

Surface Mount Frequency Mixer

Level 7 (LO Power +7 dBm) 200 to 1000 MHz

ADE-4+
ADE-4



Generic photo used for illustration purposes only

CASE STYLE: CD542

+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
7"	20, 50, 100, 200
13"	500, 1000

Maximum Ratings

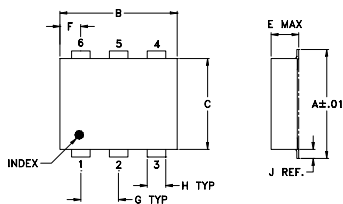
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	50mW
IF Current	40mA

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

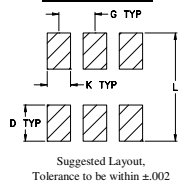
Pin Connections

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

Outline Drawing



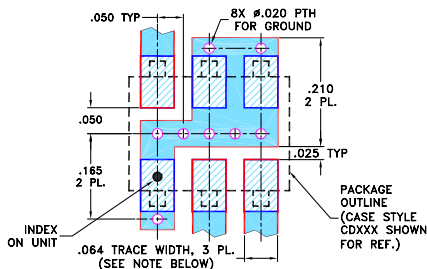
PCB Land Pattern



Outline Dimensions (inch)

A	B	C	D	E	F	G
.272	.310	.220	.100	.112	.055	.100
6.91	7.87	5.59	2.54	2.84	1.40	2.54
H	J	K	L	wt		
.030	.026	.065	.300	grams		
0.76	0.66	1.65	7.62	0.20		

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.
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

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

Features

- low conversion loss, 6.8 dB typ.
- good L-R isolation, 53 dB typ.
- low profile package
- aqueous washable
- low cost
- protected by U.S. Patent 6,133,525

Applications

- cellular
- VHF/UHF receivers

Electrical Specifications

FREQUENCY (MHz)		CONVERSION LOSS (dB)			LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)			IP3 at center band (dBm)
LO/RF	IF	M	Total Range	Max.	L	M	U	L	M	U	
f _L -f _U		$\bar{X}$	σ		Typ. Min.	Typ. Min.	Typ. Min.	Typ. Min.	Typ. Min.	Typ. Min.	Typ.
200-1000	DC-800	6.8	0.10	8.5	60 45	53 40	45 30	45 30	40 22	35 20	15

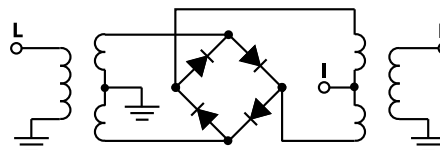
1 dB COMP.: +1 dBm typ.

L = 200-400 MHz M = 400-500 MHz U = 500-1000 MHz

Typical Performance Data

Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)
RF	LO	LO +7dBm	LO +7dBm	LO +7dBm	LO +7dBm	LO +7dBm
200.00	230.00	7.14	60.34	44.99	1.41	2.56
250.00	280.00	6.82	59.00	43.67	1.38	2.28
300.00	330.00	6.87	57.00	43.34	1.39	2.20
350.00	380.00	7.02	59.50	42.50	1.40	2.10
375.00	405.00	6.89	59.01	42.17	1.40	2.10
400.00	430.00	6.97	59.17	41.33	1.39	2.17
450.00	480.00	6.72	56.50	40.17	1.37	2.04
475.00	505.00	6.82	56.67	39.67	1.36	2.10
500.00	530.00	6.85	57.32	39.17	1.37	2.10
550.00	580.00	6.93	56.67	38.50	1.39	2.10
600.00	630.00	7.03	55.83	37.84	1.39	2.10
650.00	680.00	6.90	54.33	37.00	1.34	2.10
675.00	705.00	6.94	53.34	36.67	1.34	2.13
700.00	730.00	6.90	52.84	36.17	1.34	2.07
750.00	780.00	6.96	51.50	35.33	1.32	2.20
800.00	830.00	7.00	49.83	34.50	1.28	2.10
850.00	880.00	6.83	48.00	32.99	1.24	2.28
900.00	930.00	6.70	47.00	31.66	1.22	2.20
950.00	980.00	6.81	45.83	30.83	1.18	2.41
1000.00	1030.00	6.82	44.33	30.33	1.11	2.46

Electrical Schematic

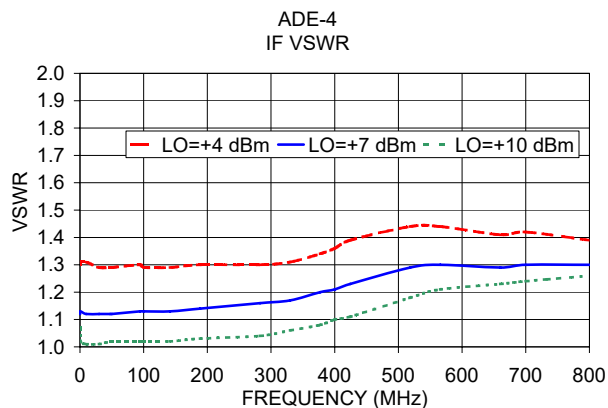
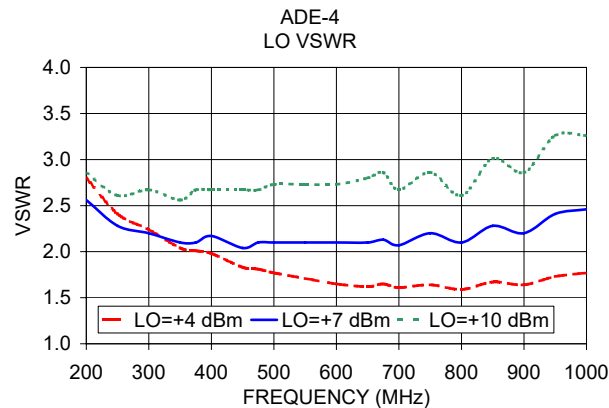
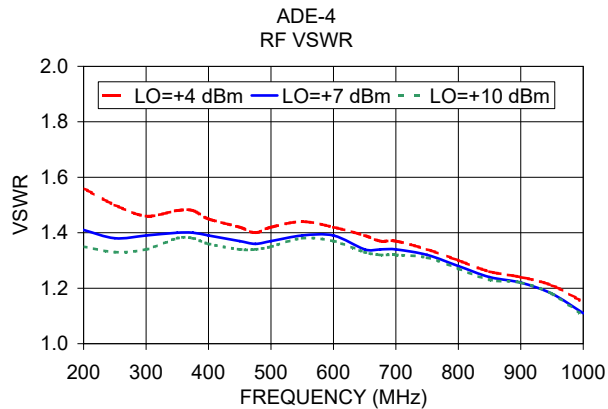
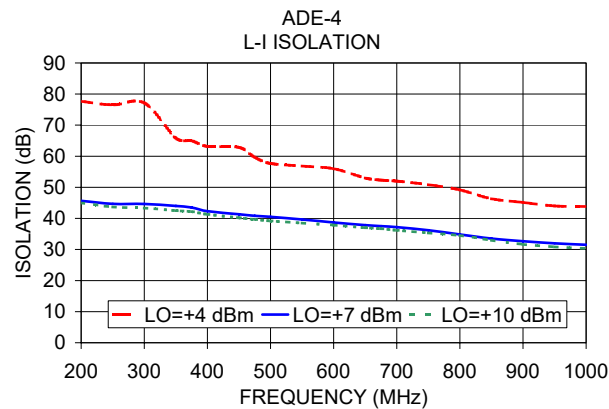
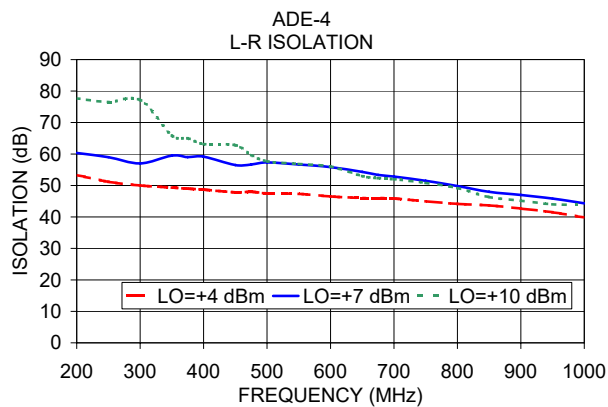
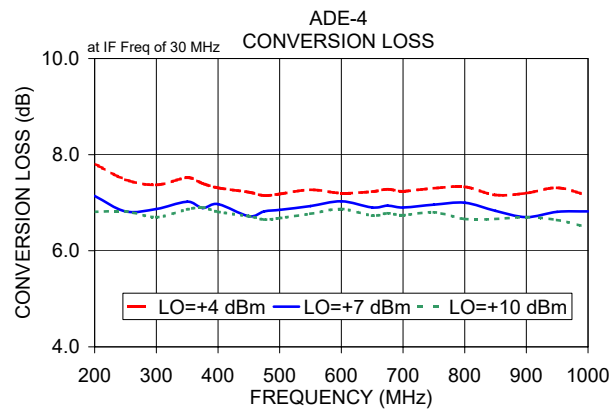


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Performance Charts



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Frequency Mixer

ADE-4+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)		
		@LO (dBm)		
		+4	+7	+10
20.1	50.1	16.10	9.82	7.27
60.1	90.1	9.81	7.49	6.57
100.1	130.1	7.89	6.76	6.39
140.1	170.1	7.85	6.87	6.49
180.1	210.1	7.42	6.60	6.34
220.1	250.1	7.38	6.61	6.39
260.1	290.1	7.12	6.61	6.41
300.1	330.1	6.96	6.51	6.32
340.1	370.1	7.08	6.63	6.43
380.1	410.1	6.85	6.54	6.41
420.1	450.1	6.90	6.49	6.29
480.1	510.1	6.88	6.54	6.33
520.1	550.1	6.97	6.61	6.39
580.1	610.1	6.83	6.49	6.29
620.1	650.1	6.89	6.55	6.36
680.1	710.1	6.87	6.52	6.29
720.1	750.1	6.99	6.64	6.42
780.1	810.1	7.05	6.72	6.51
820.1	850.1	7.18	6.78	6.54
880.1	910.1	7.17	6.63	6.33
920.1	950.1	7.28	6.75	6.38
980.1	1010.1	7.24	6.76	6.42
1020.1	1050.1	7.17	6.71	6.38
1080.1	1110.1	7.14	6.69	6.39
1120.1	1150.1	7.05	6.63	6.33
1180.1	1210.1	6.83	6.41	6.11
1220.1	1250.1	6.74	6.30	6.04
1280.1	1310.1	6.74	6.30	6.07
1320.1	1350.1	6.85	6.37	6.13
1380.1	1410.1	7.15	6.62	6.32
1420.1	1450.1	7.36	6.82	6.51
1480.1	1510.1	7.60	7.14	6.82
1520.1	1550.1	7.86	7.46	7.13
1580.1	1610.1	8.30	8.00	7.73
1620.1	1650.1	8.53	8.28	8.05
1680.1	1710.1	8.89	8.71	8.55
1720.1	1750.1	9.08	8.92	8.78
1780.1	1810.1	9.57	9.41	9.31
1820.1	1850.1	9.83	9.66	9.55
1880.1	1910.1	10.49	10.31	10.17

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+4	+7	+10
20.1	50.1	-3.37	4.00	10.62
60.1	90.1	5.33	11.61	16.79
100.1	130.1	10.27	14.73	15.61
140.1	170.1	11.93	16.60	15.14
180.1	210.1	12.13	12.99	18.36
220.1	250.1	13.45	13.87	22.68
260.1	290.1	11.33	16.49	22.37
300.1	330.1	11.09	18.12	21.86
340.1	370.1	12.39	19.68	18.40
380.1	410.1	14.62	19.92	17.12
420.1	450.1	14.25	20.48	19.23
480.1	510.1	15.84	19.19	18.06
520.1	550.1	16.51	15.65	15.02
580.1	610.1	15.25	14.94	14.93
620.1	650.1	13.75	13.85	14.43
680.1	710.1	16.60	14.95	14.64
720.1	750.1	16.30	17.30	16.91
780.1	810.1	15.10	15.97	16.79
820.1	850.1	14.00	14.99	15.69
880.1	910.1	13.49	12.68	13.96
920.1	950.1	13.50	13.09	13.06
980.1	1010.1	13.00	13.18	12.80
1020.1	1050.1	11.57	11.93	11.74
1080.1	1110.1	8.90	9.53	9.60
1120.1	1150.1	7.93	8.45	8.75
1180.1	1210.1	7.13	8.06	8.76
1220.1	1250.1	7.34	8.93	9.77
1280.1	1310.1	7.03	8.76	9.89
1320.1	1350.1	6.84	8.49	9.94
1380.1	1410.1	6.41	8.02	9.82
1420.1	1450.1	6.39	7.94	9.83
1480.1	1510.1	6.35	7.89	9.95
1520.1	1550.1	6.24	7.55	9.64
1580.1	1610.1	6.11	7.05	8.76
1620.1	1650.1	6.33	6.92	8.32
1680.1	1710.1	7.80	7.90	8.85
1720.1	1750.1	9.34	8.89	9.43
1780.1	1810.1	12.99	12.06	11.58
1820.1	1850.1	14.92	14.25	13.35
1880.1	1910.1	13.74	17.42	17.11

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+1dBm (dB)		
		@LO (dBm)		
		+4	+7	+10
20.1	50.1	-3.15	-0.42	0.09
60.1	90.1	-0.16	0.22	0.24
100.1	130.1	0.49	0.44	0.29
140.1	170.1	0.36	0.32	0.22
180.1	210.1	0.49	0.38	0.22
220.1	250.1	0.52	0.34	0.16
260.1	290.1	0.56	0.34	0.21
300.1	330.1	0.60	0.39	0.25
340.1	370.1	0.50	0.33	0.17
380.1	410.1	0.60	0.38	0.22
420.1	450.1	0.56	0.36	0.26
480.1	510.1	0.54	0.38	0.28
520.1	550.1	0.50	0.35	0.26
580.1	610.1	0.64	0.46	0.35
620.1	650.1	0.63	0.46	0.35
680.1	710.1	0.77	0.59	0.46
720.1	750.1	0.78	0.59	0.46
780.1	810.1	0.92	0.69	0.54
820.1	850.1	0.96	0.73	0.58
880.1	910.1	1.12	0.98	0.81
920.1	950.1	1.10	0.99	0.86
980.1	1010.1	1.26	1.07	0.96
1020.1	1050.1	1.34	1.18	1.03
1080.1	1110.1	1.43	1.23	1.09
1120.1	1150.1	1.55	1.32	1.17
1180.1	1210.1	1.81	1.52	1.28
1220.1	1250.1	1.90	1.56	1.28
1280.1	1310.1	2.00	1.63	1.31
1320.1	1350.1	1.94	1.61	1.28
1380.1	1410.1	1.86	1.59	1.28
1420.1	1450.1	1.72	1.52	1.26
1480.1	1510.1	1.73	1.52	1.31
1520.1	1550.1	1.55	1.37	1.21
1580.1	1610.1	1.32	1.14	1.02
1620.1	1650.1	1.16	0.97	0.84
1680.1	1710.1	0.97	0.77	0.64
1720.1	1750.1	0.89	0.67	0.55
1780.1	1810.1	0.75	0.55	0.43
1820.1	1850.1	0.69	0.52	0.39
1880.1	1910.1	0.52	0.39	0.30

Frequency Mixer

ADE-4+

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=389.9MHz (dB)
		@LO (dBm)
		+7
10.1	400.0	6.9
12.6	402.5	6.9
15.1	405.0	6.9
17.6	407.5	6.9
20.1	410.0	6.8
22.6	412.5	6.8
25.1	415.0	6.8
27.6	417.5	6.8
30.1	420.0	6.9
32.6	422.5	6.9
35.1	425.0	6.9
37.6	427.5	6.9
40.1	430.0	6.9
42.6	432.5	6.9
45.1	435.0	6.9
47.6	437.5	6.9
50.1	440.0	6.9
52.6	442.5	6.9
55.1	445.0	7.0
57.6	447.5	6.9
60.1	450.0	6.9
62.6	452.5	6.9
65.1	455.0	6.9
67.6	457.5	6.9
70.1	460.0	6.9
72.6	462.5	6.9
75.1	465.0	6.9
77.6	467.5	6.9
80.1	470.0	6.9
82.6	472.5	6.9
85.1	475.0	6.9
87.6	477.5	6.9
90.1	480.0	6.9
92.6	482.5	6.9
95.1	485.0	7.0
97.6	487.5	7.0
100.1	490.0	7.0
102.6	492.5	7.0
107.6	497.5	6.9
110.1	500.0	7.0

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=189.9MHz (dB)
		@LO (dBm)
		+7
10.1	200.0	6.61
50.1	240.0	6.61
90.1	280.0	6.63
130.1	320.0	6.65
170.1	360.0	6.67
210.1	400.0	6.72
250.1	440.0	6.76
290.1	480.0	6.81
330.1	520.0	6.91
370.1	560.0	6.96
410.1	600.0	7.06
450.1	640.0	7.01
490.1	680.0	7.05
530.1	720.0	7.14
570.1	760.0	7.21
610.1	800.0	7.36
650.1	840.0	7.53
690.1	880.0	7.60
730.1	920.0	7.67
770.1	960.0	7.72
810.1	1000.0	7.76
850.1	1040.0	7.71
890.1	1080.0	7.71
930.1	1120.0	7.72
970.1	1160.0	7.65
1010.1	1200.0	7.65
1050.1	1240.0	7.74
1090.1	1280.0	7.84
1130.1	1320.0	7.97
1170.1	1360.0	8.10
1210.1	1400.0	8.23
1250.1	1440.0	8.27
1290.1	1480.0	8.45
1330.1	1520.0	8.58
1370.1	1560.0	8.70
1410.1	1600.0	8.91
1450.1	1640.0	9.07
1510.1	1700.0	9.41
1550.1	1740.0	9.60
1610.1	1800.0	9.92

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1010.1MHz (dB)
		@LO (dBm)
		+7
970.1	40.0	11.54
950.1	60.0	9.03
930.1	80.0	7.91
910.1	100.0	7.37
890.1	120.0	7.16
870.1	140.0	7.03
850.1	160.0	7.03
830.1	180.0	6.95
810.1	200.0	6.90
790.1	220.0	6.83
770.1	240.0	6.81
750.1	260.0	6.83
730.1	280.0	6.79
710.1	300.0	6.78
690.1	320.0	6.70
670.1	340.0	6.67
650.1	360.0	6.63
630.1	380.0	6.60
610.1	400.0	6.57
590.1	420.0	6.51
570.1	440.0	6.47
550.1	460.0	6.49
510.1	500.0	6.54
490.1	520.0	6.53
450.1	560.0	6.58
430.1	580.0	6.66
390.1	620.0	6.61
370.1	640.0	6.63
330.1	680.0	6.66
310.1	700.0	6.69
270.1	740.0	6.78
250.1	760.0	6.84
210.1	800.0	6.84
190.1	820.0	6.79
150.1	860.0	6.74
130.1	880.0	6.63
90.1	920.0	6.55
70.1	940.0	6.60
30.1	980.0	6.64
10.1	1000.0	6.69

REV. X3

ADE-4+

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IF/RF MICROWAVE COMPONENTS



Frequency Mixer

ADE-4+

Typical Performance Data

LO	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)			RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)					@LO (dBm)		
	+4	+7	+10	+4	+7	+10			+4	+7	+10
50.1	65.35	67.43	69.20	69.90	60.14	57.65	20.1	50.1	43.97	44.42	45.24
90.1	61.74	68.56	76.50	55.88	53.56	52.10	60.1	90.1	36.59	35.50	35.72
130.1	62.03	68.61	76.37	52.32	50.25	48.50	100.1	130.1	31.62	32.48	32.37
170.1	57.58	65.05	72.91	50.59	48.14	46.50	140.1	170.1	29.99	30.19	30.49
210.1	56.10	63.48	70.78	48.52	46.66	44.82	180.1	210.1	28.40	28.85	28.85
250.1	53.43	61.35	68.67	47.91	45.93	43.62	220.1	250.1	26.99	27.81	27.90
290.1	52.25	60.84	65.50	47.26	44.93	42.62	260.1	290.1	26.82	27.37	27.37
330.1	51.20	59.48	64.14	46.50	43.73	41.33	300.1	330.1	26.36	26.90	27.14
370.1	50.39	58.82	61.86	46.00	43.02	40.54	340.1	370.1	26.00	26.47	26.79
410.1	49.85	58.25	59.67	44.88	41.80	39.53	380.1	410.1	26.00	26.78	26.99
450.1	48.65	56.32	58.39	43.61	40.79	38.78	420.1	450.1	26.21	27.18	27.78
510.1	47.86	54.37	55.20	42.44	39.83	37.97	480.1	510.1	26.37	27.14	27.44
550.1	47.41	53.02	52.95	41.43	39.06	37.17	520.1	550.1	25.16	25.83	26.17
610.1	47.62	52.04	50.76	40.56	38.54	36.89	580.1	610.1	24.16	24.95	25.54
650.1	47.22	50.82	49.49	39.65	37.60	36.19	620.1	650.1	23.68	24.50	24.99
710.1	46.45	49.02	47.53	38.44	36.49	34.88	680.1	710.1	21.68	21.74	21.70
750.1	46.26	48.40	46.46	37.44	36.19	34.68	720.1	750.1	19.85	19.63	19.44
810.1	45.28	46.83	44.82	35.48	34.62	33.93	780.1	810.1	17.07	16.74	16.48
850.1	44.58	46.10	43.92	34.29	33.29	32.71	820.1	850.1	15.52	15.20	14.89
910.1	43.39	44.67	42.33	33.05	31.70	30.86	880.1	910.1	14.04	13.58	13.44
950.1	42.16	44.48	42.05	32.50	31.04	29.91	920.1	950.1	13.40	13.01	12.77
1010.1	40.60	43.94	42.67	32.11	30.51	29.27	980.1	1010.1	12.65	12.45	12.22
1050.1	39.79	43.03	42.51	31.59	30.18	28.95	1020.1	1050.1	12.19	12.01	11.94
1110.1	38.86	41.71	41.78	31.10	29.96	28.91	1080.1	1110.1	11.76	11.54	11.48
1150.1	38.22	40.93	41.04	30.59	29.77	28.83	1120.1	1150.1	11.53	11.36	11.29
1210.1	37.40	40.05	40.15	29.49	29.25	28.55	1180.1	1210.1	11.04	10.82	10.68
1250.1	36.99	39.46	39.50	28.34	28.31	27.77	1220.1	1250.1	10.78	10.58	10.45
1310.1	35.98	38.32	38.88	26.80	26.69	26.43	1280.1	1310.1	10.71	10.46	10.24
1350.1	35.12	37.32	38.05	26.04	25.79	25.44	1320.1	1350.1	10.57	10.33	10.11
1410.1	34.29	36.15	36.94	25.63	25.16	24.72	1380.1	1410.1	10.32	10.01	9.81
1450.1	33.70	35.40	36.24	25.34	24.69	24.28	1420.1	1450.1	9.97	9.73	9.45
1510.1	32.55	34.10	34.99	24.93	24.32	23.82	1480.1	1510.1	9.32	9.08	8.83
1550.1	31.72	33.14	34.09	24.57	24.12	23.60	1520.1	1550.1	8.90	8.63	8.38
1610.1	30.51	31.67	32.48	24.36	23.96	23.48	1580.1	1610.1	8.06	7.75	7.52
1650.1	29.59	30.52	31.16	24.04	23.75	23.22	1620.1	1650.1	7.43	7.12	6.84
1710.1	28.87	29.41	29.64	24.06	23.89	23.21	1680.1	1710.1	6.84	6.49	6.22
1750.1	28.48	28.83	28.95	23.72	23.60	23.10	1720.1	1750.1	6.39	6.05	5.77
1810.1	28.04	28.31	28.32	23.32	23.48	23.12	1780.1	1810.1	5.84	5.57	5.34
1850.1	27.68	27.89	27.86	23.03	23.34	23.11	1820.1	1850.1	5.39	5.08	4.87
1910.1	27.40	27.54	27.40	22.73	23.24	23.11	1880.1	1910.1	4.95	4.76	4.51

Frequency Mixer

ADE-4+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=1000MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+4	+7	+10		+4	+7	+10		+4	+7	+10
20.1	50.1	2.32	1.77	1.47	50.1	28.03	22.00	13.09	10.0	1.30	1.13	1.01
60.1	90.1	1.97	1.65	1.44	90.1	9.08	6.15	4.96	30.0	1.32	1.15	1.02
100.1	130.1	1.66	1.46	1.33	130.1	4.72	3.79	3.76	50.0	1.34	1.17	1.04
140.1	170.1	1.61	1.47	1.33	170.1	3.54	3.01	3.16	70.0	1.33	1.16	1.03
180.1	210.1	1.60	1.44	1.36	210.1	2.95	2.74	3.05	90.0	1.32	1.15	1.03
220.1	250.1	1.53	1.40	1.34	250.1	2.67	2.49	2.87	110.0	1.34	1.17	1.04
260.1	290.1	1.53	1.42	1.37	290.1	2.46	2.37	2.83	130.0	1.33	1.16	1.03
300.1	330.1	1.49	1.41	1.37	330.1	2.28	2.30	2.84	150.0	1.35	1.18	1.05
340.1	370.1	1.51	1.43	1.40	370.1	2.18	2.24	2.79	170.0	1.33	1.17	1.04
380.1	410.1	1.49	1.43	1.40	410.1	2.05	2.20	2.82	190.0	1.35	1.18	1.05
420.1	450.1	1.48	1.42	1.39	450.1	1.97	2.18	2.82	210.0	1.34	1.18	1.05
480.1	510.1	1.51	1.46	1.43	510.1	1.87	2.19	2.88	230.0	1.34	1.18	1.05
520.1	550.1	1.50	1.45	1.42	550.1	1.82	2.18	2.89	250.0	1.35	1.18	1.05
580.1	610.1	1.49	1.44	1.41	610.1	1.77	2.22	2.96	270.0	1.37	1.20	1.07
620.1	650.1	1.46	1.42	1.39	650.1	1.76	2.23	2.98	290.0	1.36	1.19	1.07
680.1	710.1	1.45	1.41	1.38	710.1	1.74	2.27	3.05	310.0	1.38	1.21	1.08
720.1	750.1	1.44	1.41	1.38	750.1	1.75	2.30	3.08	330.0	1.37	1.20	1.07
780.1	810.1	1.43	1.40	1.39	810.1	1.75	2.36	3.16	350.0	1.39	1.23	1.10
820.1	850.1	1.43	1.39	1.37	850.1	1.77	2.40	3.20	370.0	1.38	1.21	1.09
880.1	910.1	1.40	1.35	1.32	910.1	1.79	2.45	3.27	390.0	1.39	1.23	1.11
920.1	950.1	1.39	1.33	1.29	950.1	1.84	2.51	3.34	410.0	1.40	1.24	1.11
980.1	1010.1	1.33	1.27	1.23	1010.1	1.89	2.58	3.43	430.0	1.43	1.27	1.14
1020.1	1050.1	1.31	1.25	1.20	1050.1	1.94	2.66	3.52	450.0	1.40	1.24	1.12
1080.1	1110.1	1.23	1.17	1.12	1110.1	2.00	2.73	3.60	470.0	1.43	1.27	1.15
1120.1	1150.1	1.21	1.16	1.11	1150.1	2.05	2.80	3.68	490.0	1.42	1.27	1.15
1180.1	1210.1	1.15	1.11	1.09	1210.1	2.10	2.84	3.71	510.0	1.45	1.30	1.18
1220.1	1250.1	1.18	1.14	1.13	1250.1	2.16	2.92	3.80	530.0	1.44	1.29	1.19
1280.1	1310.1	1.25	1.25	1.26	1310.1	2.24	2.99	3.86	550.0	1.44	1.29	1.18
1320.1	1350.1	1.31	1.30	1.31	1350.1	2.33	3.11	4.00	570.0	1.46	1.31	1.20
1380.1	1410.1	1.45	1.45	1.46	1410.1	2.41	3.19	4.07	590.0	1.48	1.34	1.22
1420.1	1450.1	1.51	1.50	1.51	1450.1	2.52	3.32	4.22	610.0	1.50	1.36	1.26
1480.1	1510.1	1.70	1.70	1.69	1510.1	2.57	3.37	4.25	630.0	1.46	1.33	1.23
1520.1	1550.1	1.74	1.75	1.74	1550.1	2.68	3.50	4.40	650.0	1.49	1.35	1.25
1580.1	1610.1	1.90	1.93	1.94	1610.1	2.73	3.53	4.41	670.0	1.48	1.34	1.24
1620.1	1650.1	1.88	1.92	1.95	1650.1	2.84	3.66	4.55	690.0	1.51	1.39	1.30
1680.1	1710.1	1.96	2.00	2.04	1710.1	2.89	3.68	4.55	710.0	1.48	1.35	1.27
1720.1	1750.1	1.94	1.97	2.00	1750.1	3.01	3.82	4.70	730.0	1.51	1.39	1.31
1780.1	1810.1	2.03	2.04	2.06	1810.1	3.06	3.82	4.66	750.0	1.46	1.35	1.27
1820.1	1850.1	2.01	2.01	2.02	1850.1	3.19	3.96	4.83	790.0	1.47	1.36	1.29
1880.1	1910.1	2.06	2.05	2.04	1910.1	3.23	3.96	4.78	810.0	1.49	1.39	1.32

Frequency Mixer

ADE-4+

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	9	23	13	27	20	28	34	35	34	43
1	-	18	0	25	13	49	27	37	48	36	51	45
2	51	60	52	57	52	71	52	68	61	82	64	69
3	39	70	72	66	67	67	65	71	100	75	80	75
4	73	87	88	86	94	84	98	94	85	81	89	97
5	61	92	94	81	85	89	98	98	98	84	92	91
6	78	92	86	92	103	93	86	97	86	104	95	93
7	73	82	86	96	90	96	88	90	87	83	89	92
8	90	86	89	82	82	85	89	90	97	102	87	88
9	94	86	92	86	86	98	86	95	91	85	89	93
10	100	92	90	91	100	87	89	100	88	95	89	109
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 600 MHz; -14 dBm
LO IN: 630 MHz; +7.00 dBm
IF OUT: 30 MHz; -26.68 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	18	33	25	37	32	39	45	49	46	59
1	-	18	0	24	13	47	28	42	48	41	65	51
2	51	51	42	49	41	70	44	62	53	64	59	66
3	39	50	48	48	48	49	50	55	58	55	67	54
4	73	69	63	64	77	65	74	70	64	68	71	76
5	61	71	67	66	58	68	59	68	60	68	73	83
6	78	107	89	81	86	73	76	75	74	83	74	85
7	73	92	93	85	84	87	85	77	90	76	99	84
8	90	106	98	98	97	91	90	94	87	85	89	107
9	94	95	103	107	89	91	106	95	89	87	86	95
10	100	99	93	96	99	93	92	97	95	105	97	92
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 600 MHz; -4 dBm
LO IN: 630 MHz; +7.00 dBm
IF OUT: 30 MHz; -10.68 dBm

- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

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101013
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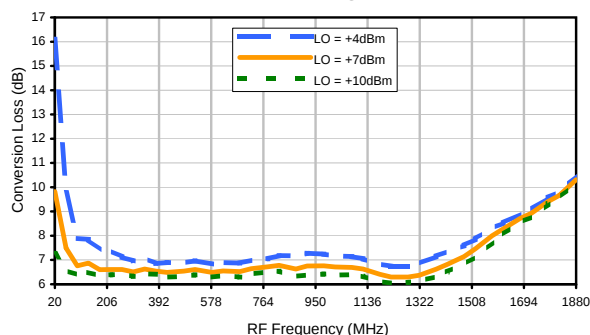


Frequency Mixer

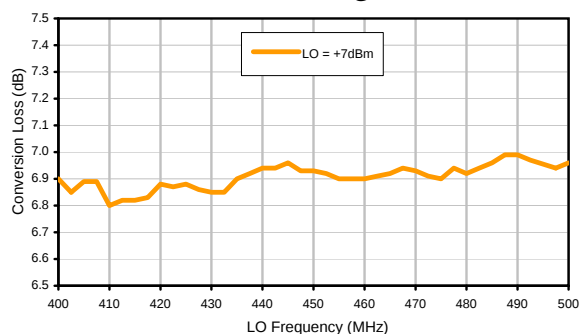
ADE-4+

Typical Performance Curves

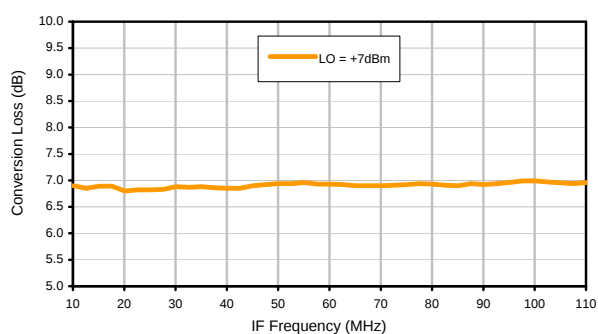
Conversion Loss @ IF=30MHz



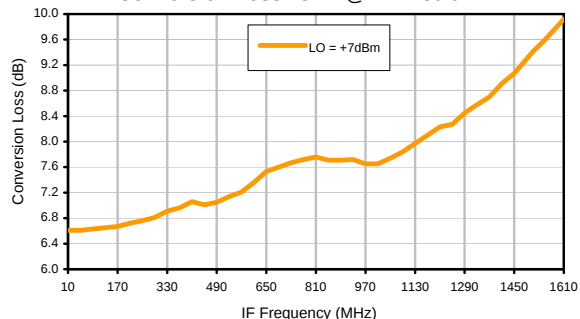
Conversion Loss vs. LO @ RF=389.9MHz



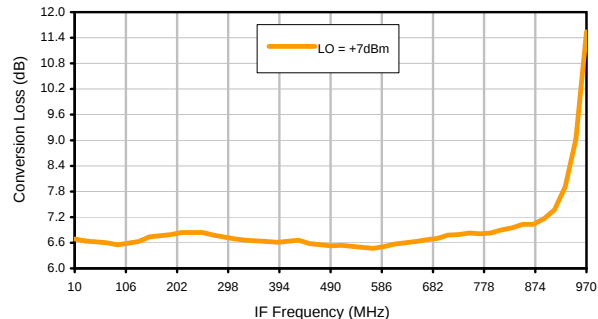
Conversion Loss vs. IF @ RF=389.9MHz



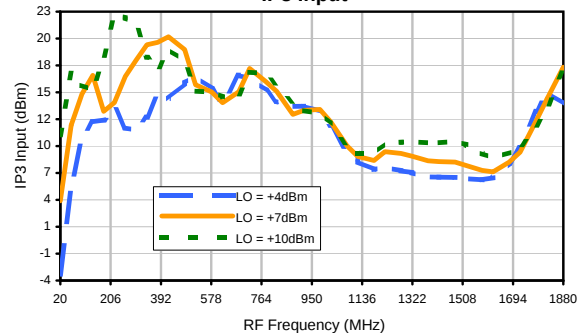
Conversion Loss vs. IF @ RF=189.9MHz



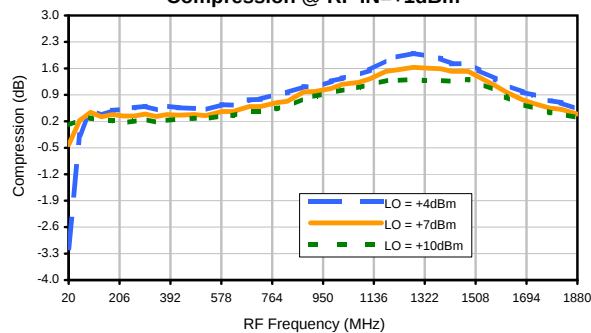
Conversion Loss vs. IF @ RF=1010.1MHz



IP3 Input



Compression @ RF IN=+1dBm

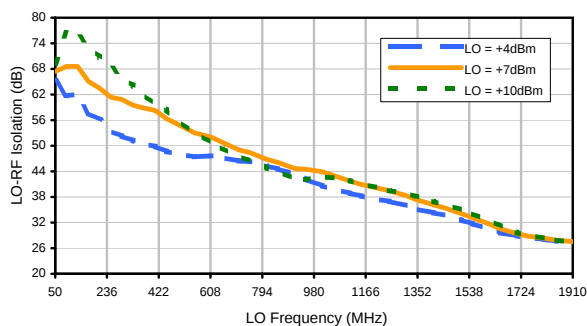


Frequency Mixer

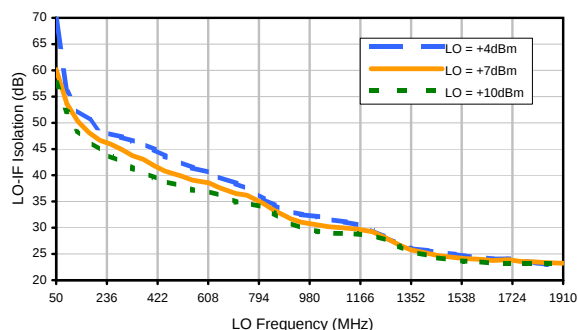
ADE-4+

Typical Performance Curves

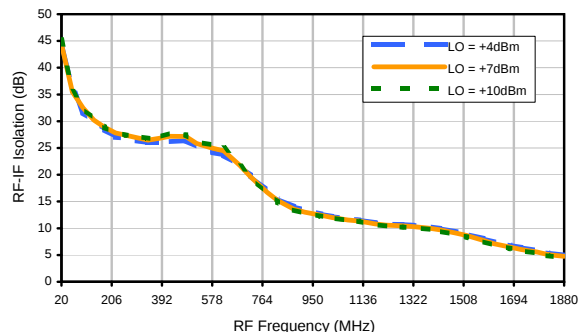
LO-RF Isolation



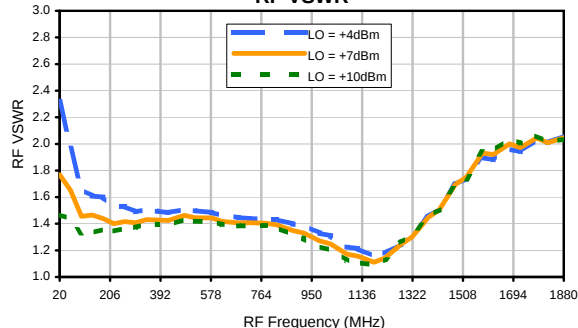
LO-IF Isolation



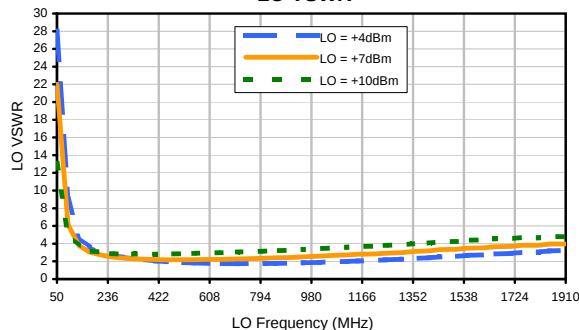
RF-IF Isolation



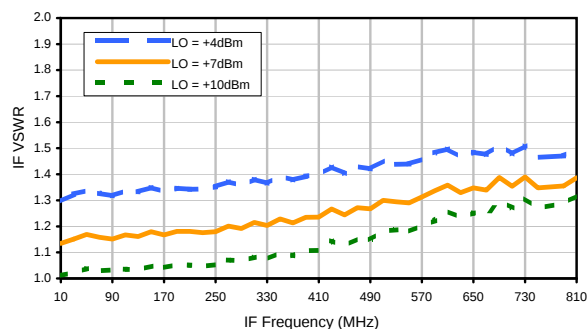
RF VSWR



LO VSWR



IF VSWR



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101013
Page 2 of 3



Frequency Mixer

ADE-4+

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	9	23	13	27	20	28	34	35	34	43
1	-	18	0	25	13	49	27	37	48	36	51	45
2	51	60	52	57	52	71	52	68	61	82	64	69
3	39	70	72	66	67	67	65	71	100	75	80	75
4	73	87	88	86	94	84	98	94	85	81	89	97
5	61	92	94	81	85	89	98	98	98	84	92	91
6	78	92	86	92	103	93	86	97	86	104	95	93
7	73	82	86	96	90	96	88	90	87	83	89	92
8	90	86	89	82	82	85	89	90	97	102	87	88
9	94	86	92	86	86	98	86	95	91	85	89	93
10	100	92	90	91	100	87	89	100	88	95	89	109
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 600 MHz; -14 dBm
LO IN: 630 MHz; +7.00 dBm
IF OUT: 30 MHz; -26.68 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	18	33	25	37	32	39	45	49	46	59
1	-	18	0	24	13	47	28	42	48	41	65	51
2	51	51	42	49	41	70	44	62	53	64	59	66
3	39	50	48	48	48	49	50	55	58	55	67	54
4	73	69	63	64	77	65	74	70	64	68	71	76
5	61	71	67	66	58	68	59	68	60	68	73	83
6	78	107	89	81	86	73	76	75	74	83	74	85
7	73	92	93	85	84	87	85	77	90	76	99	84
8	90	106	98	98	97	91	90	94	87	85	89	107
9	94	95	103	107	89	91	106	95	89	87	86	95
10	100	99	93	96	99	93	92	97	95	105	97	92
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

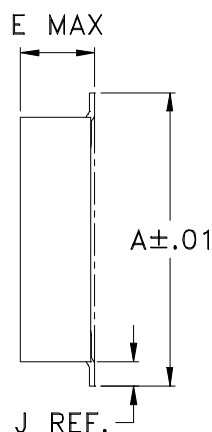
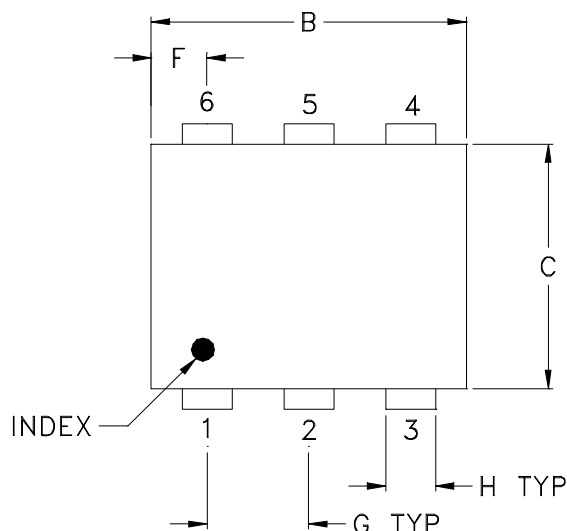
Test conditions:

RF IN: 600 MHz; -4 dBm
LO IN: 630 MHz; +7.00 dBm
IF OUT: 30 MHz; -10.68 dBm

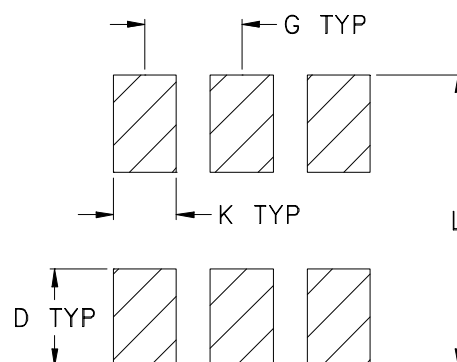
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

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.



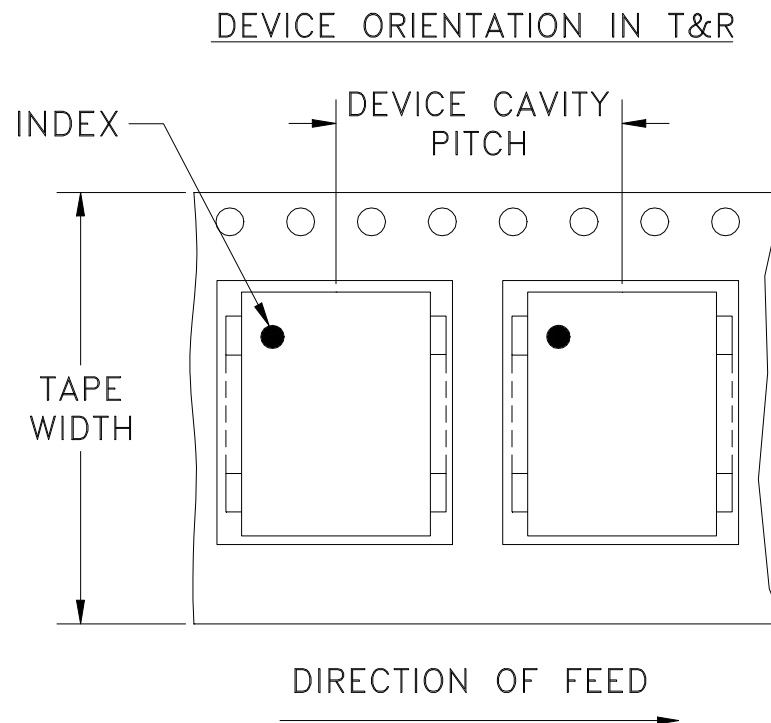
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Tape & Reel Packaging TR-F34



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



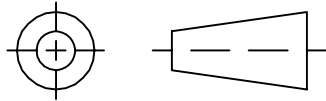
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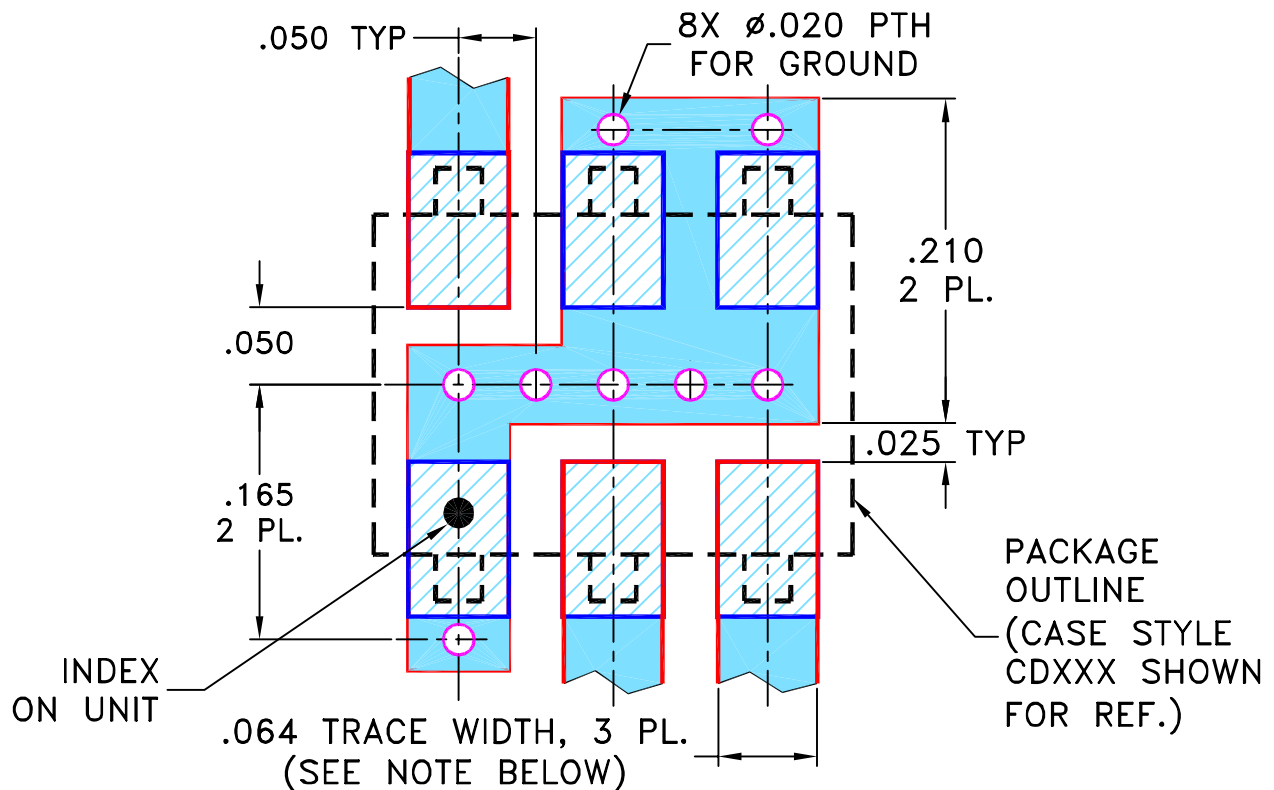
THIRD ANGLE PROJECTION



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

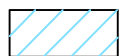
SUGGESTED MOUNTING CONFIGURATION
FOR BH292, CD541/542/636/637, TT100/240 CASE
STYLES, "gk", "ht", "hu", "nd", "w" PIN CONNECTIONS



- 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

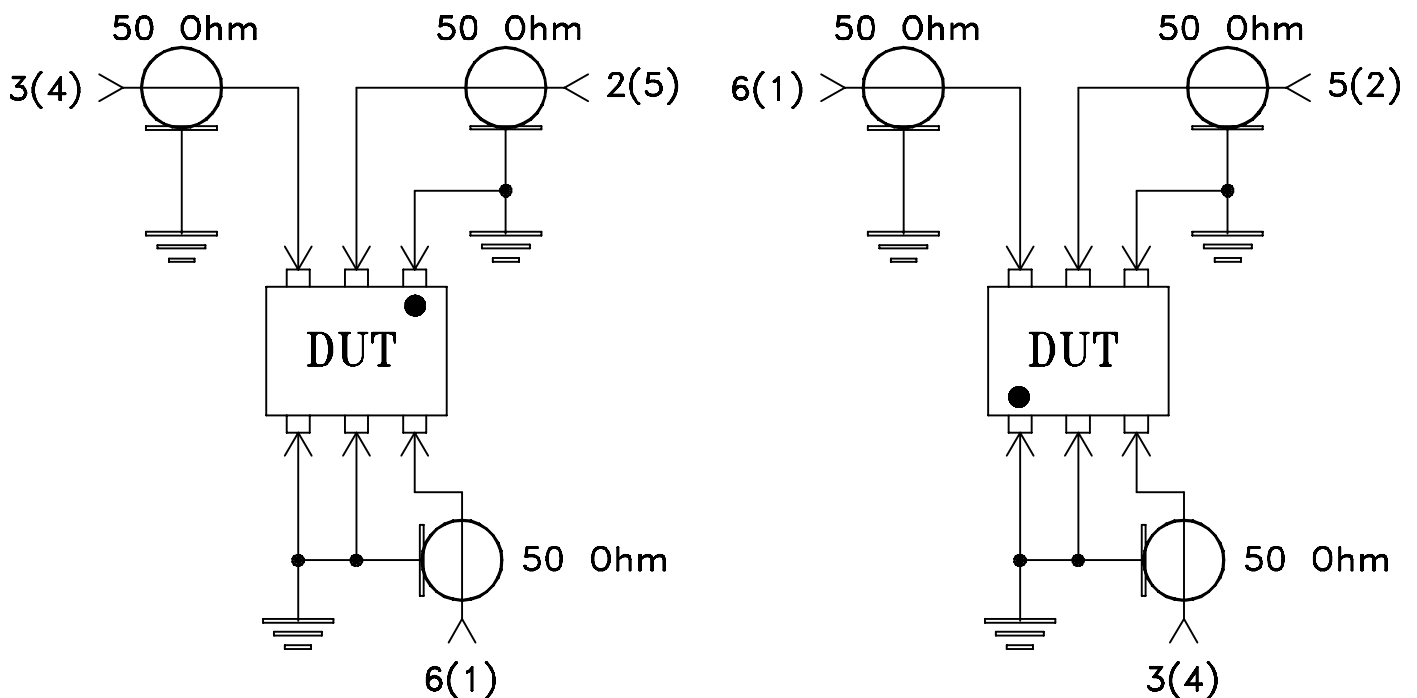
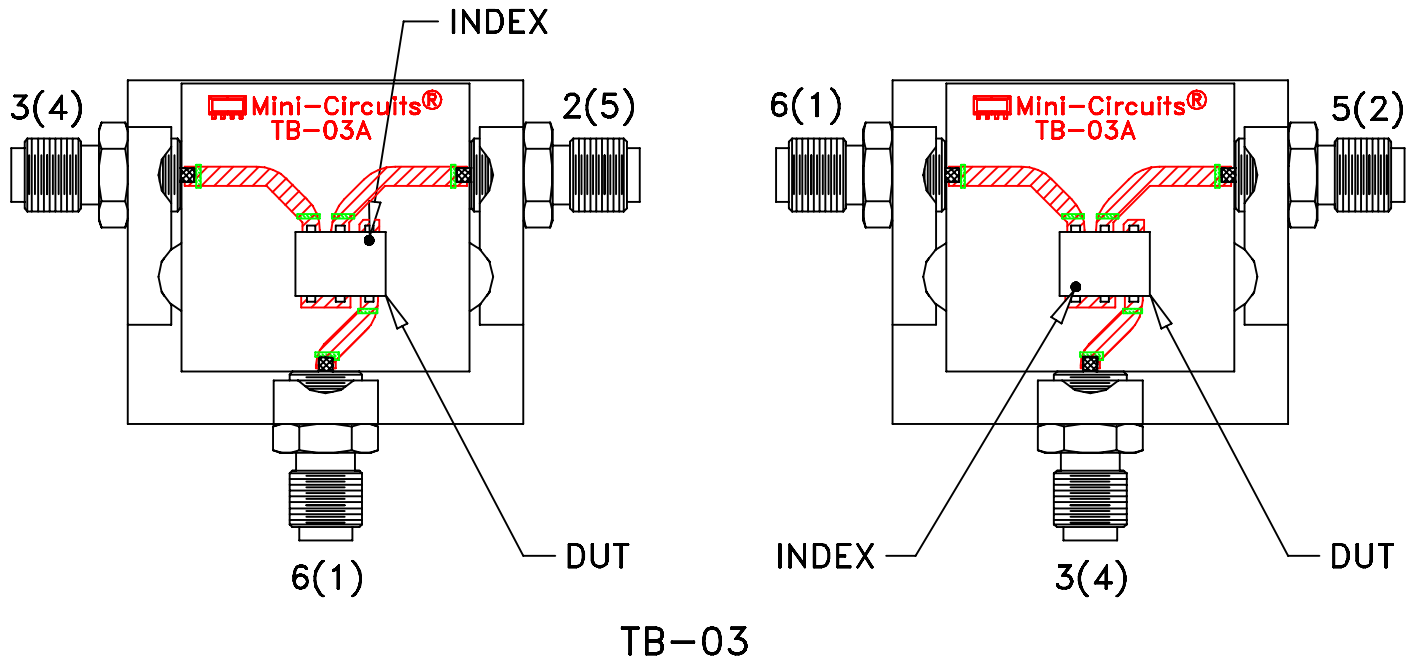
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ASHEETA1.DWG REV:A DATE:01/12/95

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
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