

# Frequency Mixer

# TFM-3+

## 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=+1dBm (dB)		
		@LO (dBm)					@LO (dBm)					@LO (dBm)		
		+4	+7	+10			+4	+7	+10			+4	+7	+10
0.04	30.04	6.45	6.15	6.01	10.1	40.1	18.34	18.12	19.29	10.1	40.1	1.41	1.12	0.86
0.05	30.05	5.82	5.52	5.36	26.5	56.5	15.46	16.47	17.00	26.5	56.5	1.37	1.07	0.83
0.07	30.07	5.44	5.12	4.99	42.9	72.9	15.83	16.32	18.84	42.9	72.9	1.42	1.09	0.85
0.1	30.1	5.30	4.92	4.76	59.3	89.3	14.90	17.08	26.69	59.3	89.3	1.37	1.06	0.81
0.5	30.5	5.10	4.77	4.60	75.7	105.7	15.53	20.21	21.09	75.7	105.7	1.29	1.00	0.76
1.0	31.0	5.07	4.76	4.59	92.2	122.2	15.69	21.92	19.52	92.2	122.2	1.29	0.97	0.75
5.0	35.0	4.91	4.75	4.56	108.6	138.6	17.27	19.72	15.31	108.6	138.6	1.32	1.03	0.81
10.0	40.0	4.87	4.75	4.56	125.0	155.0	15.96	19.66	15.62	125.0	155.0	1.25	0.96	0.75
26.5	56.5	4.95	4.75	4.64	141.4	171.4	16.57	18.74	15.23	141.4	171.4	1.19	0.88	0.68
59.3	89.3	4.90	4.72	4.61	157.8	187.8	14.48	13.78	14.60	157.8	187.8	1.16	0.89	0.67
75.7	105.7	4.89	4.71	4.61	174.2	204.2	10.86	9.57	9.61	174.2	204.2	1.13	0.86	0.68
92.2	122.2	4.93	4.76	4.66	190.6	220.6	13.18	11.49	11.69	190.6	220.6	1.12	0.85	0.67
108.6	138.6	4.96	4.78	4.68	207.0	237.0	21.67	16.79	15.17	207.0	237.0	1.12	0.87	0.67
125.0	155.0	4.98	4.82	4.72	223.4	253.4	18.96	26.39	21.19	223.4	253.4	1.06	0.85	0.65
157.8	187.8	5.02	4.86	4.77	239.8	269.8	12.73	11.76	13.59	239.8	269.8	1.07	0.85	0.67
174.2	204.2	5.01	4.85	4.77	256.3	286.3	10.71	10.03	9.84	256.3	286.3	1.17	0.91	0.71
190.6	220.6	5.09	4.92	4.82	272.7	302.7	10.27	9.73	9.89	272.7	302.7	1.29	0.99	0.78
207.0	237.0	5.21	4.99	4.85	289.1	319.1	9.58	8.94	9.57	289.1	319.1	1.46	1.10	0.83
239.8	269.8	5.37	5.19	5.03	305.5	335.5	9.68	9.46	11.23	305.5	335.5	1.62	1.16	0.85
256.3	286.3	5.36	5.21	5.10	321.9	351.9	9.85	10.88	13.21	321.9	351.9	1.74	1.19	0.87
272.7	302.7	5.36	5.22	5.14	338.3	368.3	9.46	12.39	14.57	338.3	368.3	1.90	1.28	0.94
289.1	319.1	5.42	5.27	5.21	354.7	384.7	7.04	11.87	16.12	354.7	384.7	2.04	1.45	1.07
305.5	335.5	5.51	5.34	5.26	371.1	401.1	3.90	9.26	14.09	371.1	401.1	2.11	1.65	1.23
338.3	368.3	5.72	5.50	5.41	387.5	417.5	1.59	4.94	9.88	387.5	417.5	2.18	1.80	1.42
354.7	384.7	5.90	5.60	5.44	403.9	433.9	0.63	2.54	6.03	403.9	433.9	2.18	1.82	1.55
371.1	401.1	6.15	5.74	5.47	420.4	450.4	0.62	1.91	4.57	420.4	450.4	2.04	1.75	1.55
387.5	417.5	6.37	5.97	5.58	436.8	466.8	0.90	1.96	4.13	436.8	466.8	1.97	1.73	1.54
403.9	433.9	6.60	6.23	5.76	453.2	483.2	1.51	2.36	4.19	453.2	483.2	1.80	1.58	1.41
436.8	466.8	6.96	6.54	6.09	469.6	499.6	3.21	3.85	5.69	469.6	499.6	1.56	1.36	1.18
453.2	483.2	7.22	6.80	6.38	486.0	516.0	4.63	5.15	7.03	486.0	516.0	1.50	1.29	1.06
469.6	499.6	7.55	7.13	6.75	502.4	532.4	6.23	6.75	9.10	502.4	532.4	1.52	1.29	1.02
486.0	516.0	7.70	7.28	6.97	518.8	548.8	8.20	9.20	13.44	518.8	548.8	1.49	1.19	0.93
502.4	532.4	7.82	7.39	7.11	535.2	565.2	8.50	10.98	24.22	535.2	565.2	1.53	1.19	1.00
535.2	565.2	7.89	7.55	7.27	551.6	581.6	8.72	11.06	13.65	551.6	581.6	1.50	1.15	1.01
551.6	581.6	8.05	7.74	7.43	568.0	598.0	8.40	10.17	12.17	568.0	598.0	1.45	1.08	0.91
568.0	598.0	8.22	7.98	7.75	584.5	614.5	7.91	9.30	11.52	584.5	614.5	1.46	1.10	0.88
584.5	614.5	8.39	8.15	8.00	600.9	630.9	7.55	9.15	11.65	600.9	630.9	1.45	1.05	0.80
600.9	630.9	8.67	8.47	8.39	617.3	647.3	7.68	9.57	12.27	617.3	647.3	1.34	0.93	0.68
633.7	663.7	9.39	9.26	9.30	633.7	663.7	8.04	10.37	12.57	633.7	663.7	1.25	0.87	0.67
650.1	680.1	9.84	9.74	9.79	650.1	680.1	8.83	11.29	12.78	650.1	680.1	1.15	0.81	0.67

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## Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=200.1MHz (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)=400.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+7			+7			+7
190.0	10.1	5.22	10.0	20.1	4.68	390.0	10.1	6.77
185.4	14.7	5.19	19.7	29.8	4.72	380.3	19.8	6.67
180.8	19.3	5.17	29.5	39.6	4.74	370.5	29.6	6.60
176.2	23.9	5.14	39.2	49.3	4.73	360.8	39.3	6.52
171.5	28.6	5.12	49.0	59.1	4.76	351.0	49.1	6.46
166.9	33.2	5.09	58.7	68.8	4.79	341.3	58.8	6.41
162.3	37.8	5.07	68.5	78.6	4.80	331.5	68.6	6.36
157.7	42.4	5.05	78.2	88.3	4.81	321.8	78.3	6.33
153.1	47.0	5.02	87.9	98.0	4.84	312.1	88.0	6.34
148.5	51.6	5.00	97.7	107.8	4.87	302.3	97.8	6.36
143.8	56.3	4.99	107.4	117.5	4.91	292.6	107.5	6.34
139.2	60.9	4.99	117.2	127.3	4.93	282.8	117.3	6.31
134.6	65.5	4.98	126.9	137.0	4.92	273.1	127.0	6.30
130.0	70.1	4.97	136.7	146.8	4.96	263.3	136.8	6.28
125.4	74.7	4.96	146.4	156.5	5.00	253.6	146.5	6.25
120.8	79.3	4.96	156.2	166.3	5.01	243.8	156.3	6.25
116.2	83.9	4.96	165.9	176.0	5.00	234.1	166.0	6.26
111.5	88.6	4.95	175.6	185.7	5.03	224.4	175.7	6.26
106.9	93.2	4.95	185.4	195.5	5.07	214.6	185.5	6.28
102.3	97.8	4.94	195.1	205.2	5.06	204.9	195.2	6.28
97.7	102.4	4.94	204.9	215.0	5.06	195.1	205.0	6.33
93.1	107.0	4.94	214.6	224.7	5.06	185.4	214.7	6.34
88.5	111.6	4.93	224.4	234.5	5.07	175.6	224.5	6.31
83.8	116.3	4.93	234.1	244.2	5.14	165.9	234.2	6.28
79.2	120.9	4.94	243.8	253.9	5.24	156.2	243.9	6.23
74.6	125.5	4.94	253.6	263.7	5.35	146.4	253.7	6.17
70.0	130.1	4.96	263.3	273.4	5.46	136.7	263.4	6.11
65.4	134.7	4.95	273.1	283.2	5.52	126.9	273.2	6.08
60.8	139.3	4.94	282.8	292.9	5.50	117.2	282.9	6.05
56.2	143.9	4.94	292.6	302.7	5.50	107.4	292.7	6.07
51.5	148.6	4.92	302.3	312.4	5.47	97.7	302.4	6.05
46.9	153.2	4.92	312.1	322.2	5.37	87.9	312.2	6.01
42.3	157.8	4.91	321.8	331.9	5.34	78.2	321.9	5.96
37.7	162.4	4.90	331.5	341.6	5.29	68.5	331.6	5.90
33.1	167.0	4.90	341.3	351.4	5.26	58.7	341.4	5.83
28.5	171.6	4.88	351.0	361.1	5.27	49.0	351.1	5.75
23.8	176.3	4.88	360.8	370.9	5.27	39.2	360.9	5.70
19.2	180.9	4.88	370.5	380.6	5.28	29.5	370.6	5.69
14.6	185.5	4.89	380.3	390.4	5.30	19.7	380.4	5.71
10.0	190.1	4.89	390.0	400.1	5.33	10.0	390.1	5.74

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## Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)			RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)					@LO (dBm)		
	+4	+7	+10	+4	+7	+10			+4	+7	+10
0.04	64.00	67.00	70.00	64.00	67.00	70.00	10.1	40.1	38.99	37.34	36.05
0.05	64.00	67.00	70.00	64.00	67.00	70.00	26.5	56.5	32.65	32.27	31.88
0.07	64.00	67.00	70.00	64.00	67.00	70.00	42.9	72.9	29.18	29.08	29.02
0.1	64.00	67.00	70.00	64.00	67.00	70.00	59.3	89.3	26.91	26.99	26.92
0.5	64.00	67.00	70.00	64.00	67.00	70.00	75.7	105.7	25.62	25.69	25.71
1.0	64.00	67.00	70.00	62.64	63.53	70.00	92.2	122.2	24.42	24.73	24.91
5.0	64.00	67.00	70.00	59.16	60.91	64.41	108.6	138.6	23.61	23.78	23.94
10.0	64.00	67.00	70.00	58.46	60.97	63.86	125.0	155.0	23.72	23.91	24.00
26.5	63.64	63.74	64.07	68.51	67.00	63.99	141.4	171.4	23.61	24.14	24.42
59.3	56.40	57.07	57.61	59.54	58.60	57.92	157.8	187.8	23.25	24.08	24.81
75.7	54.38	55.00	55.47	56.44	56.36	55.91	174.2	204.2	23.05	23.69	24.29
92.2	52.53	53.30	53.92	54.83	55.18	54.58	190.6	220.6	23.19	23.62	24.05
108.6	51.42	52.05	52.43	53.51	53.60	52.81	207.0	237.0	23.97	24.32	24.74
125.0	49.40	50.12	50.74	52.77	53.18	52.24	223.4	253.4	25.47	25.88	26.25
157.8	49.08	49.80	50.11	50.76	49.69	48.46	239.8	269.8	26.73	27.52	28.43
174.2	47.15	48.30	48.92	53.73	50.60	47.63	256.3	286.3	25.99	26.76	27.68
190.6	44.41	45.24	46.10	53.19	52.00	48.69	272.7	302.7	23.49	24.02	24.51
207.0	43.23	43.82	44.60	52.99	49.95	47.58	289.1	319.1	20.80	21.11	21.40
239.8	44.72	44.69	44.95	44.98	43.33	42.13	305.5	335.5	19.00	19.18	19.25
256.3	46.05	45.83	45.40	41.80	40.57	39.69	321.9	351.9	17.53	17.59	17.61
272.7	47.71	47.16	46.28	40.85	39.28	38.38	338.3	368.3	16.54	16.48	16.47
289.1	47.80	47.00	46.10	39.90	38.12	37.25	354.7	384.7	15.82	15.76	15.78
305.5	47.46	46.56	45.14	41.22	37.98	36.35	371.1	401.1	15.40	15.28	15.33
338.3	42.22	42.40	41.90	44.60	36.27	32.98	387.5	417.5	15.02	14.91	14.98
354.7	40.09	40.42	40.36	43.95	35.36	32.12	403.9	433.9	14.87	14.73	14.80
371.1	38.65	39.37	39.91	42.50	35.06	31.48	420.4	450.4	14.83	14.75	14.76
387.5	37.78	38.46	39.13	39.02	33.74	30.49	436.8	466.8	14.68	14.60	14.67
403.9	37.12	37.45	37.86	37.78	33.32	29.88	453.2	483.2	14.55	14.45	14.48
436.8	37.33	37.91	38.27	34.50	32.98	29.63	469.6	499.6	14.28	14.16	14.21
453.2	37.59	38.29	38.74	32.59	31.50	29.11	486.0	516.0	13.70	13.60	13.71
469.6	37.67	38.56	39.14	31.17	30.32	28.26	502.4	532.4	13.15	13.12	13.21
486.0	37.37	37.94	38.03	29.85	29.15	27.16	518.8	548.8	12.51	12.54	12.63
502.4	36.40	36.96	36.68	28.92	28.54	26.31	535.2	565.2	12.03	12.05	12.02
535.2	35.20	35.15	33.64	26.51	25.98	23.22	551.6	581.6	11.51	11.47	11.36
551.6	34.46	33.90	31.90	25.22	24.26	21.47	568.0	598.0	10.92	10.80	10.63
568.0	33.13	32.03	29.87	24.06	22.70	19.99	584.5	614.5	10.41	10.27	10.03
584.5	31.32	29.94	27.94	22.91	21.36	18.92	600.9	630.9	9.83	9.63	9.32
600.9	29.98	28.61	26.77	21.70	20.24	18.10	617.3	647.3	9.14	8.88	8.53
633.7	26.75	25.67	24.23	19.21	18.24	16.61	633.7	663.7	8.45	8.16	7.82
650.1	25.12	24.22	22.91	17.99	17.19	15.72	650.1	680.1	7.79	7.47	7.19



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## Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)		
		@LO (dBm)		
		+4	+7	+10
5.0	35.0	1.36	1.24	1.18
10.0	40.0	1.36	1.25	1.18
26.5	56.5	1.36	1.25	1.17
42.9	72.9	1.33	1.22	1.15
59.3	89.3	1.32	1.21	1.14
75.7	105.7	1.27	1.17	1.11
92.2	122.2	1.25	1.15	1.09
108.6	138.6	1.24	1.15	1.09
125.0	155.0	1.22	1.13	1.08
141.4	171.4	1.18	1.09	1.05
157.8	187.8	1.17	1.07	1.04
174.2	204.2	1.14	1.06	1.03
190.6	220.6	1.11	1.04	1.02
207.0	237.0	1.10	1.04	1.07
223.4	253.4	1.10	1.06	1.12
239.8	269.8	1.06	1.07	1.13
256.3	286.3	1.05	1.10	1.16
272.7	302.7	1.09	1.17	1.23
289.1	319.1	1.14	1.23	1.30
305.5	335.5	1.16	1.26	1.33
321.9	351.9	1.17	1.26	1.32
338.3	368.3	1.15	1.24	1.29
354.7	384.7	1.09	1.18	1.23
371.1	401.1	1.01	1.10	1.16
387.5	417.5	1.06	1.03	1.11
403.9	433.9	1.15	1.08	1.08
420.4	450.4	1.26	1.20	1.16
436.8	466.8	1.34	1.28	1.24
453.2	483.2	1.46	1.40	1.36
469.6	499.6	1.64	1.58	1.55
486.0	516.0	1.74	1.70	1.69
502.4	532.4	1.88	1.86	1.85
518.8	548.8	2.03	2.02	2.03
535.2	565.2	2.13	2.13	2.13
551.6	581.6	2.28	2.29	2.26
568.0	598.0	2.43	2.42	2.39
584.5	614.5	2.53	2.52	2.48
600.9	630.9	2.65	2.61	2.58
617.3	647.3	2.72	2.68	2.65
633.7	663.7	2.76	2.71	2.68
650.1	680.1	2.80	2.73	2.69

LO (MHz)	LO VSWR (:1)		
	@LO (dBm)		
	+4	+7	+10
5.0	1.71	2.69	4.09
10.0	1.64	2.55	3.82
26.5	1.66	2.44	3.42
42.9	1.62	2.34	3.25
59.3	1.60	2.30	3.18
75.7	1.62	2.34	3.24
92.2	1.67	2.43	3.36
108.6	1.68	2.43	3.35
125.0	1.66	2.36	3.22
141.4	1.63	2.30	3.12
157.8	1.65	2.32	3.14
174.2	1.69	2.39	3.24
190.6	1.74	2.46	3.34
207.0	1.74	2.44	3.29
223.4	1.74	2.38	3.18
239.8	1.74	2.36	3.14
256.3	1.77	2.43	3.23
272.7	1.83	2.52	3.37
289.1	1.87	2.57	3.43
305.5	1.88	2.54	3.36
321.9	1.87	2.48	3.26
338.3	1.89	2.48	3.24
354.7	1.96	2.55	3.33
371.1	2.06	2.67	3.46
387.5	2.15	2.79	3.58
403.9	2.18	2.84	3.61
420.4	2.15	2.82	3.59
436.8	2.14	2.81	3.59
453.2	2.17	2.86	3.67
469.6	2.22	2.95	3.79
486.0	2.27	3.00	3.85
502.4	2.27	2.97	3.79
518.8	2.25	2.91	3.70
535.2	2.25	2.90	3.67
551.6	2.28	2.92	3.68
568.0	2.32	2.96	3.71
584.5	2.34	2.97	3.72
600.9	2.35	2.95	3.67
617.3	2.36	2.93	3.63
633.7	2.39	2.94	3.62
650.1	2.46	2.99	3.65

IF (OUT) (MHz)	IF VSWR @LO=400.1MHz (:1)		
	@LO (dBm)		
	+4	+7	+10
5.0	1.73	1.59	1.46
10.0	1.74	1.59	1.47
20.0	2.01	1.60	1.39
30.0	2.02	1.61	1.40
40.0	2.02	1.61	1.41
50.0	2.03	1.63	1.43
60.0	2.04	1.64	1.45
70.0	2.05	1.66	1.47
80.0	2.06	1.67	1.48
90.0	2.06	1.68	1.50
100.0	2.07	1.70	1.52
110.0	2.09	1.73	1.55
120.0	2.11	1.75	1.57
130.0	2.10	1.76	1.59
140.0	2.11	1.77	1.61
150.0	2.11	1.79	1.64
160.0	2.13	1.80	1.66
170.0	2.14	1.82	1.68
180.0	2.14	1.84	1.70
190.0	2.15	1.86	1.73
200.0	2.17	1.88	1.75
210.0	2.17	1.89	1.77
220.0	2.16	1.89	1.78
230.0	2.15	1.90	1.79
240.0	2.15	1.90	1.81
250.0	2.16	1.92	1.82
260.0	2.18	1.93	1.83
270.0	2.18	1.94	1.85
280.0	2.19	1.96	1.87
290.0	2.18	1.96	1.88
300.0	2.17	1.95	1.88
310.0	2.15	1.94	1.86
320.0	2.12	1.92	1.85
330.0	2.11	1.91	1.84
340.0	2.11	1.90	1.84
350.0	2.11	1.90	1.84
360.0	2.11	1.90	1.84
370.0	2.11	1.90	1.84
380.0	2.10	1.90	1.84
390.0	2.09	1.89	1.83
400.0	2.26	2.09	2.06

## Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	20	30	13	34	17	36	27	38	38	44
1	-	19	+0	25	11	39	23	43	39	40	37	42
2	>100	59	55	56	56	58	49	61	54	77	62	79
3	>100	68	64	66	68	71	66	69	73	72	65	69
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	78	>81	>81	>81	>81	>81
7	>100	>81	>81	>81	>81	>81	>81	66	>81	>81	>81	>81
8	>100	>81	>81	>81	>81	>81	>81	>81	61	>81	>81	>81
9	>100	>81	>81	>81	>81	>81	>81	>81	>81	51	>81	>81
10	>100	>81	>81	>81	>81	>81	>81	>81	>81	>81	79	>81
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

### LO HARMONICS ORDER

Test conditions: RF IN: 200.1 MHz; -14.00 dBm.  
 LO IN: 230.01 MHz; +7.00 dBm  
 IF OUT: 29.91 MHz; -19.03 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	29	39	24	52	28	50	39	52	52	58
1	-	20	+0	26	12	36	24	50	38	48	46	50
2	97	55	51	53	51	54	46	56	50	70	55	62
3	>100	52	39	45	41	45	37	54	49	54	54	51
4	>100	67	68	65	64	64	65	64	56	72	65	80
5	>100	71	60	67	55	74	52	84	53	63	63	67
6	>100	89	82	82	81	81	75	80	78	79	78	85
7	>100	>91	89	84	82	76	70	74	65	72	62	89
8	>100	>91	>91	>91	>91	87	>91	>91	75	87	87	91
9	>100	>91	89	89	88	>91	78	86	82	67	83	87
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: 200.1 MHz; -4.00 dBm.  
 LO IN: 230.01 MHz; +7.00 dBm  
 IF OUT: 29.91 MHz; -9.07 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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