Frequency Mixer TSM-1

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB) @LO (dBm)		
		+4	+7	+10
1.0	31.0	7.31	7.00	6.81
5.0	35.0	6.05	5.81	5.66
10.1	40.1	6.10	5.81	5.66
50.4	80.4	6.11	5.79	5.67
90.7	120.7	6.12	5.84	5.71
131.0	161.0	6.13	5.87	5.74
171.3	201.3	6.14	5.89	5.77
211.5	241.5	6.15	5.91	5.79
251.8	281.8	6.19	5.96	5.83
292.1	322.1	6.21	5.98	5.86
332.4	362.4	6.29	6.06	5.92
372.7	402.7	6.37	6.14	5.98
413.0	443.0	6.42	6.18	6.02
453.3	483.3	6.50	6.24	6.09
493.6	523.6	6.63	6.37	6.19
533.9	563.9	6.80	6.53	6.36
574.2	604.2	6.95	6.70	6.52
654.7	684.7	7.19	6.80	6.55
695.0	725.0	7.38	6.86	6.57
735.3	765.3	7.60	6.98	6.63
775.6	805.6	7.76	7.06	6.65
815.9	845.9	8.02	7.22	6.72
856.2	886.2	8.24	7.40	6.82
896.5	926.5	8.47	7.67	7.01
916.6	946.6	8.55	7.80	7.14
956.9	986.9	8.66	8.00	7.43
977.1	1007.1	8.67	8.03	7.51
1037.5	1067.5	8.69	8.11	7.70
1077.8	1107.8	8.73	8.18	7.80
1097.9	1127.9	8.75	8.26	7.89
1138.2	1168.2	8.88	8.46	8.13
1158.4	1188.4	8.96	8.57	8.27
1198.7	1228.7	9.20	8.87	8.62
1218.8	1248.8	9.29	9.00	8.77
1259.1	1289.1	9.50	9.24	9.06
1279.2	1309.2	9.61	9.35	9.17
1319.5	1349.5	9.85	9.58	9.42
1339.7	1369.7	9.97	9.68	9.51
1380.0	1410.0	10.31	10.00	9.82
1400.1	1430.1	10.47	10.15	9.97

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm) @LO (dBm)		
		+4	+7	+10
10.1	40.1	21.40	17.13	24.37
50.4	80.4	17.43	19.28	26.17
90.7	120.7	18.84	26.08	21.51
131.0	161.0	25.37	22.89	25.46
171.3	201.3	21.04	21.99	22.99
211.5	241.5	20.86	24.64	23.30
251.8	281.8	25.91	26.02	20.58
292.1	322.1	14.91	15.60	19.80
332.4	362.4	13.82	18.09	19.87
372.7	402.7	15.37	15.76	20.64
413.0	443.0	24.89	17.39	21.14
453.3	483.3	21.73	25.43	20.53
493.6	523.6	12.99	15.53	25.90
533.9	563.9	9.66	10.68	13.12
574.2	604.2	8.63	9.62	11.25
614.4	644.4	9.21	10.87	12.80
654.7	684.7	10.73	14.75	20.62
695.0	725.0	11.63	20.72	17.94
735.3	765.3	11.00	20.71	16.03
775.6	805.6	10.12	17.96	13.39
815.9	845.9	9.61	14.18	11.41
856.2	886.2	8.80	12.13	8.78
896.5	926.5	8.06	10.57	7.57
916.6	946.6	8.34	11.47	8.55
956.9	986.9	9.07	13.25	17.78
977.1	1007.1	11.27	12.17	11.83
1017.3	1047.3	14.57	10.95	10.91
1037.5	1067.5	14.18	11.81	11.20
1077.8	1107.8	13.57	13.88	13.85
1097.9	1127.9	13.13	14.30	14.39
1138.2	1168.2	13.03	15.12	16.33
1158.4	1188.4	13.68	14.94	15.05
1198.7	1228.7	15.42	17.17	15.84
1218.8	1248.8	14.97	15.70	22.53
1259.1	1289.1	15.47	17.92	24.47
1279.2	1309.2	16.09	16.37	21.54
1319.5	1349.5	15.01	15.00	17.83
1339.7	1369.7	13.32	15.76	17.01
1380.0	1410.0	14.00	14.94	17.95
1400.1	1430.1	14.15	15.93	18.61

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+1dBm (dB) @LO (dBm)		
		+4	+7	+10
10.1	40.1	0.95	0.72	0.52
50.4	80.4	0.93	0.68	0.52
90.7	120.7	0.89	0.65	0.47
131.0	161.0	0.88	0.60	0.44
171.3	201.3	0.85	0.57	0.41
211.5	241.5	0.81	0.57	0.41
251.8	281.8	0.78	0.54	0.40
292.1	322.1	0.74	0.54	0.42
332.4	362.4	0.71	0.51	0.41
372.7	402.7	0.70	0.52	0.42
413.0	443.0	0.78	0.57	0.46
453.3	483.3	0.84	0.65	0.51
493.6	523.6	0.98	0.76	0.61
533.9	563.9	1.13	0.87	0.72
574.2	604.2	1.23	0.99	0.82
614.4	644.4	1.38	1.12	0.94
654.7	684.7	1.54	1.28	1.11
695.0	725.0	1.71	1.45	1.28
735.3	765.3	1.73	1.54	1.36
775.6	805.6	1.74	1.62	1.42
815.9	845.9	1.66	1.64	1.48
856.2	886.2	1.54	1.56	1.47
896.5	926.5	1.48	1.48	1.44
916.6	946.6	1.43	1.39	1.35
956.9	986.9	1.36	1.28	1.20
977.1	1007.1	1.40	1.26	1.12
1017.3	1047.3	1.44	1.23	1.03
1037.5	1067.5	1.43	1.23	1.00
1077.8	1107.8	1.46	1.18	0.97
1097.9	1127.9	1.44	1.15	0.96
1138.2	1168.2	1.29	1.00	0.84
1158.4	1188.4	1.21	0.92	0.78
1198.7	1228.7	1.01	0.74	0.60
1218.8	1248.8	0.91	0.63	0.53
1259.1	1289.1	0.80	0.51	0.38
1279.2	1309.2	0.77	0.47	0.34
1319.5	1349.5	0.69	0.38	0.28
1339.7	1369.7	0.66	0.36	0.25
1380.0	1410.0	0.67	0.35	0.21
1400.1	1430.1	0.64	0.33	0.21

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=300.1MHz (dB) @LO (dBm) +7
290.0	10.1	6.13
282.8	17.3	6.11
275.6	24.5	6.08
268.5	31.6	6.07
261.3	38.8	6.04
254.1	46.0	6.04
246.9	53.2	6.07
239.7	60.4	6.00
232.6	67.5	5.98
225.4	74.7	5.96
218.2	81.9	5.96
211.0	89.1	5.95
203.8	96.3	5.94
196.7	103.4	5.94
189.5	110.6	5.93
182.3	117.8	5.92
175.1	125.0	5.91
167.9	132.2	5.90
160.8	139.3	5.91
153.6	146.5	5.88
146.4	153.7	5.91
139.2	160.9	5.92
132.1	168.0	5.94
124.9	175.2	5.93
117.7	182.4	5.94
110.5	189.6	5.93
103.3	196.8	5.93
96.2	203.9	5.93
89.0	211.1	5.93
81.8	218.3	5.93
74.6	225.5	5.94
67.4	232.7	5.94
60.3	239.8	5.93
53.1	247.0	5.94
45.9	254.2	5.94
38.7	261.4	5.95
31.5	268.6	5.96
24.4	275.7	5.97
17.2	282.9	5.97
10.0	290.1	5.92

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=10.1MHz (dB) @LO (dBm) +7
10.0	20.1	5.78
24.9	35.0	5.78
39.7	49.8	5.79
54.6	64.7	5.80
69.5	79.6	5.85
84.4	94.5	5.84
99.2	109.3	5.84
114.1	124.2	5.85
129.0	139.1	5.85
143.8	153.9	5.88
158.7	168.8	5.90
173.6	183.7	5.92
188.5	198.6	5.92
203.3	213.4	5.93
218.2	228.3	5.92
233.1	243.2	5.95
247.9	258.0	5.97
262.8	272.9	6.00
277.7	287.8	6.01
292.6	302.7	6.02
307.4	317.5	6.03
322.3	332.4	6.06
337.2	347.3	6.05
352.1	362.2	6.05
366.9	377.0	6.11
381.8	391.9	6.11
396.7	406.8	6.12
411.5	421.6	6.10
426.4	436.5	6.16
441.3	451.4	6.23
456.2	466.3	6.24
471.0	481.1	6.26
485.9	496.0	6.30
500.8	510.9	6.38
515.6	525.7	6.42
530.5	540.6	6.47
545.4	555.5	6.51
560.3	570.4	6.54
575.1	585.2	6.52
590.0	600.1	6.47

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=600.1MHz (dB) @LO (dBm) +7
590.0	10.1	6.65
575.1	25.0	6.58
560.3	39.8	6.53
545.4	54.7	6.51
530.5	69.6	6.45
515.6	84.5	6.43
500.8	99.3	6.40
485.9	114.2	6.38
471.0	129.1	6.37
456.2	143.9	6.39
441.3	158.8	6.43
426.4	173.7	6.43
411.5	188.6	6.40
396.7	203.4	6.40
381.8	218.3	6.43
366.9	233.2	6.44
352.1	248.0	6.45
337.2	262.9	6.46
322.3	277.8	6.49
307.4	292.7	6.47
292.6	307.5	6.48
277.7	322.4	6.50
262.8	337.3	6.51
247.9	352.2	6.53
233.1	367.0	6.51
218.2	381.9	6.52
203.3	396.8	6.53
188.5	411.6	6.54
173.6	426.5	6.54
158.7	441.4	6.57
143.8	456.3	6.59
129.0	471.1	6.59
114.1	486.0	6.60
99.2	500.9	6.60
84.4	515.7	6.63
69.5	530.6	6.66
54.6	545.5	6.69
39.7	560.4	6.72
24.9	575.2	6.75
10.0	590.1	6.74

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm)			LO-IF ISOLATION (dB) @LO (dBm)		
	+4	+7	+10	+4	+7	+10
1.0	64.00	67.00	70.00	64.00	67.00	67.13
5.0	64.00	67.00	70.00	64.00	67.00	66.56
10.1	72.16	71.08	72.42	65.50	64.02	61.42
50.4	57.50	58.79	59.27	49.80	48.49	47.54
90.7	52.14	53.10	54.03	44.86	43.40	42.96
131.0	49.22	50.39	51.27	41.22	40.52	40.14
171.3	46.94	48.13	49.02	39.30	38.53	38.20
211.5	45.52	46.71	47.66	37.71	37.08	36.65
251.8	43.94	45.17	46.20	36.59	35.96	35.48
292.1	42.97	44.27	45.29	35.81	35.15	34.56
332.4	42.07	43.37	44.47	35.04	34.28	33.70
372.7	41.20	42.66	43.91	34.31	33.36	32.53
413.0	40.52	42.00	43.40	33.48	32.73	32.12
453.3	39.87	41.29	42.71	32.40	31.72	31.17
493.6	39.77	41.58	43.15	31.54	30.45	29.80
533.9	39.62	41.65	43.46	31.27	30.07	29.12
574.2	39.10	40.96	42.69	30.63	29.81	28.99
654.7	38.27	39.99	41.66	28.00	27.30	26.89
695.0	38.02	39.87	41.33	26.65	25.74	25.31
735.3	37.58	39.44	40.84	25.88	24.53	23.99
775.6	37.36	39.54	41.07	25.80	24.12	23.26
815.9	37.03	39.60	41.44	25.59	23.88	22.65
856.2	36.81	39.61	41.72	25.16	23.73	22.34
896.5	36.96	40.03	42.55	24.73	23.68	22.37
916.6	36.80	39.63	41.86	24.35	23.59	22.35
956.9	37.15	39.95	41.99	23.63	23.23	22.37
977.1	37.64	40.59	42.47	23.24	22.88	22.04
1037.5	39.29	40.64	39.68	21.89	21.37	20.44
1077.8	40.64	39.76	37.87	21.18	20.41	19.31
1097.9	40.98	38.76	36.80	20.68	19.81	18.75
1138.2	41.58	37.19	35.36	19.85	18.82	17.90
1158.4	41.86	36.80	34.82	19.48	18.51	17.54
1198.7	41.67	35.72	33.76	18.78	17.89	17.02
1218.8	40.60	34.92	33.13	18.51	17.64	16.84
1259.1	38.53	33.65	32.02	18.08	17.26	16.52
1279.2	37.72	33.25	31.50	17.94	17.16	16.28
1319.5	35.98	32.21	30.58	17.64	16.94	16.08
1339.7	35.07	31.70	30.16	17.48	16.78	15.94
1380.0	33.91	31.07	29.65	17.33	16.74	15.88
1400.1	33.17	30.57	29.17	17.17	16.61	15.76

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB) @LO (dBm)		
		+4	+7	+10
10.1	40.1	45.50	45.22	47.89
50.4	80.4	41.53	41.65	40.95
90.7	120.7	36.54	37.50	37.08
131.0	161.0	34.56	34.67	34.73
171.3	201.3	32.95	33.38	33.42
211.5	241.5	32.21	32.51	32.88
251.8	281.8	31.84	32.33	32.55
292.1	322.1	31.54	32.43	32.68
332.4	362.4	31.22	31.87	32.15
372.7	402.7	30.45	31.12	31.05
413.0	443.0	29.87	30.72	30.93
453.3	483.3	29.13	30.21	30.43
493.6	523.6	28.14	28.64	28.44
533.9	563.9	26.62	26.87	26.41
574.2	604.2	25.10	25.16	24.87
614.4	644.4	23.64	23.55	23.18
654.7	684.7	22.53	22.43	21.98
695.0	725.0	22.16	21.96	21.55
735.3	765.3	22.29	22.16	21.65
775.6	805.6	22.86	22.77	22.23
815.9	845.9	23.43	23.31	22.56
856.2	886.2	23.64	23.13	22.00
896.5	926.5	23.76	22.85	21.23
916.6	946.6	23.75	22.80	20.94
956.9	986.9	23.38	22.45	20.46
977.1	1007.1	22.94	21.96	20.05
1017.3	1047.3	21.51	20.61	19.05
1037.5	1067.5	20.63	19.79	18.42
1077.8	1107.8	19.01	18.24	17.16
1097.9	1127.9	18.17	17.45	16.55
1138.2	1168.2	16.77	16.15	15.39
1158.4	1188.4	16.18	15.54	14.87
1198.7	1228.7	15.07	14.44	13.88
1218.8	1248.8	14.52	13.93	13.38
1259.1	1289.1	13.62	13.02	12.52
1279.2	1309.2	13.25	12.61	12.11
1319.5	1349.5	12.53	11.91	11.42
1339.7	1369.7	12.22	11.64	11.15
1380.0	1410.0	11.64	11.03	10.53
1400.1	1430.1	11.29	10.69	10.25

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1) @LO (dBm)		
		+4	+7	+10
5.0	35.0	1.24	1.34	1.30
10.0	40.0	1.11	1.23	1.19
50.4	80.4	1.01	1.07	1.13
90.7	120.7	1.02	1.09	1.15
131.0	161.0	1.04	1.12	1.17
171.3	201.3	1.07	1.14	1.19
211.5	241.5	1.10	1.17	1.22
251.8	281.8	1.12	1.20	1.24
292.1	322.1	1.15	1.23	1.27
332.4	362.4	1.16	1.24	1.29
372.7	402.7	1.17	1.24	1.30
413.0	443.0	1.19	1.27	1.32
453.3	483.3	1.22	1.31	1.37
493.6	523.6	1.23	1.32	1.39
533.9	563.9	1.24	1.32	1.38
574.2	604.2	1.25	1.31	1.36
614.4	644.4	1.22	1.28	1.33
654.7	684.7	1.18	1.23	1.28
695.0	725.0	1.10	1.16	1.22
735.3	765.3	1.06	1.12	1.19
775.6	805.6	1.13	1.15	1.20
815.9	845.9	1.23	1.23	1.26
856.2	886.2	1.34	1.33	1.34
896.5	926.5	1.45	1.43	1.43
916.6	946.6	1.51	1.50	1.50
956.9	986.9	1.64	1.63	1.63
977.1	1007.1	1.72	1.71	1.71
1017.3	1047.3	1.87	1.87	1.87
1037.5	1067.5	1.94	1.96	1.95
1077.8	1107.8	2.10	2.12	2.11
1097.9	1127.9	2.18	2.19	2.19
1138.2	1168.2	2.32	2.33	2.34
1158.4	1188.4	2.37	2.40	2.38
1198.7	1228.7	2.47	2.49	2.49
1218.8	1248.8	2.51	2.54	2.54
1259.1	1289.1	2.55	2.59	2.59
1279.2	1309.2	2.57	2.61	2.62
1319.5	1349.5	2.63	2.68	2.69
1339.7	1369.7	2.66	2.70	2.72
1380.0	1410.0	2.74	2.78	2.79
1400.1	1430.1	2.78	2.81	2.82

LO (MHz)	LO VSWR (:1) @LO (dBm)		
	+4	+7	+10
5.0	1.91	2.92	4.23
10.0	1.85	2.84	4.07
50.4	1.82	2.63	3.65
90.7	1.75	2.49	3.42
131.0	1.79	2.57	3.52
171.3	1.75	2.48	3.36
211.5	1.80	2.54	3.43
251.8	1.81	2.53	3.40
292.1	1.82	2.53	3.38
332.4	1.87	2.61	3.47
372.7	1.88	2.58	3.42
413.0	1.94	2.66	3.50
453.3	1.95	2.66	3.47
493.6	1.99	2.69	3.49
533.9	2.04	2.74	3.53
574.2	2.06	2.75	3.52
614.4	2.11	2.78	3.56
654.7	2.12	2.78	3.54
695.0	2.18	2.83	3.56
735.3	2.24	2.88	3.60
775.6	2.31	2.93	3.63
815.9	2.36	2.98	3.67
856.2	2.41	3.04	3.71
896.5	2.46	3.08	3.74
916.6	2.47	3.09	3.74
956.9	2.50	3.11	3.76
977.1	2.52	3.13	3.78
1017.3	2.53	3.11	3.75
1037.5	2.53	3.10	3.72
1077.8	2.53	3.08	3.67
1097.9	2.53	3.06	3.65
1138.2	2.54	3.05	3.62
1158.4	2.56	3.06	3.62
1198.7	2.59	3.07	3.62
1218.8	2.62	3.09	3.62
1259.1	2.70	3.14	3.65
1279.2	2.74	3.16	3.66
1319.5	2.81	3.20	3.67
1339.7	2.86	3.24	3.70
1380.0	2.96	3.30	3.73
1400.1	3.00	3.33	3.75

IF (OUT) (MHz)	IF VSWR @LO=600.1MHz (:1) @LO (dBm)		
	+4	+7	+10
5.0	1.37	1.22	1.13
10.0	1.37	1.22	1.13
25.1	1.78	1.61	1.37
40.3	1.75	1.55	1.40
55.4	1.76	1.55	1.39
70.5	1.79	1.57	1.42
85.6	1.77	1.57	1.40
100.8	1.78	1.57	1.41
115.9	1.77	1.58	1.41
131.0	1.81	1.59	1.43
146.2	1.81	1.60	1.44
161.3	1.81	1.60	1.44
176.4	1.81	1.60	1.44
191.5	1.82	1.61	1.45
206.7	1.83	1.63	1.47
221.8	1.84	1.64	1.48
236.9	1.84	1.64	1.49
252.1	1.85	1.64	1.48
267.2	1.85	1.65	1.49
282.3	1.85	1.66	1.50
297.4	1.86	1.66	1.51
312.6	1.87	1.68	1.52
327.7	1.89	1.69	1.54
342.8	1.92	1.73	1.57
357.9	1.93	1.74	1.58
373.1	1.93	1.73	1.57
388.2	1.92	1.73	1.57
403.3	1.92	1.73	1.58
418.5	1.95	1.76	1.60
433.6	1.97	1.78	1.62
448.7	1.98	1.78	1.63
463.8	1.99	1.79	1.64
479.0	1.99	1.80	1.65
494.1	1.99	1.81	1.65
509.2	2.00	1.81	1.65
524.4	2.02	1.82	1.67
539.5	2.05	1.86	1.70
554.6	2.09	1.90	1.73
569.7	2.12	1.92	1.75
584.9	2.12	1.92	1.76
600.0	1.79	1.71	1.66

Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	7	25	19	31	25	42	24	35	27	49
1	-	27	+0	35	12	43	17	32	40	48	39	44
2	>100	75	48	71	48	73	49	64	56	75	55	65
3	>100	75	63	74	63	79	59	79	61	70	>80	>80
4	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
5	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
6	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
7	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
8	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
9	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
10	>100	>80	>80	>80	>80	>80	>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: 300.1 MHz; -14.00 dBm.**
LO IN: 330.01 MHz; +7.00 dBm
IF OUT: 29.91 MHz; -20.22 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	16	37	33	45	35	50	39	54	40	58
1	-	27	+0	36	12	47	18	38	36	53	51	51
2	95	63	41	62	42	65	44	60	51	69	54	67
3	>100	53	44	56	45	61	44	59	43	53	60	63
4	>100	77	67	76	60	78	59	80	57	71	63	81
5	>100	74	67	81	60	78	59	78	58	76	62	78
6	>100	>90	78	>90	82	>90	81	>90	79	>90	74	88
7	>100	>90	84	>90	>90	>90	78	86	76	>90	74	86
8	>100	>90	>90	>90	>90	>90	>90	>90	85	88	87	>90
9	>100	>90	>90	>90	>90	>90	>90	>90	>90	86	>90	>90
10	>100	>90	>90	>90	>90	>90	>90	>90	>90	86	80	87
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: **RF IN: 300.1 MHz; -4.00 dBm.**
LO IN: 330.01 MHz; +7.00 dBm
IF OUT: 29.91 MHz; -10.42 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.