Frequency Mixer TSM-3+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB) @LO (dBm) +4	+7	+10
0.1	30.1	6.00	5.74	5.57
0.2	30.2	5.45	5.22	5.09
0.5	30.5	5.20	4.98	4.85
1.0	31.0	5.12	4.89	4.76
2.0	32.0	5.08	4.86	4.74
5.0	35.0	5.03	4.82	4.72
10.0	40.0	5.09	4.86	4.72
30.3	60.3	5.12	4.86	4.73
50.5	80.5	5.16	4.88	4.79
70.7	100.7	5.10	4.89	4.79
90.9	120.9	5.09	4.89	4.81
111.1	141.1	5.12	4.90	4.81
151.5	181.5	5.16	4.96	4.88
171.7	201.7	5.19	4.98	4.87
191.9	221.9	5.21	4.99	4.90
212.1	242.1	5.22	5.02	4.94
252.5	282.5	5.35	5.10	5.00
272.8	302.8	5.45	5.16	5.04
293.0	323.0	5.47	5.23	5.08
313.2	343.2	5.52	5.32	5.15
353.6	383.6	5.56	5.30	5.19
373.8	403.8	5.63	5.36	5.22
394.0	424.0	5.73	5.46	5.33
454.6	484.6	6.40	5.91	5.56
495.0	525.0	6.75	6.38	5.91
515.2	545.2	7.00	6.57	6.13
555.6	585.6	7.30	6.74	6.24
575.8	605.8	7.38	6.77	6.22
616.2	646.2	7.17	6.49	6.02
676.8	706.8	6.96	6.40	6.12
697.0	727.0	6.98	6.51	6.28
737.4	767.4	7.32	6.87	6.65
757.7	787.7	7.44	7.02	6.77
798.1	828.1	7.72	7.29	7.10
818.3	848.3	8.04	7.60	7.34
858.7	888.7	8.61	8.21	8.01
878.9	908.9	8.87	8.52	8.37
919.3	949.3	9.70	9.27	9.15
979.9	1009.9	10.79	10.28	10.18
1000.1	1030.1	11.42	10.83	10.56

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm) @LO (dBm) +4	+7	+10
10.1	40.1	23.94	23.55	24.66
30.3	60.3	23.21	26.57	23.26
50.5	80.5	21.47	26.56	23.91
70.7	100.7	21.54	23.07	22.31
90.9	120.9	22.00	23.18	21.85
111.1	141.1	22.55	26.55	24.18
131.3	161.3	24.82	20.04	22.07
151.5	181.5	21.41	16.93	19.11
171.7	201.7	21.19	18.44	20.61
191.9	221.9	18.29	18.74	20.71
212.1	242.1	16.67	18.36	15.89
232.3	262.3	16.72	16.87	17.11
252.5	282.5	18.22	17.58	20.78
272.8	302.8	18.98	19.11	24.00
293.0	323.0	16.81	17.22	19.90
313.2	343.2	16.50	16.21	18.28
333.4	363.4	14.89	16.75	18.24
353.6	383.6	14.60	16.12	17.49
373.8	403.8	15.54	15.83	20.94
394.0	424.0	15.18	17.11	20.10
434.4	464.4	10.92	15.56	18.49
454.6	484.6	9.03	11.76	16.23
495.0	525.0	7.87	9.10	11.79
515.2	545.2	7.73	8.74	10.28
555.6	585.6	8.90	10.72	13.04
575.8	605.8	10.65	13.09	14.82
616.2	646.2	13.89	17.33	24.37
636.4	666.4	16.35	24.04	25.99
676.8	706.8	20.94	21.81	21.37
697.0	727.0	21.63	20.43	19.15
737.4	767.4	16.97	20.73	18.40
757.7	787.7	16.54	20.10	19.43
798.1	828.1	15.32	15.09	16.35
818.3	848.3	14.87	14.81	15.16
858.7	888.7	17.56	14.06	16.67
878.9	908.9	16.07	18.76	15.80
919.3	949.3	14.88	18.33	20.31
939.5	969.5	21.55	18.75	21.53
979.9	1009.9	21.22	20.33	23.64
1000.1	1030.1	20.75	21.73	17.86

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+1dBm (dB) @LO (dBm) +4	+7	+10
10.1	40.1	1.49	1.17	0.97
30.3	60.3	1.39	1.16	0.90
50.5	80.5	1.36	1.07	0.89
70.7	100.7	1.25	1.06	0.89
90.9	120.9	1.29	0.99	0.83
111.1	141.1	1.20	0.94	0.76
131.3	161.3	1.28	0.95	0.78
151.5	181.5	1.18	0.91	0.75
171.7	201.7	1.13	0.88	0.72
191.9	221.9	1.10	0.86	0.71
212.1	242.1	1.09	0.87	0.71
232.3	262.3	1.10	0.87	0.73
252.5	282.5	1.08	0.84	0.68
272.8	302.8	1.14	0.91	0.75
293.0	323.0	1.15	0.95	0.80
313.2	343.2	1.24	1.01	0.86
333.4	363.4	1.42	1.11	0.93
353.6	383.6	1.64	1.28	1.07
373.8	403.8	1.75	1.36	1.14
394.0	424.0	1.91	1.47	1.26
434.4	464.4	2.23	1.84	1.55
454.6	484.6	2.30	1.97	1.73
495.0	525.0	2.26	1.93	1.77
515.2	545.2	2.17	1.85	1.65
555.6	585.6	2.05	1.80	1.61
575.8	605.8	1.90	1.70	1.58
616.2	646.2	2.04	1.83	1.66
636.4	666.4	2.07	1.85	1.66
676.8	706.8	2.09	1.81	1.56
697.0	727.0	2.05	1.73	1.48
737.4	767.4	1.90	1.59	1.37
757.7	787.7	1.91	1.61	1.41
798.1	828.1	1.81	1.63	1.51
818.3	848.3	1.85	1.61	1.51
858.7	888.7	1.64	1.35	1.27
878.9	908.9	1.54	1.19	1.10
919.3	949.3	1.43	1.01	0.87
939.5	969.5	1.32	0.95	0.84
979.9	1009.9	1.22	0.89	0.82
1000.1	1030.1	1.34	0.91	0.83

Frequency Mixer TSM-3+

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=250.1MHz (dB) @LO (dBm) +7
240.0	10.1	5.27
234.1	16.0	5.22
228.2	21.9	5.16
222.3	27.8	5.14
216.4	33.7	5.12
210.5	39.6	5.10
204.6	45.5	5.11
198.7	51.4	5.06
192.8	57.3	5.02
186.9	63.2	5.05
181.0	69.1	5.07
175.1	75.0	5.08
169.2	80.9	5.05
163.3	86.8	5.03
157.4	92.7	5.03
151.5	98.6	5.03
145.6	104.5	5.04
139.7	110.4	5.06
133.8	116.3	5.02
127.9	122.2	5.00
122.1	128.0	5.00
116.2	133.9	5.02
110.3	139.8	5.04
104.4	145.7	5.02
98.5	151.6	5.02
92.6	157.5	5.02
86.7	163.4	5.04
80.8	169.3	5.05
74.9	175.2	5.06
69.0	181.1	5.03
63.1	187.0	5.01
57.2	192.9	5.02
51.3	198.8	5.02
45.4	204.7	5.05
39.5	210.6	5.06
33.6	216.5	5.06
27.7	222.4	5.05
21.8	228.3	5.06
15.9	234.2	5.08
10.0	240.1	5.13

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=10.1MHz (dB) @LO (dBm) +7
10.0	20.1	4.71
22.3	32.4	4.65
34.6	44.7	4.66
46.9	57.0	4.66
59.2	69.3	4.65
71.5	81.6	4.70
83.8	93.9	4.73
96.2	106.3	4.71
108.5	118.6	4.74
120.8	130.9	4.74
133.1	143.2	4.74
145.4	155.5	4.78
157.7	167.8	4.84
170.0	180.1	4.82
182.3	192.4	4.86
194.6	204.7	4.85
206.9	217.0	4.87
219.2	229.3	4.89
231.5	241.6	4.90
243.8	253.9	4.89
256.2	266.3	4.93
268.5	278.6	4.88
280.8	290.9	4.95
293.1	303.2	5.02
305.4	315.5	5.06
317.7	327.8	5.18
330.0	340.1	5.19
342.3	352.4	5.18
354.6	364.7	5.21
366.9	377.0	5.21
379.2	389.3	5.18
391.5	401.6	5.15
403.8	413.9	5.05
416.2	426.3	5.10
428.5	438.6	5.14
440.8	450.9	5.16
453.1	463.2	5.16
465.4	475.5	5.16
477.7	487.8	5.15
490.0	500.1	5.14

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=500.1MHz (dB) @LO (dBm) +7
490.0	10.1	6.18
477.7	22.4	6.11
465.4	34.7	6.06
453.1	47.0	6.05
440.8	59.3	6.10
428.5	71.6	6.05
416.2	83.9	6.00
403.8	96.3	5.98
391.5	108.6	5.96
379.2	120.9	6.01
366.9	133.2	6.04
354.6	145.5	5.98
342.3	157.8	6.00
330.0	170.1	6.00
317.7	182.4	6.00
305.4	194.7	6.04
293.1	207.0	5.99
280.8	219.3	5.98
268.5	231.6	6.02
256.2	243.9	6.02
243.8	256.3	6.07
231.5	268.6	6.05
219.2	280.9	5.98
206.9	293.2	6.04
194.6	305.5	6.02
182.3	317.8	6.02
170.0	330.1	6.06
157.7	342.4	6.03
145.4	354.7	6.01
133.1	367.0	5.99
120.8	379.3	5.93
108.5	391.6	5.91
96.2	403.9	5.88
83.8	416.3	5.77
71.5	428.6	5.77
59.2	440.9	5.77
46.9	453.2	5.73
34.6	465.5	5.86
22.3	477.8	6.00
10.0	490.1	6.02

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm) +4	+7	+10	LO-IF ISOLATION (dB) @LO (dBm) +4	+7	+10
0.1	64.00	67.00	70.00	64.00	67.00	66.23
0.2	64.00	67.00	70.00	64.00	67.00	65.77
0.5	64.00	67.00	70.00	64.00	67.00	65.50
1.0	64.00	67.00	70.00	64.00	67.00	65.49
2.0	64.00	67.00	70.00	64.00	67.00	65.24
5.0	64.00	67.00	70.00	64.00	67.00	64.20
10.0	64.00	67.00	64.53	64.00	67.00	60.90
30.3	62.31	63.44	64.26	65.52	65.76	65.95
50.5	57.19	58.94	60.01	64.15	64.54	62.76
70.7	55.00	55.85	56.72	60.57	60.93	60.79
90.9	52.43	53.71	54.57	58.16	59.09	59.29
111.1	50.91	51.93	52.93	55.12	56.77	58.26
151.5	48.23	49.20	49.86	50.64	53.05	54.89
171.7	47.17	48.48	49.29	48.92	51.12	52.75
191.9	46.09	47.15	47.98	47.39	50.05	52.72
212.1	45.26	45.90	46.67	46.24	48.88	51.74
252.5	44.56	45.51	46.31	43.44	45.77	48.34
272.8	45.13	46.49	47.39	42.70	45.07	47.75
293.0	43.46	44.82	45.82	43.49	46.50	49.41
313.2	42.23	43.49	44.69	42.56	45.38	48.19
353.6	40.39	41.98	43.56	40.54	41.85	42.61
373.8	39.60	41.29	42.96	39.54	40.30	40.58
394.0	39.65	41.77	44.10	38.55	38.90	38.83
454.6	40.74	42.60	44.25	37.74	37.64	37.10
495.0	39.86	41.81	43.38	36.85	36.84	35.91
515.2	39.85	41.81	43.35	35.52	35.38	34.55
555.6	39.41	41.01	42.16	33.24	32.44	31.36
575.8	39.08	40.51	41.38	32.12	31.04	29.86
616.2	39.21	39.99	40.00	30.11	28.38	26.32
676.8	37.94	37.62	37.19	27.54	25.05	23.46
697.0	38.80	38.47	38.15	26.52	24.21	22.70
737.4	40.28	38.80	37.35	24.38	22.39	20.89
757.7	42.42	38.73	36.24	23.55	21.79	20.35
798.1	43.93	37.11	33.94	21.37	19.96	18.66
818.3	41.96	35.77	32.89	20.21	19.06	17.94
858.7	37.08	33.15	30.66	18.75	17.81	16.88
878.9	34.21	31.51	29.46	18.09	17.26	16.31
919.3	30.58	28.91	27.37	17.00	16.30	15.42
979.9	26.74	26.34	25.20	16.04	15.81	15.00
1000.1	25.73	25.47	24.57	15.64	15.44	14.73

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB) @LO (dBm) +4	+7	+10
10.1	40.1	44.57	44.66	38.82
30.3	60.3	34.07	34.76	35.17
50.5	80.5	31.12	31.05	31.34
70.7	100.7	28.37	28.85	28.66
90.9	120.9	26.99	27.02	27.20
111.1	141.1	25.58	25.81	26.04
131.3	161.3	24.74	24.88	25.15
151.5	181.5	24.15	24.43	24.64
171.7	201.7	23.94	24.23	24.53
191.9	221.9	23.80	24.32	24.75
212.1	242.1	23.39	23.93	24.50
232.3	262.3	23.58	24.10	24.67
252.5	282.5	23.82	24.29	24.79
272.8	302.8	23.87	24.19	24.53
293.0	323.0	25.02	25.42	25.82
313.2	343.2	25.30	26.01	26.66
333.4	363.4	25.47	26.62	27.78
353.6	383.6	24.73	25.96	26.99
373.8	403.8	23.08	23.85	24.23
394.0	424.0	21.60	21.86	21.78
434.4	464.4	18.77	18.39	18.11
454.6	484.6	18.09	17.83	17.45
495.0	525.0	16.98	16.84	16.68
515.2	545.2	16.82	16.65	16.51
555.6	585.6	17.04	16.81	16.51
575.8	605.8	17.14	16.83	16.45
616.2	646.2	17.10	16.53	15.98
636.4	666.4	16.84	16.19	15.64
676.8	706.8	15.96	15.37	14.92
697.0	727.0	15.52	15.04	14.69
737.4	767.4	14.55	14.01	13.59
757.7	787.7	13.89	13.42	13.00
798.1	828.1	12.48	12.02	11.56
818.3	848.3	11.88	11.42	10.98
858.7	888.7	10.46	10.04	9.66
878.9	908.9	9.91	9.42	9.09
919.3	949.3	8.95	8.54	8.17
939.5	969.5	8.48	8.08	7.71
979.9	1009.9	7.61	7.29	6.99
1000.1	1030.1	7.35	7.04	6.80

Frequency Mixer TSM-3+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1) @LO (dBm)		
		+4	+7	+10
5.0	35.0	1.20	1.11	1.05
10.0	40.0	1.20	1.11	1.05
30.3	60.3	1.25	1.14	1.08
50.5	80.5	1.23	1.12	1.06
70.7	100.7	1.21	1.11	1.05
90.9	120.9	1.20	1.09	1.04
111.1	141.1	1.15	1.07	1.03
131.3	161.3	1.15	1.07	1.03
151.5	181.5	1.14	1.06	1.03
171.7	201.7	1.12	1.04	1.04
191.9	221.9	1.10	1.04	1.06
212.1	242.1	1.09	1.01	1.05
232.3	262.3	1.08	1.01	1.05
252.5	282.5	1.06	1.02	1.07
272.8	302.8	1.06	1.02	1.08
293.0	323.0	1.04	1.04	1.09
313.2	343.2	1.02	1.05	1.10
333.4	363.4	1.01	1.08	1.14
353.6	383.6	1.04	1.11	1.17
373.8	403.8	1.06	1.12	1.17
394.0	424.0	1.07	1.12	1.14
434.4	464.4	1.14	1.10	1.09
454.6	484.6	1.22	1.16	1.12
495.0	525.0	1.36	1.29	1.23
515.2	545.2	1.46	1.39	1.33
555.6	585.6	1.68	1.60	1.53
575.8	605.8	1.80	1.70	1.63
616.2	646.2	1.93	1.83	1.76
636.4	666.4	1.98	1.88	1.81
676.8	706.8	2.07	1.99	1.93
697.0	727.0	2.16	2.08	2.02
737.4	767.4	2.38	2.31	2.22
757.7	787.7	2.47	2.39	2.30
798.1	828.1	2.60	2.50	2.41
818.3	848.3	2.69	2.58	2.49
858.7	888.7	2.78	2.70	2.63
878.9	908.9	2.81	2.74	2.69
919.3	949.3	2.96	2.91	2.87
939.5	969.5	2.97	2.93	2.91
979.9	1009.9	3.00	2.96	2.96
1000.1	1030.1	3.01	2.97	2.97

LO (MHz)	LO VSWR (:1) @LO (dBm)		
	+4	+7	+10
5.0	1.72	2.55	3.62
10.0	1.74	2.49	3.53
30.3	1.79	2.66	3.71
50.5	1.75	2.58	3.65
70.7	1.66	2.40	3.34
90.9	1.66	2.46	3.41
111.1	1.66	2.42	3.36
131.3	1.72	2.50	3.48
151.5	1.70	2.44	3.37
171.7	1.66	2.38	3.24
191.9	1.68	2.38	3.22
212.1	1.73	2.45	3.33
232.3	1.76	2.52	3.39
252.5	1.75	2.44	3.29
272.8	1.80	2.52	3.35
293.0	1.76	2.44	3.25
313.2	1.82	2.52	3.35
333.4	1.84	2.54	3.35
353.6	1.83	2.50	3.28
373.8	1.86	2.54	3.30
394.0	1.87	2.51	3.29
434.4	1.98	2.60	3.36
454.6	2.07	2.72	3.47
495.0	2.09	2.73	3.46
515.2	2.13	2.78	3.51
555.6	2.18	2.83	3.53
575.8	2.14	2.77	3.47
616.2	2.18	2.79	3.48
636.4	2.20	2.82	3.50
676.8	2.19	2.77	3.43
697.0	2.23	2.80	3.46
737.4	2.33	2.92	3.54
757.7	2.31	2.85	3.47
798.1	2.46	2.96	3.55
818.3	2.56	3.05	3.60
858.7	2.72	3.12	3.61
878.9	2.84	3.21	3.66
919.3	3.07	3.41	3.82
939.5	3.09	3.38	3.76
979.9	3.19	3.48	3.83
1000.1	3.22	3.52	3.86

IF (OUT) (MHz)	IF VSWR @LO=500.1MHz (:1) @LO (dBm)		
	+4	+7	+10
5.0	0.58	1.44	1.33
10.0	0.59	1.45	1.33
22.6	2.17	1.84	1.57
35.1	2.07	1.74	1.49
47.7	2.06	1.73	1.47
60.3	2.07	1.76	1.48
72.8	2.11	1.79	1.52
85.4	2.10	1.80	1.54
97.9	2.10	1.80	1.56
110.5	2.14	1.83	1.58
123.1	2.19	1.87	1.61
135.6	2.23	1.90	1.63
148.2	2.21	1.90	1.64
160.8	2.20	1.89	1.64
173.3	2.19	1.89	1.65
185.9	2.23	1.93	1.69
198.5	2.28	1.98	1.74
211.0	2.30	2.01	1.77
223.6	2.27	1.99	1.75
236.2	2.26	1.97	1.74
248.7	2.28	1.99	1.74
261.3	2.32	2.03	1.79
273.8	2.34	2.05	1.82
286.4	2.30	2.05	1.83
299.0	2.27	2.01	1.82
311.5	2.25	2.01	1.81
324.1	2.29	2.04	1.83
336.7	2.33	2.08	1.87
349.2	2.34	2.08	1.88
361.8	2.32	2.05	1.86
374.4	2.29	2.03	1.83
386.9	2.28	2.03	1.84
399.5	2.32	2.06	1.86
412.1	2.32	2.07	1.88
424.6	2.28	2.05	1.86
437.2	2.25	2.01	1.83
449.7	2.28	2.01	1.81
462.3	2.33	2.04	1.84
474.9	2.33	2.05	1.85
487.4	2.31	2.02	1.82
500.0	2.36	2.12	1.96

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	18	25	14	33	19	37	30	47	45	63
1	-	21	+0	29	12	32	21	40	37	48	50	48
2	>100	67	58	69	59	64	54	65	55	74	64	>81
3	>100	71	59	74	59	>81	56	>81	73	77	77	76
4	>100	>81	>81	>81	>81	>81	>81	>81	>81	>81	>81	>81
5	>100	>81	>81	>81	>81	>81	>81	>81	>81	>81	>81	>81
6	>100	>81	>81	>81	>81	>81	>81	>81	>81	>81	>81	>81
7	>100	>81	>81	>81	>81	>81	>81	>81	>81	>81	>81	>81
8	>100	>81	>81	>81	>81	>81	>81	>81	>81	>81	>81	>81
9	>100	>81	>81	>81	>81	>81	>81	>81	>81	>81	>81	>81
10	>100	>81	>81	>81	>81	>81	>81	>81	>81	>81	>81	>81
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:
RF IN: 250.1 MHz; -14.00 dBm.
LO IN: 280.01 MHz; +7.00 dBm
IF OUT: 29.91 MHz; -19.18 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	28	35	24	44	31	48	42	59	59	75
1	-	22	+0	30	12	33	23	46	38	53	54	57
2	99	57	52	58	57	57	51	57	52	75	59	78
3	>100	48	37	48	39	51	36	50	46	56	58	59
4	>100	75	66	78	67	84	67	70	61	71	64	83
5	>100	74	75	70	52	73	51	76	53	64	74	70
6	>100	90	81	87	78	84	82	>91	79	84	79	>91
7	>100	>91	79	80	70	74	64	84	63	77	60	73
8	>100	>91	>91	>91	>91	90	>91	>91	82	>91	90	90
9	>100	>91	>91	>91	89	>91	82	>91	84	72	79	>91
10	>100	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:
RF IN: 250.1 MHz; -4.00 dBm.
LO IN: 280.01 MHz; +7.00 dBm
IF OUT: 29.91 MHz; -9.37 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.

REV. X2
TSM-3+
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