

Frequency Mixer

HJK-ED11004/1

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=88.5MHz (dB)			RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)			RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+15dBm (dB)		
		@LO (dBm)					@LO (dBm)					@LO (dBm)		
		+13	+15	+17			+13	+15	+17			+13	+15	+17
100.0	11.5	6.52	6.05	5.78	100.0	11.5	21.63	28.43	27.27	100.0	11.5	-0.42	-0.20	-0.06
120.0	31.5	6.59	6.17	5.91	120.0	31.5	22.36	27.27	29.96	120.0	31.5	-0.36	-0.18	-0.07
140.0	51.5	6.75	6.28	6.00	140.0	51.5	19.37	22.12	24.07	140.0	51.5	-0.34	-0.18	-0.08
160.0	71.5	6.39	6.04	5.79	160.0	71.5	21.12	22.46	23.18	160.0	71.5	-0.21	-0.09	0.01
180.0	91.5	6.32	5.96	5.73	180.0	91.5	20.85	27.14	21.35	180.0	91.5	-0.15	-0.03	0.06
200.0	111.5	6.49	6.12	5.86	200.0	111.5	19.96	22.10	22.92	200.0	111.5	-0.26	-0.12	0.00
220.0	131.5	6.40	6.08	5.85	220.0	131.5	21.34	22.40	22.29	220.0	131.5	-0.16	-0.04	0.07
240.0	151.5	6.53	6.16	5.90	240.0	151.5	19.31	21.55	22.42	240.0	151.5	-0.19	-0.06	0.05
260.0	171.5	6.36	6.06	5.86	260.0	171.5	19.80	21.26	21.07	260.0	171.5	-0.06	0.03	0.07
280.0	191.5	6.39	6.10	5.97	280.0	191.5	21.32	23.45	23.76	280.0	191.5	-0.12	0.00	0.08
300.0	211.5	6.53	6.19	6.00	300.0	211.5	20.84	25.01	26.54	300.0	211.5	-0.18	-0.05	0.04
320.0	231.5	6.26	5.98	5.89	320.0	231.5	20.80	24.45	25.02	320.0	231.5	-0.09	0.02	0.07
340.0	251.5	6.22	5.91	5.77	340.0	251.5	18.07	20.49	21.39	340.0	251.5	-0.06	0.09	0.15
360.0	271.5	6.37	6.14	6.06	360.0	271.5	22.37	24.38	25.74	360.0	271.5	-0.03	0.08	0.12
380.0	291.5	6.22	5.99	5.90	380.0	291.5	22.66	25.35	26.66	380.0	291.5	-0.07	0.05	0.11
400.0	311.5	6.21	5.94	5.83	400.0	311.5	23.67	28.00	29.01	400.0	311.5	-0.11	0.02	0.09
420.0	331.5	6.20	5.97	5.90	420.0	331.5	24.69	34.09	30.18	420.0	331.5	-0.10	0.01	0.07
445.0	356.5	6.40	6.13	5.99	445.0	356.5	22.60	26.73	29.92	445.0	356.5	-0.16	-0.06	0.02
465.0	376.5	6.47	6.23	6.11	465.0	376.5	22.37	27.36	32.56	465.0	376.5	-0.13	-0.04	0.02
490.0	401.5	6.83	6.52	6.34	490.0	401.5	20.75	22.80	25.33	490.0	401.5	-0.27	-0.15	-0.09
510.0	421.5	6.69	6.43	6.27	510.0	421.5	22.33	23.44	27.46	510.0	421.5	-0.21	-0.12	-0.06
535.0	446.5	7.00	6.68	6.47	535.0	446.5	18.62	19.99	21.88	535.0	446.5	-0.30	-0.20	-0.13
555.0	466.5	7.11	6.78	6.55	555.0	466.5	17.22	18.95	21.03	555.0	466.5	-0.22	-0.16	-0.10
580.0	491.5	7.67	7.20	6.94	580.0	491.5	13.31	14.05	13.76	580.0	491.5	0.18	0.39	0.53
600.0	511.5	8.15	7.80	7.64	600.0	511.5	15.55	20.91	23.61	600.0	511.5	0.45	0.45	0.32
625.0	536.5	8.13	7.57	7.43	625.0	536.5	17.93	22.07	24.42	625.0	536.5	0.41	0.39	0.25
645.0	556.5	8.55	7.64	7.37	645.0	556.5	18.05	20.80	22.25	645.0	556.5	0.37	0.45	0.35
670.0	581.5	8.32	7.50	7.24	670.0	581.5	19.91	22.10	23.59	670.0	581.5	0.26	0.32	0.24
690.0	601.5	8.99	7.86	7.46	690.0	601.5	20.91	23.04	23.23	690.0	601.5	0.15	0.32	0.29
715.0	626.5	8.81	7.77	7.39	715.0	626.5	21.66	24.60	24.38	715.0	626.5	0.10	0.26	0.24
735.0	646.5	9.64	8.31	7.81	735.0	646.5	21.02	34.53	28.94	735.0	646.5	-0.01	0.26	0.26
760.0	671.5	9.82	8.47	7.95	760.0	671.5	20.13	26.38	27.14	760.0	671.5	-0.09	0.21	0.22
780.0	691.5	9.67	8.38	7.88	780.0	691.5	20.57	26.23	26.95	780.0	691.5	-0.08	0.18	0.18
805.0	716.5	10.64	9.04	8.40	805.0	716.5	17.81	21.59	22.32	805.0	716.5	-0.29	0.12	0.19
825.0	736.5	10.36	8.88	8.27	825.0	736.5	18.64	22.80	23.54	825.0	736.5	-0.24	0.12	0.18
850.0	761.5	11.84	9.94	9.15	850.0	761.5	15.28	18.83	19.57	850.0	761.5	-0.57	-0.03	0.16
870.0	781.5	11.31	9.61	8.91	870.0	781.5	16.20	19.27	20.21	870.0	781.5	-0.50	-0.01	0.15
895.0	806.5	11.91	10.03	9.25	895.0	806.5	15.23	18.49	19.49	895.0	806.5	-0.63	-0.10	0.10
915.0	826.5	12.46	10.49	9.66	915.0	826.5	13.99	17.20	17.94	915.0	826.5	-0.60	-0.13	0.02
940.0	851.5	12.62	10.64	9.80	940.0	851.5	14.06	17.85	18.67	940.0	851.5	-0.27	0.11	0.16

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Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=436.5MHz (dB)
		@LO (dBm)
		+15
426.5	10.0	7.80
409.8	26.7	7.51
393.2	43.3	7.73
376.5	60.0	7.63
359.9	76.6	7.26
343.2	93.3	7.31
326.5	110.0	7.34
309.9	126.6	7.08
293.2	143.3	6.99
276.6	159.9	7.00
259.9	176.6	6.73
243.2	193.3	6.62
226.6	209.9	6.66
209.9	226.6	6.41
193.3	243.2	6.36
176.6	259.9	6.47
143.3	293.2	6.35
126.6	309.9	6.26
93.3	343.2	6.05
76.6	359.9	6.13
43.3	393.2	6.23
26.7	409.8	6.19
10.0	446.5	6.66
32.5	469.0	6.35
77.6	514.1	7.61
100.2	536.7	7.56
145.2	581.7	7.37
167.8	604.3	7.51
212.9	649.4	7.68
235.4	671.9	7.74
280.5	717.0	8.21
303.0	739.5	8.19
348.1	784.6	8.68
370.6	807.1	9.13
415.7	852.2	9.87
438.3	874.8	10.80
483.3	919.8	11.65
505.9	942.4	11.39
551.0	987.5	12.01
573.5	1010.0	11.64

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=415.1MHz (dB)
		@LO (dBm)
		+15
10.0	425.1	6.41
20.0	435.1	6.26
30.0	445.1	6.24
40.0	455.1	6.34
50.0	465.1	6.28
60.0	475.1	6.29
70.0	485.1	6.42
80.0	495.1	6.86
90.0	505.1	7.49
100.0	515.1	7.71
110.0	525.1	7.66
120.0	535.1	7.60
130.0	545.1	7.60
140.0	555.1	7.53
150.0	565.1	7.52
160.0	575.1	7.37
170.0	585.1	7.32
180.0	595.1	7.40
200.0	615.1	7.44
210.0	625.1	7.44
230.0	645.1	7.70
240.0	655.1	7.87
260.0	675.1	7.71
270.0	685.1	7.60
290.0	705.1	8.03
300.0	715.1	8.17
320.0	735.1	8.10
330.0	745.1	8.33
350.0	765.1	8.91
360.0	775.1	8.76
380.0	795.1	8.52
390.0	805.1	8.87
410.0	825.1	9.42
420.0	835.1	9.39
440.0	855.1	9.90
450.0	865.1	10.43
470.0	885.1	10.22
480.0	895.1	9.99
500.0	915.1	11.12
510.0	925.1	11.53

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=458.1MHz (dB)
		@LO (dBm)
		+15
440.1	18.0	7.62
430.1	28.0	7.66
420.1	38.0	7.71
410.1	48.0	7.67
400.1	58.0	7.62
390.1	68.0	7.46
380.1	78.0	7.36
370.1	88.0	7.34
360.1	98.0	7.41
350.1	108.0	7.33
340.1	118.0	7.27
330.1	128.0	7.16
320.1	138.0	7.13
310.1	148.0	7.15
300.1	158.0	7.05
290.1	168.0	6.99
280.1	178.0	6.80
270.1	188.0	6.76
260.1	198.0	6.75
250.1	208.0	6.75
240.1	218.0	6.72
230.1	228.0	6.53
220.1	238.0	6.45
210.1	248.0	6.44
200.1	258.0	6.54
190.1	268.0	6.52
180.1	278.0	6.45
170.1	288.0	6.37
160.1	298.0	6.37
150.1	308.0	6.29
140.1	318.0	6.40
130.1	328.0	6.27
110.1	348.0	6.27
100.1	358.0	6.13
80.1	378.0	6.18
70.1	388.0	6.25
50.1	408.0	6.28
40.1	418.0	6.22
20.1	438.0	6.33
10.1	448.0	6.62

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+13	+15	+17	+13	+15	+17
11.5	77.62	73.75	76.52	64.57	64.82	64.85
31.5	67.92	68.01	68.64	62.73	62.85	63.04
51.5	62.09	62.16	62.55	56.83	56.97	57.08
71.5	57.26	57.53	58.04	54.19	54.35	54.58
91.5	54.10	54.42	54.98	52.22	52.34	52.56
111.5	52.52	53.08	53.46	50.51	50.57	50.73
131.5	51.30	51.81	52.40	49.17	49.17	49.44
151.5	52.47	53.01	53.63	48.13	48.16	48.39
171.5	50.61	51.24	52.47	47.13	47.29	47.90
191.5	49.38	50.06	50.91	46.37	46.36	46.39
211.5	48.87	49.71	50.83	46.00	46.00	46.02
231.5	47.07	48.03	49.31	45.94	46.28	46.39
251.5	46.61	47.22	48.21	45.15	45.93	46.35
271.5	46.44	46.96	47.79	43.04	43.07	43.18
291.5	45.45	45.88	46.49	42.50	42.22	42.04
311.5	46.29	46.82	47.45	42.58	42.11	41.76
331.5	45.73	46.47	46.95	42.86	42.34	41.83
356.5	45.14	45.87	46.65	44.02	43.29	42.69
376.5	46.15	46.82	47.67	45.30	44.57	43.84
401.5	45.99	46.64	47.35	48.32	47.77	47.18
421.5	48.25	48.83	49.69	49.67	49.23	48.55
446.5	47.77	48.37	49.16	46.36	46.01	45.77
466.5	47.50	47.76	48.19	42.24	41.78	41.24
491.5	45.78	45.28	44.49	38.14	37.34	36.53
511.5	43.03	42.42	42.34	37.96	37.33	37.11
536.5	42.12	42.16	42.45	38.27	37.86	37.81
556.5	42.01	42.05	42.39	39.23	38.62	38.46
581.5	42.45	42.48	42.78	39.87	39.43	39.29
601.5	43.22	43.05	43.29	40.97	40.27	40.00
626.5	43.28	43.01	43.17	41.71	41.13	40.94
646.5	44.19	43.90	44.04	42.60	41.98	41.72
671.5	44.57	44.13	44.13	43.27	42.80	42.61
691.5	44.85	44.45	44.46	43.63	43.27	43.09
716.5	45.99	45.29	45.06	44.37	44.21	44.22
736.5	45.25	44.63	44.41	44.66	44.63	44.66
761.5	46.29	45.37	44.99	44.70	44.82	45.05
781.5	46.17	45.38	45.19	44.64	44.63	44.74
806.5	46.86	45.86	45.55	44.78	44.88	45.14
826.5	47.25	46.37	46.27	44.76	44.80	45.00
851.5	47.18	46.11	45.91	45.07	45.19	45.57

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+13	+15	+17
100.0	157.6	36.38	44.51	53.66
120.0	177.6	36.17	40.27	38.90
140.0	197.6	40.10	55.76	61.68
160.0	217.6	37.84	43.83	45.32
180.0	237.6	41.56	56.79	52.54
200.0	257.6	39.27	47.80	67.51
220.0	277.6	40.05	46.52	45.95
240.0	297.6	42.52	56.58	62.18
260.0	317.6	42.91	63.33	76.20
280.0	337.6	44.31	54.20	44.43
300.0	357.6	42.43	55.55	49.57
320.0	377.6	44.09	54.29	47.50
340.0	397.6	41.94	48.05	51.34
360.0	417.6	43.48	48.34	51.51
380.0	437.6	43.57	47.43	48.44
400.0	457.6	43.80	46.57	46.91
420.0	477.6	43.40	45.44	46.20
445.0	502.6	34.48	34.69	35.37
465.0	522.6	31.87	31.91	31.40
490.0	547.6	33.90	34.57	34.48
510.0	567.6	34.53	34.97	34.28
535.0	592.6	35.54	36.51	35.55
555.0	612.6	36.40	37.51	36.46
580.0	637.6	37.63	37.93	35.93
600.0	657.6	39.08	39.60	36.57
625.0	682.6	40.35	40.60	37.85
645.0	702.6	40.55	41.48	37.71
670.0	727.6	40.90	41.80	38.00
690.0	747.6	40.15	41.64	37.76
715.0	772.6	38.76	41.00	36.82
735.0	792.6	38.65	40.88	37.37
760.0	817.6	37.18	40.51	37.73
780.0	837.6	36.92	40.84	38.30
805.0	862.6	36.33	39.82	38.59
825.0	882.6	36.11	40.46	39.03
850.0	907.6	36.42	42.43	38.75
870.0	927.6	36.99	41.79	39.19
895.0	952.6	38.36	40.99	37.18
915.0	972.6	38.47	39.69	37.31
940.0	997.6	38.76	35.17	33.77

Frequency Mixer

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Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=369.5MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+13	+15	+17		+13	+15	+17		+13	+15	+17
100.0	11.5	1.36	1.27	1.26	11.5	1.64	1.64	1.64	10.0	1.22	1.10	1.03
120.0	31.5	1.37	1.31	1.31	31.5	2.60	2.60	2.60	20.0	1.25	1.13	1.06
140.0	51.5	1.44	1.36	1.36	51.5	5.56	5.56	5.52	30.0	1.26	1.15	1.09
160.0	71.5	1.43	1.42	1.44	71.5	5.68	5.66	5.65	40.0	1.27	1.17	1.12
180.0	91.5	1.50	1.48	1.50	91.5	5.41	5.39	5.38	50.0	1.30	1.20	1.16
200.0	111.5	1.56	1.54	1.55	111.5	5.23	5.22	5.20	60.0	1.31	1.22	1.18
220.0	131.5	1.58	1.59	1.63	131.5	4.88	4.88	4.86	70.0	1.34	1.25	1.22
240.0	151.5	1.63	1.62	1.65	151.5	4.54	4.53	4.52	80.0	1.38	1.29	1.25
260.0	171.5	1.67	1.69	1.76	171.5	4.18	4.16	4.14	90.0	1.41	1.32	1.28
280.0	191.5	1.72	1.75	1.82	191.5	3.83	3.82	3.78	100.0	1.44	1.36	1.32
300.0	211.5	1.74	1.76	1.80	211.5	3.48	3.46	3.44	110.0	1.48	1.40	1.36
320.0	231.5	1.77	1.80	1.86	231.5	3.11	3.10	3.06	120.0	1.51	1.44	1.40
340.0	251.5	1.81	1.84	1.91	251.5	2.80	2.79	2.76	130.0	1.53	1.46	1.43
360.0	271.5	1.84	1.90	1.97	271.5	2.55	2.55	2.52	140.0	1.56	1.48	1.45
380.0	291.5	1.86	1.91	1.97	291.5	2.35	2.35	2.33	150.0	1.60	1.52	1.49
400.0	311.5	1.87	1.90	1.96	311.5	2.26	2.26	2.24	160.0	1.64	1.56	1.52
420.0	331.5	1.91	1.93	1.99	331.5	2.29	2.31	2.29	170.0	1.69	1.61	1.57
445.0	356.5	1.94	1.95	1.97	356.5	2.54	2.57	2.54	180.0	1.74	1.66	1.61
465.0	376.5	1.98	1.97	1.99	376.5	2.90	2.94	2.91	190.0	1.78	1.70	1.66
490.0	401.5	2.04	1.99	1.98	401.5	3.56	3.62	3.56	200.0	1.83	1.74	1.70
510.0	421.5	2.05	2.01	1.99	421.5	4.31	4.38	4.33	210.0	1.87	1.78	1.73
535.0	446.5	2.20	2.12	2.09	446.5	5.30	5.38	5.30	215.0	1.90	1.81	1.76
555.0	466.5	2.26	2.17	2.12	466.5	6.09	6.17	6.11	225.0	1.92	1.84	1.79
580.0	491.5	2.39	2.18	2.12	491.5	6.81	6.83	6.78	230.0	1.93	1.85	1.80
600.0	511.5	2.10	1.94	2.01	511.5	8.01	8.23	8.23	240.0	1.96	1.87	1.83
625.0	536.5	2.06	1.98	2.03	536.5	10.50	10.75	10.62	245.0	1.98	1.89	1.84
645.0	556.5	2.27	2.01	1.99	556.5	12.52	12.80	12.52	255.0	2.03	1.93	1.88
670.0	581.5	2.24	2.00	1.98	581.5	15.53	15.81	15.26	260.0	2.06	1.96	1.90
690.0	601.5	2.56	2.12	2.05	601.5	18.11	18.30	17.93	270.0	2.11	2.00	1.94
715.0	626.5	2.60	2.17	2.09	626.5	20.95	21.20	20.45	275.0	2.14	2.03	1.97
735.0	646.5	3.05	2.41	2.32	646.5	22.29	22.58	21.73	285.0	2.19	2.08	2.02
760.0	671.5	3.16	2.48	2.39	671.5	24.14	24.14	23.18	290.0	2.21	2.10	2.04
780.0	691.5	3.14	2.49	2.40	691.5	25.94	25.94	25.19	300.0	2.26	2.15	2.09
805.0	716.5	3.67	2.79	2.71	716.5	27.59	28.03	27.16	305.0	2.28	2.17	2.10
825.0	736.5	3.58	2.77	2.68	736.5	28.49	28.03	26.74	315.0	2.30	2.19	2.13
850.0	761.5	4.28	3.16	3.08	761.5	30.49	30.49	28.96	320.0	2.31	2.20	2.13
870.0	781.5	4.01	3.03	2.96	781.5	33.42	32.79	31.60	330.0	2.32	2.21	2.14
895.0	806.5	4.34	3.23	3.17	806.5	36.20	36.20	35.46	335.0	2.33	2.22	2.15
915.0	826.5	4.62	3.43	3.40	826.5	37.77	37.77	36.20	345.0	2.40	2.27	2.20
940.0	851.5	4.75	3.54	3.50	851.5	37.77	36.97	34.07	350.0	2.43	2.30	2.22

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Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	20	29	29	32	42	44	46	58	59	59
1	-	41	+0	45	12	40	20	38	28	42	34	44
2	69	58	49	61	53	60	67	59	66	61	64	63
3	>90	66	56	65	56	64	54	62	53	61	56	64
4	>90	81	81	>84	83	>84	78	>84	83	75	81	78
5	>90	>84	>84	>84	81	>84	78	>84	79	83	74	78
6	>90	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84
7	>90	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84
8	>90	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84
9	>90	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84
10	>90	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 436.5 MHz; 0.00 dBm.
LO IN: 348 MHz; +15.00 dBm
IF OUT: 88.5 MHz; -6.14 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	29	40	36	43	46	61	52	64	58	64
1	-	44	+0	44	12	47	20	43	27	48	33	52
2	49	51	41	50	48	55	54	58	65	65	57	60
3	78	65	41	61	40	60	40	59	42	54	51	56
4	>90	64	62	70	64	73	64	73	76	70	77	75
5	>90	75	62	69	57	70	57	71	55	72	54	65
6	>90	83	93	74	73	78	74	86	78	79	72	76
7	>90	81	79	79	74	75	67	73	65	76	64	74
8	>90	87	89	88	92	86	83	83	81	83	92	84
9	>90	88	84	89	84	87	80	84	74	78	75	79
10	>90	>94	>94	>94	>94	>94	>94	93	93	86	87	88
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 436.5 MHz; 10.00 dBm.
LO IN: 348 MHz; +15.00 dBm
IF OUT: 88.5 MHz; 3.9 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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