

# Frequency Mixer

# SYM-11LH

## Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)			RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)			RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+5dBm (dB)		
		@LO (dBm)					@LO (dBm)					@LO (dBm)		
		+7	+10	+13			+7	+10	+13			+7	+10	+13
1.0	31.0	6.90	6.50	6.30	10.1	40.1	19.90	19.98	18.83	10.1	40.1	1.55	1.19	0.97
5.0	35.0	6.80	6.40	6.30	90.4	120.4	13.35	12.71	13.38	90.4	120.4	1.45	1.15	0.94
10.0	40.0	6.70	6.30	6.20	170.7	200.7	10.56	11.57	13.75	170.7	200.7	1.49	1.21	1.02
90.4	120.4	6.16	5.91	5.75	250.9	280.9	10.03	12.19	15.28	250.9	280.9	1.63	1.39	1.22
170.7	200.7	6.39	6.09	5.90	331.2	361.2	10.55	13.79	18.72	331.2	361.2	1.72	1.55	1.38
250.9	280.9	6.66	6.31	6.02	411.5	441.5	11.14	14.21	18.23	411.5	441.5	1.71	1.62	1.49
331.2	361.2	6.94	6.48	6.14	491.8	521.8	12.94	14.88	15.62	491.8	521.8	1.78	1.64	1.44
411.5	441.5	7.29	6.69	6.26	572.0	602.0	12.37	14.71	15.62	572.0	602.0	1.75	1.72	1.52
491.8	521.8	7.47	6.83	6.41	652.3	682.3	10.47	13.17	15.26	652.3	682.3	1.24	1.43	1.37
572.0	602.0	7.72	6.90	6.46	732.6	762.6	10.02	11.87	14.05	732.6	762.6	0.97	1.07	1.07
652.3	682.3	8.27	7.33	6.76	812.9	842.9	10.62	12.62	14.47	812.9	842.9	1.00	0.93	0.86
732.6	762.6	8.63	7.81	7.21	893.1	923.1	11.71	13.01	14.34	893.2	923.2	1.25	1.00	0.84
893.1	923.1	8.28	7.81	7.50	973.4	1003.4	13.22	14.24	15.24	973.4	1003.4	1.28	0.99	0.80
973.4	1003.4	7.96	7.61	7.38	1053.7	1083.7	14.07	15.04	15.78	1053.7	1083.7	1.02	0.80	0.65
1053.7	1083.7	7.87	7.51	7.33	1134.0	1164.0	14.91	15.21	16.33	1134.0	1164.0	0.82	0.63	0.52
1134.0	1164.0	7.84	7.51	7.32	1214.2	1244.2	13.68	16.18	16.46	1214.3	1244.3	0.67	0.50	0.41
1214.2	1244.2	7.85	7.48	7.31	1294.5	1324.5	12.86	15.33	16.56	1294.5	1324.5	0.62	0.40	0.35
1294.5	1324.5	7.88	7.49	7.31	1354.7	1384.7	13.18	15.23	16.95	1354.8	1384.8	0.57	0.35	0.30
1354.7	1384.7	7.92	7.52	7.36	1435.0	1465.0	13.54	14.55	18.05	1435.0	1465.0	0.58	0.34	0.28
1435.0	1465.0	8.03	7.52	7.35	1495.2	1525.2	15.21	15.25	16.92	1495.2	1525.2	0.58	0.34	0.25
1495.2	1525.2	8.12	7.53	7.34	1575.5	1605.5	15.59	16.16	17.16	1575.5	1605.5	0.60	0.34	0.25
1575.5	1605.5	8.20	7.56	7.37	1635.7	1665.7	16.33	17.48	18.37	1635.7	1665.7	0.53	0.35	0.28
1635.7	1665.7	8.29	7.61	7.39	1715.9	1745.9	17.87	18.90	20.01	1716.0	1746.0	0.52	0.31	0.28
1715.9	1745.9	8.41	7.71	7.46	1776.2	1806.2	20.72	19.89	20.39	1776.2	1806.2	0.48	0.33	0.27
1776.2	1806.2	8.66	7.83	7.53	1856.4	1886.4	20.99	18.30	18.62	1856.5	1886.5	0.40	0.30	0.24
1856.4	1886.4	8.75	7.85	7.54	1916.6	1946.6	20.81	18.08	17.18	1916.7	1946.7	0.42	0.29	0.25
1916.6	1946.6	8.87	7.86	7.53	1996.9	2026.9	17.23	17.67	17.20	1997.0	2027.0	0.26	0.29	0.27
1996.9	2026.9	9.03	7.93	7.58	2057.1	2087.1	15.80	17.02	17.03	2057.2	2087.2	0.25	0.27	0.24
2057.1	2087.1	9.15	8.06	7.68	2137.4	2167.4	14.42	15.19	16.25	2137.5	2167.5	0.22	0.23	0.22
2137.4	2167.4	9.18	8.10	7.74	2197.6	2227.6	13.41	14.79	15.78	2197.7	2227.7	0.19	0.22	0.20
2197.6	2227.6	9.25	8.13	7.79	2277.9	2307.9	12.95	14.77	16.25	2277.9	2307.9	0.30	0.26	0.22
2277.9	2307.9	9.30	8.20	7.86	2338.1	2368.1	12.03	14.35	15.86	2338.2	2368.2	0.28	0.25	0.18
2338.1	2368.1	9.26	8.27	7.99	2418.4	2448.4	11.97	14.27	15.92	2418.4	2448.4	0.29	0.23	0.21
2418.4	2448.4	9.36	8.44	8.10	2478.6	2508.6	12.44	14.32	16.56	2478.6	2508.6	0.33	0.24	0.20
2478.6	2508.6	9.55	8.66	8.36	2558.8	2588.8	12.93	14.87	16.09	2558.9	2588.9	0.30	0.22	0.17
2558.8	2588.8	9.62	8.85	8.57	2619.0	2649.0	13.31	14.95	16.52	2619.1	2649.1	0.22	0.19	0.17
2619.0	2649.0	9.92	9.18	8.91	2699.3	2729.3	14.65	14.40	17.27	2699.4	2729.4	0.19	0.20	0.18
2699.3	2729.3	10.19	9.56	9.25	2759.5	2789.5	18.09	15.54	18.75	2759.6	2789.6	0.19	0.16	0.16
2759.5	2789.5	10.55	10.02	9.71	2839.8	2869.8	20.25	17.41	18.39	2839.9	2869.9	0.19	0.17	0.14
2839.8	2869.8	10.82	10.36	10.10	2900.0	2930.0	22.64	18.19	19.36	2900.1	2930.1	0.19	0.14	0.10
2900.0	2930.0													

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## Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1000.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=10.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=2000.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+10			+10			+10
600.0	400.1	8.26	10.0	20.1	5.71	600.0	1400.1	8.44
584.9	415.2	8.25	25.1	35.2	5.51	584.9	1415.2	8.43
569.7	430.4	8.19	40.3	50.4	5.56	569.7	1430.4	8.38
554.6	445.5	8.18	55.4	65.5	5.58	554.6	1445.5	8.32
539.5	460.6	8.19	70.5	80.6	5.62	539.5	1460.6	8.31
524.4	475.7	8.16	85.6	95.7	5.61	524.4	1475.7	8.31
509.2	490.9	8.19	100.8	110.9	5.60	509.2	1490.9	8.29
494.1	506.0	8.08	115.9	126.0	5.59	494.1	1506.0	8.30
479.0	521.1	8.12	131.0	141.1	5.55	479.0	1521.1	8.30
463.8	536.3	8.08	146.2	156.3	5.58	463.8	1536.3	8.27
448.7	551.4	8.09	161.3	171.4	5.56	448.7	1551.4	8.22
433.6	566.5	8.10	176.4	186.5	5.57	433.6	1566.5	8.22
418.5	581.6	8.16	191.5	201.6	5.54	418.5	1581.6	8.25
403.3	596.8	8.16	206.7	216.8	5.54	403.3	1596.8	8.25
388.2	611.9	8.17	221.8	231.9	5.52	388.2	1611.9	8.22
373.1	627.0	8.18	236.9	247.0	5.51	373.1	1627.0	8.17
357.9	642.2	8.18	252.1	262.2	5.53	357.9	1642.2	8.15
342.8	657.3	8.11	267.2	277.3	5.52	342.8	1657.3	8.15
327.7	672.4	8.16	282.3	292.4	5.54	327.7	1672.4	8.13
312.6	687.5	8.15	297.4	307.5	5.51	312.6	1687.5	8.09
297.4	702.7	8.11	312.6	322.7	5.53	297.4	1702.7	8.08
282.3	717.8	8.10	327.7	337.8	5.52	282.3	1717.8	8.05
267.2	732.9	8.10	342.8	352.9	5.53	267.2	1732.9	8.01
252.1	748.0	8.18	357.9	368.0	5.53	252.1	1748.0	7.98
236.9	763.2	8.16	373.1	383.2	5.53	236.9	1763.2	7.97
221.8	778.3	8.02	388.2	398.3	5.57	221.8	1778.3	7.97
206.7	793.4	8.00	403.3	413.4	5.55	206.7	1793.4	7.97
191.5	808.6	8.03	418.5	428.6	5.60	191.5	1808.6	7.96
176.4	823.7	8.01	433.6	443.7	5.57	176.4	1823.7	7.94
161.3	838.8	7.96	448.7	458.8	5.59	161.3	1838.8	7.91
146.2	853.9	7.91	463.8	473.9	5.60	146.2	1853.9	7.88
131.0	869.1	7.86	479.0	489.1	5.64	131.0	1869.1	7.88
115.9	884.2	7.80	494.1	504.2	5.64	115.9	1884.2	7.88
100.8	899.3	7.86	509.2	519.3	5.66	100.8	1899.3	7.90
85.6	914.5	7.77	524.4	534.5	5.69	85.6	1914.5	7.84
70.5	929.6	7.75	539.5	549.6	5.70	70.5	1929.6	7.84
55.4	944.7	7.67	554.6	564.7	5.76	55.4	1944.7	7.82
40.3	959.8	7.64	569.7	579.8	5.80	40.3	1959.8	7.84
25.1	975.0	7.67	584.9	595.0	5.87	25.1	1975.0	7.81
10.0	990.1	7.57	600.0	610.1	5.89	10.0	1990.1	8.02

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## Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+7	+10	+13	+7	+10	+13
1.0	58.40	61.00	64.00	58.50	60.60	61.40
5.0	58.20	60.80	63.60	58.50	60.00	61.00
10.0	58.18	60.77	63.32	58.45	59.99	60.87
90.4	62.13	65.98	68.16	58.31	55.20	53.31
170.7	57.13	63.00	71.88	50.72	48.82	47.30
250.9	53.49	58.79	66.85	44.66	43.79	42.78
331.2	50.26	55.00	60.26	40.20	40.10	39.33
411.5	47.64	51.68	56.00	37.18	37.43	37.02
491.8	45.47	48.96	51.99	34.68	35.09	34.93
572.0	43.68	47.02	49.91	32.65	33.27	33.20
652.3	42.48	45.46	48.38	30.79	31.73	31.94
732.6	41.58	43.96	46.10	29.45	30.22	30.60
893.2	40.12	42.12	43.52	28.31	29.02	29.03
973.4	39.44	41.64	43.11	27.69	28.23	28.24
1053.7	38.47	40.81	42.56	26.90	27.45	27.65
1134.0	37.47	39.78	41.71	25.86	26.42	26.73
1214.3	36.91	39.20	41.16	24.69	25.40	25.82
1294.5	36.70	39.12	41.35	23.74	24.58	25.07
1354.8	36.47	39.05	41.54	22.96	23.91	24.45
1435.0	35.83	38.30	40.88	22.14	23.00	23.52
1495.2	35.53	37.87	40.29	21.54	22.33	22.79
1575.5	34.96	37.13	39.57	20.91	21.42	21.78
1635.7	34.20	36.29	38.58	20.42	20.89	21.18
1716.0	33.41	35.29	37.36	21.67	22.04	22.20
1776.2	33.80	35.69	37.79	25.77	25.80	25.62
1856.5	34.67	36.88	39.54	34.42	33.36	32.38
1997.0	35.44	38.24	41.76	50.05	45.46	40.99
2057.2	35.66	38.61	42.06	44.46	43.39	40.56
2137.5	35.76	38.73	41.58	41.59	41.13	39.42
2197.7	35.63	38.63	40.55	40.32	39.98	38.99
2277.9	35.64	38.57	39.13	38.55	38.49	38.35
2338.2	35.47	37.93	37.74	37.21	37.50	37.72
2418.4	35.01	37.05	35.89	35.89	36.52	37.46
2478.6	34.49	36.39	35.11	34.98	35.62	36.91
2558.9	33.59	35.03	34.26	34.05	35.22	36.66
2619.1	32.98	34.10	33.62	33.46	35.22	37.42
2699.4	32.11	33.19	32.83	32.88	34.91	38.27
2759.6	31.26	32.15	32.36	32.78	34.95	38.36
2839.9	30.48	30.99	31.22	32.90	35.61	40.21
2900.1	29.91	30.44	30.79	33.14	36.15	41.06

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+7	+10	+13
10.1	40.1	21.29	21.40	21.81
90.4	120.4	21.94	22.23	22.34
170.7	200.7	22.57	22.80	23.09
250.9	280.9	23.47	23.78	24.20
331.2	361.2	24.48	25.08	25.67
411.5	441.5	25.96	26.69	27.32
491.8	521.8	28.19	29.22	29.91
572.0	602.0	30.54	31.96	33.31
652.3	682.3	32.96	34.27	35.42
732.6	762.6	36.57	37.03	37.35
812.9	842.9	37.49	37.09	36.95
893.2	923.2	33.95	33.20	32.77
973.4	1003.4	30.82	30.13	29.71
1053.7	1083.7	28.62	28.02	27.65
1134.0	1164.0	27.06	26.44	26.13
1214.3	1244.3	26.14	25.43	25.10
1294.5	1324.5	25.61	25.14	24.81
1354.8	1384.8	25.29	25.01	24.77
1435.0	1465.0	24.48	24.53	24.51
1495.2	1525.2	23.74	24.00	24.08
1575.5	1605.5	23.32	23.63	23.86
1635.7	1665.7	23.47	23.91	24.21
1716.0	1746.0	23.87	24.35	24.83
1776.2	1806.2	22.78	23.31	23.73
1856.5	1886.5	21.69	22.24	22.61
1916.7	1946.7	21.56	22.09	22.45
1997.0	2027.0	21.71	22.11	22.40
2057.2	2087.2	21.94	22.19	22.33
2137.5	2167.5	22.00	21.86	21.70
2197.7	2227.7	21.66	21.16	20.85
2277.9	2307.9	20.68	19.84	19.41
2338.2	2368.2	19.49	18.64	18.18
2418.4	2448.4	17.58	16.91	16.58
2478.6	2508.6	16.43	15.82	15.55
2558.9	2588.9	14.96	14.53	14.31
2619.1	2649.1	14.02	13.71	13.61
2699.4	2729.4	13.06	12.85	12.81
2759.6	2789.6	12.54	12.38	12.34
2839.9	2869.9	11.97	11.93	11.93
2900.1	2930.1	11.79	11.81	11.85

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## Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)		
		@LO (dBm)		
		+7	+10	+13
1.0	31.0	1.80	1.69	1.59
5.0	35.0	2.04	1.91	1.78
10.0	40.0	2.06	1.92	1.78
90.4	120.4	1.17	1.08	1.03
170.7	200.7	1.27	1.19	1.15
250.9	280.9	1.47	1.40	1.35
331.2	361.2	1.76	1.67	1.61
411.5	441.5	2.13	2.00	1.90
491.8	521.8	2.54	2.37	2.25
572.0	602.0	2.99	2.73	2.56
652.3	682.3	3.45	3.13	2.89
732.6	762.6	3.71	3.43	3.20
812.9	842.9	3.72	3.48	3.31
893.2	923.2	3.75	3.58	3.44
973.4	1003.4	3.58	3.45	3.35
1053.7	1083.7	3.38	3.26	3.17
1134.0	1164.0	3.20	3.07	2.99
1214.3	1244.3	3.06	2.92	2.82
1294.5	1324.5	2.92	2.75	2.65
1354.8	1384.8	2.80	2.62	2.52
1435.0	1465.0	2.66	2.42	2.31
1495.2	1525.2	2.57	2.31	2.17
1575.5	1605.5	2.45	2.17	2.02
1635.7	1665.7	2.35	2.09	1.93
1716.0	1746.0	2.23	1.97	1.81
1776.2	1806.2	2.17	1.90	1.74
1856.5	1886.5	2.08	1.81	1.65
1916.7	1946.7	2.00	1.74	1.59
1997.0	2027.0	1.94	1.68	1.53
2057.2	2087.2	1.89	1.63	1.49
2137.5	2167.5	1.77	1.54	1.41
2197.7	2227.7	1.68	1.46	1.35
2277.9	2307.9	1.60	1.39	1.28
2338.2	2368.2	1.55	1.36	1.25
2418.4	2448.4	1.44	1.29	1.20
2478.6	2508.6	1.37	1.24	1.17
2558.9	2588.9	1.29	1.20	1.18
2619.1	2649.1	1.26	1.20	1.19
2699.4	2729.4	1.24	1.21	1.22
2759.6	2789.6	1.22	1.22	1.24
2839.9	2869.9	1.21	1.24	1.27
2900.1	2930.1	1.23	1.27	1.31

LO (MHz)	LO VSWR (:1)		
	@LO (dBm)		
	+7	+10	+13
1.0	1.51	2.23	3.16
5.0	1.50	2.25	3.16
10.0	1.45	2.23	3.21
90.4	1.71	2.50	3.52
170.7	1.73	2.51	3.49
250.9	1.79	2.55	3.52
331.2	1.83	2.54	3.47
411.5	1.86	2.52	3.39
491.8	1.89	2.48	3.29
572.0	1.94	2.48	3.22
652.3	1.99	2.49	3.20
732.6	1.98	2.45	3.13
812.9	1.94	2.36	3.00
893.2	1.92	2.29	2.88
973.4	1.96	2.25	2.80
1053.7	2.08	2.27	2.74
1134.0	2.20	2.28	2.69
1214.3	2.31	2.27	2.60
1294.5	2.41	2.27	2.53
1354.8	2.50	2.29	2.50
1435.0	2.57	2.28	2.43
1495.2	2.60	2.27	2.38
1575.5	2.63	2.26	2.33
1635.7	2.66	2.25	2.31
1716.0	2.61	2.19	2.22
1776.2	2.54	2.10	2.12
1856.5	2.53	2.05	2.02
1916.7	2.54	2.01	1.95
1997.0	2.53	1.95	1.84
2057.2	2.50	1.91	1.77
2137.5	2.48	1.84	1.68
2197.7	2.47	1.80	1.58
2277.9	2.41	1.74	1.48
2338.2	2.35	1.69	1.42
2418.4	2.29	1.62	1.32
2478.6	2.25	1.58	1.26
2558.9	2.15	1.52	1.20
2619.1	2.07	1.46	1.14
2699.4	1.94	1.39	1.06
2759.6	1.83	1.33	1.02
2839.9	1.68	1.24	1.04
2900.1	1.60	1.19	1.08

IF (OUT) (MHz)	IF VSWR @LO=2000.1MHz (:1)		
	@LO (dBm)		
	+7	+10	+13
1.0	1.26	1.31	1.42
5.0	1.16	1.10	1.24
10.0	1.15	1.06	1.22
24.9	1.13	1.42	1.66
39.6	1.11	1.44	1.66
54.4	1.12	1.47	1.71
69.1	1.11	1.46	1.70
83.9	1.08	1.43	1.67
98.6	1.09	1.43	1.67
113.4	1.12	1.43	1.67
128.1	1.12	1.42	1.66
142.9	1.17	1.47	1.70
157.6	1.20	1.54	1.78
172.4	1.21	1.56	1.81
187.1	1.18	1.51	1.76
201.9	1.16	1.47	1.70
216.6	1.18	1.48	1.72
231.4	1.25	1.54	1.78
246.1	1.28	1.59	1.83
260.9	1.29	1.62	1.86
275.6	1.26	1.58	1.81
290.4	1.26	1.57	1.81
305.1	1.26	1.55	1.79
319.9	1.29	1.57	1.81
334.6	1.30	1.59	1.82
349.4	1.31	1.61	1.84
364.1	1.33	1.65	1.89
378.9	1.32	1.64	1.88
393.6	1.30	1.61	1.84
408.4	1.29	1.59	1.83
423.1	1.31	1.61	1.85
437.9	1.35	1.65	1.90
452.6	1.38	1.69	1.93
467.4	1.38	1.70	1.94
482.1	1.35	1.68	1.92
496.9	1.34	1.67	1.90
511.6	1.36	1.67	1.92
526.4	1.37	1.69	1.94
541.1	1.39	1.71	1.96
555.9	1.41	1.74	2.00
585.4	1.39	1.72	1.96
600.1	1.37	1.69	1.93

## Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	10	33	27	36	35	53	54	74	56	59
1	-	22	+0	34	33	37	26	42	59	65	56	66
2	80	71	43	51	42	60	45	56	53	60	61	68
3	>100	50	65	64	39	54	57	54	45	56	62	75
4	>100	91	65	83	58	65	55	81	58	67	66	65
5	>100	78	69	75	86	84	56	68	67	67	56	68
6	>100	83	79	91	76	>92	69	77	66	92	67	76
7	>100	>92	>92	90	80	>92	>92	90	70	80	78	78
8	>100	>92	>92	92	87	>92	84	>92	77	92	76	>92
9	>100	>92	>92	>92	>92	>92	92	>92	>92	>92	84	>92
10	>100	>92	>92	>92	>92	>92	>92	>92	92	>92	85	>92
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

### LO HARMONICS ORDER

Test conditions: RF IN: 1000.1 MHz; 0.00 dBm.  
 LO IN: 1030.01 MHz; +10.00 dBm  
 IF OUT: 29.91 MHz; -7.82 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+0	22	16	25	22	38	35	51	40	43
1	-	22	+0	33	32	34	24	38	48	57	41	53
2	99	79	48	58	48	71	51	64	56	59	61	69
3	>100	71	>82	74	58	70	72	70	60	71	73	>82
4	>100	>82	80	>82	74	>82	74	>82	76	>82	>82	>82
5	>100	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
6	>100	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
7	>100	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
8	>100	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
9	>100	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
10	>100	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

### LO HARMONICS ORDER

Test conditions: RF IN: 1000.1 MHz; -10.00 dBm.  
 LO IN: 1030.01 MHz; +10.00 dBm  
 IF OUT: 29.91 MHz; -17.77 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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