

Level 17 (LO Power +17 dBm) 400 to 2800 MHz

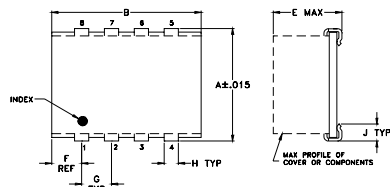
Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	200mW
IF Current	40mA
Permanent damage may occur if any of these limits are exceeded.	

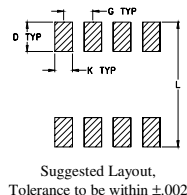
Pin Connections

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

Outline Drawing



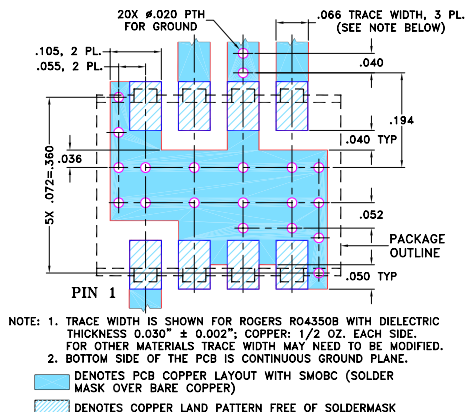
PCB Land Pattern



Outline Dimensions (inch)

A	B	C	D	E	F	G
.395	.500	--	.100	.230	.100	.100
10.03	12.70	--	2.54	5.84	2.54	2.54

H	J	K	L	wt
.047	.065	.065	.425	grams
1.19	1.65	1.65	10.80	0.80

Demo Board MCL P/N: TB-259
Suggested PCB Layout (PL-080)

Notes

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
 B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
 C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp

Features

- wide bandwidth, 400 to 2800 MHz
- good IP3, 23 dBm typ.
- high L-R isolation, 40 dB typ.

Applications

- cellular
- satellite distribution
- PCS, DCS, UMTS
- MMDS



CASE STYLE: BJ293

Electrical Specifications

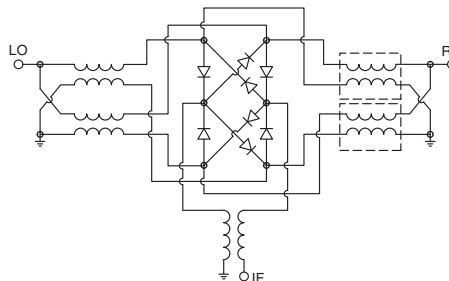
FREQUENCY (MHz)	CONVERSION LOSS (dB)	LO-RF ISOLATION (dB)		LO-IF ISOLATION (dB)		IP3 at center band (dBm)
LO/RF $f_L - f_U$	Mid-Band m $\bar{X}$ σ Max. Total Range Max.	Typ. Min.		Typ. Min.		Typ.
400-2800 4-700	6.3 .20 8.0 9.0	40 25		30 15		23

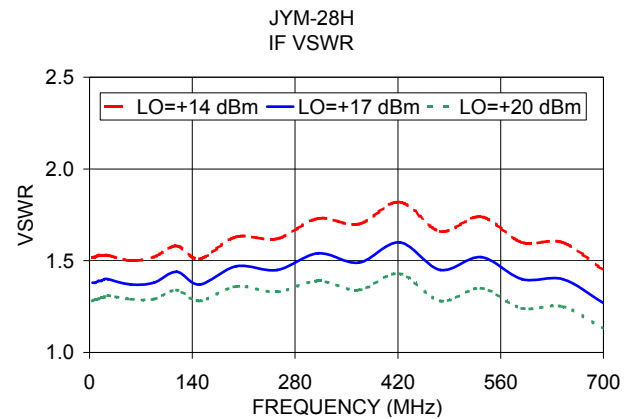
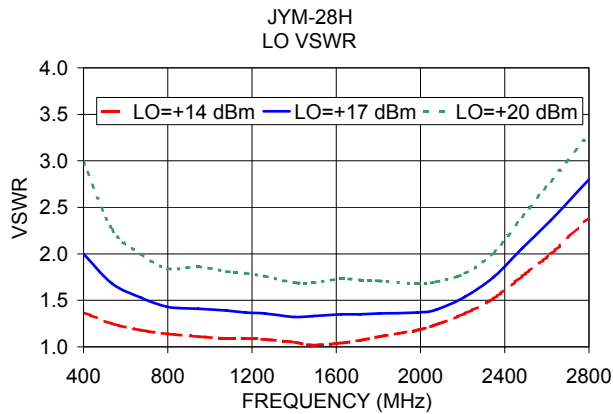
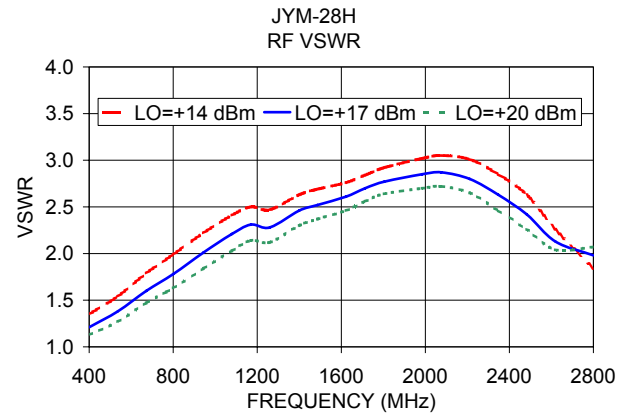
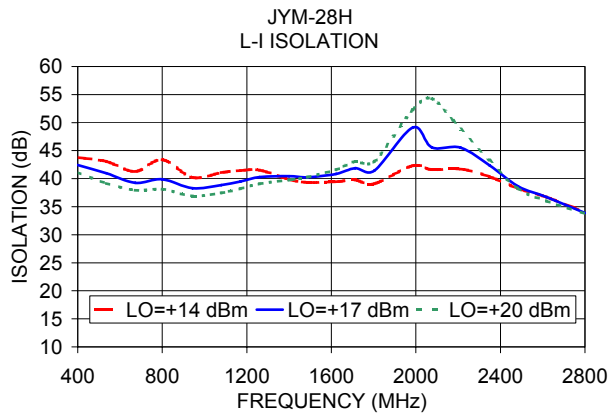
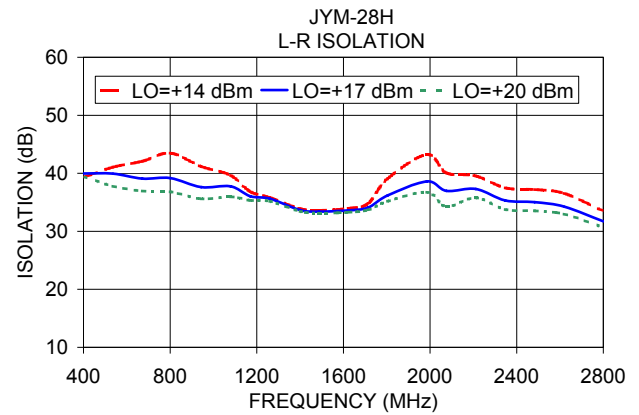
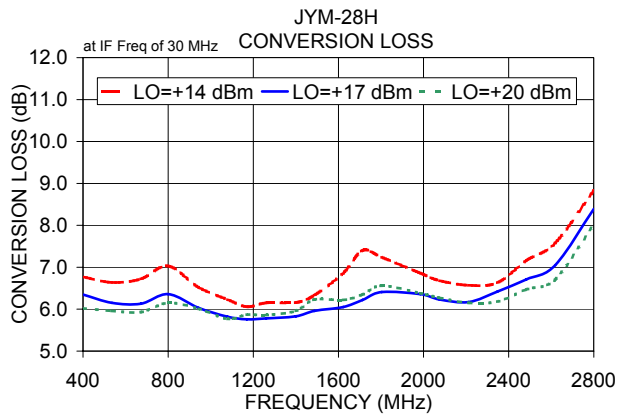
1 dB COMP.: +10 dBm typ.
 m=mid band [$2f_L$ to $f_U/2$]

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 +17dBm	LO +17dBm	LO +17dBm	LO +17dBm	LO +17dBm
400.00	430.00	6.35	39.96	42.42	1.21	2.00
535.85	565.85	6.15	39.94	40.97	1.38	1.68
671.70	701.70	6.13	39.08	39.25	1.60	1.53
800.00	830.00	6.36	39.17	39.90	1.78	1.43
943.40	973.40	6.03	37.63	38.28	2.01	1.41
1079.25	1109.25	5.82	37.76	38.87	2.21	1.39
1169.81	1199.81	5.76	36.05	39.48	2.31	1.37
1260.38	1290.38	5.78	35.62	40.30	2.28	1.36
1400.00	1430.00	5.83	33.66	40.46	2.46	1.32
1486.79	1516.79	5.96	33.40	40.25	2.52	1.33
1622.64	1592.64	6.05	33.61	40.84	2.61	1.35
1713.21	1683.21	6.22	34.09	41.86	2.70	1.35
1803.77	1773.77	6.41	36.18	41.43	2.77	1.36
1984.91	1954.91	6.36	38.60	49.09	2.85	1.37
2075.47	2045.47	6.23	36.96	45.57	2.87	1.40
2211.32	2181.32	6.17	37.30	45.52	2.80	1.54
2347.17	2317.17	6.42	35.31	42.38	2.63	1.75
2483.02	2453.02	6.71	35.03	38.65	2.42	2.06
2618.87	2588.87	7.05	34.27	36.72	2.13	2.36
2800.00	2770.00	8.39	31.73	33.90	1.98	2.80

Electrical Schematic





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Frequency Mixer

JYM-28H

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)		
		@LO (dBm)		
		+14	+17	+20
10.1	40.1	6.32	6.00	6.00
90.9	120.9	6.12	5.88	5.77
171.7	201.7	6.25	5.98	5.83
252.5	282.5	6.39	6.08	5.88
333.2	363.2	6.48	6.07	5.88
414.0	444.0	6.60	6.12	5.90
494.8	524.8	6.65	6.16	5.96
575.6	605.6	6.50	6.11	5.95
656.4	686.4	6.53	6.15	5.99
737.2	767.2	6.66	6.24	6.02
817.9	847.9	6.60	6.27	6.10
898.7	928.7	6.44	6.18	6.07
979.5	1009.5	6.28	6.08	5.98
1060.3	1090.3	6.17	5.98	5.90
1141.1	1171.1	6.07	5.91	5.84
1221.9	1251.9	6.08	5.87	5.80
1302.6	1332.6	6.08	5.89	5.81
1383.4	1413.4	6.07	5.88	5.82
1464.2	1494.2	6.10	5.91	5.85
1545.0	1575.0	6.19	6.02	5.96
1625.8	1655.8	6.27	6.07	6.02
1706.6	1736.6	6.42	6.18	6.10
1787.4	1817.4	6.43	6.16	6.10
1868.1	1898.1	6.43	6.17	6.13
1948.9	1978.9	6.37	6.15	6.15
2029.7	2059.7	6.45	6.22	6.19
2110.5	2140.5	6.50	6.28	6.26
2191.3	2221.3	6.62	6.35	6.30
2272.1	2302.1	6.76	6.40	6.34
2352.8	2382.8	6.88	6.55	6.47
2433.6	2463.6	7.04	6.70	6.61
2514.4	2544.4	7.21	6.89	6.77
2595.2	2625.2	7.40	7.11	7.01
2676.0	2706.0	7.66	7.43	7.35
2756.8	2786.8	7.99	7.82	7.76
2817.4	2847.4	8.31	8.15	8.09
2898.1	2928.1	8.84	8.70	8.68
2958.7	2988.7	9.27	9.14	9.17
3039.5	3069.5	9.94	9.83	9.89
3100.1	3130.1	10.43	10.32	10.37

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+14	+17	+20
10.1	40.1	26.37	23.95	23.39
90.9	120.9	21.05	19.80	20.48
171.7	201.7	17.64	18.69	21.74
252.5	282.5	17.10	20.68	26.05
333.2	363.2	18.71	23.89	25.46
414.0	444.0	19.04	23.22	23.20
494.8	524.8	19.39	22.93	23.77
575.6	605.6	19.76	20.48	21.30
656.4	686.4	18.33	20.43	21.90
737.2	767.2	18.32	20.32	21.51
817.9	847.9	16.96	18.40	19.95
898.7	928.7	16.42	17.74	19.07
979.5	1009.5	16.83	18.48	20.21
1060.3	1090.3	17.27	18.93	20.15
1141.1	1171.1	17.49	18.67	19.42
1221.9	1251.9	17.61	18.45	19.56
1302.6	1332.6	18.40	19.00	20.10
1383.4	1413.4	18.76	20.20	21.32
1464.2	1494.2	20.92	21.52	22.32
1545.0	1575.0	20.48	21.21	21.99
1625.8	1655.8	21.92	22.81	20.94
1706.6	1736.6	19.51	20.09	17.44
1787.4	1817.4	15.62	15.54	14.71
1868.1	1898.1	13.79	14.35	14.96
1948.9	1978.9	14.27	15.34	15.85
2029.7	2059.7	14.89	15.98	16.75
2110.5	2140.5	17.30	18.28	18.07
2191.3	2221.3	18.12	19.56	19.84
2272.1	2302.1	18.63	19.36	20.02
2352.8	2382.8	17.68	18.26	19.22
2433.6	2463.6	16.56	17.77	18.87
2514.4	2544.4	16.15	17.57	18.44
2595.2	2625.2	15.87	17.85	18.81
2676.0	2706.0	15.70	17.42	18.49
2756.8	2786.8	15.47	16.90	17.77
2817.4	2847.4	15.22	16.62	17.73
2898.1	2928.1	15.02	16.27	17.39
2958.7	2988.7	15.43	16.96	18.00
3039.5	3069.5	15.62	16.74	17.65
3100.1	3130.1	15.82	17.07	18.29

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+10dBm (dB)		
		@LO (dBm)		
		+14	+17	+20
10.1	40.1	0.30	0.19	0.14
90.9	120.9	0.42	0.26	0.16
171.7	201.7	0.41	0.26	0.18
252.5	282.5	0.41	0.29	0.22
333.2	363.2	0.44	0.43	0.34
414.0	444.0	0.61	0.56	0.44
494.8	524.8	0.66	0.61	0.48
575.6	605.6	0.92	0.76	0.58
656.4	686.4	0.99	0.82	0.64
737.2	767.2	0.98	0.85	0.69
817.9	847.9	1.03	0.87	0.72
898.7	928.7	1.14	0.96	0.81
979.5	1009.5	1.09	0.91	0.79
1060.3	1090.3	1.06	0.91	0.78
1141.1	1171.1	1.00	0.89	0.77
1221.9	1251.9	0.90	0.80	0.71
1302.6	1332.6	0.81	0.72	0.64
1383.4	1413.4	0.75	0.65	0.59
1464.2	1494.2	0.71	0.63	0.59
1545.0	1575.0	0.67	0.58	0.55
1625.8	1655.8	0.71	0.58	0.53
1706.6	1736.6	0.73	0.62	0.56
1787.4	1817.4	0.83	0.69	0.62
1868.1	1898.1	0.97	0.76	0.63
1948.9	1978.9	1.13	0.84	0.67
2029.7	2059.7	1.20	0.92	0.77
2110.5	2140.5	1.09	0.87	0.75
2191.3	2221.3	0.99	0.78	0.69
2272.1	2302.1	0.90	0.76	0.68
2352.8	2382.8	0.87	0.73	0.65
2433.6	2463.6	0.79	0.66	0.58
2514.4	2544.4	0.73	0.62	0.54
2595.2	2625.2	0.74	0.59	0.49
2676.0	2706.0	0.74	0.59	0.47
2756.8	2786.8	0.70	0.54	0.46
2817.4	2847.4	0.63	0.48	0.41
2898.1	2928.1	0.57	0.41	0.34
2958.7	2988.7	0.56	0.43	0.34
3039.5	3069.5	0.49	0.43	0.36
3100.1	3130.1	0.43	0.39	0.36

REV. X2

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Frequency Mixer

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Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1400.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=400.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=2800.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+17			+17			+17
600.0	800.1	6.00	10.0	410.1	6.09	700.0	2100.1	7.61
584.9	815.2	5.98	27.7	427.8	6.11	682.3	2117.8	7.59
569.7	830.4	5.98	45.4	445.5	6.09	664.6	2135.5	7.54
554.6	845.5	5.92	63.1	463.2	6.17	646.9	2153.2	7.53
539.5	860.6	5.93	80.8	480.9	6.13	629.2	2170.9	7.50
524.4	875.7	5.86	98.5	498.6	6.13	611.5	2188.6	7.51
509.2	890.9	5.85	116.2	516.3	6.09	593.8	2206.3	7.52
494.1	906.0	5.81	133.8	533.9	6.14	576.2	2223.9	7.59
479.0	921.1	5.80	151.5	551.6	6.18	558.5	2241.6	7.61
463.8	936.3	5.80	169.2	569.3	6.22	540.8	2259.3	7.62
448.7	951.4	5.76	186.9	587.0	6.19	523.1	2277.0	7.62
433.6	966.5	5.78	204.6	604.7	6.18	505.4	2294.7	7.60
418.5	981.6	5.73	222.3	622.4	6.15	487.7	2312.4	7.57
403.3	996.8	5.73	240.0	640.1	6.19	470.0	2330.1	7.54
388.2	1011.9	5.70	257.7	657.8	6.24	452.3	2347.8	7.54
373.1	1027.0	5.74	275.4	675.5	6.27	434.6	2365.5	7.48
357.9	1042.2	5.73	293.1	693.2	6.26	416.9	2383.2	7.44
342.8	1057.3	5.72	310.8	710.9	6.26	399.2	2400.9	7.41
327.7	1072.4	5.74	328.5	728.6	6.31	381.5	2418.6	7.45
312.6	1087.5	5.72	346.2	746.3	6.34	363.8	2436.3	7.41
297.4	1102.7	5.76	363.8	763.9	6.44	346.2	2453.9	7.39
282.3	1117.8	5.74	381.5	781.6	6.48	328.5	2471.6	7.38
267.2	1132.9	5.79	399.2	799.3	6.53	310.8	2489.3	7.37
252.1	1148.0	5.77	416.9	817.0	6.50	293.1	2507.0	7.34
236.9	1163.2	5.80	434.6	834.7	6.61	275.4	2524.7	7.37
221.8	1178.3	5.81	452.3	852.4	6.55	257.7	2542.4	7.39
206.7	1193.4	5.84	470.0	870.1	6.62	240.0	2560.1	7.40
191.5	1208.6	5.88	487.7	887.8	6.53	222.3	2577.8	7.41
176.4	1223.7	5.86	505.4	905.5	6.58	204.6	2595.5	7.43
161.3	1238.8	5.89	523.1	923.2	6.53	186.9	2613.2	7.46
146.2	1253.9	5.84	540.8	940.9	6.62	169.2	2630.9	7.49
131.0	1269.1	5.87	558.5	958.6	6.62	151.5	2648.6	7.53
115.9	1284.2	5.83	576.2	976.3	6.70	133.8	2666.3	7.53
100.8	1299.3	5.83	593.8	993.9	6.66	116.2	2683.9	7.57
85.6	1314.5	5.84	611.5	1011.6	6.69	98.5	2701.6	7.60
70.5	1329.6	5.84	629.2	1029.3	6.67	80.8	2719.3	7.68
55.4	1344.7	5.87	646.9	1047.0	6.72	63.1	2737.0	7.73
40.3	1359.8	5.86	664.6	1064.7	6.73	45.4	2754.7	7.81
25.1	1375.0	5.91	682.3	1082.4	6.76	27.7	2772.4	7.90
10.0	1390.1	5.91	700.0	1100.1	6.77	10.0	2790.1	7.95

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Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+14	+17	+20	+14	+17	+20
10.1	25.69	28.40	31.12	44.09	47.03	49.67
90.9	36.56	40.06	43.87	44.37	47.06	48.53
171.7	39.21	42.83	45.82	44.50	45.54	44.85
252.5	40.28	42.88	44.38	43.79	42.95	41.83
333.2	40.18	42.03	42.57	43.04	41.18	40.09
414.0	39.85	41.31	41.09	42.21	39.81	38.71
494.8	39.92	40.95	40.32	41.47	38.94	37.66
575.6	41.57	41.43	39.94	40.60	38.65	37.51
656.4	42.74	41.89	39.94	41.32	38.66	37.39
737.2	43.15	41.86	40.06	40.69	38.26	36.83
817.9	45.09	42.12	39.80	41.28	38.87	37.31
898.7	45.55	41.70	39.73	42.15	39.35	37.82
979.5	43.59	40.52	38.95	45.38	41.05	38.89
1060.3	42.79	40.14	39.32	48.67	42.48	39.65
1141.1	51.29	45.27	42.17	48.88	43.21	40.57
1221.9	56.60	49.94	44.54	55.36	46.50	42.65
1302.6	52.23	47.16	43.36	50.35	53.60	46.96
1383.4	43.51	41.16	39.82	44.52	51.84	49.29
1464.2	41.28	39.36	38.18	41.98	47.13	52.47
1545.0	39.37	37.95	36.96	41.26	47.02	53.78
1625.8	39.09	37.64	36.61	40.57	45.79	55.07
1706.6	39.18	37.37	36.10	41.19	45.15	49.89
1787.4	40.14	37.81	36.16	41.01	43.53	45.76
1868.1	44.80	41.75	39.18	40.02	41.09	42.50
1948.9	46.70	45.80	42.99	40.22	41.53	42.24
2029.7	49.20	50.52	49.66	40.04	41.68	41.56
2110.5	51.67	52.52	57.19	40.36	41.05	40.36
2191.3	51.91	56.66	60.31	39.03	38.56	37.78
2272.1	53.40	56.69	57.60	38.15	36.74	35.49
2352.8	48.78	48.64	49.86	37.15	36.11	34.76
2433.6	47.39	49.13	50.23	35.40	33.96	33.07
2514.4	45.94	48.97	50.35	34.33	32.65	31.51
2595.2	44.91	45.46	45.71	33.78	32.18	30.69
2676.0	43.46	42.91	41.53	32.58	31.39	30.20
2756.8	42.73	42.13	39.98	31.59	30.50	29.42
2817.4	41.30	41.09	38.85	31.22	29.75	28.65
2898.1	38.64	37.39	35.79	31.18	29.98	28.76
2958.7	37.41	35.63	33.92	30.72	29.64	28.82
3039.5	35.46	33.41	31.22	30.59	29.91	29.00
3100.1	34.36	31.73	29.42	30.36	30.00	29.41

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+14	+17	+20
10.1	40.1	33.98	33.80	35.32
90.9	120.9	33.99	34.35	34.75
171.7	201.7	33.57	33.83	33.76
252.5	282.5	33.53	33.75	33.83
333.2	363.2	33.24	33.28	33.69
414.0	444.0	33.02	33.03	33.42
494.8	524.8	33.11	33.27	33.32
575.6	605.6	33.49	33.53	33.55
656.4	686.4	33.63	33.69	34.06
737.2	767.2	35.73	36.06	35.98
817.9	847.9	37.43	37.04	36.69
898.7	928.7	37.38	36.78	36.04
979.5	1009.5	36.38	35.38	34.85
1060.3	1090.3	35.79	35.02	34.51
1141.1	1171.1	34.71	34.20	33.75
1221.9	1251.9	34.10	33.30	32.92
1302.6	1332.6	35.32	34.37	33.72
1383.4	1413.4	37.98	36.70	35.51
1464.2	1494.2	39.97	39.87	39.17
1545.0	1575.0	42.86	43.53	44.59
1625.8	1655.8	48.66	56.34	50.58
1706.6	1736.6	41.79	45.38	42.85
1787.4	1817.4	36.14	39.39	40.20
1868.1	1898.1	34.05	36.87	39.60
1948.9	1978.9	35.38	37.08	38.45
2029.7	2059.7	32.86	34.81	38.59
2110.5	2140.5	31.44	31.56	33.25
2191.3	2221.3	30.35	30.33	30.69
2272.1	2302.1	29.24	29.14	29.23
2352.8	2382.8	28.01	28.06	28.21
2433.6	2463.6	27.10	26.92	26.96
2514.4	2544.4	26.22	25.82	25.64
2595.2	2625.2	25.77	25.19	24.84
2676.0	2706.0	25.43	25.16	24.99
2756.8	2786.8	24.93	25.01	24.91
2817.4	2847.4	24.04	24.33	24.49
2898.1	2928.1	23.37	23.56	23.89
2958.7	2988.7	23.13	23.31	23.56
3039.5	3069.5	22.69	22.93	23.13
3100.1	3130.1	22.34	22.63	23.06

Frequency Mixer

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Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)		
		@LO (dBm)		
		+14	+17	+20
10.1	40.1	1.66	1.65	1.65
90.9	120.9	1.20	1.17	1.17
171.7	201.7	1.25	1.20	1.18
252.5	282.5	1.30	1.24	1.20
333.2	363.2	1.36	1.28	1.23
414.0	444.0	1.43	1.33	1.26
494.8	524.8	1.46	1.34	1.27
575.6	605.6	1.47	1.36	1.28
656.4	686.4	1.50	1.38	1.31
737.2	767.2	1.52	1.41	1.34
817.9	847.9	1.52	1.43	1.37
898.7	928.7	1.50	1.42	1.36
979.5	1009.5	1.46	1.40	1.36
1060.3	1090.3	1.43	1.37	1.34
1141.1	1171.1	1.37	1.32	1.31
1221.9	1251.9	1.33	1.29	1.28
1302.6	1332.6	1.29	1.25	1.24
1383.4	1413.4	1.23	1.21	1.20
1464.2	1494.2	1.20	1.17	1.16
1545.0	1575.0	1.15	1.12	1.13
1625.8	1655.8	1.12	1.09	1.10
1706.6	1736.6	1.15	1.10	1.09
1787.4	1817.4	1.19	1.12	1.10
1868.1	1898.1	1.23	1.15	1.12
1948.9	1978.9	1.21	1.13	1.12
2029.7	2059.7	1.20	1.14	1.11
2110.5	2140.5	1.18	1.10	1.10
2191.3	2221.3	1.22	1.11	1.06
2272.1	2302.1	1.25	1.11	1.04
2352.8	2382.8	1.26	1.12	1.03
2433.6	2463.6	1.26	1.13	1.07
2514.4	2544.4	1.22	1.14	1.13
2595.2	2625.2	1.19	1.18	1.21
2676.0	2706.0	1.23	1.27	1.33
2756.8	2786.8	1.32	1.40	1.47
2817.4	2847.4	1.42	1.51	1.59
2898.1	2928.1	1.59	1.71	1.80
2958.7	2988.7	1.75	1.89	1.99
3039.5	3069.5	2.00	2.12	2.23
3100.1	3130.1	2.22	2.33	2.44

LO (MHz)	LO VSWR (:1)		
	@LO (dBm)		
	+14	+17	+20
10.1	1.93	2.60	3.56
90.9	1.73	2.48	3.43
171.7	1.74	2.51	3.45
252.5	1.76	2.55	3.50
333.2	1.77	2.53	3.47
414.0	1.74	2.47	3.37
494.8	1.69	2.39	3.23
575.6	1.65	2.32	3.13
656.4	1.65	2.29	3.06
737.2	1.63	2.25	3.00
817.9	1.58	2.19	2.92
898.7	1.56	2.13	2.83
979.5	1.52	2.07	2.73
1060.3	1.51	2.02	2.65
1141.1	1.50	1.97	2.57
1221.9	1.50	1.92	2.48
1302.6	1.49	1.87	2.40
1383.4	1.49	1.82	2.33
1464.2	1.48	1.79	2.27
1545.0	1.46	1.73	2.20
1625.8	1.45	1.66	2.11
1706.6	1.46	1.64	2.05
1787.4	1.44	1.59	1.98
1868.1	1.41	1.54	1.92
1948.9	1.40	1.48	1.85
2029.7	1.40	1.45	1.80
2110.5	1.38	1.39	1.73
2191.3	1.34	1.30	1.63
2272.1	1.31	1.22	1.54
2352.8	1.27	1.17	1.50
2433.6	1.27	1.11	1.46
2514.4	1.31	1.12	1.44
2595.2	1.36	1.19	1.46
2676.0	1.41	1.29	1.52
2756.8	1.47	1.41	1.62
2817.4	1.53	1.50	1.71
2898.1	1.63	1.66	1.88
2958.7	1.72	1.78	2.01
3039.5	1.84	1.94	2.17
3100.1	1.95	2.07	2.30

IF (OUT) (MHz)	IF VSWR @LO=2800.1MHz (:1)		
	@LO (dBm)		
	+14	+17	+20
10.0	2.22	2.10	2.01
27.7	2.23	2.12	2.01
45.4	2.23	2.11	2.01
63.1	2.25	2.13	2.02
80.8	2.33	2.20	2.08
98.5	2.37	2.23	2.12
116.2	2.31	2.18	2.06
133.8	2.26	2.13	2.01
151.5	2.25	2.10	1.99
169.2	2.24	2.09	1.97
186.9	2.22	2.08	1.96
204.6	2.26	2.10	1.97
222.3	2.34	2.17	2.03
240.0	2.33	2.15	2.00
257.7	2.26	2.07	1.93
275.4	2.26	2.07	1.92
293.1	2.32	2.11	1.96
310.8	2.30	2.09	1.93
328.5	2.24	2.04	1.88
346.2	2.20	2.00	1.84
363.8	2.19	1.98	1.82
381.5	2.16	1.95	1.79
399.2	2.15	1.94	1.78
416.9	2.20	1.98	1.81
434.6	2.18	1.96	1.79
452.3	2.07	1.85	1.70
470.0	1.99	1.79	1.64
487.7	2.01	1.80	1.65
505.4	2.05	1.84	1.68
523.1	2.03	1.81	1.66
540.8	1.96	1.75	1.60
558.5	1.91	1.70	1.56
576.2	1.87	1.67	1.53
593.8	1.86	1.66	1.51
611.5	1.87	1.67	1.52
629.2	1.86	1.66	1.51
646.9	1.77	1.58	1.45
664.6	1.68	1.50	1.38
682.3	1.68	1.50	1.38
700.0	1.72	1.54	1.41

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Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	30	20	34	44	30	40	29	58	46	60
1	-	38	+0	40	16	41	28	55	29	38	45	60
2	>100	40	41	42	44	40	66	54	53	51	48	70
3	>100	55	43	49	39	62	40	69	55	66	48	53
4	>100	69	82	51	73	50	54	76	82	69	74	68
5	>100	77	74	73	50	62	56	56	60	68	75	76
6	>100	70	79	82	78	58	62	65	63	61	73	89
7	>100	75	77	89	80	83	68	74	67	68	76	87
8	>100	85	84	99	97	88	83	67	73	75	71	69
9	>100	97	>99	84	93	90	88	87	72	74	73	96
10	>100	>99	99	98	83	91	95	90	>99	75	86	74
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 1600.1 MHz; 5.00 dBm.
LO IN: 1630.01 MHz; +17.00 dBm
IF OUT: 29.91 MHz; -1.24 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	18	10	24	36	20	27	17	43	31	46
1	-	43	+0	38	15	40	27	52	27	37	43	53
2	>100	51	64	60	60	52	67	61	59	58	61	86
3	>100	74	65	72	66	71	65	78	72	84	65	70
4	>100	>89	>89	>89	>89	>89	88	87	>89	>89	>89	>89
5	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
6	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
7	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
8	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
9	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
10	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 1600.1 MHz; -5.00 dBm.
LO IN: 1630.01 MHz; +17.00 dBm
IF OUT: 29.91 MHz; -11.07 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.

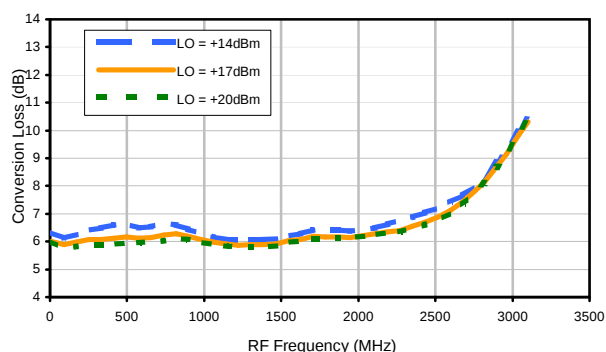
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Frequency Mixer

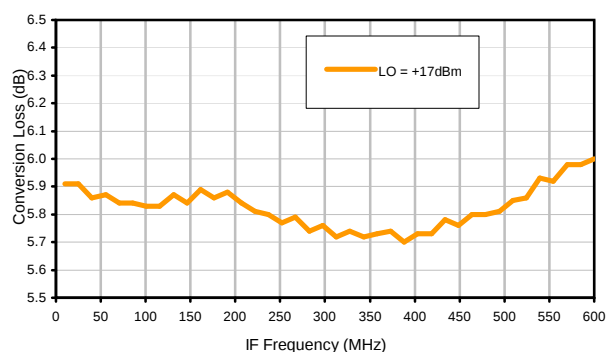
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Typical Performance Curves

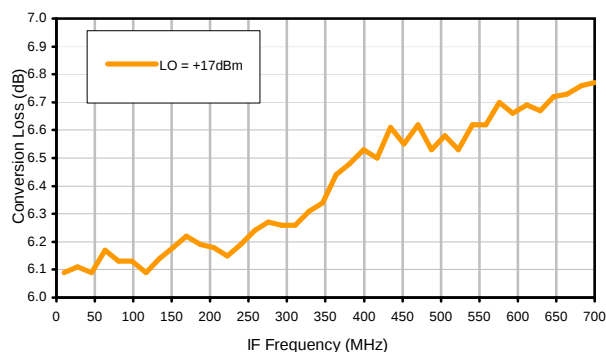
Conversion Loss @ IF=30MHz



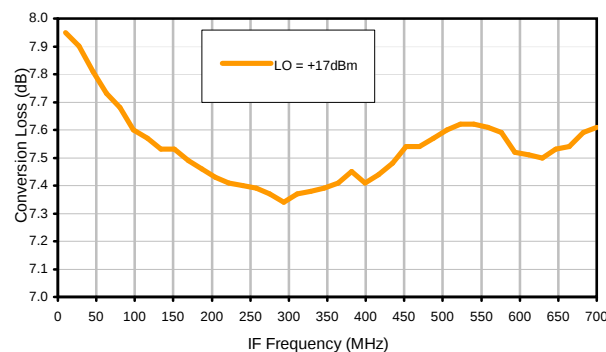
Conversion Loss vs. IF @ RF=1400.1MHz



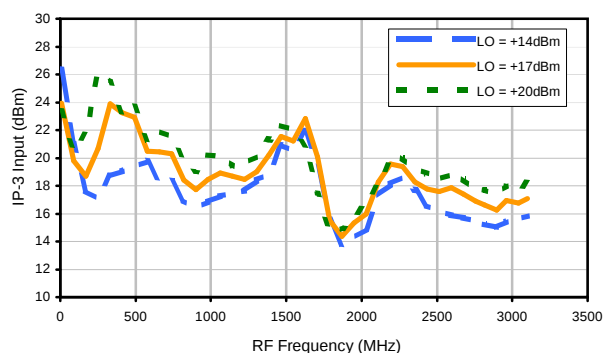
Conversion Loss vs. IF @ RF=400.1MHz



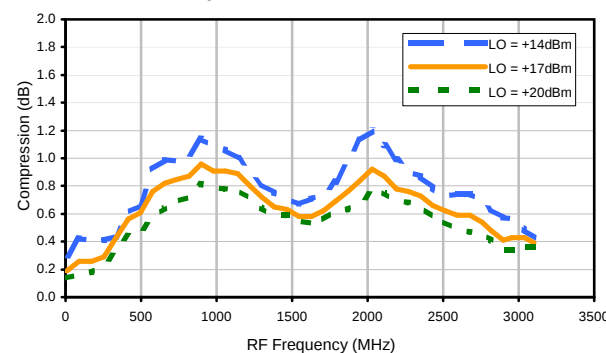
Conversion Loss vs. IF @ RF=2800.1MHz



IP3 Input



Compression @ RF IN=+10dBm



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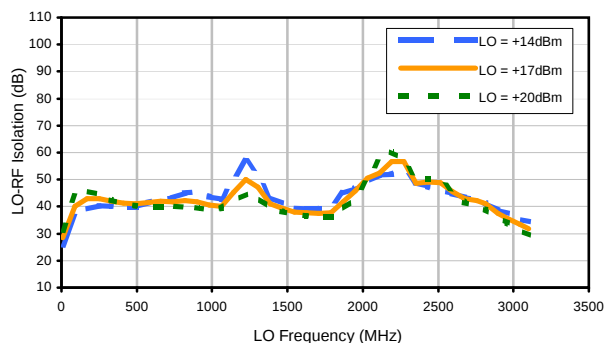


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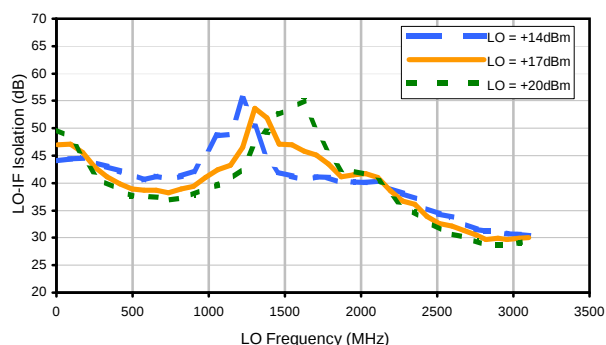


Typical Performance Curves

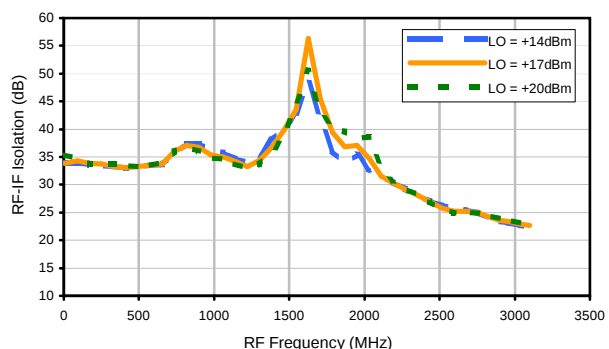
LO-RF Isolation



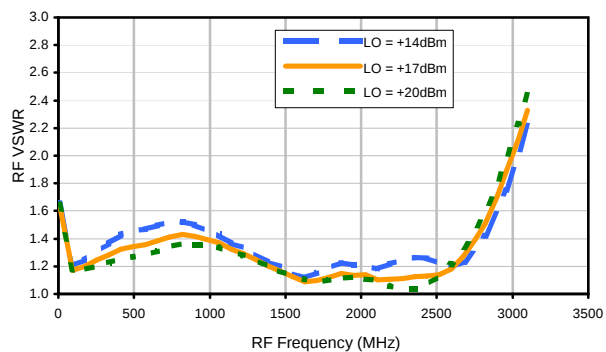
LO-IF Isolation



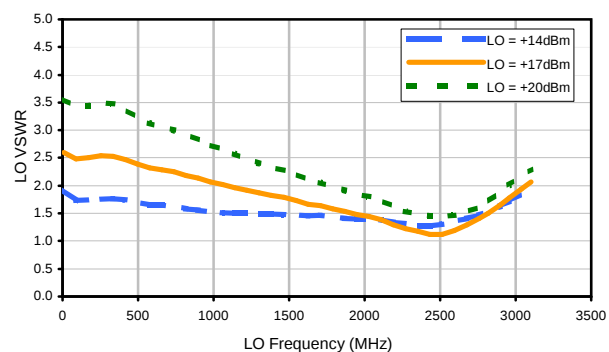
RF-IF Isolation



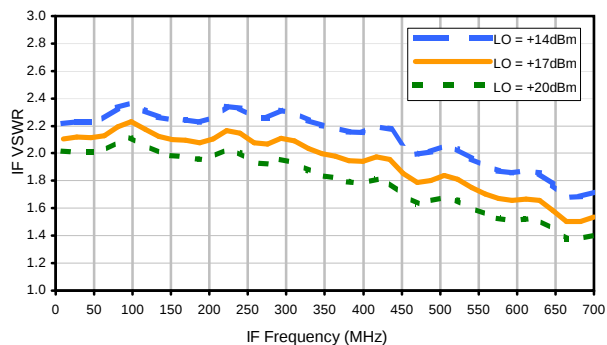
RF VSWR



LO VSWR



IF VSWR



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Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	30	20	34	44	30	40	29	58	46	60
1	-	38	+0	40	16	41	28	55	29	38	45	60
2	>100	40	41	42	44	40	66	54	53	51	48	70
3	>100	55	43	49	39	62	40	69	55	66	48	53
4	>100	69	82	51	73	50	54	76	82	69	74	68
5	>100	77	74	73	50	62	56	56	60	68	75	76
6	>100	70	79	82	78	58	62	65	63	61	73	89
7	>100	75	77	89	80	83	68	74	67	68	76	87
8	>100	85	84	99	97	88	83	67	73	75	71	69
9	>100	97	>99	84	93	90	88	87	72	74	73	96
10	>100	>99	99	98	83	91	95	90	>99	75	86	74
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 1600.1 MHz; 5.00 dBm.
LO IN: 1630.01 MHz; +17.00 dBm
IF OUT: 29.91 MHz; -1.24 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	18	10	24	36	20	27	17	43	31	46
1	-	43	+0	38	15	40	27	52	27	37	43	53
2	>100	51	64	60	60	52	67	61	59	58	61	86
3	>100	74	65	72	66	71	65	78	72	84	65	70
4	>100	>89	>89	>89	>89	>89	88	87	>89	>89	>89	>89
5	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
6	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
7	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
8	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
9	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
10	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 1600.1 MHz; -5.00 dBm.
LO IN: 1630.01 MHz; +17.00 dBm
IF OUT: 29.91 MHz; -11.07 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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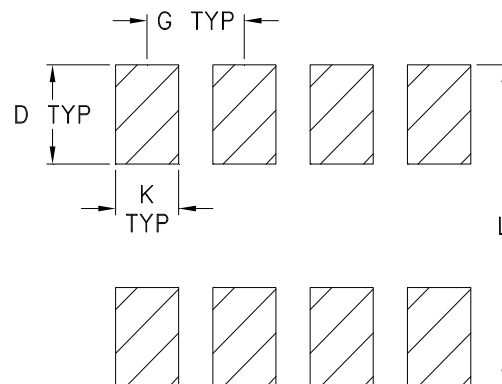
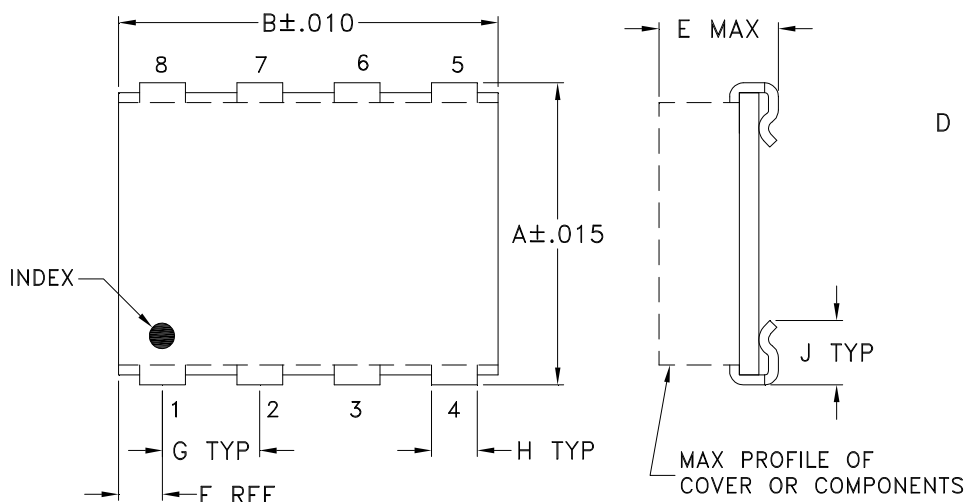


Outline Dimensions

BJ293

BJ398

PCB Land Pattern



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

CASE#	A	B	C	D	E	F	G	H	J	K	L	WT. GRAMS
BJ293	.395 (10.03)	.500 (12.70)	-- --	.100 (2.54)	.230 (5.84)	.100 (2.54)	.100 (2.54)	.047 (1.19)	.065 (1.65)	.065 (1.65)	.425 (10.80)	.80
BJ398	.305 (7.75)	.390 (9.91)	-- --	.100 (2.54)	.105 (2.67)	.045 (1.14)	.100 (2.54)	.047 (1.19)	.065 (1.65)	.065 (1.65)	.325 (8.26)	.20

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

Notes:

- Case material: Plastic.
- Base material: Printed wiring laminate.
- 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.



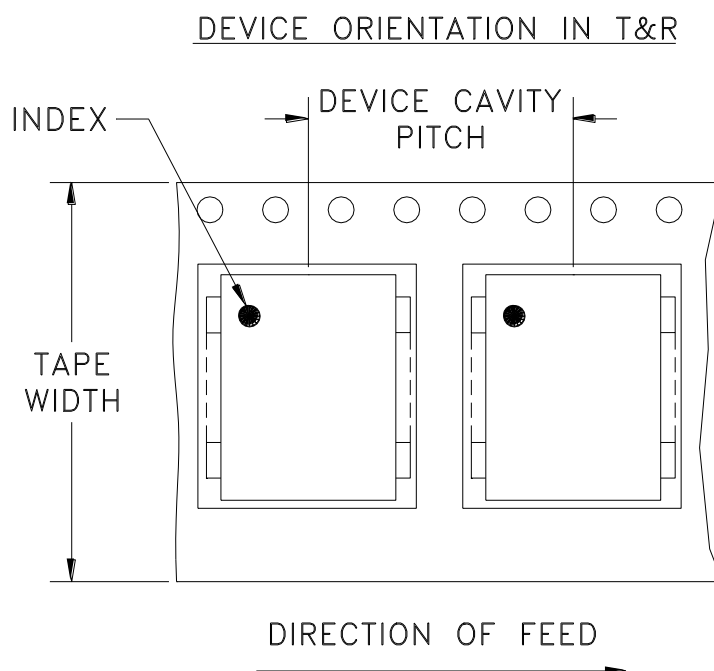
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Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
24	16	7	10,20,50,100,200
		13	500

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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REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M94649	NEW RELEASE	10/11/04	MMG	WL
A	M102713	ADDED "...WITH SMOBC"	01/14/06	GF	IL

20X $\varnothing$.020 PTH FOR GROUND

.066 TRACE WIDTH, 3 PL. (SEE NOTE BELOW)

.105, 2 PL.

.055, 2 PL.

.040

.194

.040 TYP

.036

.072 = .360

5X

.052

.050 TYP

PACKAGE OUTLINE

PIN 1

NOTE: 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS 0.030" $\pm$ 0.002"; 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 SOLDERMASK

UNLESS OTHERWISE SPECIFIED

INITIALS

DATE _____

DIMENSIONS ARE IN INCHES

DRAWN

MMG

10/04/04

TOLERANCES ON:

CLIQUE

AV

10/11/04

2 PL DECIMALS ±

CHECK	
-------	--

10/11/04

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

APPROV

WL

10/11/04

ANGLES $\pm$
FRACTIONS $\pm$

1

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

11

Mini-Circuits®

13 Neptune Avenue
Brooklyn NY 11235

PL, hp, BJ293, JYM, TB-259

SIZE
A

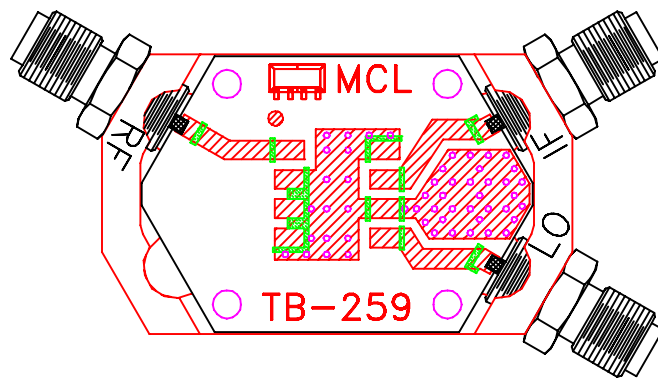
CODE IDENT
15542

DRAWING NO:
98-PL-080

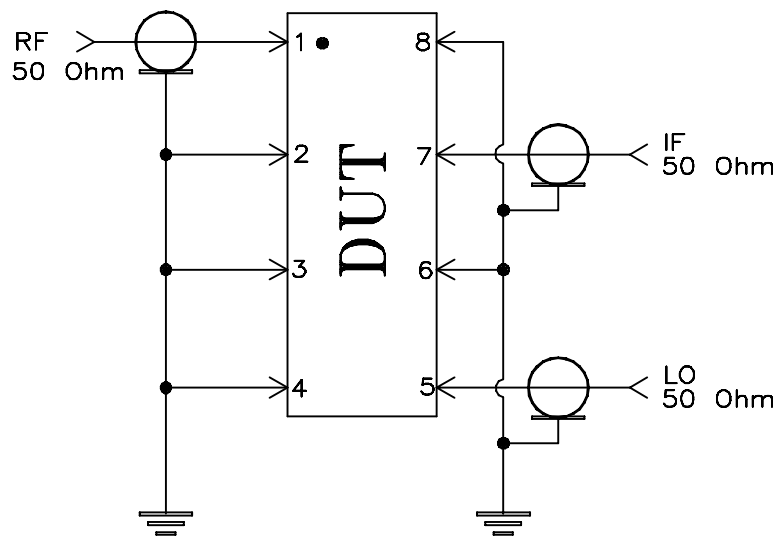
REV:	A
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FILE: 98PL080	SCALE: 8:1	SHEET: 1 OF 1
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Evaluation Board and Circuit



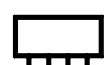
TB-259



Schematic Diagram

Notes:

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

 **Mini-Circuits®**



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, 95% Coverage
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215