Surface Mount

Frequency Mixer

ADE-13+

Level 7 (LO Power +7 dBm) 50 to 1600 MHz



CASE STYLE: CD541

+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, 500
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

Pin Connections

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

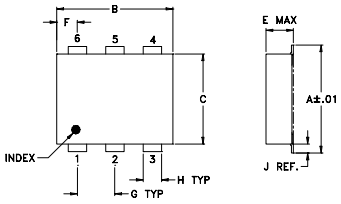
Features

- low conversion loss, 8.1 dB typ.
- excellent L-R isolation, 40 dB typ.
- low profile package
- aqueous washable
- protected by U.S. Patent 6,133,525

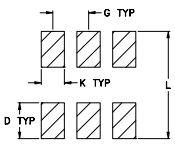
Applications

- satellite distribution
- GPS

Outline Drawing



PCB Land Pattern



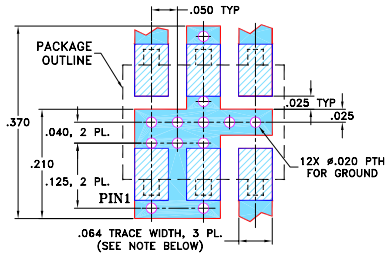
Suggested Layout,
Tolerance to be within ±.002

Outline Dimensions (inch / mm)

A	B	C	D	E	F	G
.272	.310	.220	.100	.082	.055	.100
6.91	7.87	5.59	2.54	2.08	1.40	2.54

H	J	K	L			wt
.030	.026	.065	.300			grams
0.76	0.66	1.65	7.62			0.15

Demo Board MCL P/N: TB-02
Suggested PCB Layout (PL-051)



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

Electrical Specifications

FREQUENCY (MHz)		CONVERSION LOSS (dB)				LO-RF ISOLATION (dB)						LO-IF ISOLATION (dB)						IP3 at center band (dBm)
LO/RF	IF	Mid-Band m			Total Range	L		M		U		L		M		U		
f_L-f_U		$\overline{X}$	σ	Max.	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.
50-1600	50-1000	8.1	0.10	9.0	9.8	50	25	40	25	33	20	49	30	35	20	32	20	11

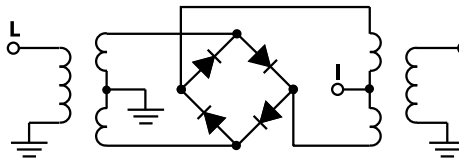
1 dB COMP.: +1 dBm typ.

L = low range [f_L to 10 f_L]
m= mid band [2f_L to f_U/2]
M = mid range [10 f_L to f_U/2]
U = upper range [f_U/2 to f_U]

Typical Performance Data

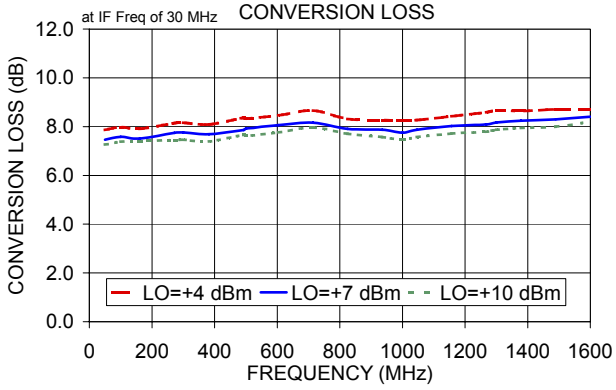
Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)
RF	LO	LO +7dBm	LO +7dBm	LO +7dBm	LO +7dBm	LO +7dBm
50.00	80.00	7.46	55.80	52.20	1.07	2.68
100.00	130.00	7.58	52.00	47.90	1.05	2.72
160.71	190.71	7.51	49.30	44.30	1.01	2.61
271.43	301.43	7.74	45.70	40.50	1.13	2.58
300.00	330.00	7.76	45.00	39.70	1.17	2.72
382.14	412.14	7.69	43.20	38.00	1.31	2.65
492.86	522.86	7.86	40.40	36.20	1.49	2.61
500.00	530.00	7.92	40.40	36.10	1.50	2.61
603.57	633.57	8.06	37.80	35.40	1.71	2.46
714.29	744.29	8.16	36.20	34.40	1.81	2.35
825.00	855.00	7.91	35.30	33.50	1.69	2.52
935.71	965.71	7.87	32.30	33.20	1.64	2.72
1000.00	1030.00	7.75	31.00	33.40	1.63	2.80
1046.43	1076.43	7.87	30.60	33.60	1.61	2.80
1157.14	1187.14	8.02	30.00	33.20	1.48	3.01
1267.86	1297.86	8.09	30.60	32.80	1.30	3.26
1300.00	1330.00	8.17	31.50	32.30	1.27	3.32
1378.57	1408.57	8.24	31.60	31.90	1.27	3.57
1489.29	1519.29	8.30	28.10	31.10	1.42	4.22
1600.00	1630.00	8.40	27.60	30.80	1.56	5.33

Electrical Schematic

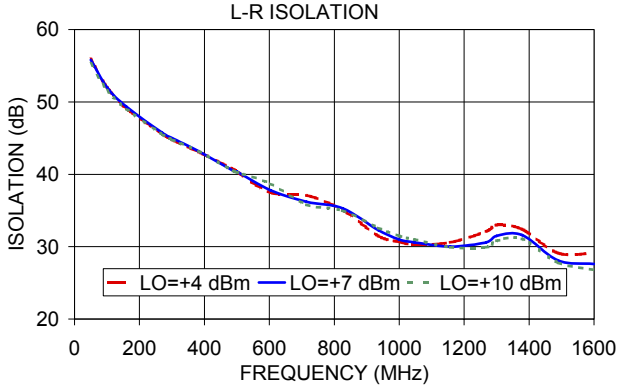


Notes
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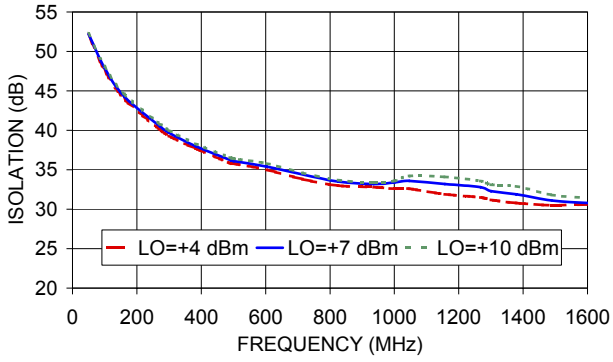
ADE-13+
CONVERSION LOSS
at IF Freq of 30 MHz



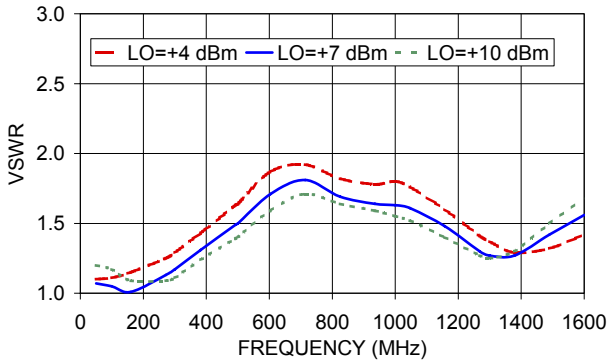
ADE-13+
L-R ISOLATION



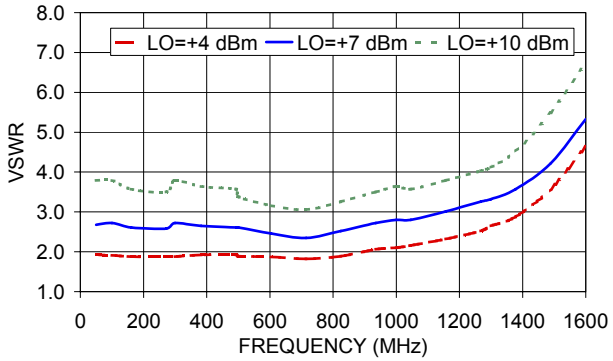
ADE-13+
L-I ISOLATION



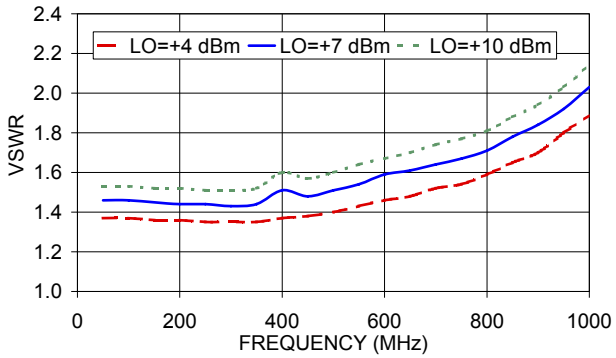
ADE-13+
RF VSWR



ADE-13+
LO VSWR



ADE-13+
IF VSWR



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Frequency Mixer ADE-13+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=50MHz (dB) @LO (dBm)		
		+4	+7	+10
10.1	60.1	6.99	6.45	6.28
70.4	120.4	7.83	7.31	7.08
130.7	180.7	7.78	7.31	7.09
191.0	241.0	7.84	7.36	7.14
251.3	301.3	7.88	7.44	7.20
311.5	361.5	7.92	7.47	7.21
371.8	421.8	8.01	7.54	7.30
432.1	482.1	8.05	7.59	7.29
492.4	542.4	8.16	7.66	7.43
552.7	602.7	8.21	7.68	7.38
613.0	663.0	8.37	7.87	7.53
673.3	723.3	8.45	8.01	7.72
733.6	783.6	8.36	7.99	7.76
793.9	843.9	8.29	7.85	7.63
834.0	884.0	8.25	7.78	7.56
894.3	944.3	8.26	7.73	7.49
934.5	984.5	8.35	7.77	7.50
994.8	1044.8	8.38	7.78	7.45
1035.0	1085.0	8.45	7.85	7.48
1095.3	1145.3	8.50	7.93	7.52
1135.5	1185.5	8.59	8.03	7.63
1195.8	1245.8	8.66	8.19	7.83
1236.0	1286.0	8.66	8.27	7.94
1296.3	1346.3	8.57	8.21	7.91
1336.4	1386.4	8.53	8.12	7.80
1396.7	1446.7	8.43	7.95	7.63
1436.9	1486.9	8.34	7.83	7.58
1497.2	1547.2	8.26	7.78	7.53
1537.4	1587.4	8.24	7.77	7.55
1597.7	1647.7	8.21	7.82	7.60
1637.9	1687.9	8.30	7.89	7.68
1698.2	1748.2	8.37	7.99	7.80
1738.4	1788.4	8.47	8.09	7.89
1798.7	1848.7	8.66	8.24	8.06
1838.9	1888.9	8.81	8.40	8.23
1899.1	1949.1	9.11	8.65	8.47
1939.3	1989.3	9.36	8.86	8.71
1999.6	2049.6	9.70	9.18	9.01
2039.8	2089.8	10.02	9.48	9.28
2100.1	2150.1	10.34	9.81	9.65

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm) @LO (dBm)		
		+4	+7	+10
10.1	60.1	12.96	14.60	14.33
70.4	120.4	11.58	11.86	12.62
130.7	180.7	10.12	12.39	15.54
191.0	241.0	10.53	14.51	18.86
251.3	301.3	11.97	18.67	15.66
311.5	361.5	14.11	14.42	14.58
371.8	421.8	14.39	12.91	13.72
432.1	482.1	12.48	12.13	13.24
492.4	542.4	9.96	10.90	11.25
552.7	602.7	8.54	9.82	13.43
613.0	663.0	8.19	9.08	10.67
673.3	723.3	7.64	8.35	9.40
733.6	783.6	7.67	8.68	9.82
793.9	843.9	7.36	10.43	13.39
834.0	884.0	7.24	10.11	12.62
894.3	944.3	7.24	8.77	11.53
934.5	984.5	7.80	8.35	10.76
994.8	1044.8	8.36	8.94	9.68
1035.0	1085.0	8.19	9.47	9.75
1095.3	1145.3	7.78	9.94	11.05
1135.5	1185.5	7.09	9.37	12.00
1195.8	1245.8	6.07	7.60	10.02
1236.0	1286.0	5.30	6.06	7.53
1296.3	1346.3	5.16	5.36	6.08
1336.4	1386.4	5.47	6.08	7.42
1396.7	1446.7	6.90	8.93	11.09
1436.9	1486.9	8.57	10.96	12.78
1497.2	1547.2	9.11	11.79	13.81
1537.4	1587.4	9.04	11.85	14.25
1597.7	1647.7	9.41	13.06	14.75
1637.9	1687.9	9.29	12.50	14.65
1698.2	1748.2	9.31	12.84	14.68
1738.4	1788.4	8.77	12.55	14.72
1798.7	1848.7	8.23	11.41	13.71
1838.9	1888.9	7.95	11.50	13.36
1899.1	1949.1	7.58	11.02	14.40
1939.3	1989.3	7.46	10.67	13.26
1999.6	2049.6	8.53	11.63	14.58
2039.8	2089.8	7.66	11.28	12.90
2100.1	2150.1	8.65	13.36	14.27

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+1dBm (dB) @LO (dBm)		
		+4	+7	+10
10.1	60.1	20.57	16.95	4.37
70.4	120.4	1.16	0.70	0.43
130.7	180.7	1.17	0.75	0.54
191.0	241.0	1.14	0.74	0.48
251.3	301.3	1.27	0.88	0.58
311.5	361.5	1.27	0.92	0.72
371.8	421.8	1.36	0.96	0.73
432.1	482.1	1.39	1.04	0.85
492.4	542.4	1.49	1.11	0.83
552.7	602.7	1.34	1.10	0.86
613.0	663.0	1.45	1.11	1.04
673.3	723.3	1.34	1.04	0.86
733.6	783.6	1.25	0.96	0.79
793.9	843.9	1.43	1.13	1.06
834.0	884.0	1.33	1.06	0.96
894.3	944.3	1.35	1.23	1.05
934.5	984.5	1.26	1.15	1.00
994.8	1044.8	1.11	1.06	0.93
1035.0	1085.0	1.06	0.93	0.87
1095.3	1145.3	1.06	0.92	0.89
1135.5	1185.5	1.09	0.89	0.89
1195.8	1245.8	1.07	0.91	0.88
1236.0	1286.0	1.08	0.78	0.74
1296.3	1346.3	1.15	0.80	0.75
1336.4	1386.4	1.21	0.92	0.82
1396.7	1446.7	1.38	0.96	0.69
1436.9	1486.9	1.39	0.98	0.66
1497.2	1547.2	1.49	0.91	0.58
1537.4	1587.4	1.44	0.79	0.52
1597.7	1647.7	1.38	0.72	0.44
1637.9	1687.9	1.46	0.71	0.48
1698.2	1748.2	1.27	0.61	0.35
1738.4	1788.4	1.28	0.54	0.34
1798.7	1848.7	1.20	0.54	0.29
1838.9	1888.9	1.30	0.63	0.29
1899.1	1949.1	1.20	0.53	0.30
1939.3	1989.3	1.17	0.51	0.31
1999.6	2049.6	1.15	0.52	0.23
2039.8	2089.8	1.09	0.51	0.21
2100.1	2150.1	0.99	0.39	0.25

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Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=800.1MHz (dB) @LO (dBm) +7
790.0	10.1	7.44
771.0	29.1	7.48
752.1	48.0	7.45
733.1	67.0	7.49
714.1	86.0	7.53
695.1	105.0	7.57
676.2	123.9	7.55
657.2	142.9	7.55
638.2	161.9	7.55
619.2	180.9	7.57
600.3	199.8	7.58
581.3	218.8	7.58
562.3	237.8	7.54
543.3	256.8	7.57
524.4	275.7	7.57
505.4	294.7	7.56
486.4	313.7	7.59
467.4	332.7	7.58
448.5	351.6	7.57
429.5	370.6	7.63
410.5	389.6	7.61
391.5	408.6	7.60
372.6	427.5	7.60
353.6	446.5	7.67
334.6	465.5	7.65
315.6	484.5	7.75
296.7	503.4	7.77
277.7	522.4	7.77
258.7	541.4	7.79
239.7	560.4	7.75
220.8	579.3	7.83
201.8	598.3	7.81
182.8	617.3	7.88
163.8	636.3	7.86
144.9	655.2	7.90
125.9	674.2	7.94
106.9	693.2	7.94
87.9	712.2	8.01
69.0	731.1	7.95
50.0	750.1	7.95

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=50.1MHz (dB) @LO (dBm) +7
50.0	100.1	7.20
70.2	120.3	7.33
90.4	140.5	7.23
110.6	160.7	7.22
130.9	181.0	7.16
151.1	201.2	7.17
171.3	221.4	7.12
191.5	241.6	7.15
211.7	261.8	7.10
231.9	282.0	7.07
252.1	302.2	7.03
272.3	322.4	7.02
292.6	342.7	7.02
312.8	362.9	6.98
333.0	383.1	6.96
353.2	403.3	6.96
373.4	423.5	6.90
393.6	443.7	6.89
413.8	463.9	7.00
434.0	484.1	7.00
454.3	504.4	6.88
474.5	524.6	6.90
494.7	544.8	6.90
514.9	565.0	6.87
555.3	605.4	6.85
575.5	625.6	6.88
616.0	666.1	6.92
636.2	686.3	6.89
676.6	726.7	6.92
696.8	746.9	6.94
737.2	787.3	6.94
757.4	807.5	6.93
797.9	848.0	6.95
818.1	868.2	6.93
858.5	908.6	6.95
878.7	928.8	6.97
919.1	969.2	7.02
939.4	989.5	7.12
979.8	1029.9	7.22
1000.0	1050.1	7.28

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1600.1MHz (dB) @LO (dBm) +7
1000.0	600.1	7.56
979.8	620.3	7.42
959.6	640.5	7.39
939.4	660.7	7.39
919.1	681.0	7.39
898.9	701.2	7.39
878.7	721.4	7.38
858.5	741.6	7.30
838.3	761.8	7.31
818.1	782.0	7.31
797.9	802.2	7.31
777.7	822.4	7.29
757.4	842.7	7.27
737.2	862.9	7.25
717.0	883.1	7.25
696.8	903.3	7.27
676.6	923.5	7.21
656.4	943.7	7.26
636.2	963.9	7.26
616.0	984.1	7.37
595.7	1004.4	7.46
575.5	1024.6	7.51
555.3	1044.8	7.62
535.1	1065.0	7.72
494.7	1105.4	7.87
474.5	1125.6	7.95
434.0	1166.1	8.03
413.8	1186.3	8.10
373.4	1226.7	8.03
353.2	1246.9	8.00
312.8	1287.3	8.01
292.6	1307.5	8.05
252.1	1348.0	8.07
231.9	1368.2	8.09
191.5	1408.6	8.06
171.3	1428.8	7.99
130.9	1469.2	7.91
110.6	1489.5	7.91
70.2	1529.9	7.81
50.0	1550.1	7.80

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Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm)			LO-IF ISOLATION (dB) @LO (dBm)		
	+4	+7	+10	+4	+7	+10
10.1	58.40	53.85	54.17	57.27	57.85	67.92
70.4	52.12	49.64	48.36	52.89	52.37	53.05
130.7	47.33	45.42	44.30	47.21	47.33	47.37
191.0	44.65	42.99	42.07	43.93	44.13	44.26
251.3	42.83	41.47	40.50	41.70	41.90	41.95
311.5	41.55	40.22	39.17	40.05	40.24	40.32
371.8	40.45	39.07	38.05	38.70	38.83	38.90
432.1	39.37	38.20	37.21	37.60	37.75	37.81
492.4	37.63	36.68	35.93	36.84	37.08	37.19
552.7	35.74	35.08	34.46	35.92	36.13	36.24
613.0	34.23	33.78	33.49	35.36	35.51	35.54
673.3	33.16	32.51	32.09	35.04	35.26	35.32
733.6	32.00	31.51	31.03	34.67	34.87	34.96
793.9	31.12	30.86	30.41	34.51	34.56	34.54
834.0	30.56	30.66	30.34	34.51	34.45	34.34
894.3	29.17	29.63	29.73	34.78	34.74	34.59
934.5	28.44	28.79	28.98	34.94	34.92	34.70
994.8	27.56	27.75	27.93	34.99	35.08	34.83
1035.0	27.31	27.52	27.72	34.97	35.05	34.82
1095.3	26.61	26.88	27.13	35.02	35.15	34.99
1135.5	26.18	26.44	26.69	35.10	35.23	35.13
1195.8	25.86	26.10	26.32	35.68	35.80	35.74
1236.0	25.68	25.88	25.98	35.93	36.06	35.94
1296.3	26.04	26.53	26.76	36.52	36.58	36.40
1336.4	26.09	26.88	27.35	36.85	36.83	36.65
1396.7	25.83	26.89	27.71	36.83	37.03	37.07
1436.9	25.59	26.70	27.61	36.77	37.40	37.86
1497.2	24.92	26.01	27.02	36.69	38.32	39.68
1537.4	24.64	25.76	26.82	36.43	38.61	40.53
1597.7	24.35	25.49	26.62	35.96	38.70	41.38
1637.9	24.33	25.47	26.62	35.52	38.33	41.24
1698.2	24.63	25.75	26.88	35.08	37.77	40.66
1738.4	24.96	26.01	27.09	34.63	37.12	39.69
1798.7	25.73	26.55	27.41	34.15	36.23	38.26
1838.9	26.33	26.87	27.45	33.66	35.37	36.95
1899.1	27.49	27.48	27.55	33.10	34.27	35.22
1939.3	28.38	27.87	27.50	32.86	33.65	34.20
1999.6	30.05	28.46	27.40	32.22	32.48	32.57
2039.8	30.86	28.57	27.14	31.72	31.60	31.41
2100.1	31.54	28.52	26.70	31.02	30.52	30.13

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB) @LO (dBm)		
		+4	+7	+10
10.1	60.1	40.57	32.81	35.25
70.4	120.4	38.58	41.02	39.90
130.7	180.7	34.36	35.50	36.15
191.0	241.0	31.54	32.17	32.68
251.3	301.3	29.41	30.16	30.75
311.5	361.5	27.86	28.48	29.03
371.8	421.8	26.62	27.32	28.05
432.1	482.1	25.64	26.57	27.29
492.4	542.4	25.08	25.88	26.60
552.7	602.7	24.92	25.85	26.64
613.0	663.0	25.07	26.14	27.18
673.3	723.3	25.42	26.66	27.69
733.6	783.6	25.83	27.31	28.43
793.9	843.9	25.72	27.25	28.20
834.0	884.0	25.05	26.33	26.80
894.3	944.3	23.83	24.60	24.83
934.5	984.5	23.35	23.98	24.21
994.8	1044.8	22.97	23.35	23.51
1035.0	1085.0	23.05	23.38	23.39
1095.3	1145.3	23.84	23.95	23.74
1135.5	1185.5	24.65	24.67	24.27
1195.8	1245.8	26.33	26.00	25.23
1236.0	1286.0	26.91	26.41	25.52
1296.3	1346.3	25.00	24.10	23.09
1336.4	1386.4	22.83	21.77	20.74
1396.7	1446.7	19.86	18.76	17.94
1436.9	1486.9	18.06	17.10	16.45
1497.2	1547.2	15.92	15.13	14.64
1537.4	1587.4	14.72	14.01	13.58
1597.7	1647.7	13.16	12.47	12.07
1637.9	1687.9	12.38	11.64	11.22
1698.2	1748.2	11.27	10.52	10.08
1738.4	1788.4	10.67	9.87	9.41
1798.7	1848.7	9.79	8.94	8.47
1838.9	1888.9	9.25	8.38	7.89
1899.1	1949.1	8.56	7.64	7.14
1939.3	1989.3	8.15	7.21	6.70
1999.6	2049.6	7.57	6.60	6.07
2039.8	2089.8	7.32	6.33	5.79
2100.1	2150.1	6.71	5.81	5.31

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Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1) @LO (dBm)		
		+4	+7	+10
10.1	60.1	1.33	1.26	1.20
70.4	120.4	1.19	1.03	1.14
130.7	180.7	1.20	1.03	1.08
191.0	241.0	1.25	1.09	1.02
251.3	301.3	1.28	1.14	1.07
311.5	361.5	1.32	1.18	1.11
371.8	421.8	1.41	1.27	1.19
432.1	482.1	1.50	1.36	1.27
492.4	542.4	1.58	1.44	1.37
552.7	602.7	1.66	1.50	1.40
613.0	663.0	1.77	1.62	1.51
673.3	723.3	1.84	1.72	1.63
733.6	783.6	1.85	1.75	1.69
793.9	843.9	1.84	1.73	1.68
834.0	884.0	1.88	1.78	1.75
894.3	944.3	1.88	1.78	1.77
934.5	984.5	1.96	1.82	1.81
994.8	1044.8	1.99	1.82	1.79
1035.0	1085.0	2.02	1.84	1.76
1095.3	1145.3	2.04	1.88	1.77
1135.5	1185.5	2.13	1.97	1.85
1195.8	1245.8	2.04	1.93	1.82
1236.0	1286.0	2.03	1.94	1.85
1296.3	1346.3	1.93	1.84	1.77
1336.4	1386.4	1.88	1.77	1.71
1396.7	1446.7	1.75	1.64	1.61
1436.9	1486.9	1.66	1.57	1.56
1497.2	1547.2	1.54	1.48	1.48
1537.4	1587.4	1.47	1.42	1.43
1597.7	1647.7	1.38	1.35	1.37
1637.9	1687.9	1.32	1.29	1.32
1698.2	1748.2	1.23	1.22	1.27
1738.4	1788.4	1.18	1.18	1.24
1798.7	1848.7	1.19	1.04	1.11
1838.9	1888.9	1.08	1.12	1.24
1899.1	1949.1	1.12	1.13	1.24
1939.3	1989.3	1.08	1.17	1.30
1999.6	2049.6	1.16	1.28	1.41
2039.8	2089.8	1.16	1.26	1.39
2100.1	2150.1	1.24	1.40	1.54

LO (MHz)	LO VSWR (:1) @LO (dBm)		
	+4	+7	+10
10.1	1.80	2.37	3.52
70.4	1.83	2.60	3.59
130.7	1.82	2.58	3.55
191.0	1.83	2.57	3.51
251.3	1.84	2.57	3.51
311.5	1.85	2.58	3.51
371.8	1.90	2.66	3.60
432.1	1.90	2.63	3.55
492.4	1.92	2.65	3.54
552.7	1.99	2.74	3.67
613.0	2.00	2.72	3.58
673.3	2.03	2.74	3.59
733.6	2.12	2.85	3.73
793.9	2.12	2.80	3.62
834.0	2.19	2.88	3.70
894.3	2.20	2.83	3.59
934.5	2.31	2.97	3.75
994.8	2.34	2.98	3.72
1035.0	2.41	3.07	3.82
1095.3	2.44	3.10	3.85
1135.5	2.48	3.14	3.89
1195.8	2.52	3.17	3.90
1236.0	2.56	3.20	3.94
1296.3	2.55	3.13	3.82
1336.4	2.57	3.15	3.84
1396.7	2.51	3.01	3.66
1436.9	2.53	3.03	3.70
1497.2	2.50	2.98	3.63
1537.4	2.57	3.06	3.71
1597.7	2.69	3.14	3.76
1637.9	2.82	3.24	3.85
1698.2	2.99	3.35	3.92
1738.4	3.15	3.47	4.02
1798.7	3.33	3.58	4.07
1838.9	3.52	3.72	4.20
1899.1	3.72	3.82	4.22
1939.3	3.92	3.98	4.37
1999.6	4.15	4.08	4.37
2039.8	4.38	4.27	4.55
2100.1	4.57	4.37	4.59

IF (OUT) (MHz)	IF VSWR @LO=1600.1MHz (:1) @LO (dBm)		
	+4	+7	+10
50.1	1.35	1.44	1.50
69.9	1.41	1.50	1.53
89.7	1.36	1.43	1.49
109.5	1.32	1.40	1.45
129.3	1.35	1.39	1.48
149.1	1.35	1.43	1.49
168.9	1.37	1.45	1.49
188.6	1.35	1.42	1.46
208.4	1.32	1.41	1.45
228.2	1.34	1.41	1.46
248.0	1.35	1.42	1.47
267.8	1.34	1.41	1.47
287.6	1.31	1.38	1.44
307.4	1.31	1.37	1.42
327.2	1.31	1.38	1.43
347.0	1.33	1.39	1.44
366.8	1.32	1.39	1.44
386.6	1.31	1.39	1.43
406.4	1.30	1.37	1.42
426.1	1.31	1.39	1.43
445.9	1.30	1.38	1.43
465.7	1.29	1.36	1.42
505.3	1.27	1.35	1.40
525.1	1.27	1.35	1.40
564.7	1.26	1.33	1.39
584.5	1.25	1.33	1.39
624.1	1.25	1.32	1.39
643.9	1.26	1.33	1.40
683.4	1.26	1.34	1.40
703.2	1.27	1.34	1.41
742.8	1.32	1.39	1.45
762.6	1.36	1.42	1.47
802.2	1.38	1.44	1.49
822.0	1.42	1.48	1.53
861.6	1.52	1.57	1.61
881.4	1.55	1.59	1.63
920.9	1.64	1.68	1.71
940.7	1.72	1.75	1.78
980.3	1.83	1.84	1.87
1000.1	1.89	1.89	1.91

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Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	5	10	26	42	8	24	23	49	34	44
1	-	19	0	31	18	22	37	26	38	42	48	48
2	104	46	57	56	57	45	46	63	39	52	53	58
3	119	52	55	59	56	66	57	55	71	59	60	82
4	119	94	71	67	78	69	82	73	71	86	64	75
5	117	84	94	87	98	88	86	86	91	93	90	85
6	120	104	89	101	91	87	89	83	94	97	93	97
7	109	103	102	104	97	99	104	104	92	95	101	112
8	111	107	102	107	118	102	107	101	96	85	97	99
9	119	92	101	102	100	104	98	105	105	94	95	108
10	112	105	104	99	102	104	107	98	98	100	92	88
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 820.1 MHz; -14.00 dBm.
LO IN: 850.1 MHz; +7.00 dBm
IF OUT: 30 MHz; -22.4 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	15	19	40	49	22	37	42	59	48	60
1	-	18	0	32	17	26	39	30	41	49	60	67
2	89	44	50	59	49	43	42	57	35	49	48	64
3	110	35	38	44	42	55	46	39	66	45	57	63
4	112	69	66	59	66	56	87	55	56	85	49	64
5	116	60	80	58	57	62	53	67	55	55	70	57
6	114	70	70	85	68	64	69	65	74	72	64	75
7	120	83	82	70	85	70	69	74	65	77	71	67
8	112	86	84	76	77	94	75	72	77	74	76	86
9	112	92	97	91	91	80	94	82	82	81	79	81
10	117	97	92	95	92	85	86	107	86	77	87	78
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 820.1 MHz; -4.00 dBm.
LO IN: 850.1 MHz; +7.00 dBm
IF OUT: 30 MHz; -12.4 dBm

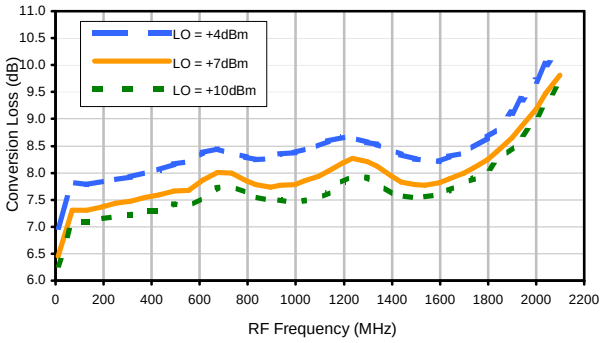
Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

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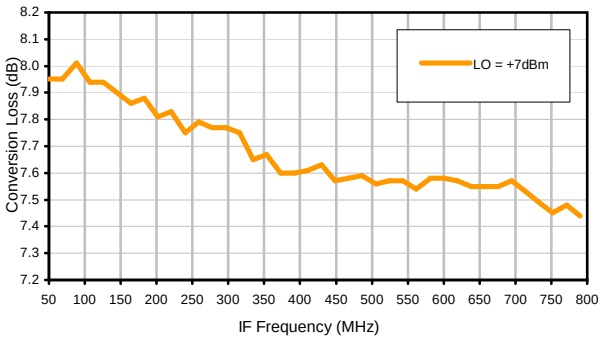
Frequency Mixer ADE-13+

Typical Performance Curves

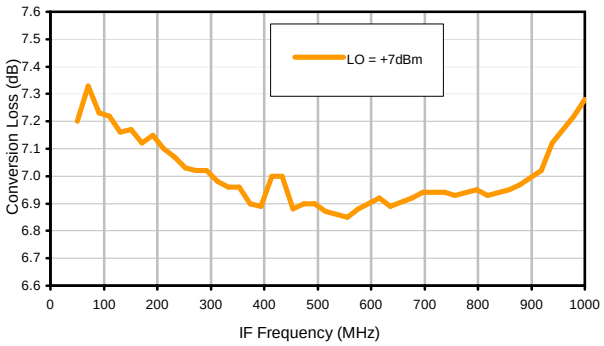
Conversion Loss @ IF=50MHz



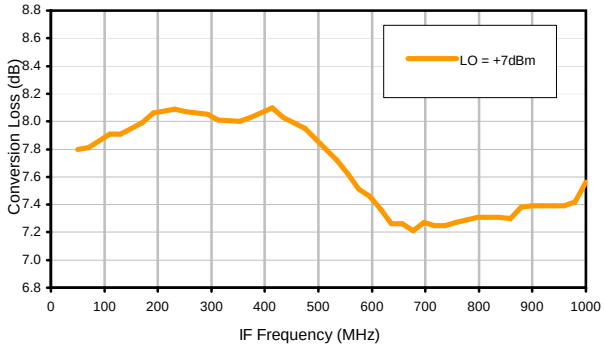
Conversion Lossvs. IF @ RF=800.1MHz



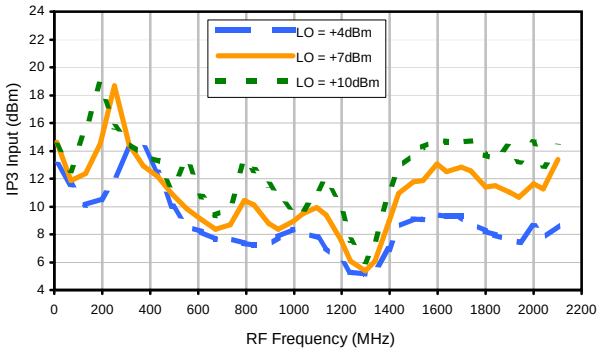
Conversion Loss vs. IF @ RF=50.1MHz



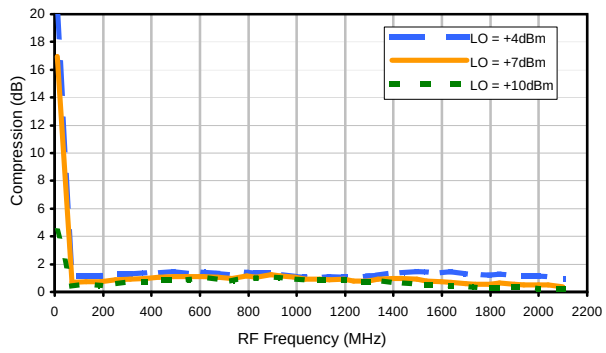
Conversion Loss vs. IF @ RF=1600.1MHz



IP3 Input



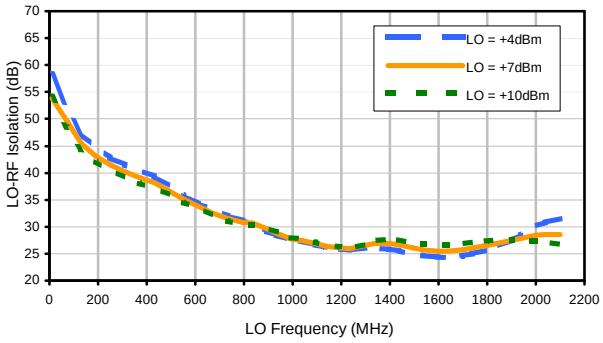
Compression @ RF IN=+1dBm



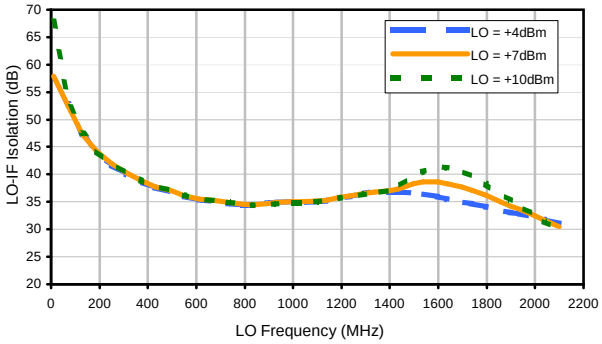
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Typical Performance Curves

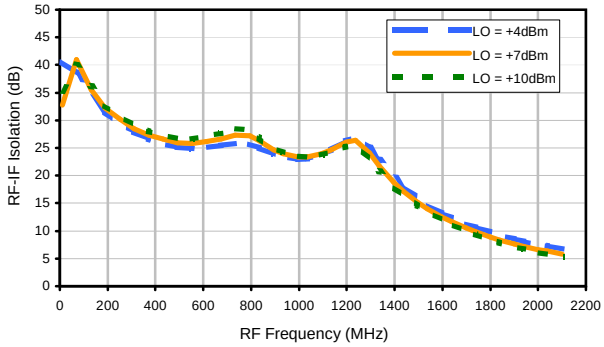
LO-RF Isolation



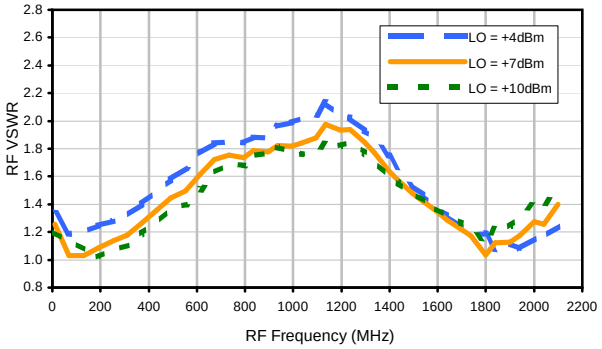
LO-IF Isolation



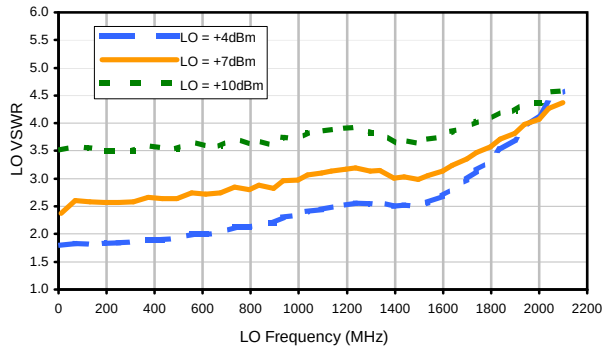
RF-IF Isolation



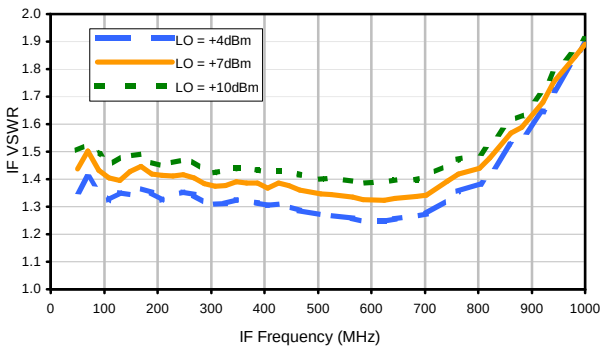
RF VSWR



LO VSWR



IF VSWR



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Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	5	10	26	42	8	24	23	49	34	44
1	-	19	0	31	18	22	37	26	38	42	48	48
2	104	46	57	56	57	45	46	63	39	52	53	58
3	119	52	55	59	56	66	57	55	71	59	60	82
4	119	94	71	67	78	69	82	73	71	86	64	75
5	117	84	94	87	98	88	86	86	91	93	90	85
6	120	104	89	101	91	87	89	83	94	97	93	97
7	109	103	102	104	97	99	104	104	92	95	101	112
8	111	107	102	107	118	102	107	101	96	85	97	99
9	119	92	101	102	100	104	98	105	105	94	95	108
10	112	105	104	99	102	104	107	98	98	100	92	88
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 820.1 MHz; -14.00 dBm.
LO IN: 850.1 MHz; +7.00 dBm
IF OUT: 30 MHz; -22.4 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	15	19	40	49	22	37	42	59	48	60
1	-	18	0	32	17	26	39	30	41	49	60	67
2	89	44	50	59	49	43	42	57	35	49	48	64
3	110	35	38	44	42	55	46	39	66	45	57	63
4	112	69	66	59	66	56	87	55	56	85	49	64
5	116	60	80	58	57	62	53	67	55	55	70	57
6	114	70	70	85	68	64	69	65	74	72	64	75
7	120	83	82	70	85	70	69	74	65	77	71	67
8	112	86	84	76	77	94	75	72	77	74	76	86
9	112	92	97	91	91	80	94	82	82	81	79	81
10	117	97	92	95	92	85	86	107	86	77	87	78
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 820.1 MHz; -4.00 dBm.
LO IN: 850.1 MHz; +7.00 dBm
IF OUT: 30 MHz; -12.4 dBm

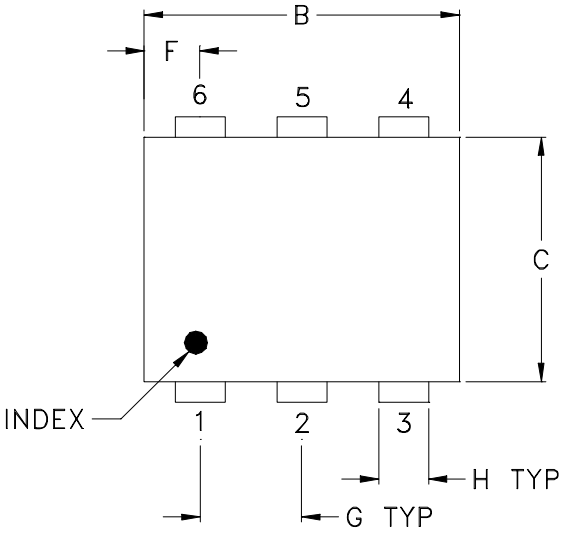
Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

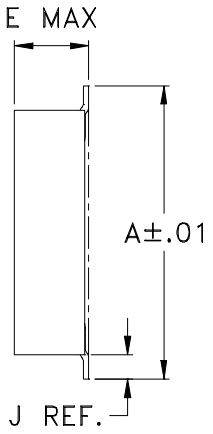
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Case Style CD

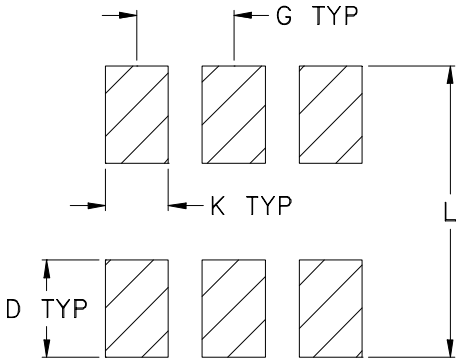
CD541
CD542
CD636
CD637

Outline Dimensions





PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

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

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

Notes:

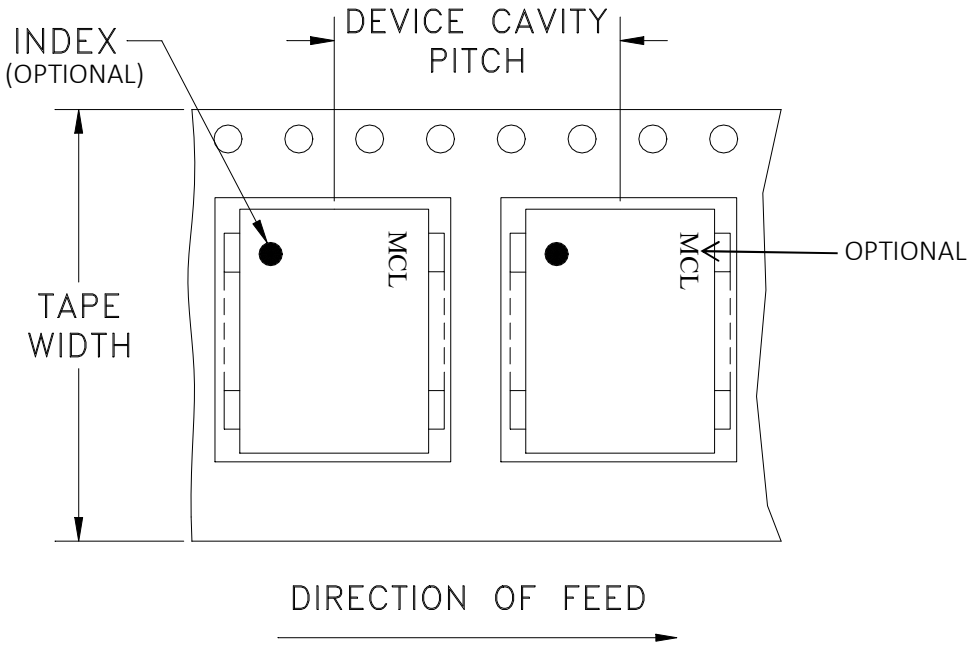
1. Case material: Plastic.
2. Termination finish:
   For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
   For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

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Tape & Reel Packaging TR-F34

DEVICE ORIENTATION IN T&R



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

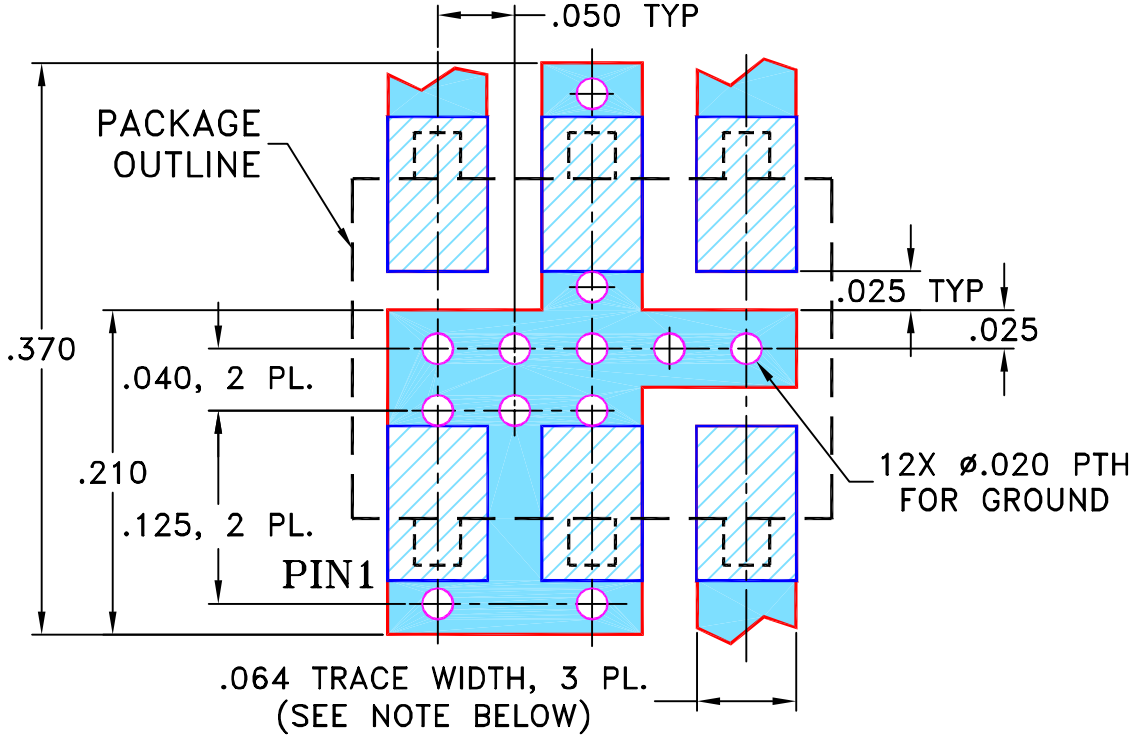
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THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M82272	NEW RELEASE	08/05/02	MMG	DJ
A	M102713	ADDED NOTE 2 & "...WITH SMOBC"	01/17/06	MMG	IL

SUGGESTED MOUNTING CONFIGURATION FOR CD541/542/636/637 CASE STYLES, "jv", "ju", "jw" PIN CONNECTIONS



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

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	MMG	07/17/02
TOLERANCES ON:	CHECKED	WL	08/02/02
2 PL DECIMALS ±	APPROVED	DJ	08/05/02
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

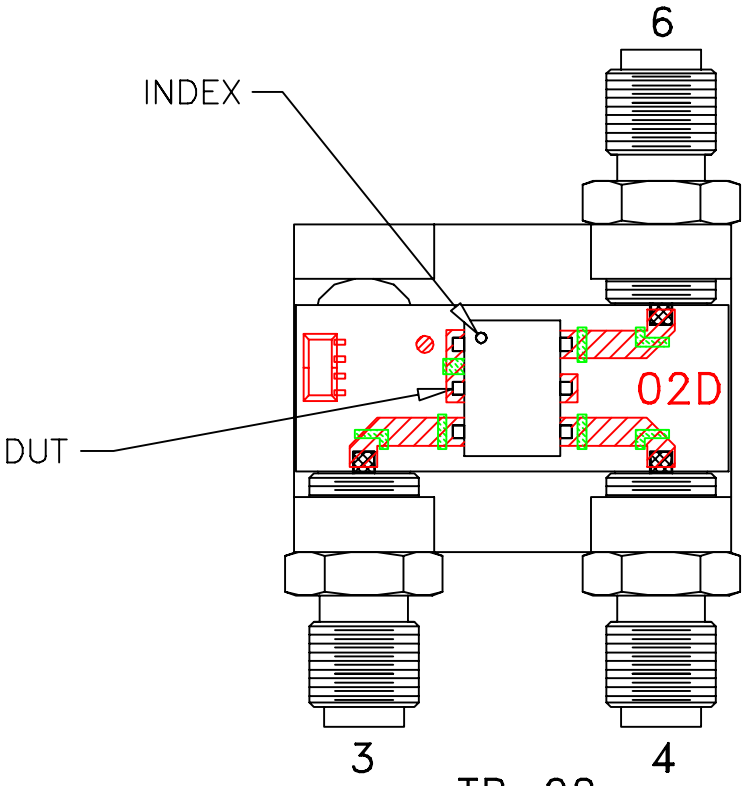
PL, jv/ju/jw, CD541/542/636/637, ADE, TB-02

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-051	A

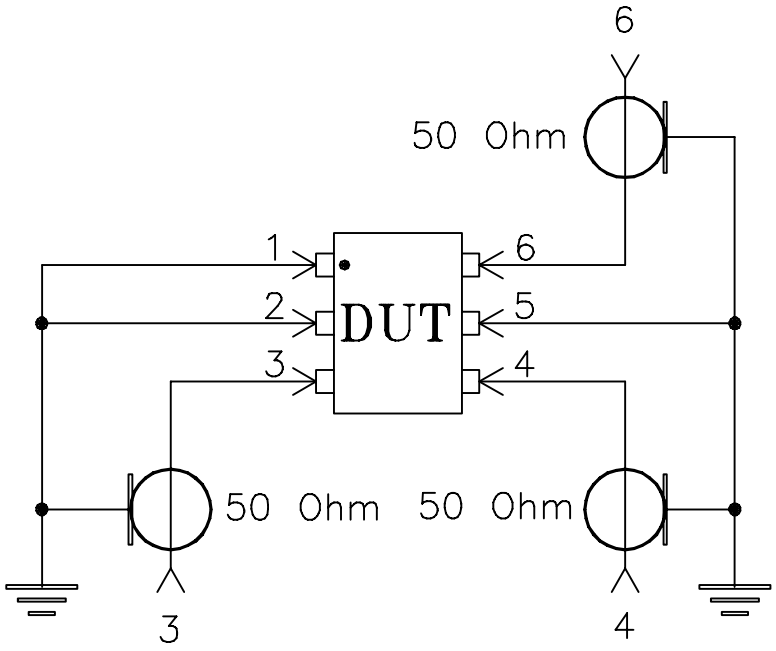
FILE:	SCALE:	SHEET:
98PL051	8:1	1 OF 1

Evaluation Board and Circuit

For Pin Connections refer to Data Sheet of the DUT



TB-02



Schematic Diagram

Notes:

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

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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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