

# Surface Mount Frequency Mixer

## ADE-13+

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



CASE STYLE: CD541

### 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

### +RoHS Compliant

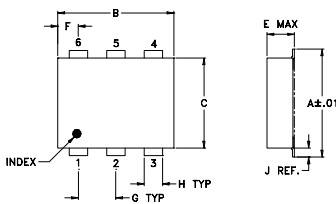
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications



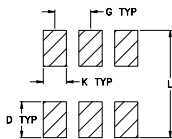
Available Tape and Reel at no extra cost

Reel Size	Devices/Reel
7"	20, 50, 100, 200, 500
13"	500, 1000

### Outline Drawing



### PCB Land Pattern

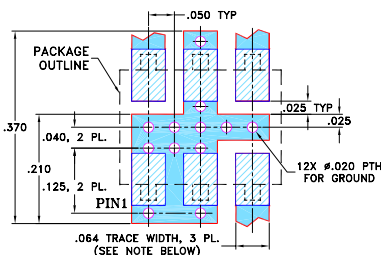


Suggested Layout. Tolerance to be within ±.002

### 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

### 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.  
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### Electrical Specifications

FREQUENCY (MHz)	CONVERSION LOSS (dB)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)			IP3 at center band (dBm)										
		L	M	U	L	M	U											
LO/RF $f_L$ - $f_U$	Mid-Band $m$ $\bar{X}$ $\sigma$ Max.	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  $f_U/2$ ]

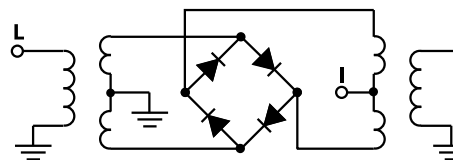
M = mid range [10  $f_L$  to  $f_U/2$ ]

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

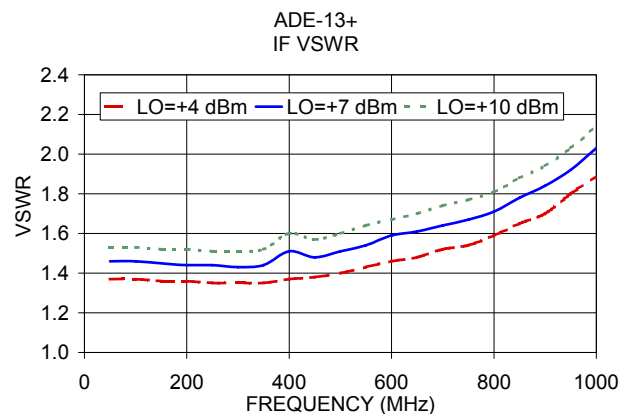
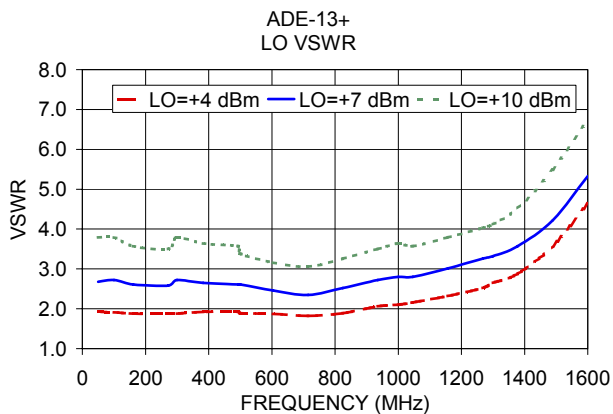
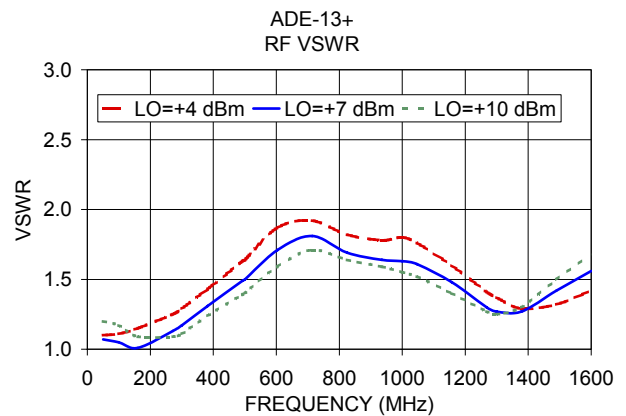
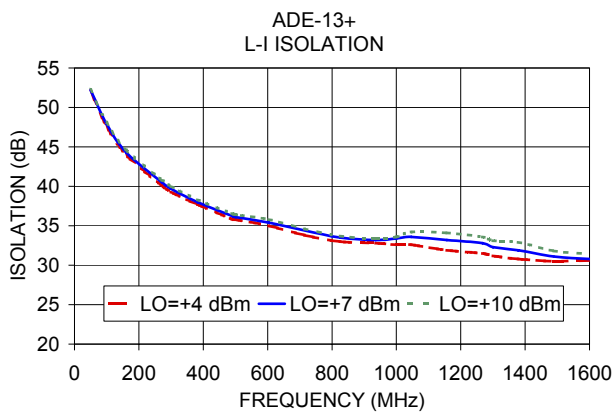
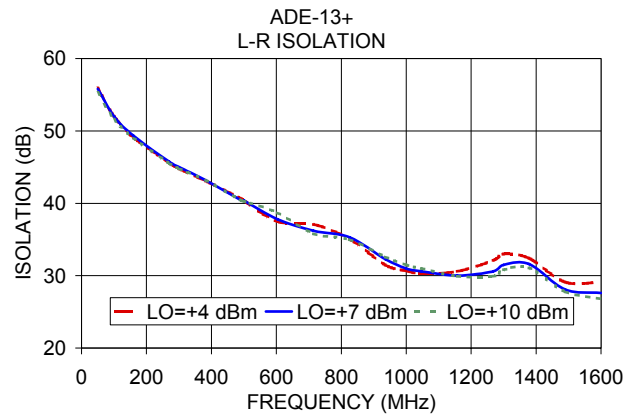
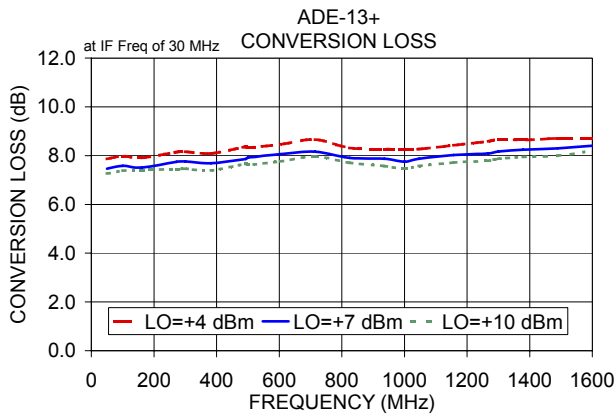
### Electrical Schematic



**Mini-Circuits**

[www.minicircuits.com](http://www.minicircuits.com) P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 sales@minicircuits.com

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# Frequency Mixer

# ADE-13+

## Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=50MHz (dB)			RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)			RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+1dBm (dB)		
		@LO (dBm)					@LO (dBm)					@LO (dBm)		
		+4	+7	+10			+4	+7	+10			+4	+7	+10
10.1	60.1	6.99	6.45	6.28	10.1	60.1	12.96	14.60	14.33	10.1	60.1	20.57	16.95	4.37
70.4	120.4	7.83	7.31	7.08	70.4	120.4	11.58	11.86	12.62	70.4	120.4	1.16	0.70	0.43
130.7	180.7	7.78	7.31	7.09	130.7	180.7	10.12	12.39	15.54	130.7	180.7	1.17	0.75	0.54
191.0	241.0	7.84	7.36	7.14	191.0	241.0	10.53	14.51	18.86	191.0	241.0	1.14	0.74	0.48
251.3	301.3	7.88	7.44	7.20	251.3	301.3	11.97	18.67	15.66	251.3	301.3	1.27	0.88	0.58
311.5	361.5	7.92	7.47	7.21	311.5	361.5	14.11	14.42	14.58	311.5	361.5	1.27	0.92	0.72
371.8	421.8	8.01	7.54	7.30	371.8	421.8	14.39	12.91	13.72	371.8	421.8	1.36	0.96	0.73
432.1	482.1	8.05	7.59	7.29	432.1	482.1	12.48	12.13	13.24	432.1	482.1	1.39	1.04	0.85
492.4	542.4	8.16	7.66	7.43	492.4	542.4	9.96	10.90	11.25	492.4	542.4	1.49	1.11	0.83
552.7	602.7	8.21	7.68	7.38	552.7	602.7	8.54	9.82	13.43	552.7	602.7	1.34	1.10	0.86
613.0	663.0	8.37	7.87	7.53	613.0	663.0	8.19	9.08	10.67	613.0	663.0	1.45	1.11	1.04
673.3	723.3	8.45	8.01	7.72	673.3	723.3	7.64	8.35	9.40	673.3	723.3	1.34	1.04	0.86
733.6	783.6	8.36	7.99	7.76	733.6	783.6	7.67	8.68	9.82	733.6	783.6	1.25	0.96	0.79
793.9	843.9	8.29	7.85	7.63	793.9	843.9	7.36	10.43	13.39	793.9	843.9	1.43	1.13	1.06
834.0	884.0	8.25	7.78	7.56	834.0	884.0	7.24	10.11	12.62	834.0	884.0	1.33	1.06	0.96
894.3	944.3	8.26	7.73	7.49	894.3	944.3	7.24	8.77	11.53	894.3	944.3	1.35	1.23	1.05
934.5	984.5	8.35	7.77	7.50	934.5	984.5	7.80	8.35	10.76	934.5	984.5	1.26	1.15	1.00
994.8	1044.8	8.38	7.78	7.45	994.8	1044.8	8.36	8.94	9.68	994.8	1044.8	1.11	1.06	0.93
1035.0	1085.0	8.45	7.85	7.48	1035.0	1085.0	8.19	9.47	9.75	1035.0	1085.0	1.06	0.93	0.87
1095.3	1145.3	8.50	7.93	7.52	1095.3	1145.3	7.78	9.94	11.05	1095.3	1145.3	1.06	0.92	0.89
1135.5	1185.5	8.59	8.03	7.63	1135.5	1185.5	7.09	9.37	12.00	1135.5	1185.5	1.09	0.89	0.89
1195.8	1245.8	8.66	8.19	7.83	1195.8	1245.8	6.07	7.60	10.02	1195.8	1245.8	1.07	0.91	0.88
1236.0	1286.0	8.66	8.27	7.94	1236.0	1286.0	5.30	6.06	7.53	1236.0	1286.0	1.08	0.78	0.74
1296.3	1346.3	8.57	8.21	7.91	1296.3	1346.3	5.16	5.36	6.08	1296.3	1346.3	1.15	0.80	0.75
1336.4	1386.4	8.53	8.12	7.80	1336.4	1386.4	5.47	6.08	7.42	1336.4	1386.4	1.21	0.92	0.82
1396.7	1446.7	8.43	7.95	7.63	1396.7	1446.7	6.90	8.93	11.09	1396.7	1446.7	1.38	0.96	0.69
1436.9	1486.9	8.34	7.83	7.58	1436.9	1486.9	8.57	10.96	12.78	1436.9	1486.9	1.39	0.98	0.66
1497.2	1547.2	8.26	7.78	7.53	1497.2	1547.2	9.11	11.79	13.81	1497.2	1547.2	1.49	0.91	0.58
1537.4	1587.4	8.24	7.77	7.55	1537.4	1587.4	9.04	11.85	14.25	1537.4	1587.4	1.44	0.79	0.52
1597.7	1647.7	8.21	7.82	7.60	1597.7	1647.7	9.41	13.06	14.75	1597.7	1647.7	1.38	0.72	0.44
1637.9	1687.9	8.30	7.89	7.68	1637.9	1687.9	9.29	12.50	14.65	1637.9	1687.9	1.46	0.71	0.48
1698.2	1748.2	8.37	7.99	7.80	1698.2	1748.2	9.31	12.84	14.68	1698.2	1748.2	1.27	0.61	0.35
1738.4	1788.4	8.47	8.09	7.89	1738.4	1788.4	8.77	12.55	14.72	1738.4	1788.4	1.28	0.54	0.34
1798.7	1848.7	8.66	8.24	8.06	1798.7	1848.7	8.23	11.41	13.71	1798.7	1848.7	1.20	0.54	0.29
1838.9	1888.9	8.81	8.40	8.23	1838.9	1888.9	7.95	11.50	13.36	1838.9	1888.9	1.30	0.63	0.29
1899.1	1949.1	9.11	8.65	8.47	1899.1	1949.1	7.58	11.02	14.40	1899.1	1949.1	1.20	0.53	0.30
1939.3	1989.3	9.36	8.86	8.71	1939.3	1989.3	7.46	10.67	13.26	1939.3	1989.3	1.17	0.51	0.31
1999.6	2049.6	9.70	9.18	9.01	1999.6	2049.6	8.53	11.63	14.58	1999.6	2049.6	1.15	0.52	0.23
2039.8	2089.8	10.02	9.48	9.28	2039.8	2089.8	7.66	11.28	12.90	2039.8	2089.8	1.09	0.51	0.21
2100.1	2150.1	10.34	9.81	9.65	2100.1	2150.1	8.65	13.36	14.27	2100.1	2150.1	0.99	0.39	0.25



# Frequency Mixer

# ADE-13+

## Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=800.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=50.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1600.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+7			+7			+7
790.0	10.1	7.44	50.0	100.1	7.20	1000.0	600.1	7.56
771.0	29.1	7.48	70.2	120.3	7.33	979.8	620.3	7.42
752.1	48.0	7.45	90.4	140.5	7.23	959.6	640.5	7.39
733.1	67.0	7.49	110.6	160.7	7.22	939.4	660.7	7.39
714.1	86.0	7.53	130.9	181.0	7.16	919.1	681.0	7.39
695.1	105.0	7.57	151.1	201.2	7.17	898.9	701.2	7.39
676.2	123.9	7.55	171.3	221.4	7.12	878.7	721.4	7.38
657.2	142.9	7.55	191.5	241.6	7.15	858.5	741.6	7.30
638.2	161.9	7.55	211.7	261.8	7.10	838.3	761.8	7.31
619.2	180.9	7.57	231.9	282.0	7.07	818.1	782.0	7.31
600.3	199.8	7.58	252.1	302.2	7.03	797.9	802.2	7.31
581.3	218.8	7.58	272.3	322.4	7.02	777.7	822.4	7.29
562.3	237.8	7.54	292.6	342.7	7.02	757.4	842.7	7.27
543.3	256.8	7.57	312.8	362.9	6.98	737.2	862.9	7.25
524.4	275.7	7.57	333.0	383.1	6.96	717.0	883.1	7.25
505.4	294.7	7.56	353.2	403.3	6.96	696.8	903.3	7.27
486.4	313.7	7.59	373.4	423.5	6.90	676.6	923.5	7.21
467.4	332.7	7.58	393.6	443.7	6.89	656.4	943.7	7.26
448.5	351.6	7.57	413.8	463.9	7.00	636.2	963.9	7.26
429.5	370.6	7.63	434.0	484.1	7.00	616.0	984.1	7.37
410.5	389.6	7.61	454.3	504.4	6.88	595.7	1004.4	7.46
391.5	408.6	7.60	474.5	524.6	6.90	575.5	1024.6	7.51
372.6	427.5	7.60	494.7	544.8	6.90	555.3	1044.8	7.62
353.6	446.5	7.67	514.9	565.0	6.87	535.1	1065.0	7.72
334.6	465.5	7.65	535.3	605.4	6.85	494.7	1105.4	7.87
315.6	484.5	7.75	555.5	625.6	6.88	474.5	1125.6	7.95
296.7	503.4	7.77	616.0	666.1	6.92	434.0	1166.1	8.03
277.7	522.4	7.77	636.2	686.3	6.89	413.8	1186.3	8.10
258.7	541.4	7.79	676.6	726.7	6.92	373.4	1226.7	8.03
239.7	560.4	7.75	696.8	746.9	6.94	353.2	1246.9	8.00
220.8	579.3	7.83	737.2	787.3	6.94	312.8	1287.3	8.01
201.8	598.3	7.81	757.4	807.5	6.93	292.6	1307.5	8.05
182.8	617.3	7.88	797.9	848.0	6.95	252.1	1348.0	8.07
163.8	636.3	7.86	818.1	868.2	6.93	231.9	1368.2	8.09
144.9	655.2	7.90	858.5	908.6	6.95	191.5	1408.6	8.06
125.9	674.2	7.94	878.7	928.8	6.97	171.3	1428.8	7.99
106.9	693.2	7.94	919.1	969.2	7.02	130.9	1469.2	7.91
87.9	712.2	8.01	939.4	989.5	7.12	110.6	1489.5	7.91
69.0	731.1	7.95	979.8	1029.9	7.22	70.2	1529.9	7.81
50.0	750.1	7.95	1000.0	1050.1	7.28	50.0	1550.1	7.80

REV. X2  
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## Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@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

## 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

## 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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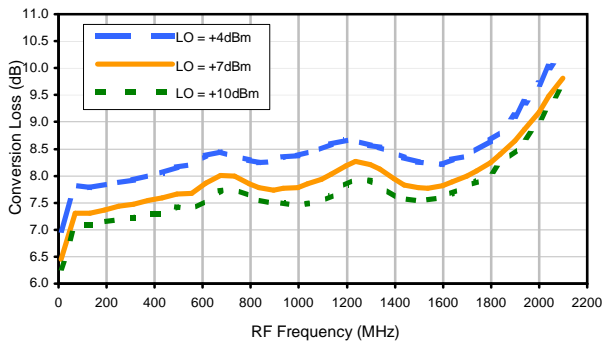
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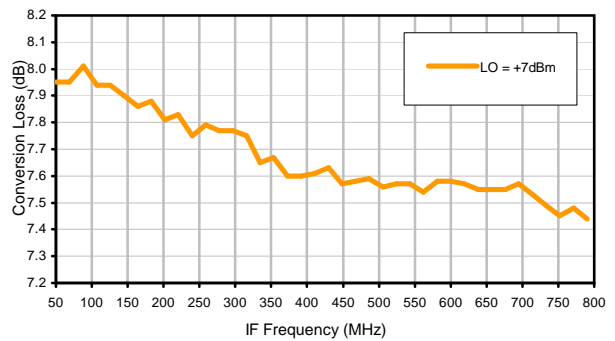
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## Typical Performance Curves

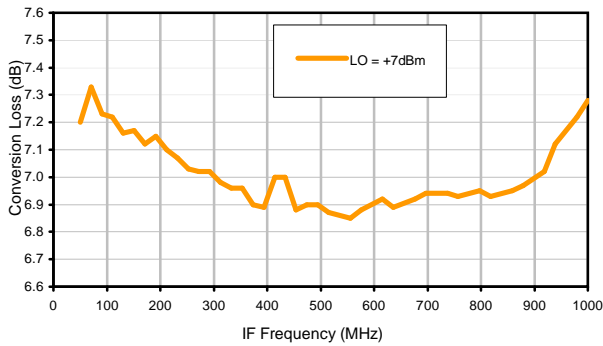
Conversion Loss @ IF=50MHz



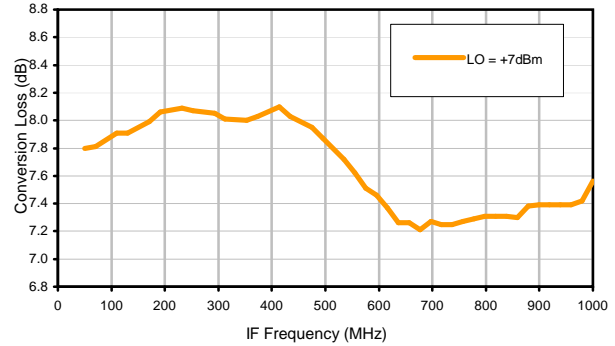
Conversion Loss vs. IF @ RF=800.1MHz



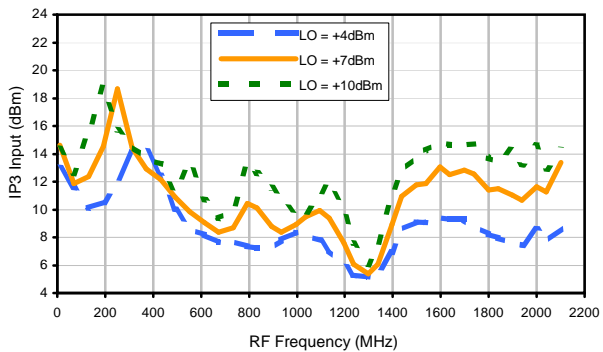
Conversion Loss vs. IF @ RF=50.1MHz



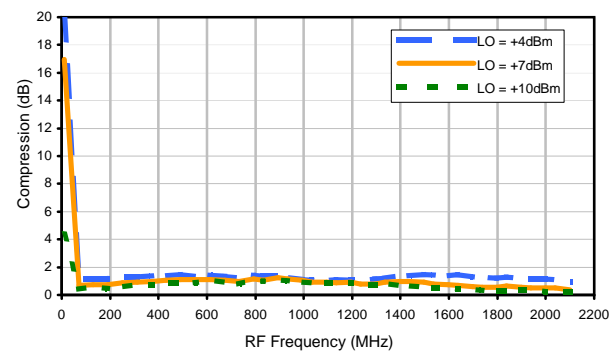
Conversion Loss vs. IF @ RF=1600.1MHz



IP3 Input



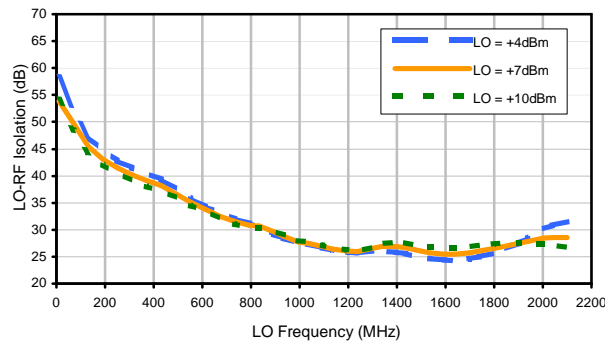
Compression @ RF IN=+1dBm



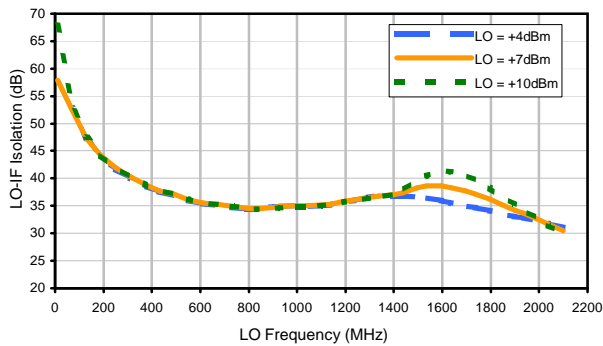


## Typical Performance Curves

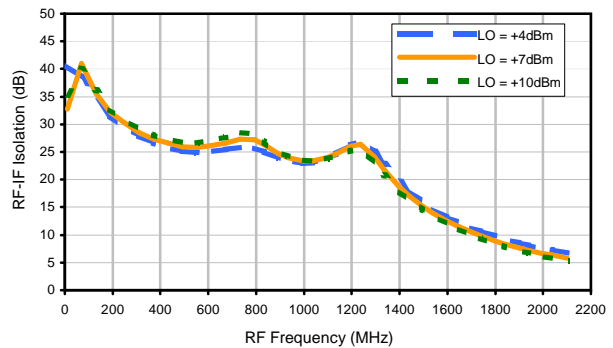
LO-RF Isolation



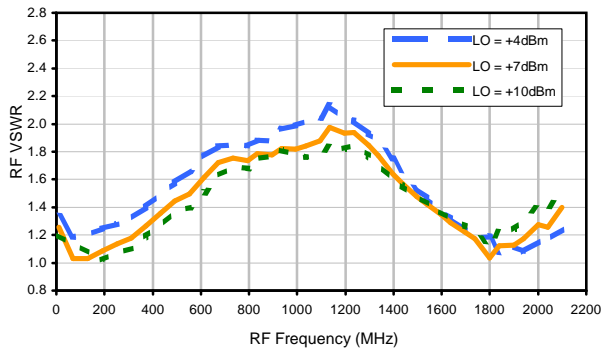
LO-IF Isolation



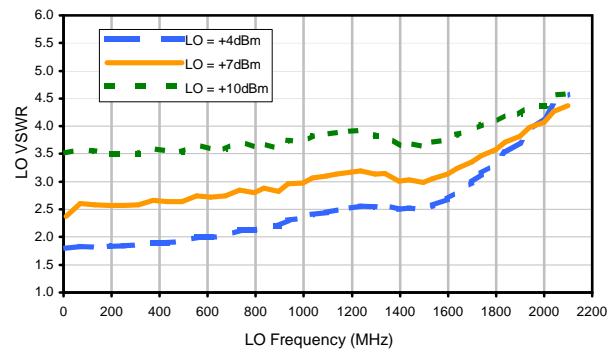
RF-IF Isolation



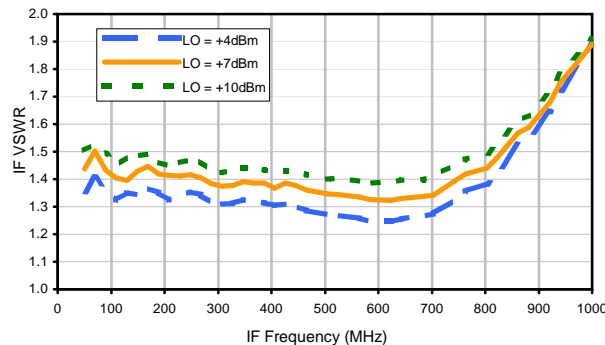
RF VSWR



LO VSWR



IF VSWR



## 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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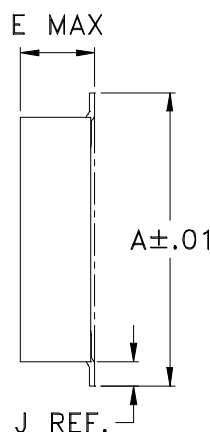
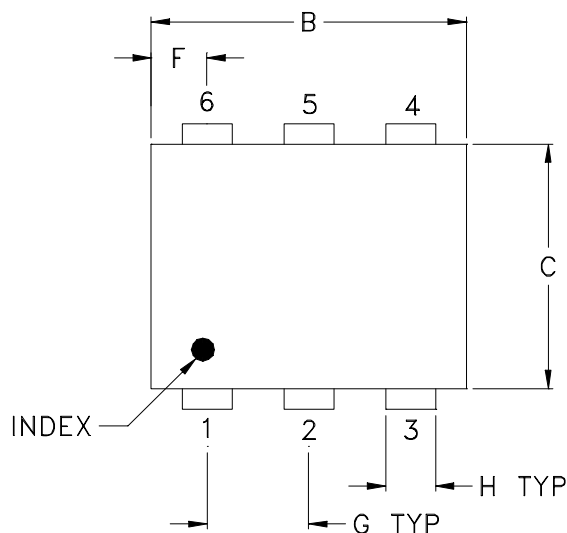
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# Case Style

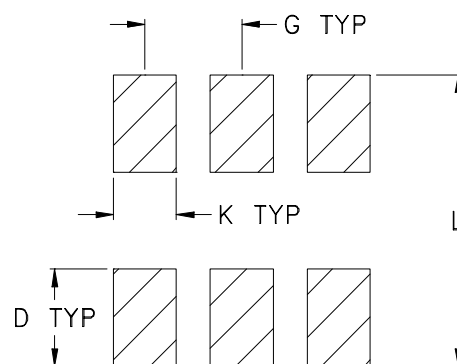
# CD

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.

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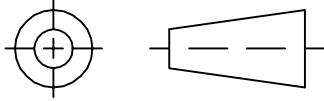
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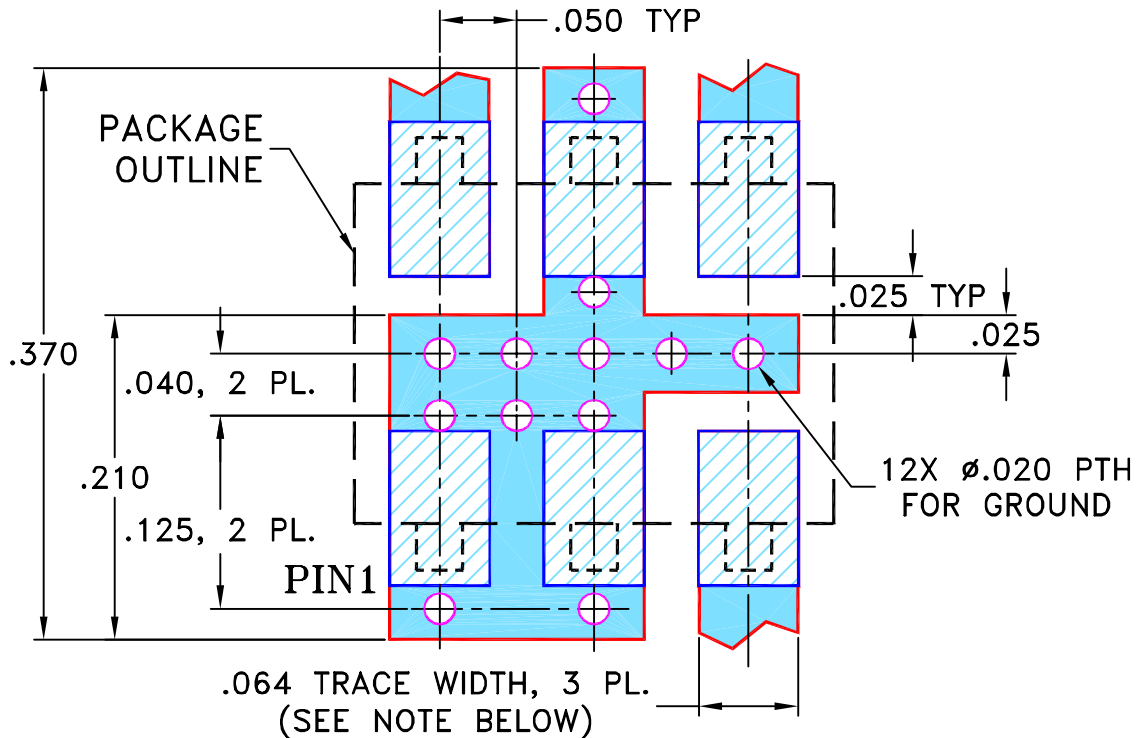
THIRD ANGLE PROJECTION



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 R04350B 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 <b>MMG</b>	07/17/02
TOLERANCES ON:	CHECKED <b>WL</b>	08/02/02
2 PL DECIMALS ±	APPROVED <b>DJ</b>	08/05/02
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		

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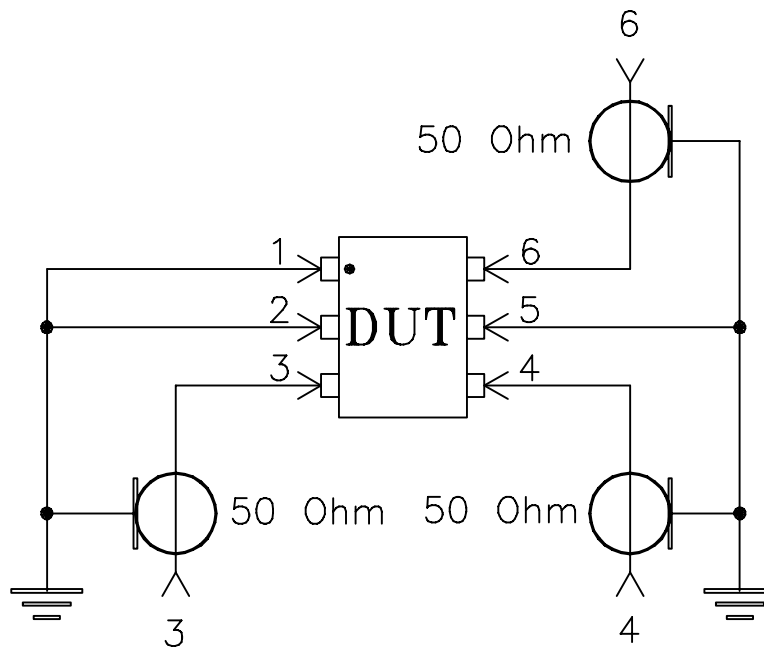
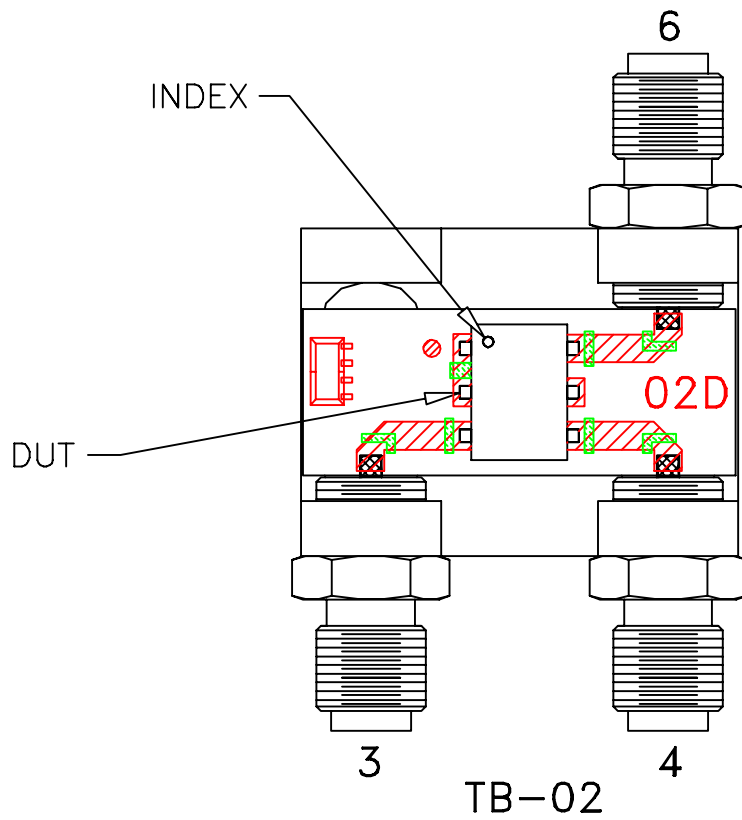
PL, jv/ju/jw, CD541/542/636/637, ADE, TB-02

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SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-051	REV: A
FILE: 98PL051	SCALE: 8:1	SHEET: 1 OF 1	

# Evaluation Board and Circuit

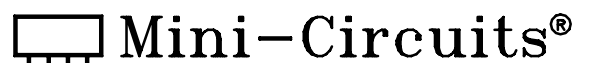
For Pin Connections refer to Data Sheet of the DUT



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