Frequency Mixer TAK-5R

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB) @LO (dBm)		
		+4	+7	+10
0.05	30.1	5.36	5.17	5.02
0.2	30.2	5.02	4.82	4.70
1.0	31.0	4.79	4.62	4.50
5.0	35.0	4.80	4.59	4.52
10.0	40.0	4.95	4.76	4.66
20.9	50.9	5.31	4.83	4.69
42.4	72.4	5.28	4.96	4.80
53.2	83.2	5.29	4.94	4.78
63.9	93.9	5.19	4.94	4.79
74.7	104.7	5.22	4.96	4.85
85.5	115.5	5.23	4.94	4.80
96.3	126.3	5.25	4.97	4.78
107.0	137.0	5.43	5.01	4.82
128.6	158.6	5.43	5.23	5.09
139.3	169.3	5.48	5.18	5.08
150.1	180.1	5.47	5.22	5.10
160.9	190.9	5.60	5.29	5.15
171.6	201.6	5.75	5.31	5.26
182.4	212.4	6.08	5.52	5.31
193.2	223.2	6.17	5.74	5.42
203.9	233.9	6.41	6.07	5.71
225.5	255.5	6.77	6.51	6.23
236.3	266.3	6.71	6.42	6.16
247.0	277.0	6.92	6.64	6.35
257.8	287.8	6.94	6.63	6.27
268.6	298.6	7.19	6.80	6.42
279.3	309.3	7.14	6.61	6.34
290.1	320.1	7.47	6.80	6.57
300.9	330.9	7.26	6.65	6.46
311.6	341.6	7.44	6.78	6.68
322.4	352.4	7.19	6.69	6.61
333.2	363.2	7.45	6.99	7.00
343.9	373.9	7.36	7.07	7.15
354.7	384.7	7.75	7.43	7.51
365.5	395.5	7.89	7.79	7.93
376.3	406.3	8.36	8.22	8.39
397.8	427.8	9.22	9.01	9.12
408.6	438.6	9.59	9.44	9.57
419.3	449.3	10.07	9.65	9.71
430.1	460.1	10.88	10.18	10.20

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm) @LO (dBm)		
		+4	+7	+10
10.1	40.1	22.23	26.73	19.06
20.9	50.9	24.44	23.49	21.08
31.6	61.6	22.63	26.53	20.84
42.4	72.4	16.75	26.12	21.10
53.2	83.2	18.25	22.93	26.05
63.9	93.9	16.48	21.44	24.56
74.7	104.7	17.16	26.52	21.50
85.5	115.5	17.20	23.95	20.03
96.3	126.3	17.95	25.11	21.15
107.0	137.0	18.57	24.12	20.57
117.8	147.8	20.16	21.15	21.19
128.6	158.6	18.77	26.38	19.55
139.3	169.3	17.99	26.41	22.19
150.1	180.1	20.32	26.39	18.91
160.9	190.9	23.41	23.62	17.85
171.6	201.6	20.73	20.94	19.20
182.4	212.4	13.86	25.59	18.24
193.2	223.2	11.87	25.56	19.21
203.9	233.9	10.71	21.61	15.52
214.7	244.7	10.45	24.82	10.20
225.5	255.5	10.45	24.23	10.40
236.3	266.3	10.64	20.90	10.53
247.0	277.0	10.99	17.73	10.82
257.8	287.8	11.44	23.51	11.58
268.6	298.6	12.84	17.78	13.48
279.3	309.3	12.99	22.66	13.71
290.1	320.1	14.05	24.29	16.44
300.9	330.9	14.15	22.87	19.16
311.6	341.6	15.42	23.52	20.86
322.4	352.4	13.97	21.83	21.41
333.2	363.2	15.47	22.25	18.90
343.9	373.9	17.97	25.46	20.00
354.7	384.7	14.69	20.10	22.84
365.5	395.5	16.26	21.41	17.51
376.3	406.3	15.40	21.02	15.65
387.0	417.0	14.41	20.37	16.91
397.8	427.8	14.16	21.78	15.96
408.6	438.6	14.64	17.43	17.34
419.3	449.3	15.16	19.74	18.41
430.1	460.1	15.32	21.64	19.00

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+1dBm (dB) @LO (dBm)		
		+4	+7	+10
10.1	40.1	0.42	0.18	0.08
20.9	50.9	0.20	0.14	0.02
31.6	61.6	0.23	0.14	0.04
42.4	72.4	0.27	0.12	0.04
53.2	83.2	0.25	0.12	0.06
63.9	93.9	0.35	0.15	0.07
74.7	104.7	0.39	0.13	0.07
85.5	115.5	0.26	0.15	0.10
96.3	126.3	0.29	0.15	0.10
107.0	137.0	0.24	0.18	0.10
117.8	147.8	0.34	0.12	0.10
128.6	158.6	0.34	0.16	0.11
139.3	169.3	0.52	0.20	0.15
150.1	180.1	0.65	0.26	0.18
160.9	190.9	0.62	0.32	0.16
171.6	201.6	0.67	0.37	0.12
182.4	212.4	0.68	0.46	0.16
193.2	223.2	0.72	0.58	0.29
203.9	233.9	0.76	0.51	0.33
214.7	244.7	0.83	0.59	0.34
225.5	255.5	0.75	0.48	0.31
236.3	266.3	0.86	0.63	0.49
247.0	277.0	0.68	0.46	0.35
257.8	287.8	0.71	0.50	0.44
268.6	298.6	0.43	0.33	0.31
279.3	309.3	0.62	0.49	0.42
290.1	320.1	0.46	0.44	0.35
300.9	330.9	0.66	0.64	0.46
311.6	341.6	0.76	0.64	0.41
322.4	352.4	0.99	0.70	0.44
333.2	363.2	0.97	0.65	0.39
343.9	373.9	1.10	0.69	0.39
354.7	384.7	1.13	0.61	0.34
365.5	395.5	1.18	0.50	0.25
376.3	406.3	1.15	0.46	0.26
387.0	417.0	1.29	0.46	0.26
397.8	427.8	1.59	0.55	0.36
408.6	438.6	1.64	0.55	0.42
419.3	449.3	1.84	0.78	0.58
430.1	460.1	2.12	0.81	0.62

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=100.1MHz (dB) @LO (dBm) +7
90.0	10.1	5.25
87.9	12.2	5.20
85.9	14.2	5.17
83.8	16.3	5.18
81.8	18.3	5.14
79.7	20.4	5.09
77.7	22.4	5.05
75.6	24.5	5.04
73.6	26.5	5.05
71.5	28.6	5.03
69.5	30.6	5.01
67.4	32.7	5.00
65.4	34.7	4.96
63.3	36.8	4.95
61.3	38.8	4.94
59.2	40.9	4.93
57.2	42.9	4.95
55.1	45.0	4.94
53.1	47.0	4.90
51.0	49.1	4.82
49.0	51.1	4.85
46.9	53.2	4.86
44.9	55.2	4.89
42.8	57.3	4.89
40.8	59.3	4.94
38.7	61.4	4.91
36.7	63.4	4.93
34.6	65.5	4.91
32.6	67.5	4.91
30.5	69.6	4.92
28.5	71.6	4.92
26.4	73.7	4.93
24.4	75.7	4.93
22.3	77.8	4.91
20.3	79.8	4.94
18.2	81.9	4.95
16.2	83.9	4.96
14.1	86.0	4.96
12.1	88.0	5.01
10.0	90.1	5.04

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=10.1MHz (dB) @LO (dBm) +7
10.0	20.1	4.73
14.6	24.7	4.66
19.2	29.3	4.57
23.8	33.9	4.56
28.5	38.6	4.55
33.1	43.2	4.64
37.7	47.8	4.63
42.3	52.4	4.65
46.9	57.0	4.71
51.5	61.6	4.74
56.2	66.3	4.68
60.8	70.9	4.72
65.4	75.5	4.77
70.0	80.1	4.77
74.6	84.7	4.84
79.2	89.3	4.88
83.8	93.9	4.87
88.5	98.6	4.85
93.1	103.2	4.93
97.7	107.8	4.91
102.3	112.4	4.90
106.9	117.0	4.92
111.5	121.6	4.87
116.2	126.3	4.92
120.8	130.9	4.94
125.4	135.5	4.97
130.0	140.1	5.09
134.6	144.7	5.26
139.2	149.3	5.42
143.8	153.9	5.54
148.5	158.6	5.52
153.1	163.2	5.51
157.7	167.8	5.58
162.3	172.4	5.58
166.9	177.0	5.60
171.5	181.6	5.67
176.2	186.3	5.61
180.8	190.9	5.50
185.4	195.5	5.56
190.0	200.1	5.51

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=200.1MHz (dB) @LO (dBm) +7
190.0	10.1	6.31
185.4	14.7	6.27
180.8	19.3	6.12
176.2	23.9	6.04
171.5	28.6	5.96
166.9	33.2	5.85
162.3	37.8	5.79
157.7	42.4	5.79
153.1	47.0	5.77
148.5	51.6	5.72
143.8	56.3	5.74
139.2	60.9	5.69
134.6	65.5	5.66
130.0	70.1	5.63
125.4	74.7	5.63
120.8	79.3	5.62
116.2	83.9	5.61
111.5	88.6	5.59
106.9	93.2	5.57
102.3	97.8	5.50
97.7	102.4	5.56
93.1	107.0	5.59
88.5	111.6	5.61
83.8	116.3	5.65
79.2	120.9	5.65
74.6	125.5	5.61
70.0	130.1	5.63
65.4	134.7	5.64
60.8	139.3	5.65
56.2	143.9	5.63
51.5	148.6	5.60
46.9	153.2	5.56
42.3	157.8	5.54
37.7	162.4	5.54
33.1	167.0	5.56
28.5	171.6	5.58
23.8	176.3	5.60
19.2	180.9	5.58
14.6	185.5	5.64
10.0	190.1	5.71

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm)			LO-IF ISOLATION (dB) @LO (dBm)		
	+4	+7	+10	+4	+7	+10
0.05	58.70	61.25	63.38	59.68	62.86	65.04
0.2	58.78	61.25	63.53	60.25	63.20	65.17
1.0	58.78	60.99	63.56	60.35	63.40	65.24
5.0	58.77	61.03	63.40	60.14	63.18	65.16
10.0	58.84	61.08	63.32	60.27	63.47	65.68
20.9	64.72	64.62	63.75	65.94	66.50	64.15
42.4	61.89	63.09	63.07	57.52	57.20	57.25
53.2	60.32	62.33	62.85	52.92	53.32	54.73
63.9	58.63	60.62	62.02	49.28	51.00	53.36
74.7	58.14	61.52	62.89	47.45	48.54	50.36
85.5	55.68	58.39	61.79	45.64	47.51	49.62
96.3	54.48	55.91	58.18	43.60	45.61	48.16
107.0	58.68	62.64	63.26	41.99	43.89	46.11
128.6	55.75	66.88	61.59	41.68	42.69	43.97
139.3	49.07	54.11	61.24	42.38	45.78	47.93
150.1	46.35	49.17	53.20	41.15	44.55	46.85
160.9	45.37	48.35	52.21	39.19	41.54	43.19
171.6	44.39	47.35	51.73	38.27	40.82	42.05
182.4	43.80	46.68	51.10	36.99	39.95	40.27
193.2	43.88	46.90	51.74	36.45	39.06	37.13
203.9	46.81	53.00	53.44	36.67	37.78	35.02
225.5	48.14	53.03	49.86	38.41	38.40	34.66
236.3	47.11	50.20	51.18	37.87	37.75	35.46
247.0	47.32	50.63	52.93	37.22	36.99	35.26
257.8	47.65	50.60	51.27	36.37	35.58	34.23
268.6	48.81	50.46	49.06	36.42	34.73	32.90
279.3	51.80	53.26	48.98	36.88	34.25	31.88
290.1	56.12	50.25	43.01	37.82	34.26	29.73
300.9	62.57	48.31	39.63	37.11	32.66	26.92
311.6	59.31	45.54	36.68	35.04	30.84	24.25
322.4	48.26	43.00	34.58	32.43	29.07	22.49
333.2	42.54	38.24	31.69	29.69	26.99	20.93
343.9	38.79	35.26	29.74	26.83	24.54	19.70
354.7	35.21	32.98	28.26	24.43	22.96	18.76
365.5	32.11	31.66	27.39	22.43	21.80	18.21
376.3	29.17	28.93	25.69	20.73	20.94	17.53
397.8	24.49	24.53	22.85	17.83	17.78	15.80
408.6	23.22	23.24	22.14	17.14	17.01	15.44
419.3	22.38	22.21	21.27	16.80	16.54	15.08
430.1	22.15	21.77	20.71	17.02	16.41	14.89

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB) @LO (dBm)		
		+4	+7	+10
10.1	40.1	34.15	34.78	33.95
20.9	50.9	29.45	30.25	30.66
31.6	61.6	26.99	27.28	27.69
42.4	72.4	25.13	25.75	25.96
53.2	83.2	24.27	24.79	24.96
63.9	93.9	23.62	24.14	24.57
74.7	104.7	22.99	23.79	24.46
85.5	115.5	22.62	23.39	23.98
96.3	126.3	22.20	22.88	23.50
107.0	137.0	22.42	23.15	23.74
117.8	147.8	22.88	23.68	24.14
128.6	158.6	23.14	23.90	24.30
139.3	169.3	23.15	23.94	24.46
150.1	180.1	21.75	22.49	23.04
160.9	190.9	19.67	20.25	20.70
171.6	201.6	18.25	18.71	18.95
182.4	212.4	16.85	17.19	17.38
193.2	223.2	15.74	15.95	16.09
203.9	233.9	15.36	15.46	15.70
214.7	244.7	14.86	14.88	15.04
225.5	255.5	14.65	14.64	14.88
236.3	266.3	14.31	14.23	14.50
247.0	277.0	14.40	14.37	14.55
257.8	287.8	14.38	14.30	14.61
268.6	298.6	14.67	14.65	14.88
279.3	309.3	14.39	14.34	14.43
290.1	320.1	14.57	14.37	14.16
300.9	330.9	14.22	13.85	13.42
311.6	341.6	13.71	13.01	12.53
322.4	352.4	12.88	12.10	11.56
333.2	363.2	12.09	11.33	10.72
343.9	373.9	11.20	10.51	9.84
354.7	384.7	10.39	9.63	9.08
365.5	395.5	9.55	8.73	8.28
376.3	406.3	8.74	7.96	7.64
387.0	417.0	8.12	7.43	7.14
397.8	427.8	7.61	7.10	6.83
408.6	438.6	7.23	6.82	6.51
419.3	449.3	6.93	6.55	6.29
430.1	460.1	6.65	6.24	6.01

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1) @LO (dBm)		
		+4	+7	+10
5.0	35.0	1.32	1.21	1.15
10.0	40.0	1.33	1.22	1.15
20.9	50.9	1.58	1.34	1.23
31.6	61.6	1.58	1.34	1.23
42.4	72.4	1.54	1.35	1.22
53.2	83.2	1.45	1.29	1.17
63.9	93.9	1.44	1.24	1.14
74.7	104.7	1.41	1.24	1.11
85.5	115.5	1.39	1.21	1.12
96.3	126.3	1.32	1.17	1.10
107.0	137.0	1.29	1.15	1.08
117.8	147.8	1.29	1.17	1.08
128.6	158.6	1.23	1.12	1.07
139.3	169.3	1.18	1.08	1.08
150.1	180.1	1.16	1.11	1.15
160.9	190.9	1.16	1.17	1.24
171.6	201.6	1.24	1.24	1.32
182.4	212.4	1.32	1.25	1.30
193.2	223.2	1.38	1.28	1.31
203.9	233.9	1.45	1.34	1.30
214.7	244.7	1.49	1.40	1.34
225.5	255.5	1.53	1.43	1.35
236.3	266.3	1.51	1.42	1.35
247.0	277.0	1.54	1.44	1.35
257.8	287.8	1.53	1.43	1.32
268.6	298.6	1.56	1.41	1.29
279.3	309.3	1.50	1.35	1.26
290.1	320.1	1.57	1.41	1.34
300.9	330.9	1.53	1.40	1.35
311.6	341.6	1.61	1.50	1.48
322.4	352.4	1.56	1.50	1.49
333.2	363.2	1.68	1.63	1.63
343.9	373.9	1.67	1.65	1.67
354.7	384.7	1.79	1.77	1.79
365.5	395.5	1.79	1.79	1.82
376.3	406.3	1.87	1.84	1.86
387.0	417.0	1.91	1.86	1.86
397.8	427.8	2.00	1.88	1.85
408.6	438.6	2.03	1.87	1.83
419.3	449.3	2.10	1.89	1.83
430.1	460.1	2.13	1.93	1.87

LO (MHz)	LO VSWR (:1) @LO (dBm)		
	+4	+7	+10
5.0	1.73	2.61	3.67
10.0	1.69	2.49	3.52
20.9	1.08	1.52	2.28
31.6	1.08	1.56	2.33
42.4	1.05	1.56	2.33
53.2	1.05	1.51	2.24
63.9	1.04	1.48	2.16
74.7	1.04	1.47	2.12
85.5	1.05	1.49	2.17
96.3	1.07	1.50	2.15
107.0	1.05	1.54	2.22
117.8	1.07	1.58	2.29
128.6	1.11	1.62	2.31
139.3	1.13	1.63	2.30
150.1	1.13	1.64	2.30
160.9	1.15	1.64	2.28
171.6	1.18	1.66	2.33
182.4	1.22	1.68	2.33
193.2	1.27	1.73	2.37
203.9	1.32	1.79	2.44
214.7	1.37	1.88	2.52
225.5	1.39	1.96	2.59
236.3	1.41	1.96	2.63
247.0	1.42	1.99	2.65
257.8	1.44	2.03	2.70
268.6	1.47	2.10	2.79
279.3	1.51	2.10	2.81
290.1	1.56	2.17	2.88
300.9	1.61	2.22	2.91
311.6	1.64	2.24	2.92
322.4	1.67	2.22	2.87
333.2	1.70	2.23	2.84
343.9	1.73	2.27	2.86
354.7	1.78	2.32	2.88
365.5	1.85	2.32	2.89
376.3	1.92	2.38	2.91
387.0	2.00	2.43	2.92
397.8	2.09	2.51	2.97
408.6	2.16	2.52	2.93
419.3	2.23	2.54	2.95
430.1	2.32	2.59	2.97

IF (OUT) (MHz)	IF VSWR @LO=200.1MHz (:1) @LO (dBm)		
	+4	+7	+10
5.0	1.66	1.53	1.43
10.6	1.67	1.54	1.44
14.9	2.32	1.86	1.57
19.7	2.30	1.92	1.61
24.6	2.33	1.92	1.61
29.5	2.32	1.92	1.61
34.4	2.34	1.93	1.62
39.2	2.28	1.88	1.60
44.1	2.29	1.91	1.60
49.0	2.27	1.92	1.63
53.8	2.27	1.89	1.61
58.7	2.25	1.94	1.63
63.6	2.28	1.94	1.66
68.5	2.33	1.97	1.67
73.3	2.36	2.01	1.69
78.2	2.45	2.05	1.76
83.1	2.41	2.07	1.80
87.9	2.56	2.13	1.85
92.8	2.59	2.19	1.91
97.7	2.60	2.22	1.96
102.6	2.68	2.26	2.01
107.4	2.68	2.30	2.04
112.3	2.67	2.33	2.04
117.2	2.68	2.34	2.07
122.1	2.72	2.34	2.07
126.9	2.67	2.35	2.08
131.8	2.69	2.35	2.09
136.7	2.73	2.35	2.09
141.5	2.69	2.37	2.13
146.4	2.72	2.42	2.17
151.3	2.75	2.44	2.20
156.2	2.82	2.47	2.25
161.0	2.86	2.52	2.30
165.9	2.85	2.54	2.32
170.8	2.89	2.56	2.35
175.6	2.92	2.60	2.40
180.5	2.91	2.59	2.42
185.4	2.89	2.57	2.41
190.3	2.88	2.60	2.43
195.1	2.93	2.59	2.42
200.0	2.87	2.52	2.33

Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	16	30	14	30	19	40	30	49	48	53
1	-	17	+0	25	12	29	26	38	36	47	34	57
2	>100	59	55	59	54	57	59	76	57	64	70	70
3	>100	60	59	61	61	66	60	64	61	75	60	>81
4	>100	>81	77	>81	74	>81	79	78	>81	>81	>81	>81
5	>100	>81	>81	>81	>81	>81	>81	>81	79	>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: 100.1 MHz; -14.00 dBm.
LO IN: 130.01 MHz; +7.00 dBm
IF OUT: 29.91 MHz; -18.96 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	26	40	23	39	31	53	43	71	66	75
1	-	18	+0	27	13	32	25	40	39	49	43	61
2	92	52	48	54	49	52	58	62	51	65	59	70
3	>100	45	41	48	47	49	48	49	54	57	53	66
4	>100	73	63	68	65	67	64	66	68	82	69	77
5	>100	70	68	64	66	65	58	64	59	66	63	76
6	>100	>91	84	84	74	81	74	75	75	77	79	83
7	>100	90	78	78	75	73	71	78	68	72	69	84
8	>100	>91	91	>91	85	84	84	84	81	83	89	87
9	>100	>91	88	>91	84	88	81	84	73	90	76	86
10	>100	>91	>91	>91	>91	>91	>91	>91	81	74	>91	89
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 100.1 MHz; -4.00 dBm.
LO IN: 130.01 MHz; +7.00 dBm
IF OUT: 29.91 MHz; -9.03 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.