

Frequency Mixer

HJK-ED11353/1

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=21.4MHz (dB)			RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)			RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+18dBm (dB)		
		@LO (dBm)					@LO (dBm)					@LO (dBm)		
		+15	+17	+19			+15	+17	+19			+15	+17	+19
80.0	58.6	7.41	6.83	6.41	80.0	58.6	20.81	21.74	22.61	80.0	58.6	1.84	1.47	1.01
100.0	78.6	6.84	6.41	6.10	100.0	78.6	21.82	22.81	23.70	100.0	78.6	1.53	1.06	0.71
120.0	98.6	6.56	6.20	5.96	120.0	98.6	23.70	24.56	25.46	120.0	98.6	0.87	0.55	0.36
140.0	118.6	6.46	6.13	5.91	140.0	118.6	23.91	24.85	26.18	140.0	118.6	0.86	0.60	0.41
160.0	138.6	6.52	6.18	5.95	160.0	138.6	23.67	24.94	26.33	160.0	138.6	0.91	0.62	0.45
180.0	158.6	6.33	6.06	5.87	180.0	158.6	25.53	27.42	29.11	180.0	158.6	1.00	0.74	0.53
200.0	178.6	6.22	5.97	5.81	200.0	178.6	25.90	27.41	28.52	200.0	178.6	0.82	0.63	0.47
220.0	198.6	6.20	5.96	5.80	220.0	198.6	26.74	26.91	27.59	220.0	198.6	0.69	0.46	0.33
240.0	218.6	6.22	5.97	5.81	240.0	218.6	28.70	29.47	30.12	240.0	218.6	0.78	0.51	0.36
260.0	238.6	6.23	6.00	5.84	260.0	238.6	30.98	30.99	31.14	260.0	238.6	0.79	0.50	0.34
280.0	258.6	6.14	5.97	5.86	280.0	258.6	31.93	32.02	33.22	280.0	258.6	0.84	0.53	0.35
300.0	278.6	6.10	5.93	5.81	300.0	278.6	25.11	25.54	26.01	300.0	278.6	0.69	0.42	0.30
320.0	298.6	6.09	5.94	5.87	320.0	298.6	24.65	25.32	26.56	320.0	298.6	0.49	0.41	0.35
340.0	318.6	6.16	6.02	5.94	340.0	318.6	28.99	30.22	30.90	340.0	318.6	0.42	0.36	0.30
360.0	338.6	6.18	6.08	6.02	360.0	338.6	27.87	29.52	31.50	360.0	338.6	0.34	0.28	0.22
380.0	358.6	6.17	6.10	6.07	380.0	358.6	28.35	29.63	30.16	380.0	358.6	0.32	0.24	0.18
400.0	378.6	6.13	6.05	6.00	400.0	378.6	30.72	32.12	32.15	400.0	378.6	0.28	0.20	0.15
425.0	403.6	6.08	5.97	5.90	425.0	403.6	32.96	34.50	35.26	425.0	403.6	0.27	0.20	0.15
445.0	423.6	6.14	6.02	5.94	445.0	423.6	34.44	34.95	37.28	445.0	423.6	0.20	0.15	0.11
470.0	448.6	6.11	5.99	5.90	470.0	448.6	33.59	35.51	36.84	470.0	448.6	0.22	0.17	0.13
490.0	468.6	6.19	6.04	5.92	490.0	468.6	33.37	36.17	37.02	490.0	468.6	0.14	0.11	0.09
515.0	493.6	6.26	6.09	5.95	515.0	493.6	29.70	31.74	33.10	515.0	493.6	0.14	0.08	0.05
535.0	513.6	6.51	6.30	6.13	535.0	513.6	36.02	36.59	37.48	535.0	513.6	0.41	0.03	0.00
560.0	538.6	6.95	6.72	6.51	560.0	538.6	26.43	28.18	30.43	560.0	538.6	1.23	0.76	0.43
580.0	558.6	7.58	7.34	7.11	580.0	558.6	20.36	22.38	24.91	580.0	558.6	2.30	1.86	1.55
605.0	583.6	9.03	8.57	7.48	605.0	583.6	18.40	25.28	25.47	605.0	583.6	-0.27	-0.31	0.28
625.0	603.6	7.56	7.03	6.70	625.0	603.6	23.03	24.42	28.21	625.0	603.6	0.57	0.62	0.55
650.0	628.6	7.59	7.26	7.02	650.0	628.6	24.23	26.58	30.60	650.0	628.6	0.78	0.60	0.42
670.0	648.6	7.82	7.48	7.24	670.0	648.6	23.34	25.69	28.30	670.0	648.6	0.87	0.70	0.48
695.0	673.6	8.02	7.72	7.50	695.0	673.6	23.63	25.33	26.69	695.0	673.6	0.90	0.72	0.52
715.0	693.6	8.27	7.99	7.80	715.0	693.6	23.11	24.94	26.14	715.0	693.6	0.96	0.78	0.59
740.0	718.6	8.60	8.34	8.20	740.0	718.6	22.11	24.38	26.29	740.0	718.6	1.09	0.85	0.64
760.0	738.6	8.74	8.45	8.33	760.0	738.6	20.58	22.35	24.56	760.0	738.6	1.28	1.03	0.79
785.0	763.6	8.85	8.44	8.28	785.0	763.6	19.76	20.84	22.75	785.0	763.6	1.59	1.39	1.16
805.0	783.6	8.99	8.46	8.22	805.0	783.6	19.13	19.77	21.34	805.0	783.6	1.83	1.69	1.48
830.0	808.6	9.35	8.61	8.22	830.0	808.6	19.17	19.46	20.68	830.0	808.6	2.09	2.03	1.87
850.0	828.6	9.65	8.75	8.25	850.0	828.6	19.43	19.57	20.65	850.0	828.6	2.26	2.25	2.12
875.0	853.6	10.03	8.98	8.33	875.0	853.6	20.30	20.26	21.21	875.0	853.6	2.34	2.33	2.22
895.0	873.6	10.39	9.27	8.54	895.0	873.6	20.87	20.70	21.47	895.0	873.6	2.43	2.38	2.25
920.0	898.6	11.17	9.93	9.06	920.0	898.6	20.68	21.55	21.85	920.0	898.6	2.53	2.38	2.20

REV. X2

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Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=481.1MHz (dB)
		@LO (dBm)
		+17
471.0	10.1	15.31
450.5	30.6	9.45
430.0	51.1	9.07
409.5	71.6	8.57
389.0	92.1	8.11
368.6	112.5	7.88
348.1	133.0	7.88
327.6	153.5	7.73
307.1	174.0	7.45
286.6	194.5	7.16
266.1	215.0	6.93
245.6	235.5	6.21
225.1	256.0	7.03
204.6	276.5	6.95
184.2	296.9	6.82
153.4	327.7	6.58
132.9	348.2	6.55
102.2	378.9	6.12
81.7	399.4	6.10
51.0	430.1	6.03
30.5	450.6	5.96
10.0	491.1	6.69
29.5	510.6	6.14
58.8	539.9	6.34
78.3	559.4	6.76
107.6	588.7	7.29
127.1	608.2	6.67
156.3	637.4	6.39
175.8	656.9	6.39
205.1	686.2	6.60
224.6	705.7	7.02
253.9	735.0	8.04
273.4	754.5	8.54
302.7	783.8	9.09
322.2	803.3	9.42
351.4	832.5	9.66
371.0	852.1	9.86
400.2	881.3	10.26
419.7	900.8	10.69
449.0	930.1	11.11

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=450MHz (dB)
		@LO (dBm)
		+17
10.1	460.1	6.57
20.1	470.1	6.12
30.1	480.1	6.01
40.1	490.1	5.89
50.1	500.1	5.96
60.1	510.1	5.91
70.1	520.1	6.02
80.1	530.1	6.02
90.1	540.1	6.25
100.1	550.1	6.42
110.1	560.1	6.59
120.1	570.1	6.83
130.1	580.1	7.94
140.1	590.1	7.27
150.1	600.1	6.89
160.1	610.1	6.69
170.1	620.1	6.54
180.1	630.1	6.47
190.1	640.1	6.32
200.1	650.1	6.33
210.1	660.1	6.32
220.1	670.1	6.39
230.1	680.1	6.64
240.1	690.1	6.84
250.1	700.1	7.08
260.1	710.1	7.40
280.1	730.1	7.98
290.1	740.1	8.24
310.1	760.1	8.69
320.1	770.1	8.83
340.1	790.1	9.13
350.1	800.1	9.28
370.1	820.1	9.50
380.1	830.1	9.50
400.1	850.1	9.70
410.1	860.1	9.88
430.1	880.1	10.29
440.1	890.1	10.47
460.1	910.1	10.97
470.1	920.1	11.15

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=512.1MHz (dB)
		@LO (dBm)
		+17
500.0	12.1	14.28
490.0	22.1	10.57
480.0	32.1	9.55
470.0	42.1	9.24
460.0	52.1	9.27
450.0	62.1	9.03
440.0	72.1	8.82
430.0	82.1	8.55
420.0	92.1	8.31
410.0	102.1	8.23
400.0	112.1	8.02
390.0	122.1	8.05
380.0	132.1	7.95
370.0	142.1	8.03
360.0	152.1	7.96
350.0	162.1	7.76
340.0	172.1	7.72
330.0	182.1	7.50
320.0	192.1	7.54
310.0	202.1	7.36
290.0	222.1	7.20
280.0	232.1	7.03
260.0	252.1	6.16
250.0	262.1	6.97
230.0	282.1	6.98
220.0	292.1	7.12
200.0	312.1	7.00
190.0	322.1	6.85
170.0	342.1	6.68
160.0	352.1	6.58
140.0	372.1	6.42
130.0	382.1	6.40
110.0	402.1	6.26
100.0	412.1	6.19
80.0	432.1	6.13
70.0	442.1	6.06
50.0	462.1	5.99
40.0	472.1	5.95
20.0	492.1	6.10
10.0	502.1	6.73

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+15	+17	+19	+15	+17	+19
58.6	55.88	56.45	56.97	54.69	54.65	54.52
78.6	55.29	56.20	56.75	53.05	53.17	53.16
98.6	54.16	55.14	55.77	51.85	52.08	52.08
118.6	53.38	54.62	55.33	50.83	51.07	51.09
138.6	51.82	53.19	54.00	49.75	50.02	50.07
158.6	50.99	52.62	53.41	48.87	49.25	49.35
178.6	50.54	52.42	53.48	48.05	48.37	48.40
198.6	49.25	50.58	51.16	47.23	47.55	47.65
218.6	48.92	50.73	51.71	46.67	47.18	47.37
238.6	48.19	50.42	51.77	45.79	46.21	46.28
258.6	48.50	51.36	53.32	44.82	45.17	45.22
278.6	47.17	49.91	51.97	43.57	43.70	43.49
298.6	43.72	44.52	44.85	43.74	44.58	45.26
318.6	43.58	45.00	45.87	43.54	44.38	44.86
338.6	43.37	44.87	45.86	42.79	43.39	43.59
358.6	44.14	45.95	47.15	41.91	42.54	42.73
378.6	45.11	47.63	49.45	40.74	41.43	41.80
403.6	48.12	51.84	54.40	37.95	38.48	38.81
423.6	50.76	53.57	53.24	36.01	36.31	36.49
448.6	56.82	49.94	47.54	33.99	34.05	33.98
468.6	49.55	45.39	43.75	34.14	34.10	33.95
493.6	42.07	40.15	39.38	33.74	33.66	33.45
513.6	37.67	36.43	35.84	33.76	33.71	33.55
538.6	34.35	33.40	32.90	32.68	32.57	32.42
558.6	32.22	31.55	31.13	32.15	31.82	31.49
583.6	29.42	31.09	33.81	38.21	52.44	46.52
603.6	30.04	31.35	32.69	41.37	39.85	39.17
628.6	30.72	31.60	32.41	40.12	39.21	38.81
648.6	32.19	32.96	33.56	39.02	38.44	38.31
673.6	33.89	34.52	34.96	38.85	38.12	37.94
693.6	35.51	36.04	36.38	39.25	38.25	37.89
718.6	37.08	37.52	37.77	40.12	38.81	38.23
738.6	38.82	39.30	39.51	41.06	39.54	38.79
763.6	39.99	40.50	40.65	41.69	40.16	39.31
783.6	41.01	41.80	42.14	42.46	41.05	40.33
808.6	41.47	42.40	42.94	43.09	41.87	41.21
828.6	42.15	43.32	44.10	43.78	42.62	42.05
853.6	42.14	43.37	44.20	44.02	43.09	42.59
873.6	42.17	43.58	44.59	44.34	43.67	43.29
898.6	41.60	42.93	44.00	44.41	44.05	43.96

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+15	+17	+19
80.0	58.6	40.12	42.48	41.50
100.0	78.6	46.06	59.50	62.65
120.0	98.6	44.08	47.94	46.98
140.0	118.6	44.68	48.42	48.00
160.0	138.6	51.80	62.40	55.31
180.0	158.6	42.42	44.20	43.13
200.0	178.6	61.96	52.09	47.42
220.0	198.6	44.48	47.08	46.80
240.0	218.6	43.33	45.61	45.63
260.0	238.6	44.54	47.82	49.32
280.0	258.6	44.30	46.89	47.57
300.0	278.6	47.95	54.40	57.59
320.0	298.6	41.36	42.93	43.17
340.0	318.6	41.94	44.83	46.72
360.0	338.6	41.48	44.47	46.91
380.0	358.6	39.45	41.31	42.44
400.0	378.6	37.12	38.28	38.86
425.0	403.6	36.56	37.24	37.22
445.0	423.6	38.62	39.61	39.60
470.0	448.6	37.88	39.06	39.32
490.0	468.6	37.29	38.55	39.22
515.0	493.6	37.11	37.94	38.32
535.0	513.6	36.75	37.35	37.62
560.0	538.6	35.44	35.65	35.68
580.0	558.6	34.17	34.39	34.37
605.0	583.6	35.37	37.46	39.23
625.0	603.6	41.79	46.18	47.35
650.0	628.6	41.07	51.04	59.53
670.0	648.6	36.62	42.13	49.08
695.0	673.6	33.54	37.52	41.64
715.0	693.6	31.34	34.99	37.94
740.0	718.6	28.54	32.05	34.94
760.0	738.6	26.91	30.21	33.29
785.0	763.6	25.36	28.17	31.10
805.0	783.6	24.45	26.82	29.53
830.0	808.6	23.56	25.31	27.49
850.0	828.6	23.11	24.39	26.21
875.0	853.6	22.69	23.54	25.09
895.0	873.6	22.31	22.76	23.99
920.0	898.6	21.79	21.79	22.82

Frequency Mixer

HJK-ED11353/1

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=490MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+15	+17	+19		+15	+17	+19		+15	+17	+19
80.0	58.6	1.61	1.46	1.35	58.6	25.94	25.19	23.18	10.0	1.33	1.28	1.24
100.0	78.6	1.46	1.33	1.24	78.6	12.35	12.26	11.85	20.0	1.32	1.27	1.24
120.0	98.6	1.32	1.21	1.14	98.6	10.13	10.07	9.90	30.0	1.34	1.29	1.26
140.0	118.6	1.23	1.13	1.07	118.6	9.69	9.63	9.48	40.0	1.39	1.35	1.31
160.0	138.6	1.18	1.08	1.01	138.6	9.13	9.08	8.99	50.0	1.46	1.41	1.37
180.0	158.6	1.15	1.06	1.05	158.6	8.43	8.39	8.35	60.0	1.47	1.43	1.40
200.0	178.6	1.09	1.05	1.08	178.6	8.05	8.01	7.97	70.0	1.49	1.45	1.42
220.0	198.6	1.05	1.07	1.14	198.6	7.66	7.63	7.60	80.0	1.56	1.51	1.48
240.0	218.6	1.04	1.10	1.16	218.6	7.28	7.25	7.22	90.0	1.65	1.60	1.57
260.0	238.6	1.07	1.12	1.18	238.6	6.81	6.76	6.73	100.0	1.74	1.70	1.67
280.0	258.6	1.10	1.15	1.21	258.6	6.26	6.21	6.19	110.0	1.79	1.75	1.73
300.0	278.6	1.11	1.17	1.23	278.6	5.72	5.68	5.65	120.0	1.80	1.76	1.74
320.0	298.6	1.16	1.26	1.35	298.6	5.17	5.13	5.10	130.0	1.83	1.79	1.76
340.0	318.6	1.22	1.33	1.43	318.6	4.60	4.56	4.54	140.0	1.93	1.88	1.84
360.0	338.6	1.24	1.33	1.42	338.6	3.97	3.94	3.91	150.0	2.03	1.98	1.95
380.0	358.6	1.24	1.32	1.39	358.6	3.37	3.33	3.30	160.0	2.07	2.03	2.00
400.0	378.6	1.23	1.30	1.37	378.6	2.79	2.76	2.73	170.0	2.12	2.07	2.04
425.0	403.6	1.19	1.25	1.31	403.6	2.14	2.11	2.09	180.0	2.24	2.19	2.15
445.0	423.6	1.13	1.18	1.23	423.6	1.70	1.68	1.66	190.0	2.38	2.32	2.28
470.0	448.6	1.11	1.13	1.16	448.6	1.40	1.40	1.39	200.0	2.43	2.38	2.34
490.0	468.6	1.17	1.16	1.16	468.6	1.53	1.55	1.56	210.0	2.43	2.37	2.34
515.0	493.6	1.31	1.30	1.29	493.6	2.10	2.14	2.16	220.0	2.49	2.42	2.38
535.0	513.6	1.50	1.48	1.46	513.6	2.80	2.85	2.87	230.0	2.61	2.54	2.49
560.0	538.6	1.75	1.73	1.70	538.6	3.87	3.95	3.98	240.0	2.72	2.65	2.60
580.0	558.6	1.94	1.91	1.88	558.6	4.72	4.79	4.82	250.0	2.75	2.68	2.62
605.0	583.6	1.69	1.77	2.01	583.6	5.38	5.41	5.51	260.0	2.76	2.69	2.63
625.0	603.6	1.93	2.00	2.09	603.6	6.91	7.11	7.25	280.0	3.07	2.98	2.90
650.0	628.6	2.11	2.15	2.19	628.6	9.53	9.69	9.79	290.0	3.16	3.07	3.00
670.0	648.6	2.25	2.28	2.32	648.6	11.61	11.77	11.77	310.0	3.15	3.05	2.97
695.0	673.6	2.42	2.48	2.53	673.6	14.26	14.50	14.38	320.0	3.28	3.17	3.08
715.0	693.6	2.55	2.65	2.72	693.6	16.72	16.89	16.89	340.0	3.46	3.35	3.25
740.0	718.6	2.59	2.73	2.85	718.6	19.54	19.76	19.54	350.0	3.43	3.31	3.21
760.0	738.6	2.54	2.70	2.84	738.6	21.46	21.46	21.20	370.0	3.68	3.55	3.43
785.0	763.6	2.52	2.67	2.84	763.6	24.48	24.14	23.81	380.0	3.80	3.67	3.54
805.0	783.6	2.55	2.67	2.85	783.6	28.03	27.59	27.16	400.0	3.75	3.61	3.48
830.0	808.6	2.61	2.64	2.78	808.6	32.18	32.18	31.60	410.0	3.86	3.71	3.57
850.0	828.6	2.68	2.61	2.69	828.6	34.07	34.07	33.42	430.0	4.04	3.90	3.76
875.0	853.6	2.82	2.69	2.72	853.6	35.46	34.75	33.42	440.0	3.98	3.83	3.70
895.0	873.6	3.03	2.87	2.85	873.6	38.61	37.77	36.20	460.0	4.15	4.01	3.88
920.0	898.6	3.36	3.13	3.05	898.6	40.41	39.49	38.61	470.0	4.09	3.97	3.87

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Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	14	17	34	42	41	43	39	51	45	48
1	-	30	+0	39	11	54	37	53	35	49	44	48
2	64	52	62	48	69	50	62	65	68	64	66	64
3	>90	72	67	71	64	68	64	74	65	84	65	78
4	>90	>87	>87	>87	>87	84	>87	80	>87	>87	>87	>87
5	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
6	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
7	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
8	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
9	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
10	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 481 MHz; 3.00 dBm.

LO IN: 459.6 MHz; +17.00 dBm

IF OUT: 21.4 MHz; -3.07 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	25	27	45	55	52	56	50	59	60	56
1	-	30	+0	39	12	53	37	58	39	53	44	53
2	44	41	58	38	55	42	56	60	67	58	65	61
3	69	63	46	62	45	62	44	73	53	72	50	66
4	>90	77	76	70	83	60	73	58	69	69	78	70
5	>90	85	76	74	71	70	72	68	80	74	65	86
6	>90	89	>97	89	89	92	82	77	76	72	75	80
7	>90	>97	>97	95	87	88	75	84	72	80	72	83
8	>90	>97	>97	>97	>97	>97	>97	85	87	86	84	82
9	>90	>97	>97	>97	>97	>97	>97	>97	83	94	80	>97
10	>90	>97	>97	>97	>97	>97	>97	>97	>97	89	94	86
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 481 MHz; 13.00 dBm.

LO IN: 459.6 MHz; +17.00 dBm

IF OUT: 21.4 MHz; 6.84 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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