	16.96	21.09
260.1	330.1	11.84	16.15	17.47
280.1	350.1	11.37	16.68	18.14
300.1	370.1	12.88	17.63	19.87
320.1	390.1	14.07	18.27	21.27
340.1	410.1	14.24	18.76	21.59
360.1	430.1	14.66	19.16	21.36
380.1	450.1	15.29	19.39	21.42
400.1	470.1	15.22	19.62	21.44
420.1	490.1	15.08	19.85	21.45
440.1	510.1	15.46	20.10	21.52
460.1	530.1	16.35	20.67	22.35
480.1	550.1	18.07	21.27	23.21
500.1	570.1	21.58	22.30	24.42
520.1	590.1	22.04	22.90	25.06
540.1	610.1	19.98	23.42	25.17
560.1	630.1	19.53	24.31	25.72
580.1	650.1	21.23	25.68	27.70
600.1	670.1	23.28	27.57	31.09
620.1	690.1	25.20	28.71	35.77
640.1	710.1	29.29	28.63	35.96
660.1	730.1	29.37	28.46	33.54
680.1	750.1	27.42	28.30	36.11
700.1	770.1	23.91	26.13	31.27
720.1	790.1	21.36	24.55	27.73
740.1	810.1	20.70	24.34	26.18
760.1	830.1	22.99	25.79	26.81
780.1	850.1	27.33	29.27	29.23
800.1	870.1	26.02	28.20	31.98
820.1	890.1	28.03	27.96	33.52
840.1	910.1	30.06	28.53	33.03
860.1	930.1	27.58	28.36	34.97
880.1	950.1	25.41	27.70	35.44
900.1	970.1	23.43	27.45	33.43
920.1	990.1	23.96	27.57	30.99
940.1	1010.1	27.47	28.67	31.76
960.1	1030.1	30.13	28.51	35.22
980.1	1050.1	25.56	27.25	36.31
1000.1	1070.1	23.10	25.98	31.35
1020.1	1090.1	21.52	25.24	29.45
1040.1	1110.1	20.40	24.46	27.90
1060.1	1130.1	19.31	23.68	25.81
1080.1	1150.1	18.32	23.10	24.00
1100.1	1170.1	17.54	22.83	22.87
1120.1	1190.1	17.25	22.85	22.28
1140.1	1210.1	17.35	23.62	22.18
1160.1	1230.1	17.87	26.84	22.55
1180.1	1250.1	18.90	25.96	23.72
1200.1	1270.1	18.85	21.24	25.72

REV. X2
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Typical Performance Data

RF/LO (MHz)	RF VSWR (:1)			LO VSWR (:1)			IF (MHz)	IF VSWR (:1)		
	@LO (dBm)			@LO (dBm)				@LO (dBm)		
	+7	+10	+13	+7	+10	+13		+7	+10	+13
280.1	2.20	2.18	2.19	11.09	10.96	10.96	0.3	1.07	1.03	1.04
300.1	2.06	2.08	2.09	13.29	13.19	13.19	15.7	1.07	1.05	1.06
320.1	1.98	2.03	2.03	15.53	15.67	15.53	31.1	1.10	1.09	1.10
340.1	1.92	1.96	1.99	17.75	17.93	17.75	46.4	1.13	1.13	1.13
360.1	1.90	1.95	2.02	19.76	19.76	19.54	61.8	1.17	1.17	1.16
380.1	1.89	1.95	2.04	21.20	21.20	20.95	77.2	1.22	1.23	1.22
420.1	1.87	1.97	2.06	23.18	23.49	23.18	92.6	1.27	1.29	1.29
440.1	1.89	1.98	2.09	23.81	24.14	23.81	107.9	1.33	1.35	1.36
480.1	1.99	2.10	2.26	22.58	22.58	22.29	123.3	1.39	1.41	1.44
500.1	2.01	2.15	2.30	21.20	21.20	20.95	138.7	1.45	1.46	1.50
540.1	2.08	2.21	2.36	17.75	18.11	17.57	154.1	1.53	1.55	1.58
560.1	2.19	2.30	2.49	15.96	16.26	15.81	169.4	1.61	1.64	1.66
600.1	2.35	2.49	2.65	12.09	12.26	12.01	184.8	1.69	1.72	1.75
620.1	2.43	2.58	2.74	10.37	10.56	10.31	200.2	1.73	1.77	1.82
660.1	2.59	2.69	2.89	7.63	7.70	7.50	215.6	1.70	1.73	1.81
680.1	2.66	2.79	2.93	6.53	6.56	6.39	231.0	1.64	1.65	1.75
720.1	2.77	2.95	3.08	4.83	4.86	4.74	246.3	1.55	1.56	1.67
740.1	2.83	2.98	3.16	4.27	4.28	4.19	261.7	1.48	1.49	1.59
780.1	2.87	3.06	3.16	3.51	3.49	3.45	277.1	1.45	1.46	1.56
800.1	2.84	3.02	3.13	3.30	3.27	3.24	292.5	1.44	1.45	1.54
840.1	2.94	3.07	3.20	3.14	3.11	3.10	307.8	1.44	1.45	1.54
860.1	3.04	3.18	3.28	3.18	3.13	3.13	323.2	1.45	1.47	1.55
900.1	3.18	3.31	3.43	3.37	3.31	3.31	338.6	1.48	1.50	1.58
920.1	3.25	3.34	3.49	3.50	3.44	3.45	354.0	1.52	1.54	1.63
960.1	3.45	3.52	3.62	3.81	3.74	3.76	369.3	1.56	1.59	1.67
980.1	3.52	3.58	3.71	3.98	3.91	3.93	384.7	1.60	1.63	1.71
1020.1	3.70	3.70	3.90	4.31	4.25	4.28	400.1	1.64	1.67	1.75
1040.1	3.81	3.80	3.99	4.46	4.41	4.43	415.5	1.68	1.71	1.80
1080.1	4.01	4.00	4.24	4.75	4.68	4.72	430.9	1.74	1.77	1.87
1100.1	4.11	4.09	4.32	4.91	4.86	4.88	446.2	1.79	1.82	1.93
1140.1	4.37	4.36	4.51	5.10	5.04	5.07	461.6	1.82	1.85	1.97
1160.1	4.48	4.48	4.68	5.20	5.14	5.16	477.0	1.85	1.88	2.01
1200.1	4.70	4.75	4.89	5.36	5.31	5.33	492.4	1.87	1.91	2.04
							507.7	1.91	1.96	2.08
							523.1	1.97	2.03	2.16
							538.5	2.03	2.08	2.23
							553.9	2.07	2.10	2.27
							569.2	2.10	2.13	2.31
							584.6	2.13	2.16	2.34
							600.0	2.17	2.20	2.37

REV. X2
ADE-92LH+
110112
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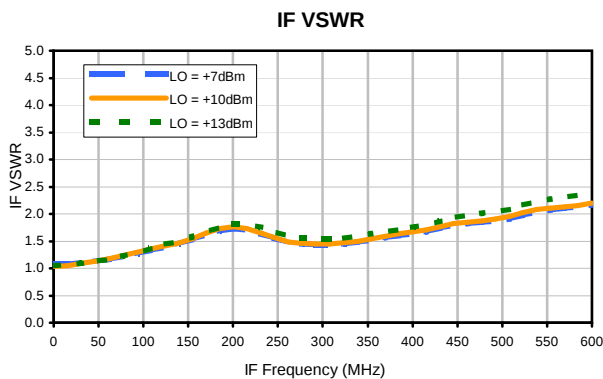
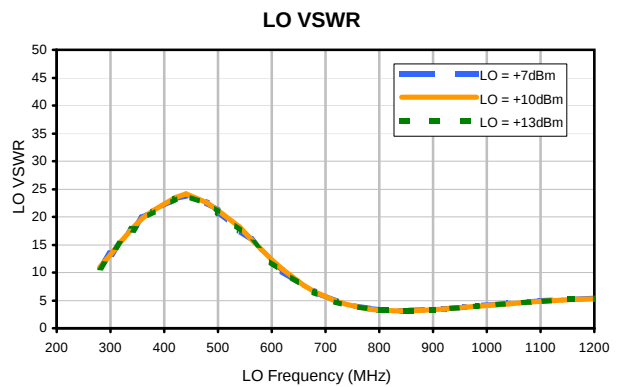
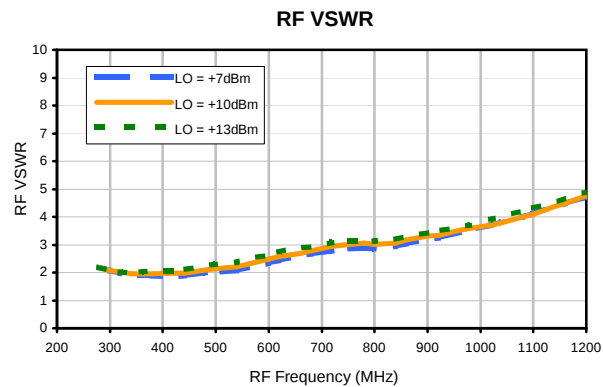
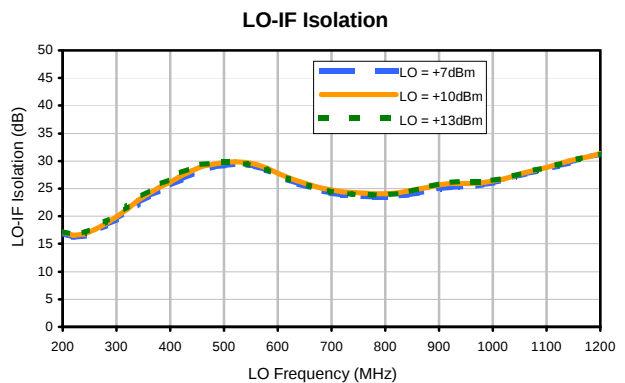
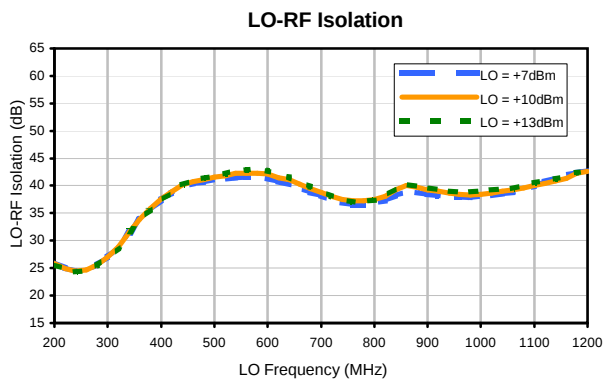
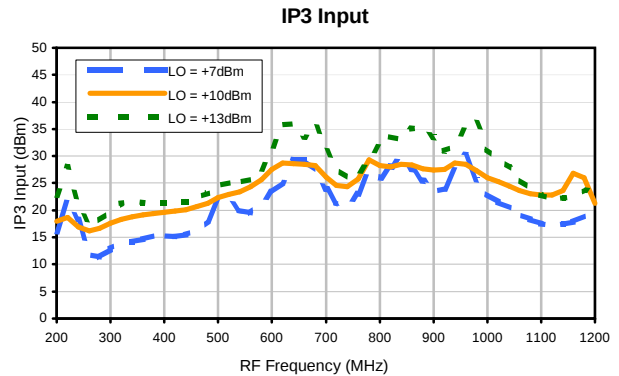
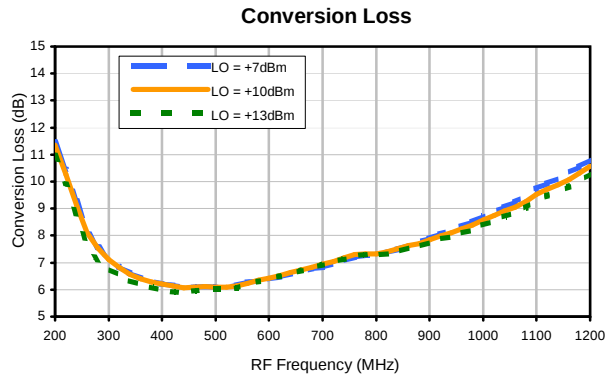
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Frequency Mixer

ADE-92LH+

Typical Performance Curves



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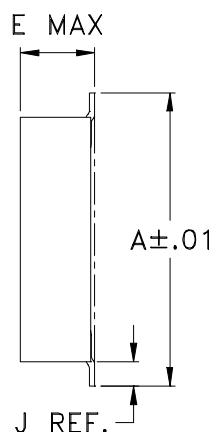
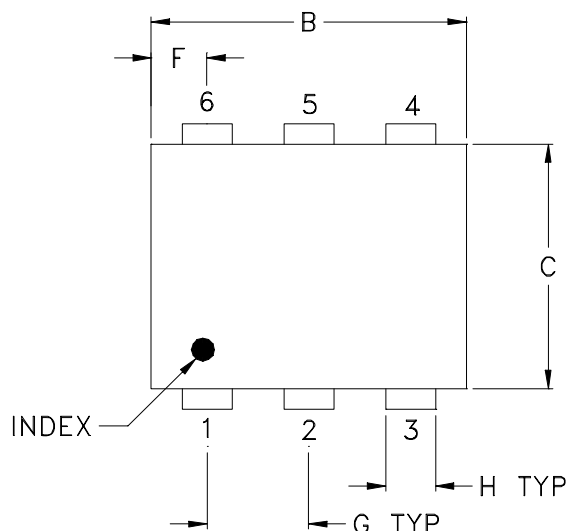


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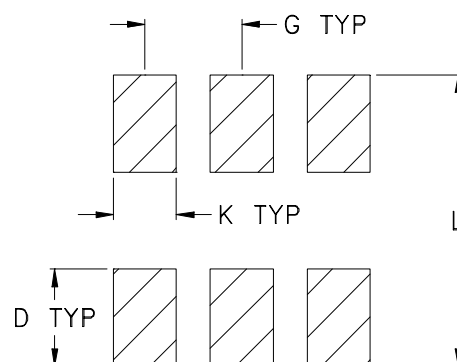


CD541
CD542
CD636
CD637

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within $\pm.002$

CASE#	A	B	C	D	E	F	G	H	J	K	L	WT, GRAM
CD541					.082 (2.08)							.15
CD542	.272 (6.91)	.310 (7.87)	.220 (5.58)	.100 (2.54)	.112 (2.84)	.055 (1.40)	.100 (2.54)	.030 (0.76)	.026 (0.66)	.065 (1.65)	.300 (7.62)	.20
CD636					.162 (4.11)							.25
CD637					.206 (5.23)							.40

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

Notes:

- Case material: Plastic.
- Termination finish:
For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.



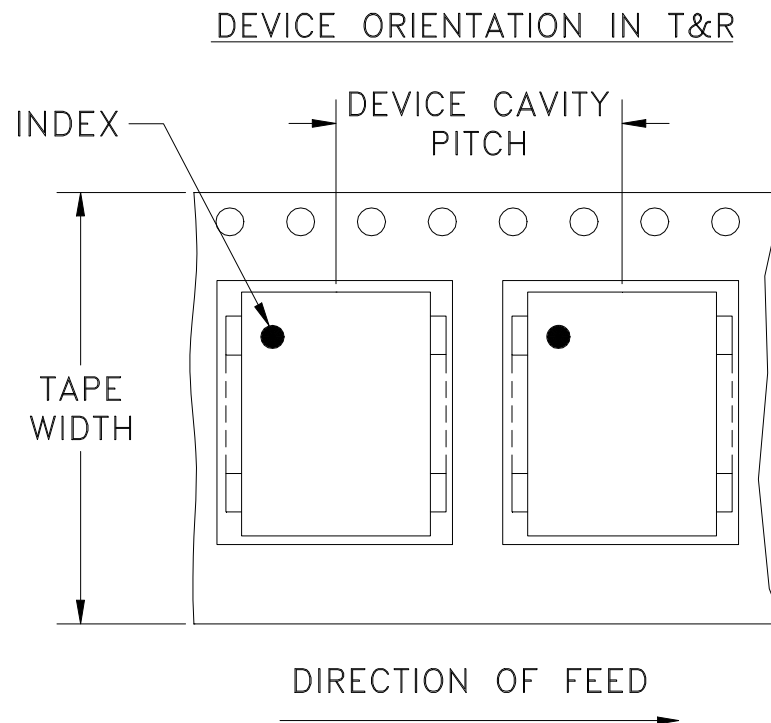
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Tape & Reel Packaging TR-F34



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
16	12	7	Small quantity standard (see note)	20
				50
				100
				200
		13	Standard	500
				1000

Note: Availability of small reel quantity varies by model.
Refer to pricing and availability on individual model dashboard.

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



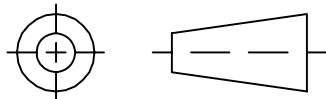
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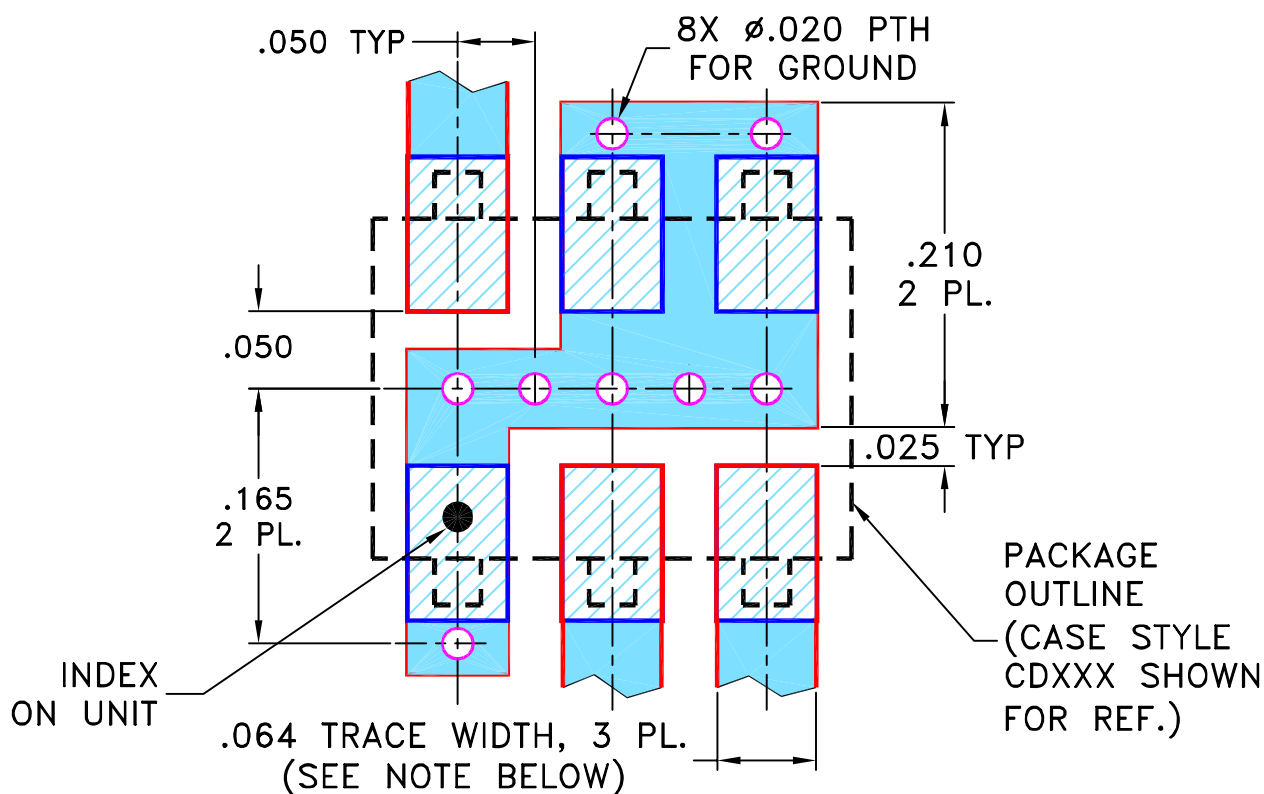
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
A	M101143	ADDED "gk" PIN CONNECTION, TT100 CASE STYLE & NOTE 2	10/10/05	MMG	DJ
B	M102713	ADDED "...WITH SMOBC"	01/17/06	MMG	IL
C	M108637	REMOVED "PIN 1", ADDED INDEX ON UNIT	12/01/06	MYG	FL

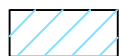
SUGGESTED MOUNTING CONFIGURATION
FOR BH292, CD541/542/636/637, TT100/240 CASE
STYLES, "gk", "ht", "hu", "nd", "w" PIN CONNECTIONS



- NOTES:** 1. 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.
 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

TOLERANCES ON:

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

DRAWN

MMG

07/17/02

CHECKED

WL

08/02/02

APPROVED

DJ

08/05/02



Mini-Circuits®

13 Neptune Avenue
 Brooklyn NY 11235

PL, gk/ht/hu/nd/w, BH292,
 CD541/542/636/637, TT100/240, TB-03

SIZE

A

CODE IDENT

15542

DRAWING NO:

98-PL-052

REV:

C

FILE:

98PL052

SCALE:

8:1

SHEET:

1 OF 1

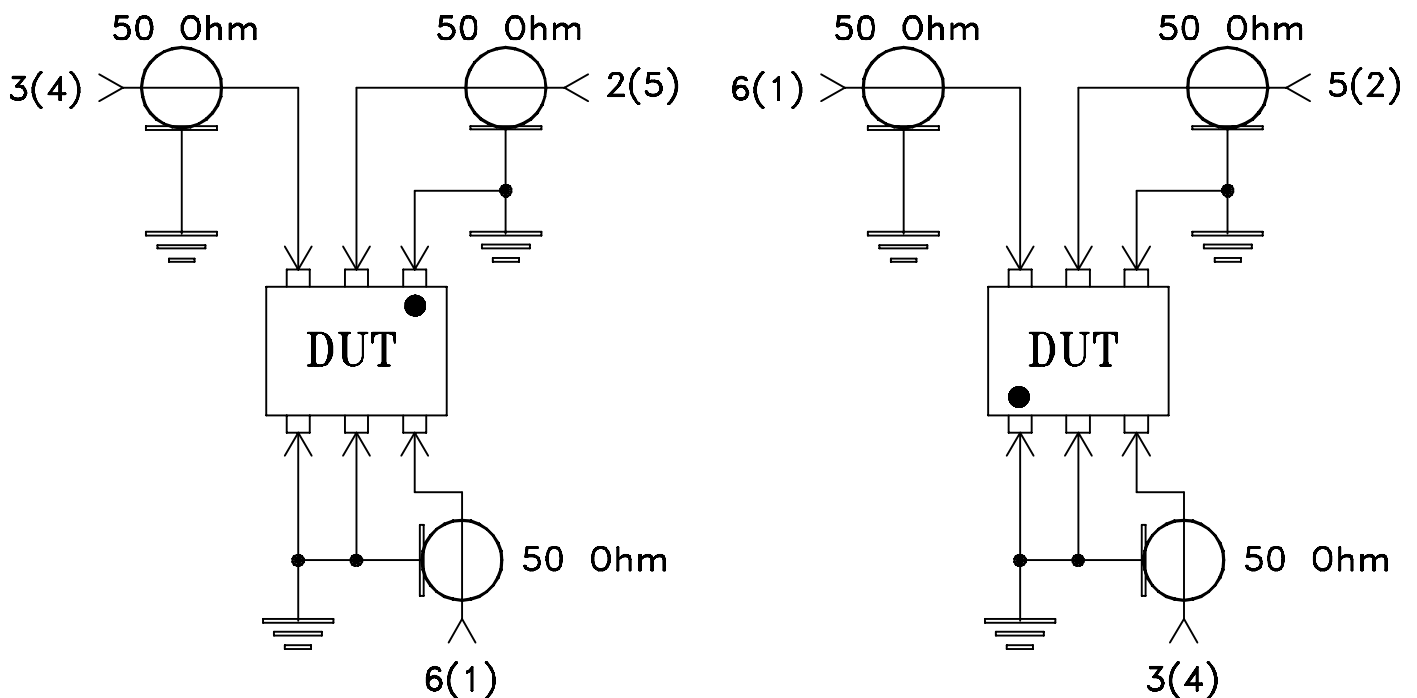
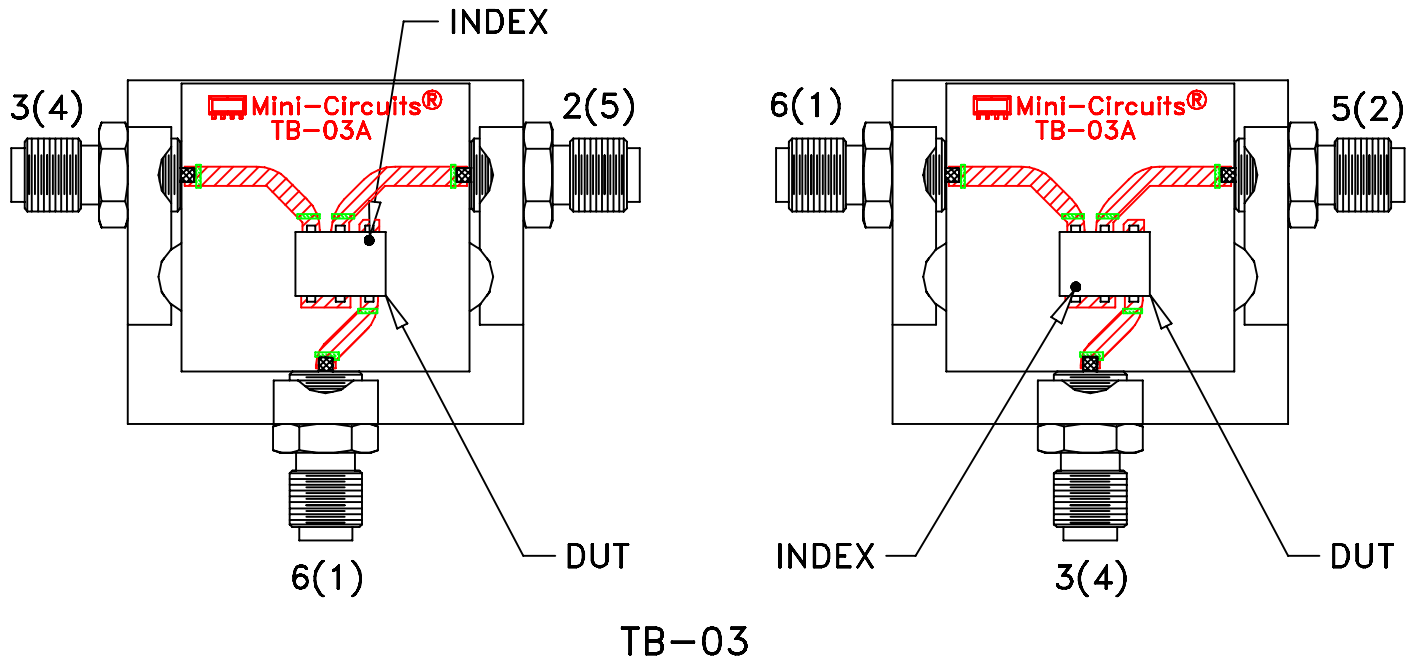
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ASHEETA1.DWG REV:A DATE:01/12/95

Evaluation Board and Circuit

For Pin Connections and DUT Orientation Refer to
Data Sheet of the DUT



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.030 inch.

 **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
HAST	130°C, 85% RH, 96 hours	JESD22-A110
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 Eutectic Process: 225°C peak Pb-Free Process, 245°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
Vibration (High Frequency)	20g peak, 20-2000 Hz, 4 times in each of three axes (total 12)	MIL-STD-883, Method 2007.3, Condition A
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