Surface Mount

Frequency Mixer

MBA-591+
MBA-591

Level 7 (LO Power +7 dBm) 2800 to 5900 MHz

Generic photo used for illustration purposes only

CASE STYLE: SM2

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

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	10
RF	6
IF	1
GROUND	2,3,4,5,7,8,9

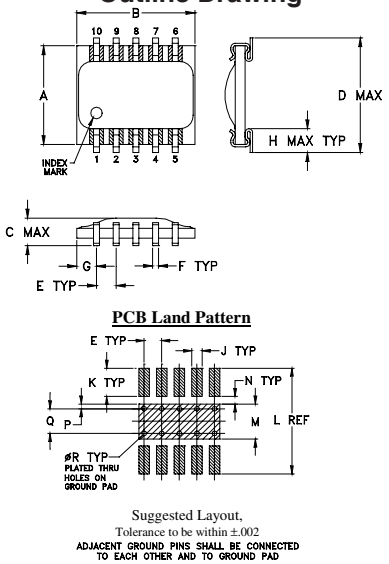
Features

- excellent temperature stability
- excellent performance repeatability
- leads with strain relief
- very low cost
- ultra low height, 0.07”
- aqueous washable
- protected by US Patent 5,534,830

Applications

- satellite communication
- ISM band
- PCMCIA

Outline Drawing

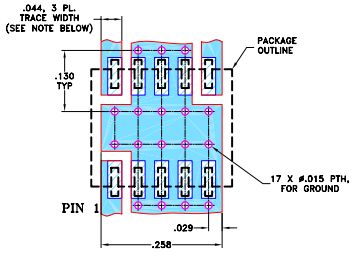


Suggested Layout,
Tolerance to be within ±.002
ADJACENT GROUND PINS SHALL BE CONNECTED TO EACH OTHER AND TO GROUND PAD

Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H	
.250	.300	.095	.290	.050	.015	.050	.060	
6.35	7.62	2.41	7.37	1.27	0.38	1.27	1.52	
J	K	L	M	N	P	Q	R	wt
.030	.080	.300	.100	.020	.015	.070	.014	grams
0.76	2.03	7.62	2.54	0.51	0.38	1.78	0.36	0.3

Demo Board MCL P/N: TB-74
Suggested PCB Layout (PL-067)



NOTES: 1.TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" ± 0.0015"; 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

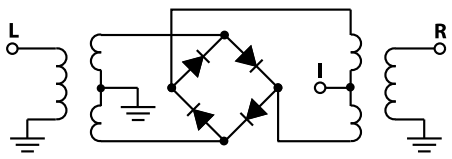
FREQUENCY (MHz)		CONVERSION LOSS (dB)			LO-RF ISOLATION (dB)		LO-IF ISOLATION (dB)		IP3 at center band (dBm)
LO/RF	IF								
f_L-f_U		$\overline{X}$	σ	Max.	Typ.	Min.	Typ.	Min.	Typ.
2800-5900	DC-1000	6.5	0.1	9.0	36	20	26	17	10

1 dB COMP.: +1 dBm typ.

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
2597.00	2627.00	6.11	33.16	23.57	3.25	7.31
2895.00	2925.00	5.11	31.10	23.98	1.88	5.83
3000.00	3030.00	4.90	31.11	23.73	1.61	5.23
3300.00	3330.00	4.58	31.80	23.98	1.28	4.61
3492.50	3522.50	4.70	33.07	24.97	1.61	4.78
3700.00	3730.00	4.92	33.70	26.25	2.10	4.21
3791.00	3821.00	5.01	34.34	26.80	2.31	3.90
4000.00	4030.00	5.32	36.66	27.71	2.84	2.86
4089.50	4119.50	5.45	37.63	27.98	2.97	2.58
4388.00	4418.00	5.93	38.33	28.33	3.16	1.70
4500.00	4530.00	6.11	39.03	28.13	3.22	1.49
4686.50	4716.50	6.33	39.88	27.54	3.43	1.25
4985.00	5015.00	6.08	40.18	26.99	4.02	1.31
5000.00	5030.00	6.10	40.38	27.03	4.07	1.33
5283.50	5313.50	6.13	39.86	27.04	3.90	1.81
5400.00	5430.00	6.57	38.38	26.96	4.09	2.08
5500.00	5530.00	7.20	38.33	26.75	4.95	2.32
5582.00	5612.00	7.42	38.54	26.53	5.13	2.45
5880.50	5910.50	8.01	38.73	25.90	4.56	2.44
6000.00	6030.00	8.02	38.49	25.53	4.39	2.75

Electrical Schematic



Notes
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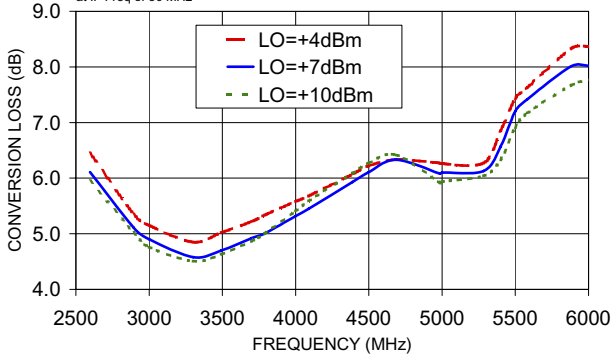
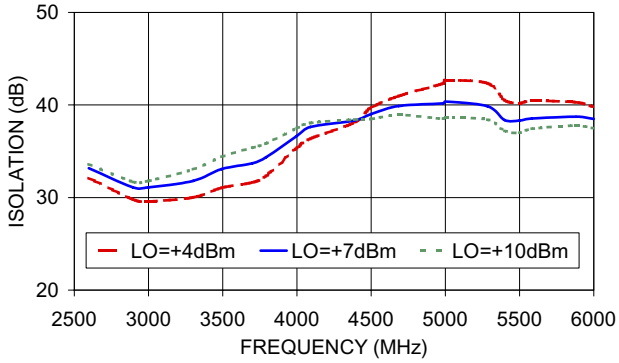
Performance Charts

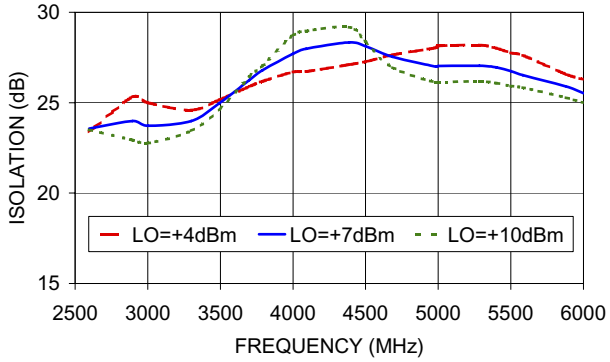
MBA-591
CONVERSION LOSS
at IF Freq of 30 MHz



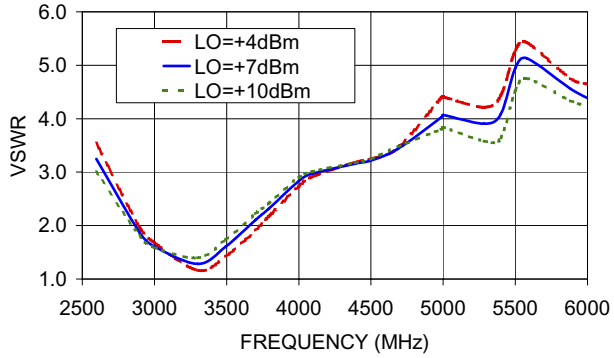
MBA-591
L-R ISOLATION



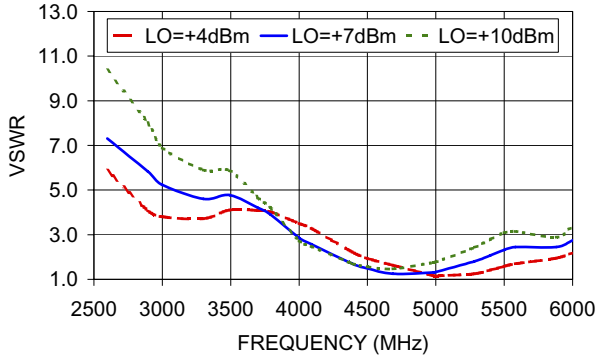
MBA-591
L-I ISOLATION



MBA-591
RF VSWR



MBA-591
LO VSWR



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Frequency Mixer MBA-591+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB) @LO (dBm)		
		+4	+7	+10
2000.0	2030.0	15.10	10.92	9.81
2140.0	2170.0	10.27	8.58	8.09
2280.0	2310.0	8.21	7.66	7.42
2420.0	2450.0	6.86	6.55	6.41
2560.0	2590.0	6.62	6.33	6.10
2700.0	2730.0	5.85	5.62	5.46
2840.0	2870.0	5.48	5.20	4.99
2980.0	3010.0	5.14	4.89	4.70
3120.0	3150.0	5.06	4.75	4.55
3260.0	3290.0	5.01	4.71	4.53
3400.0	3430.0	5.16	4.86	4.70
3540.0	3570.0	5.29	4.97	4.80
3680.0	3710.0	5.42	5.16	5.06
3820.0	3850.0	5.68	5.40	5.26
3960.0	3990.0	5.77	5.53	5.47
4100.0	4130.0	6.20	5.94	5.88
4240.0	4270.0	6.27	6.07	6.05
4380.0	4410.0	6.62	6.48	6.51
4520.0	4550.0	6.76	6.71	6.78
4660.0	4690.0	6.56	6.42	6.46
4800.0	4830.0	6.99	6.74	6.66
4940.0	4970.0	7.06	6.84	6.76
5080.0	5110.0	7.17	6.99	6.92
5220.0	5250.0	7.10	6.93	6.85
5360.0	5390.0	6.96	6.76	6.66
5500.0	5530.0	7.55	7.30	7.11
5640.0	5670.0	7.26	7.02	6.86
5780.0	5810.0	7.34	7.05	6.87
5920.0	5950.0	7.31	6.97	6.77
6060.0	6090.0	7.25	6.81	6.59
6200.0	6230.0	7.32	6.70	6.44
6340.0	6370.0	7.91	6.94	6.57
6460.0	6490.0	8.30	7.12	6.74
6600.0	6630.0	8.50	6.96	6.53
6720.0	6750.0	9.21	6.91	6.43
6860.0	6890.0	10.17	6.89	6.25
6980.0	7010.0	10.00	6.98	6.32
7120.0	7150.0	12.23	7.28	6.23
7240.0	7270.0	14.87	8.30	6.38
7380.0	7410.0	18.65	10.45	7.06

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm) @LO (dBm)		
		+4	+7	+10
2000.0	2030.0	4.28	11.67	12.20
2140.0	2170.0	11.66	10.17	10.00
2280.0	2310.0	8.15	8.34	8.24
2420.0	2450.0	5.99	6.31	6.55
2560.0	2590.0	5.21	5.73	6.40
2700.0	2730.0	5.93	6.45	6.89
2840.0	2870.0	5.56	6.30	6.91
2980.0	3010.0	5.63	6.65	7.55
3120.0	3150.0	5.52	6.76	8.04
3260.0	3290.0	5.54	6.88	8.06
3400.0	3430.0	6.22	7.68	8.87
3540.0	3570.0	6.42	8.12	9.15
3680.0	3710.0	7.31	8.95	9.96
3820.0	3850.0	7.91	9.72	10.82
3960.0	3990.0	8.36	10.30	11.60
4100.0	4130.0	9.76	10.70	12.51
4240.0	4270.0	11.50	11.26	12.88
4380.0	4410.0	13.11	13.93	12.69
4520.0	4550.0	13.35	13.18	14.23
4660.0	4690.0	12.19	12.93	12.88
4800.0	4830.0	15.42	14.82	15.72
4940.0	4970.0	15.52	14.94	15.54
5080.0	5110.0	14.40	14.93	15.14
5220.0	5250.0	14.38	15.46	15.33
5360.0	5390.0	13.02	15.63	14.40
5500.0	5530.0	15.66	17.18	14.82
5640.0	5670.0	16.30	19.18	16.03
5780.0	5810.0	14.72	16.37	15.73
5920.0	5950.0	13.61	15.71	15.28
6060.0	6090.0	11.55	14.74	15.05
6200.0	6230.0	9.56	14.04	15.37
6340.0	6370.0	9.99	13.23	15.31
6460.0	6490.0	8.01	11.41	13.45
6600.0	6630.0	6.72	9.92	13.49
6720.0	6750.0	5.44	9.32	13.42
6860.0	6890.0	2.77	7.32	11.95
6980.0	7010.0	3.14	7.62	12.13
7120.0	7150.0	-0.71	7.04	10.20
7240.0	7270.0	-3.28	6.29	9.27
7380.0	7410.0	-5.19	3.56	10.45

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+1dBm (dB) @LO (dBm)		
		+4	+7	+10
2000.0	2030.0	-1.42	0.79	0.64
2140.0	2170.0	1.37	1.60	1.26
2280.0	2310.0	2.01	1.69	1.45
2420.0	2450.0	2.40	2.05	1.81
2560.0	2590.0	2.15	1.89	1.67
2700.0	2730.0	2.17	1.87	1.70
2840.0	2870.0	2.05	1.72	1.56
2980.0	3010.0	2.14	1.87	1.70
3120.0	3150.0	2.03	1.78	1.65
3260.0	3290.0	2.03	1.71	1.56
3400.0	3430.0	1.84	1.55	1.40
3540.0	3570.0	1.74	1.41	1.25
3680.0	3710.0	1.44	1.13	1.01
3820.0	3850.0	1.23	0.94	0.83
3960.0	3990.0	1.11	0.81	0.73
4100.0	4130.0	0.80	0.58	0.53
4240.0	4270.0	0.71	0.50	0.46
4380.0	4410.0	0.60	0.47	0.41
4520.0	4550.0	0.54	0.40	0.39
4660.0	4690.0	0.74	0.52	0.44
4800.0	4830.0	0.46	0.36	0.35
4940.0	4970.0	0.38	0.30	0.28
5080.0	5110.0	0.40	0.28	0.24
5220.0	5250.0	0.39	0.27	0.22
5360.0	5390.0	0.53	0.38	0.29
5500.0	5530.0	0.38	0.29	0.25
5640.0	5670.0	0.46	0.35	0.29
5780.0	5810.0	0.45	0.35	0.30
5920.0	5950.0	0.51	0.39	0.34
6060.0	6090.0	0.61	0.46	0.39
6200.0	6230.0	0.68	0.46	0.41
6340.0	6370.0	0.63	0.57	0.49
6460.0	6490.0	0.45	0.44	0.41
6600.0	6630.0	0.32	0.46	0.44
6720.0	6750.0	-0.04	0.48	0.44
6860.0	6890.0	-0.56	0.66	0.58
6980.0	7010.0	-0.45	0.64	0.59
7120.0	7150.0	-1.89	0.67	0.66
7240.0	7270.0	-3.27	0.54	0.87
7380.0	7410.0	-5.49	-0.18	1.16

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Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=4350MHz (dB) @LO (dBm) +7
2350.0	2000.0	10.93
2222.4	2127.6	8.74
2094.7	2255.3	8.29
1967.1	2382.9	8.85
1839.5	2510.5	9.08
1711.8	2638.2	8.26
1584.2	2765.8	8.06
1456.5	2893.5	7.91
1328.9	3021.1	7.92
1201.3	3148.7	8.21
1073.6	3276.4	8.52
946.0	3404.0	8.50
818.4	3531.6	8.42
690.7	3659.3	8.15
563.1	3786.9	7.53
435.5	3914.5	6.92
307.8	4042.2	6.62
201.5	4148.5	6.40
73.8	4276.2	6.30
28.7	4378.7	6.30
141.2	4491.2	6.37
234.9	4584.9	6.68
347.3	4697.3	6.81
441.0	4791.0	6.41
553.4	4903.4	6.32
647.1	4997.1	6.39
759.5	5109.5	6.41
853.2	5203.2	6.64
965.7	5315.7	6.85
1059.4	5409.4	7.06
1171.8	5521.8	7.38
1265.5	5615.5	7.69
1377.9	5727.9	8.09
1471.6	5821.6	8.64
1584.1	5934.1	9.28
1677.7	6027.7	9.59
1790.2	6140.2	9.87
1883.9	6233.9	10.06
1996.3	6346.3	10.24
2090.0	6440.0	10.45

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=2789.89MHz (dB) @LO (dBm) +7
10.1	2800.0	5.74
90.1	2880.0	5.38
170.1	2960.0	5.35
250.1	3040.0	5.40
330.1	3120.0	5.47
410.1	3200.0	5.64
490.1	3280.0	5.90
570.1	3360.0	6.05
650.1	3440.0	6.22
730.1	3520.0	6.36
810.1	3600.0	6.59
890.1	3680.0	6.79
970.1	3760.0	7.01
1050.1	3840.0	7.15
1130.1	3920.0	7.18
1210.1	4000.0	7.34
1290.1	4080.0	7.56
1370.1	4160.0	7.68
1450.1	4240.0	7.72
1530.1	4320.0	7.71
1610.1	4400.0	7.71
1690.1	4480.0	7.73
1770.1	4560.0	7.77
1850.1	4640.0	7.92
1930.1	4720.0	8.09
2010.1	4800.0	8.18
2090.1	4880.0	8.35
2170.1	4960.0	8.52
2250.1	5040.0	8.80
2330.1	5120.0	9.10
2410.1	5200.0	8.75
2490.1	5280.0	8.42
2570.1	5360.0	8.42
2650.1	5440.0	8.21
2730.1	5520.0	7.68
2830.1	5620.0	7.20
2910.1	5700.0	7.01
3010.1	5800.0	7.71
3090.1	5880.0	8.71
3190.1	5980.0	10.45

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=5910.1MHz (dB) @LO (dBm) +7
2730.1	3180.0	10.32
2670.1	3240.0	9.87
2590.1	3320.0	9.40
2530.1	3380.0	9.38
2450.1	3460.0	8.74
2390.1	3520.0	8.01
2310.1	3600.0	7.60
2250.1	3660.0	7.55
2170.1	3740.0	7.24
2110.1	3800.0	7.37
2030.1	3880.0	7.74
1970.1	3940.0	7.92
1890.1	4020.0	8.40
1830.1	4080.0	8.85
1750.1	4160.0	9.31
1690.1	4220.0	9.35
1610.1	4300.0	9.49
1550.1	4360.0	9.62
1470.1	4440.0	9.43
1410.1	4500.0	9.05
1330.1	4580.0	8.59
1270.1	4640.0	8.39
1190.1	4720.0	7.91
1130.1	4780.0	7.63
1050.1	4860.0	7.37
990.1	4920.0	7.45
910.1	5000.0	7.51
850.1	5060.0	7.37
770.1	5140.0	7.22
710.1	5200.0	7.06
630.1	5280.0	7.01
570.1	5340.0	6.96
490.1	5420.0	6.92
430.1	5480.0	6.88
350.1	5560.0	6.88
290.1	5620.0	6.82
210.1	5700.0	6.89
150.1	5760.0	6.94
70.1	5840.0	6.96
10.1	5900.0	7.29

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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
2030.0	33.68	33.86	36.00	19.70	20.11	20.93
2170.0	32.50	34.01	37.06	20.14	21.05	22.32
2310.0	32.48	34.78	37.45	21.64	23.01	24.29
2450.0	31.93	34.11	36.54	24.00	25.13	25.74
2590.0	31.84	33.33	34.71	26.59	26.47	25.57
2730.0	31.48	32.84	33.97	28.18	25.89	24.65
2870.0	30.13	31.41	32.35	27.62	25.63	24.59
3010.0	29.51	30.79	31.53	26.30	25.30	24.58
3150.0	29.03	30.22	31.07	25.98	25.48	25.27
3290.0	28.90	30.25	31.10	25.88	25.97	26.05
3430.0	29.44	30.62	31.37	26.10	26.64	27.09
3570.0	29.50	31.19	32.09	26.29	27.36	28.22
3710.0	29.62	31.15	32.18	26.74	28.17	29.56
3850.0	30.15	31.86	32.66	26.97	28.74	30.39
3990.0	31.16	32.89	33.62	27.76	29.48	31.07
4130.0	32.02	33.68	34.20	28.60	29.98	30.93
4270.0	32.86	34.25	35.22	29.42	30.01	29.58
4410.0	34.28	35.36	35.42	29.71	29.06	27.78
4550.0	35.50	36.53	36.66	29.54	28.03	26.32
4690.0	36.74	37.26	37.23	29.15	27.03	25.50
4830.0	38.37	39.61	40.14	28.51	26.52	25.41
4970.0	39.54	40.22	40.64	27.70	26.14	25.44
5110.0	41.57	41.73	41.81	27.30	26.15	25.63
5250.0	44.06	43.17	42.69	27.35	26.47	26.06
5390.0	45.65	43.35	41.90	27.44	26.78	26.34
5530.0	46.28	44.01	42.76	27.58	27.05	26.85
5670.0	50.62	47.87	45.63	27.91	27.59	27.24
5810.0	53.58	53.71	51.18	28.14	27.84	27.67
5950.0	44.10	44.63	44.91	28.50	28.26	27.88
6090.0	38.79	38.92	38.93	28.73	28.46	28.06
6230.0	34.81	35.27	35.64	28.86	28.58	28.37
6370.0	32.60	33.34	33.90	29.30	28.98	28.74
6490.0	30.11	30.80	31.47	29.78	29.45	29.01
6630.0	27.83	28.76	29.29	30.82	30.43	29.48
6750.0	26.16	27.11	27.99	33.19	32.05	31.00
6890.0	23.95	25.23	26.05	37.26	36.24	33.67
7010.0	22.21	23.61	24.64	38.37	38.54	35.78
7150.0	19.83	20.98	22.47	34.45	35.16	35.63
7270.0	18.37	19.02	20.39	32.57	32.61	33.67
7410.0	16.12	16.43	17.60	33.86	34.13	35.30

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB) @LO (dBm)		
		+4	+7	+10
2000.0	2030.0	32.00	27.48	25.97
2140.0	2170.0	27.15	24.54	23.57
2280.0	2310.0	23.49	22.09	21.36
2420.0	2450.0	21.86	20.94	20.46
2560.0	2590.0	21.17	20.73	20.66
2700.0	2730.0	21.33	21.39	21.64
2840.0	2870.0	22.54	22.84	23.24
2980.0	3010.0	24.27	24.73	25.21
3120.0	3150.0	25.71	26.31	26.72
3260.0	3290.0	27.47	28.15	28.65
3400.0	3430.0	29.33	30.09	30.44
3540.0	3570.0	30.54	31.78	32.27
3680.0	3710.0	31.12	32.66	33.46
3820.0	3850.0	32.37	33.56	34.08
3960.0	3990.0	34.45	35.94	36.48
4100.0	4130.0	35.67	37.14	37.62
4240.0	4270.0	36.65	38.45	39.12
4380.0	4410.0	38.41	39.71	40.31
4520.0	4550.0	39.41	41.00	41.43
4660.0	4690.0	38.99	40.42	41.53
4800.0	4830.0	40.05	40.84	41.84
4940.0	4970.0	40.89	41.64	42.05
5080.0	5110.0	41.52	42.26	42.85
5220.0	5250.0	42.62	43.22	44.05
5360.0	5390.0	42.69	43.33	43.22
5500.0	5530.0	43.26	43.29	43.47
5640.0	5670.0	45.12	44.83	45.40
5780.0	5810.0	47.21	47.42	47.05
5920.0	5950.0	50.13	48.88	48.38
6060.0	6090.0	49.86	48.08	47.13
6200.0	6230.0	47.06	45.48	44.35
6340.0	6370.0	46.01	44.80	44.08
6460.0	6490.0	44.62	43.44	42.86
6600.0	6630.0	42.22	41.18	40.35
6720.0	6750.0	39.09	38.54	37.73
6860.0	6890.0	34.77	34.65	33.78
6980.0	7010.0	32.08	32.14	31.54
7120.0	7150.0	29.71	30.16	29.62
7240.0	7270.0	28.99	29.66	29.29
7380.0	7410.0	28.93	29.64	29.47

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Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1) @LO (dBm)		
		+4	+7	+10
2000.0	2030.0	16.56	11.77	10.62
2140.0	2170.0	9.63	7.83	7.22
2280.0	2310.0	5.79	5.19	4.86
2420.0	2450.0	4.15	3.76	3.50
2560.0	2590.0	3.08	2.86	2.66
2700.0	2730.0	2.31	2.19	2.10
2840.0	2870.0	1.81	1.75	1.71
2980.0	3010.0	1.41	1.39	1.40
3120.0	3150.0	1.16	1.22	1.29
3260.0	3290.0	1.18	1.30	1.41
3400.0	3430.0	1.44	1.54	1.63
3540.0	3570.0	1.75	1.86	1.96
3680.0	3710.0	2.07	2.17	2.26
3820.0	3850.0	2.41	2.46	2.54
3960.0	3990.0	2.82	2.85	2.92
4100.0	4130.0	3.17	3.16	3.21
4240.0	4270.0	3.62	3.54	3.57
4380.0	4410.0	3.82	3.73	3.73
4520.0	4550.0	4.07	4.00	4.04
4660.0	4690.0	4.07	3.73	3.66
4800.0	4830.0	4.40	3.98	3.81
4940.0	4970.0	4.53	4.13	3.90
5080.0	5110.0	4.55	4.17	3.89
5220.0	5250.0	4.30	3.93	3.65
5360.0	5390.0	4.32	3.95	3.56
5500.0	5530.0	4.68	4.37	3.99
5640.0	5670.0	4.74	4.42	4.07
5780.0	5810.0	4.80	4.47	4.14
5920.0	5950.0	4.64	4.29	3.98
6060.0	6090.0	4.57	4.11	3.80
6200.0	6230.0	4.35	3.76	3.45
6340.0	6370.0	4.57	3.79	3.42
6460.0	6490.0	4.62	3.76	3.44
6600.0	6630.0	4.41	3.41	3.01
6720.0	6750.0	4.41	3.15	2.73
6860.0	6890.0	4.22	2.86	2.34
6980.0	7010.0	3.62	2.56	2.11
7120.0	7150.0	3.65	2.52	1.93
7240.0	7270.0	3.72	2.55	1.90
7380.0	7410.0	3.86	2.76	1.99

LO (MHz)	LO VSWR (:1) @LO (dBm)		
	+4	+7	+10
2030.0	28.03	16.11	13.39
2170.0	14.87	10.37	10.69
2310.0	7.80	8.08	9.58
2450.0	5.83	6.94	8.68
2590.0	5.07	6.37	8.05
2730.0	4.41	5.87	7.63
2870.0	3.93	5.23	6.78
3010.0	4.01	5.27	6.78
3150.0	3.90	4.91	6.17
3290.0	3.95	4.75	5.89
3430.0	4.08	4.64	5.59
3570.0	4.06	4.26	4.92
3710.0	4.03	4.03	4.57
3850.0	3.89	3.51	3.79
3990.0	3.87	3.22	3.33
4130.0	3.56	2.75	2.66
4270.0	3.13	2.26	2.10
4410.0	2.58	1.78	1.64
4550.0	2.11	1.35	1.30
4690.0	1.62	1.04	1.40
4830.0	1.34	1.30	1.80
4970.0	1.26	1.64	2.25
5110.0	1.51	2.10	2.86
5250.0	1.82	2.54	3.40
5390.0	2.19	2.97	3.90
5530.0	2.73	3.61	4.67
5670.0	3.18	4.00	5.02
5810.0	3.78	4.53	5.54
5950.0	4.54	5.10	6.07
6090.0	5.36	5.61	6.46
6230.0	6.37	6.11	6.78
6370.0	7.47	6.58	7.02
6490.0	8.39	7.00	7.22
6630.0	9.33	7.44	7.44
6750.0	10.13	7.90	7.53
6890.0	10.96	8.55	7.76
7010.0	11.17	8.86	8.05
7150.0	11.69	9.90	8.47
7270.0	11.77	10.69	9.18
7410.0	10.56	10.19	9.48

IF (OUT) (MHz)	IF VSWR @LO=5900MHz (:1) @LO (dBm)		
	+4	+7	+10
10.0	1.37	1.59	1.79
50.0	1.34	1.56	1.75
90.0	1.37	1.59	1.79
130.0	1.34	1.54	1.73
170.0	1.37	1.58	1.77
210.0	1.36	1.57	1.76
250.0	1.37	1.55	1.73
290.0	1.40	1.59	1.77
330.0	1.38	1.54	1.71
370.0	1.44	1.60	1.78
410.0	1.41	1.55	1.72
450.0	1.44	1.56	1.71
490.0	1.45	1.57	1.73
530.0	1.45	1.54	1.68
570.0	1.50	1.59	1.71
610.0	1.49	1.55	1.66
650.0	1.56	1.59	1.68
690.0	1.57	1.58	1.66
730.0	1.62	1.60	1.65
770.0	1.66	1.62	1.65
810.0	1.71	1.64	1.64
850.0	1.81	1.70	1.67
890.0	1.89	1.75	1.70
930.0	2.01	1.84	1.75
970.0	2.12	1.94	1.82
990.0	2.17	1.98	1.86
1030.0	2.27	2.05	1.91
1050.0	2.33	2.10	1.95
1090.0	2.41	2.17	2.01
1110.0	2.46	2.22	2.05
1150.0	2.60	2.34	2.15
1170.0	2.69	2.42	2.22
1210.0	2.80	2.52	2.30
1230.0	2.88	2.58	2.36
1270.0	3.15	2.84	2.59
1290.0	3.15	2.84	2.60
1330.0	3.37	3.04	2.77
1350.0	3.58	3.22	2.94
1390.0	3.73	3.38	3.09
1410.0	3.79	3.42	3.12

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Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	2	43	7	42	14	---	---	---	---	---
1	-	33	+0	47	59	40	40	58	---	---	---	---
2	>90	>70	62	60	64	>70	56	>70	53	---	---	---
3	>90	>70	>70	>70	69	>70	>70	>70	>70	>70	---	---
4	>90	>70	>70	>70	>70	>70	>70	>70	>70	>70	>70	---
5	>90	>70	>70	>70	>70	>70	>70	>70	>70	>70	>70	>70
6	---	---	>70	>70	>70	>70	>70	>70	>70	>70	>70	>70
7	---	---	---	>70	>70	>70	>70	>70	>70	>70	>70	>70
8	---	---	---	---	>70	>70	>70	>70	>70	>70	>70	>70
9	---	---	---	---	---	>70	>70	>70	>70	>70	>70	>70
10	---	---	---	---	---	---	>70	>70	>70	>70	>70	>70
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 4350 MHz; -14.00 dBm.
LO IN: 4380 MHz; +7.00 dBm
IF OUT: 30 MHz; -20.4 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	12	53	17	53	27	---	---	---	---	---
1	-	33	+0	47	60	42	40	61	---	---	---	---
2	75	72	52	51	55	>80	48	68	45	---	---	---
3	>90	58	>80	>80	48	77	>80	63	65	77	---	---
4	>90	>80	>80	>80	>80	76	>80	>80	67	>80	62	---
5	>90	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
6	---	---	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
7	---	---	---	>80	>80	>80	>80	>80	>80	>80	>80	>80
8	---	---	---	---	>80	>80	>80	>80	>80	>80	>80	>80
9	---	---	---	---	---	>80	>80	>80	>80	>80	>80	>80
10	---	---	---	---	---	---	>80	>80	>80	>80	>80	>80
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 4350 MHz; -4.00 dBm.
LO IN: 4380 MHz; +7.00 dBm
IF OUT: 30 MHz; -10.46 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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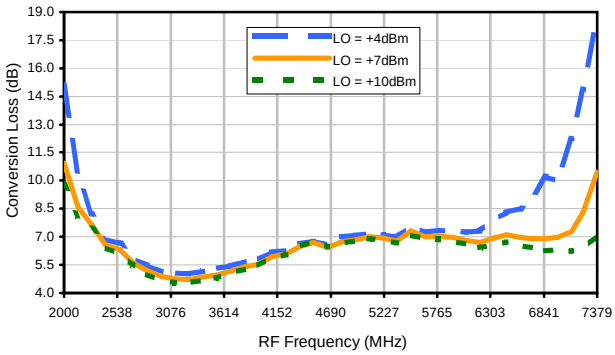
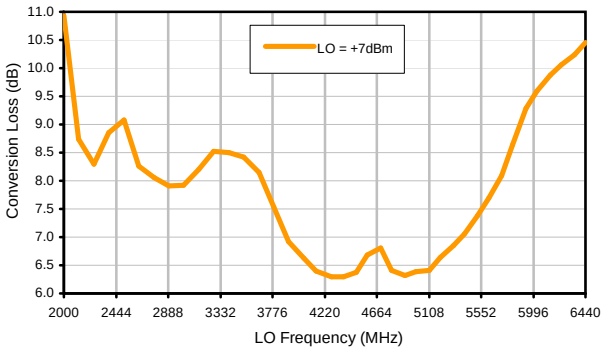
Typical Performance Curves

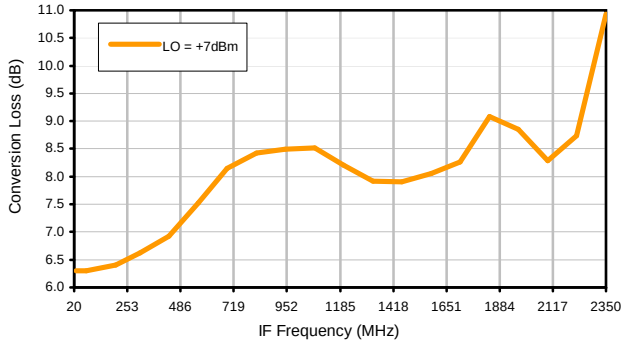
Conversion Loss @ IF=30MHz



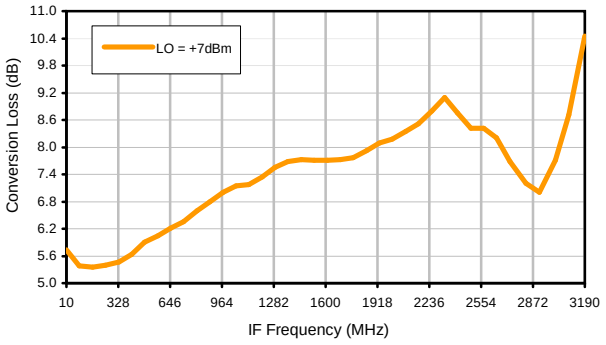
Conversion Loss vs. LO @ RF=4350MHz



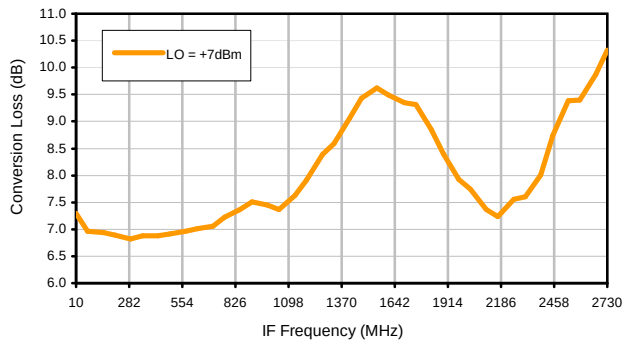
Conversion Loss vs. IF @ RF=4350MHz



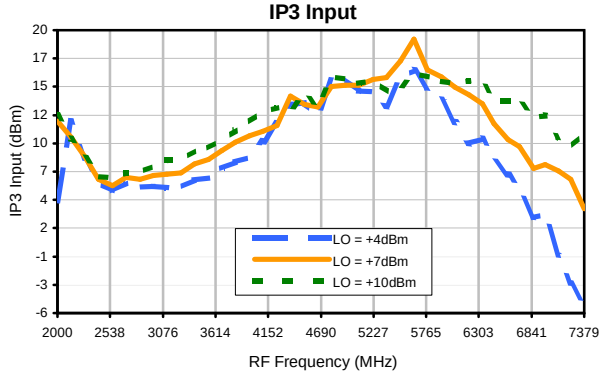
Conversion Loss vs. IF @ RF=2789.89MHz



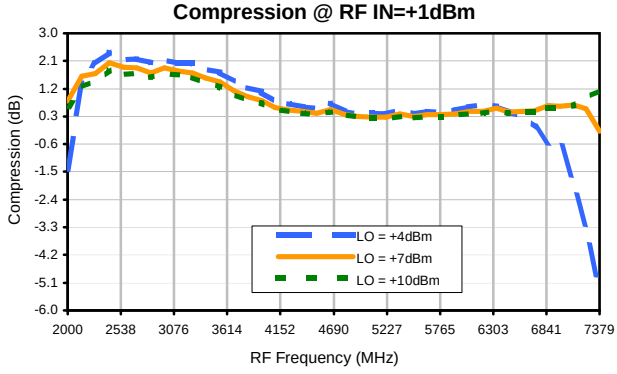
Conversion Loss vs. IF @ RF=5910.1MHz



IP3 Input



Compression @ RF IN=+1dBm



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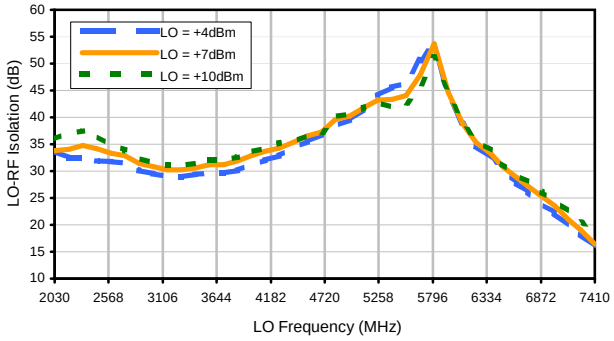
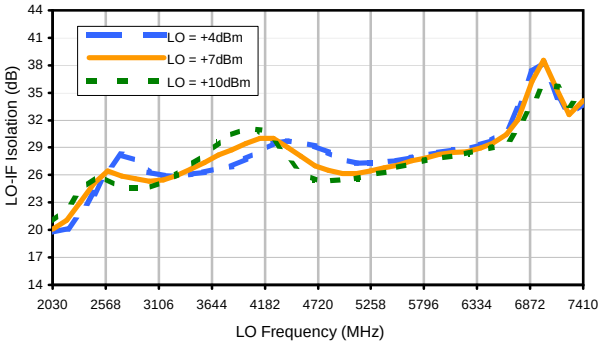
Typical Performance Curves

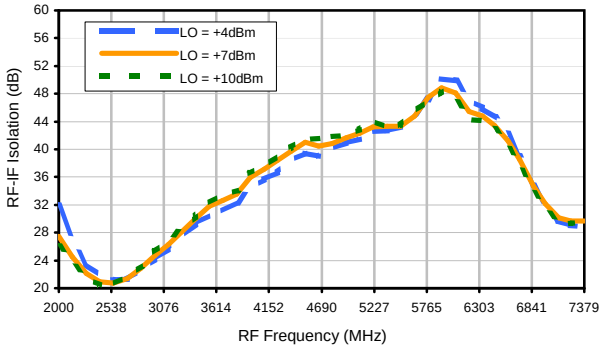
LO-RF Isolation



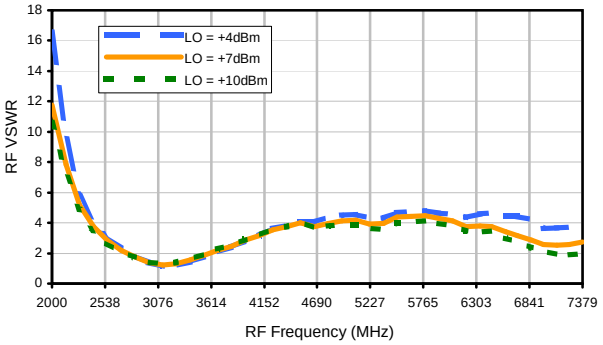
LO-IF Isolation



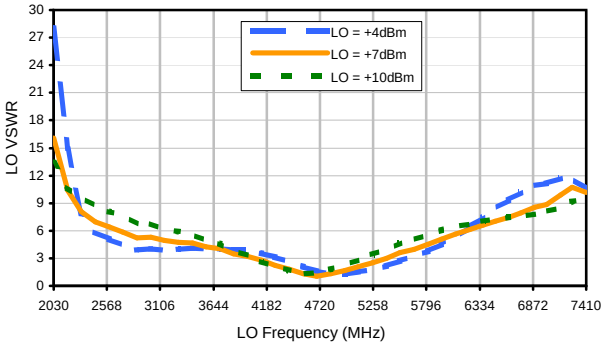
RF-IF Isolation



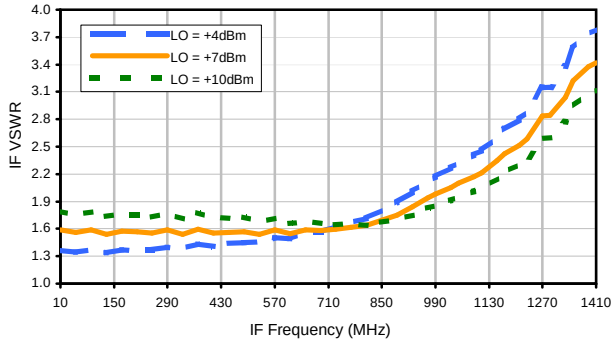
RF VSWR



LO VSWR



IF VSWR



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Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	2	43	7	42	14	---	---	---	---	---
1	-	33	+0	47	59	40	40	58	---	---	---	---
2	>90	>70	62	60	64	>70	56	>70	53	---	---	---
3	>90	>70	>70	>70	69	>70	>70	>70	>70	>70	---	---
4	>90	>70	>70	>70	>70	>70	>70	>70	>70	>70	>70	---
5	>90	>70	>70	>70	>70	>70	>70	>70	>70	>70	>70	>70
6	---	---	>70	>70	>70	>70	>70	>70	>70	>70	>70	>70
7	---	---	---	>70	>70	>70	>70	>70	>70	>70	>70	>70
8	---	---	---	---	>70	>70	>70	>70	>70	>70	>70	>70
9	---	---	---	---	---	>70	>70	>70	>70	>70	>70	>70
10	---	---	---	---	---	---	>70	>70	>70	>70	>70	>70
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 4350 MHz; -14.00 dBm.
LO IN: 4380 MHz; +7.00 dBm
IF OUT: 30 MHz; -20.4 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	12	53	17	53	27	---	---	---	---	---
1	-	33	+0	47	60	42	40	61	---	---	---	---
2	75	72	52	51	55	>80	48	68	45	---	---	---
3	>90	58	>80	>80	48	77	>80	63	65	77	---	---
4	>90	>80	>80	>80	>80	76	>80	>80	67	>80	62	---
5	>90	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
6	---	---	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
7	---	---	---	>80	>80	>80	>80	>80	>80	>80	>80	>80
8	---	---	---	---	>80	>80	>80	>80	>80	>80	>80	>80
9	---	---	---	---	---	>80	>80	>80	>80	>80	>80	>80
10	---	---	---	---	---	---	>80	>80	>80	>80	>80	>80
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 4350 MHz; -4.00 dBm.
LO IN: 4380 MHz; +7.00 dBm
IF OUT: 30 MHz; -10.46 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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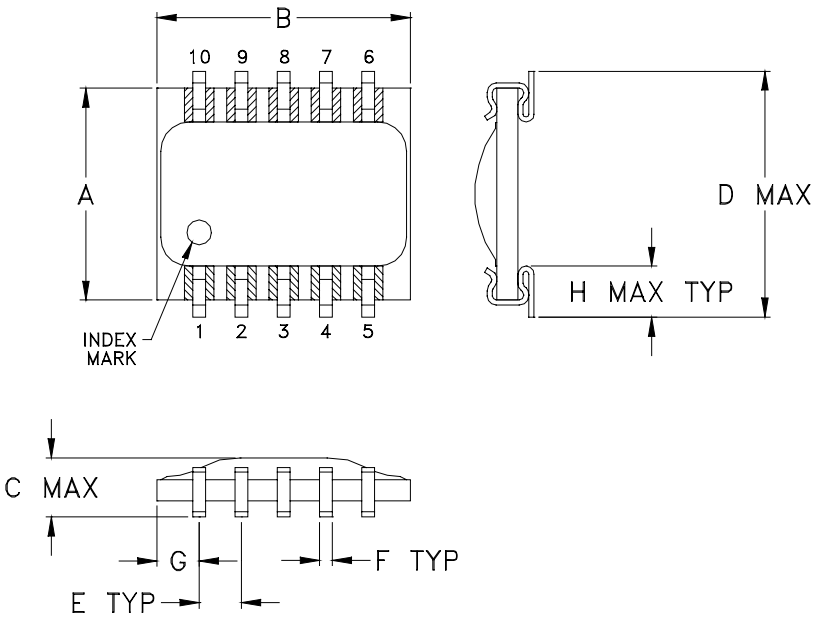
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see minicircuits.com

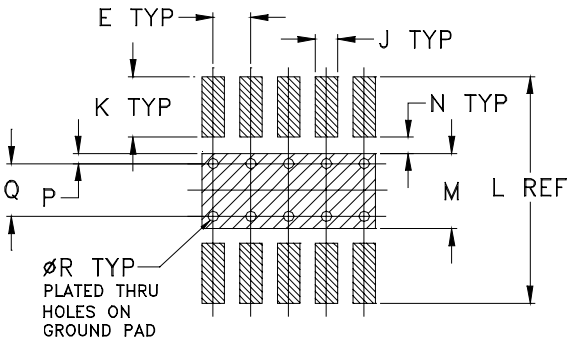
Case Style SM2

SM2

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

ADJACENT GROUND PINS SHALL BE CONNECTED TO EACH OTHER AND TO GROUND PAD

CASE #	A	B	C	D	E	F	G	H	J	K	L	M	N	P
SM2	.250 (6.35)	.300 (7.62)	.095 (2.41)	.290 (7.37)	.050 (1.27)	.015 (0.38)	.050 (1.27)	.060 (1.52)	.030 (0.76)	.080 (2.03)	.300 (7.62)	.100 (2.54)	.020 (0.51)	.015 (0.38)

CASE #	Q	R	WT. GRAM
SM2	.070 (1.78)	.014 (0.36)	.3

Dimensions are in inches (mm). Tolerances: ± .005

Notes:

1. Case material: Plastic encapsulation on Ceramic base.
2. Termination finish:
   For RoHS Case Styles: Tin plate over Nickel plate.
   For RoHS-5 Case Styles: Tin-Lead plate.

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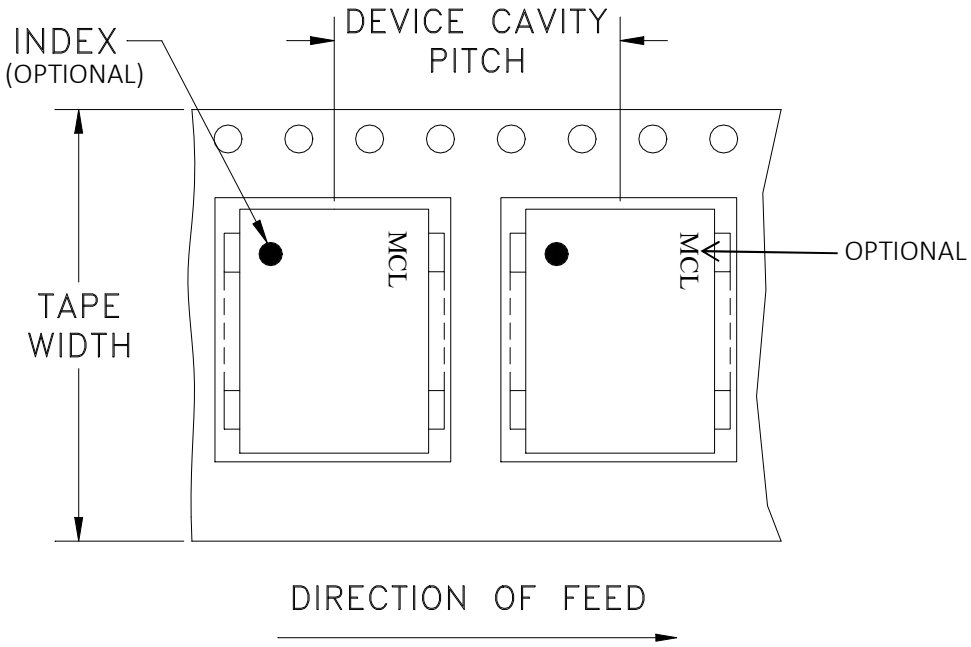
Tape & Reel Packaging TR-F34

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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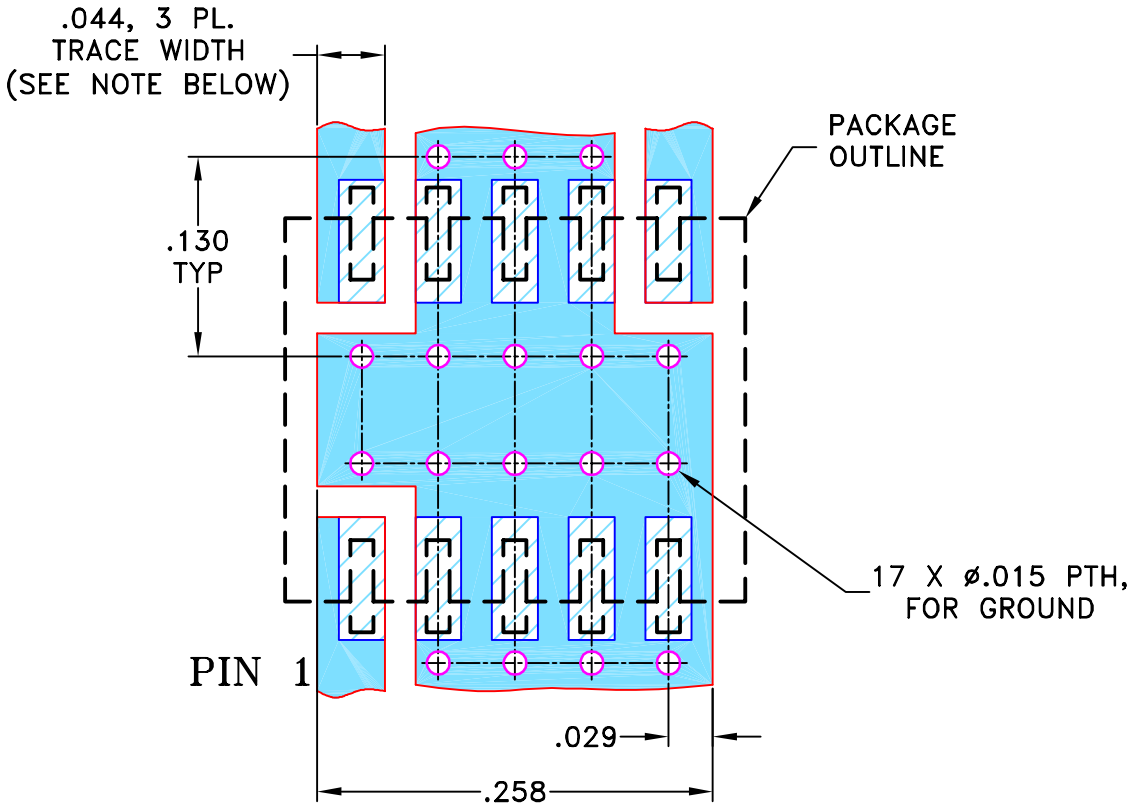
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M82272	NEW RELEASE	08/02/02	AV	DJ
A	M102713	UPDATED NOTES	01/14/06	GF	IL

SUGGESTED MOUNTING CONFIGURATION FOR SM2 CASE STYLE, "le" PIN CONNECTION



NOTES: 1.TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" ± 0.0015"; 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	AV	07/22/02
TOLERANCES ON:	CHECKED	WL	08/02/02
2 PL DECIMALS ±	APPROVED	DJ	08/02/02
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

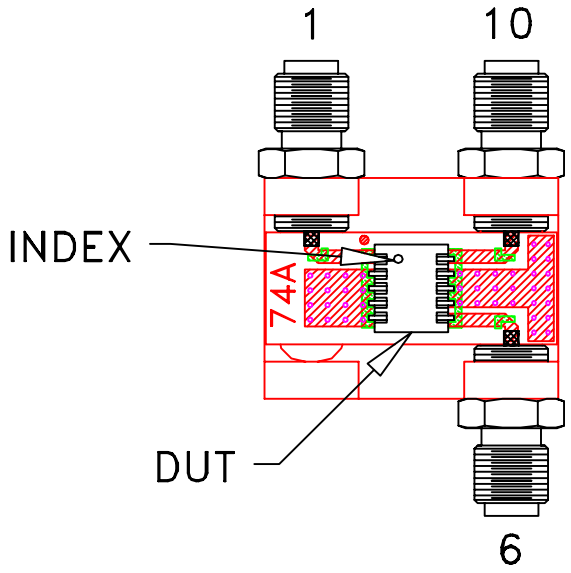
PL, le, SM2, MBA, TB-74

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-067	A

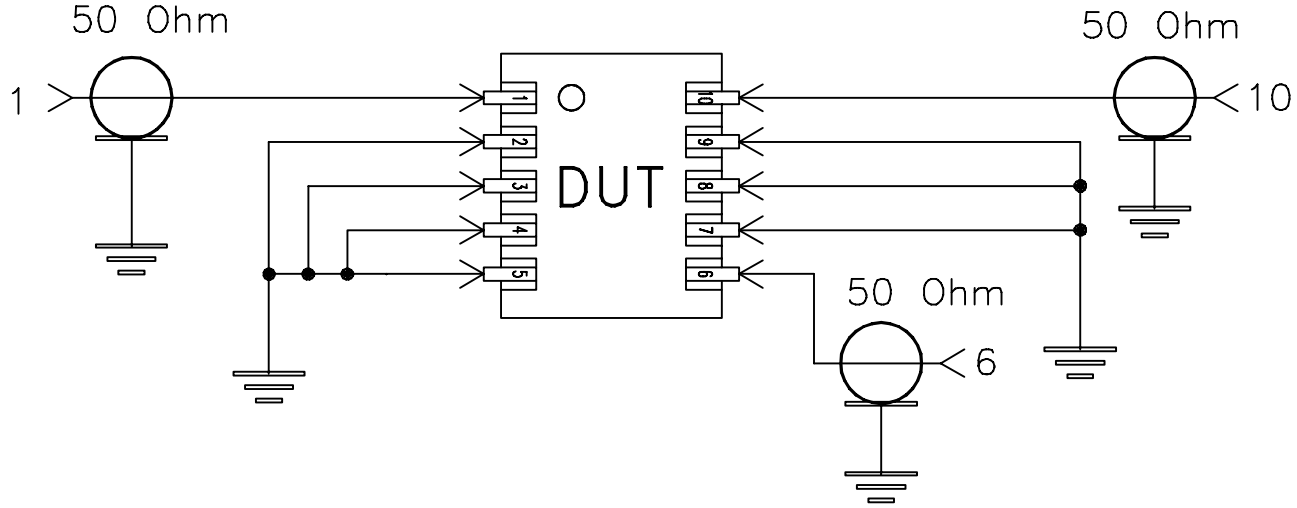
FILE:	SCALE:	SHEET:
98PL067	8:1	1 OF 1

Evaluation Board and Circuit

For Pin Connections refer to Data Sheet of the DUT



TB-74



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.020 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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