

Frequency Mixer

HJK-ED10949A/1

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=70MHz (dB)		
		@LO (dBm)		
		+14	+17	+20
80.1	10.1	6.17	5.93	5.78
104.1	34.1	6.44	6.14	5.94
128.1	58.1	6.40	6.10	5.91
152.1	82.1	6.20	5.95	5.79
176.1	106.1	6.24	6.01	5.86
200.1	130.1	6.35	6.10	5.94
224.1	154.1	6.21	5.97	5.83
248.1	178.1	6.12	5.92	5.78
272.1	202.1	6.22	6.02	5.91
296.1	226.1	6.25	6.05	5.93
320.1	250.1	6.17	5.97	5.85
344.1	274.1	6.15	5.97	5.86
368.1	298.1	6.30	6.18	6.14
392.1	322.1	6.25	6.10	6.04
416.1	346.1	6.25	6.08	6.00
440.1	370.1	6.29	6.12	6.02
464.1	394.1	6.39	6.20	6.09
488.1	418.1	6.42	6.22	6.09
512.1	442.1	6.48	6.24	6.09
536.1	466.1	6.55	6.29	6.13
560.1	490.1	6.66	6.39	6.21
584.1	514.1	6.89	6.56	6.34
608.1	538.1	7.05	6.68	6.44
632.1	562.1	7.40	7.46	8.01
656.1	586.1	8.16	7.80	7.65
678.1	608.1	8.07	7.51	7.35
702.1	632.1	8.12	7.38	7.11
724.1	654.1	8.23	7.39	7.06
748.1	678.1	8.48	7.52	7.11
770.1	700.1	8.84	7.66	7.15
794.1	724.1	9.33	7.87	7.22
816.1	746.1	9.56	8.04	7.30
840.1	770.1	9.86	8.28	7.46
862.1	792.1	10.26	8.59	7.61
886.1	816.1	10.66	8.92	7.83
908.1	838.1	10.95	9.15	7.99
932.1	862.1	11.28	9.41	8.19
954.1	884.1	11.65	9.80	8.49
978.1	908.1	12.13	10.26	8.79
1000.1	930.1	12.37	10.44	9.00

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+14	+17	+20
80.1	10.1	34.07	36.03	36.83
104.1	34.1	28.96	29.99	30.97
128.1	58.1	27.57	29.10	29.88
152.1	82.1	26.22	27.11	27.10
176.1	106.1	26.17	26.51	26.63
200.1	130.1	26.32	26.32	26.82
224.1	154.1	26.81	26.95	27.66
248.1	178.1	26.59	26.91	27.51
272.1	202.1	27.77	27.78	28.08
296.1	226.1	29.07	29.96	30.30
320.1	250.1	28.20	28.66	29.24
344.1	274.1	24.10	24.60	25.41
368.1	298.1	26.00	27.50	29.38
392.1	322.1	34.36	32.44	32.05
416.1	346.1	33.78	41.85	37.23
440.1	370.1	30.50	33.80	36.35
464.1	394.1	32.97	35.57	35.80
488.1	418.1	34.56	32.93	32.80
512.1	442.1	38.42	33.02	32.40
536.1	466.1	32.54	33.09	32.48
560.1	490.1	25.93	26.30	28.19
584.1	514.1	22.41	23.73	25.80
608.1	538.1	20.26	21.78	24.05
632.1	562.1	16.65	17.76	23.38
656.1	586.1	21.24	22.07	25.34
678.1	608.1	20.47	22.60	26.71
702.1	632.1	20.03	22.40	26.29
724.1	654.1	19.95	22.42	25.94
748.1	678.1	19.82	22.06	25.80
770.1	700.1	20.03	21.39	25.16
794.1	724.1	20.32	20.76	24.33
816.1	746.1	19.63	20.32	23.67
840.1	770.1	19.25	20.11	23.05
862.1	792.1	18.90	20.31	22.66
886.1	816.1	18.12	21.19	22.95
908.1	838.1	17.63	22.30	23.63
932.1	862.1	17.01	23.46	23.62
954.1	884.1	16.08	22.83	23.10
978.1	908.1	14.84	19.78	22.79
1000.1	930.1	14.24	18.36	21.77

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+17dBm (dB)		
		@LO (dBm)		
		+14	+17	+20
80.1	10.1	0.49	0.26	0.16
104.1	34.1	0.57	0.28	0.13
128.1	58.1	0.38	0.15	0.07
152.1	82.1	0.36	0.17	0.12
176.1	106.1	0.48	0.26	0.17
200.1	130.1	0.51	0.28	0.18
224.1	154.1	0.46	0.22	0.13
248.1	178.1	0.38	0.22	0.14
272.1	202.1	0.39	0.18	0.11
296.1	226.1	0.35	0.16	0.09
320.1	250.1	0.36	0.18	0.10
344.1	274.1	0.36	0.21	0.15
368.1	298.1	0.34	0.21	0.15
392.1	322.1	0.29	0.17	0.11
416.1	346.1	0.25	0.14	0.11
440.1	370.1	0.22	0.10	0.06
464.1	394.1	0.21	0.08	0.04
488.1	418.1	0.23	0.09	0.04
512.1	442.1	0.30	0.13	0.06
536.1	466.1	0.36	0.09	0.02
560.1	490.1	0.64	0.10	0.00
584.1	514.1	0.87	0.18	0.02
608.1	538.1	1.29	0.57	0.29
632.1	562.1	1.59	0.76	0.11
656.1	586.1	1.13	0.93	0.75
678.1	608.1	1.21	1.18	0.82
702.1	632.1	1.14	1.21	0.89
724.1	654.1	1.17	1.18	0.89
748.1	678.1	1.18	1.18	0.92
770.1	700.1	1.21	1.22	1.00
794.1	724.1	1.24	1.27	1.08
816.1	746.1	1.24	1.27	1.10
840.1	770.1	1.29	1.30	1.09
862.1	792.1	1.47	1.41	1.13
886.1	816.1	1.80	1.65	1.24
908.1	838.1	1.88	1.72	1.31
932.1	862.1	1.78	1.66	1.33
954.1	884.1	1.58	1.54	1.28
978.1	908.1	1.62	1.46	1.24
1000.1	930.1	2.09	1.78	1.38

REV. X2

HJK-ED10949A/1

101012

Page 1 of 5



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED • RoHS compliant

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Frequency Mixer

HJK-ED10949A/1

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=455MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=439.9MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=470.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+17			+17			+17
445.0	10.0	7.61	10.1	450.0	6.58	460.1	10.0	7.72
425.7	29.3	7.53	20.1	460.0	6.31	448.6	21.5	7.65
406.3	48.7	7.47	30.1	470.0	6.26	437.0	33.1	7.65
387.0	68.0	7.32	40.1	480.0	6.27	425.5	44.6	7.60
367.7	87.3	7.18	50.1	490.0	6.29	413.9	56.2	7.50
348.3	106.7	7.13	60.1	500.0	6.35	402.4	67.7	7.42
329.0	126.0	7.05	70.1	510.0	6.36	390.9	79.2	7.30
309.7	145.3	6.95	80.1	520.0	6.35	379.3	90.8	7.25
290.3	164.7	6.82	90.1	530.0	6.43	367.8	102.3	7.24
271.0	184.0	6.71	100.1	540.0	6.48	356.3	113.8	7.25
251.7	203.3	6.66	110.1	550.0	6.60	344.7	125.4	7.17
232.3	222.7	6.58	120.1	560.0	7.06	333.2	136.9	7.08
213.0	242.0	6.46	130.1	570.0	7.86	321.6	148.5	7.01
193.7	261.3	6.43	140.1	580.0	7.82	310.1	160.0	6.95
174.3	280.7	6.35	150.1	590.0	7.74	298.6	171.5	6.91
145.3	309.7	6.30	160.1	600.0	7.69	287.0	183.1	6.84
126.0	329.0	6.28	170.1	610.0	7.61	275.5	194.6	6.78
97.0	358.0	6.18	180.1	620.0	7.59	263.9	206.2	6.73
77.7	377.3	6.18	200.1	640.0	7.53	252.4	217.7	6.68
48.7	406.3	6.18	210.1	650.0	7.50	240.9	229.2	6.64
29.3	425.7	6.19	230.1	670.0	7.53	229.3	240.8	6.63
10.0	465.0	6.67	240.1	680.0	7.52	217.8	252.3	6.56
30.2	485.2	6.25	260.1	700.0	7.63	206.3	263.8	6.48
60.6	515.6	6.37	270.1	710.0	7.74	194.7	275.4	6.45
80.8	535.8	6.46	290.1	730.0	7.89	183.2	286.9	6.45
111.1	566.1	7.65	300.1	740.0	8.01	171.6	298.5	6.45
131.3	586.3	7.78	320.1	760.0	8.08	160.1	310.0	6.43
161.7	616.7	7.55	330.1	770.0	8.19	148.6	321.5	6.33
181.9	636.9	7.51	350.1	790.0	8.47	137.0	333.1	6.29
212.2	667.2	7.46	360.1	800.0	8.66	125.5	344.6	6.30
232.4	687.4	7.51	380.1	820.0	8.97	113.9	356.2	6.30
262.8	717.8	7.71	390.1	830.0	9.08	102.4	367.7	6.22
283.0	738.0	7.88	410.1	850.0	9.39	90.9	379.2	6.19
313.3	768.3	8.11	420.1	860.0	9.38	79.3	390.8	6.24
333.6	788.6	8.41	440.1	880.0	9.89	67.8	402.3	6.25
363.9	818.9	8.92	450.1	890.0	10.11	56.3	413.8	6.16
384.1	839.1	9.13	470.1	910.0	10.61	44.7	425.4	6.25
414.4	869.4	9.56	480.1	920.0	10.78	33.2	436.9	6.26
434.7	889.7	10.00	500.1	940.0	11.02	21.6	448.5	6.34
465.0	920.0	10.70	510.1	950.0	11.22	10.1	460.0	6.62

REV. X2

HJK-ED10949A/1

101012

Page 2 of 5



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Frequency Mixer

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Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+14	+17	+20	+14	+17	+20
10.1	74.88	73.66	83.03	72.84	73.21	73.65
34.1	67.93	68.60	68.84	62.58	62.85	63.17
58.1	63.49	63.53	64.16	57.80	58.09	58.48
82.1	60.44	60.97	61.43	54.99	55.19	55.50
106.1	58.57	59.37	59.94	52.57	52.92	53.20
130.1	56.46	57.21	57.79	50.81	51.08	51.37
154.1	55.36	56.10	56.55	49.46	49.73	49.93
178.1	54.52	55.43	56.03	48.20	48.55	48.77
202.1	53.03	53.53	53.90	46.96	47.10	47.24
226.1	52.34	53.05	53.63	46.08	46.37	46.57
250.1	51.89	52.84	53.78	45.49	45.67	45.92
274.1	51.37	52.34	53.28	44.21	44.51	44.75
298.1	48.94	49.28	49.63	43.12	43.19	43.27
322.1	49.41	49.79	49.93	42.82	42.78	42.57
346.1	49.44	49.90	50.29	42.66	42.52	42.46
370.1	50.15	50.82	51.32	42.70	42.65	42.54
394.1	50.26	50.94	51.48	42.97	42.83	42.74
418.1	50.82	51.83	52.52	43.16	43.12	43.03
442.1	51.68	53.01	54.10	43.31	43.23	43.21
466.1	52.27	53.46	54.32	43.50	43.42	43.32
490.1	52.42	52.99	53.05	43.41	43.26	43.14
514.1	51.13	50.82	50.25	43.04	42.77	42.57
538.1	48.80	47.83	46.96	42.37	41.82	41.47
562.1	45.22	44.20	43.51	41.33	40.61	40.40
586.1	43.59	43.58	43.74	41.23	40.84	40.54
608.1	43.96	43.96	44.24	42.33	41.70	41.34
632.1	45.10	45.03	45.23	43.64	42.85	42.34
654.1	46.00	45.68	45.92	44.53	43.60	43.11
678.1	46.97	46.62	46.63	45.33	44.52	43.88
700.1	48.01	47.56	47.55	46.03	45.23	44.65
724.1	49.30	48.66	48.47	46.64	45.85	45.23
746.1	50.01	49.49	49.31	46.84	46.34	45.83
770.1	50.67	50.07	49.81	47.14	46.79	46.39
792.1	51.47	50.91	50.45	47.35	47.24	46.91
816.1	52.16	51.81	51.47	47.46	47.48	47.35
838.1	52.75	52.54	52.29	47.54	47.66	47.69
862.1	53.37	53.13	52.93	47.54	47.51	47.37
884.1	53.31	53.14	53.07	47.29	47.09	46.77
908.1	53.73	53.62	53.49	47.18	46.99	46.66
930.1	54.19	53.99	53.87	47.08	46.81	46.60

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+14	+17	+20
80.1	10.1	48.37	53.52	61.52
104.1	34.1	48.65	56.63	55.91
128.1	58.1	44.76	46.35	48.66
152.1	82.1	52.69	62.40	48.72
176.1	106.1	47.69	52.56	60.93
200.1	130.1	46.82	48.97	51.77
224.1	154.1	56.77	60.93	49.22
248.1	178.1	51.26	53.98	61.17
272.1	202.1	50.82	52.16	55.80
296.1	226.1	57.03	71.95	59.15
320.1	250.1	50.62	51.48	55.13
344.1	274.1	49.74	50.85	55.57
368.1	298.1	54.84	53.68	53.14
392.1	322.1	58.02	57.11	59.74
416.1	346.1	56.79	59.11	78.53
440.1	370.1	55.35	57.24	62.08
464.1	394.1	49.97	50.48	53.23
488.1	418.1	50.44	49.88	49.58
512.1	442.1	50.24	49.69	49.33
536.1	466.1	49.30	49.08	48.97
560.1	490.1	47.24	46.77	46.59
584.1	514.1	46.35	45.98	45.60
608.1	538.1	46.23	46.14	46.06
632.1	562.1	42.80	42.97	43.51
656.1	586.1	46.30	44.45	41.07
678.1	608.1	48.12	46.63	41.75
702.1	632.1	44.83	49.26	45.72
724.1	654.1	43.88	47.93	47.71
748.1	678.1	41.82	45.88	48.51
770.1	700.1	40.27	43.91	47.17
794.1	724.1	38.62	41.01	43.62
816.1	746.1	37.73	39.60	41.98
840.1	770.1	37.22	38.36	40.04
862.1	792.1	37.23	37.12	37.93
886.1	816.1	37.82	36.64	37.04
908.1	838.1	37.98	35.96	35.24
932.1	862.1	37.29	35.48	35.64
954.1	884.1	36.72	35.29	36.92
978.1	908.1	36.40	34.62	36.06
1000.1	930.1	35.68	33.64	34.59

Frequency Mixer

HJK-ED10949A/1

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=390MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+14	+17	+20		+14	+17	+20		+14	+17	+20
80.1	10.1	1.24	1.21	1.20	10.1	5.39	5.38	5.38	10.0	1.15	1.07	1.02
104.1	34.1	1.33	1.29	1.27	34.1	5.52	5.52	5.49	20.0	1.14	1.07	1.05
128.1	58.1	1.34	1.31	1.31	58.1	5.03	5.00	4.98	30.0	1.14	1.08	1.09
152.1	82.1	1.37	1.36	1.37	82.1	4.91	4.89	4.86	40.0	1.15	1.09	1.09
176.1	106.1	1.43	1.42	1.44	106.1	4.56	4.54	4.51	50.0	1.18	1.13	1.12
200.1	130.1	1.46	1.46	1.47	130.1	4.28	4.26	4.23	60.0	1.21	1.16	1.15
224.1	154.1	1.48	1.49	1.51	154.1	3.94	3.92	3.89	70.0	1.26	1.21	1.19
248.1	178.1	1.52	1.53	1.55	178.1	3.56	3.53	3.50	80.0	1.30	1.26	1.24
272.1	202.1	1.55	1.57	1.60	202.1	3.24	3.21	3.18	90.0	1.34	1.29	1.27
296.1	226.1	1.57	1.59	1.61	226.1	2.86	2.84	2.82	100.0	1.38	1.34	1.32
320.1	250.1	1.60	1.62	1.64	250.1	2.52	2.50	2.48	110.0	1.41	1.37	1.35
344.1	274.1	1.63	1.65	1.67	274.1	2.26	2.24	2.22	120.0	1.43	1.39	1.38
368.1	298.1	1.66	1.70	1.76	298.1	2.08	2.07	2.06	130.0	1.47	1.43	1.41
392.1	322.1	1.66	1.70	1.75	322.1	2.05	2.05	2.04	140.0	1.50	1.46	1.44
416.1	346.1	1.69	1.72	1.76	346.1	2.22	2.23	2.22	150.0	1.54	1.49	1.47
440.1	370.1	1.71	1.73	1.76	370.1	2.57	2.59	2.59	160.0	1.59	1.54	1.52
464.1	394.1	1.74	1.75	1.77	394.1	3.13	3.16	3.17	170.0	1.64	1.59	1.56
488.1	418.1	1.76	1.75	1.76	418.1	3.88	3.93	3.95	180.0	1.70	1.65	1.61
512.1	442.1	1.78	1.77	1.77	442.1	4.92	4.99	5.02	190.0	1.75	1.70	1.66
536.1	466.1	1.82	1.79	1.78	466.1	6.17	6.26	6.28	200.0	1.78	1.72	1.69
560.1	490.1	1.86	1.81	1.79	490.1	7.60	7.70	7.73	210.0	1.83	1.77	1.73
584.1	514.1	1.93	1.87	1.83	514.1	9.23	9.33	9.38	220.0	1.86	1.80	1.76
608.1	538.1	2.03	1.94	1.89	538.1	10.69	10.69	10.69	230.0	1.89	1.83	1.79
632.1	562.1	2.07	1.85	1.70	562.1	11.53	11.38	11.31	240.0	1.95	1.88	1.84
656.1	586.1	1.79	1.73	1.80	586.1	13.92	14.15	14.26	250.0	1.98	1.92	1.87
678.1	608.1	1.84	1.73	1.77	608.1	16.89	17.22	17.39	260.0	2.03	1.96	1.92
702.1	632.1	1.99	1.79	1.76	632.1	20.22	20.45	20.45	270.0	2.11	2.04	1.99
724.1	654.1	2.11	1.84	1.77	654.1	23.18	23.49	23.18	280.0	2.15	2.07	2.02
748.1	678.1	2.24	1.93	1.80	678.1	26.74	27.16	26.74	290.0	2.20	2.13	2.07
770.1	700.1	2.41	2.02	1.85	700.1	30.49	30.49	30.49	300.0	2.26	2.18	2.13
794.1	724.1	2.65	2.17	1.94	724.1	33.42	33.42	33.42	310.0	2.28	2.20	2.14
816.1	746.1	2.77	2.29	2.03	746.1	36.20	35.46	34.75	320.0	2.32	2.24	2.18
840.1	770.1	2.92	2.40	2.11	770.1	39.49	39.49	37.77	330.0	2.36	2.28	2.22
862.1	792.1	3.07	2.53	2.21	792.1	42.38	42.38	41.37	335.0	2.37	2.28	2.23
886.1	816.1	3.25	2.69	2.33	816.1	44.55	44.55	43.44	345.0	2.40	2.32	2.26
908.1	838.1	3.39	2.82	2.43	838.1	44.55	43.44	41.37	350.0	2.45	2.36	2.30
932.1	862.1	3.50	2.89	2.47	862.1	48.26	46.96	44.55	360.0	2.51	2.42	2.35
954.1	884.1	3.57	2.95	2.48	884.1	52.65	52.65	49.64	365.0	2.52	2.42	2.36
978.1	908.1	3.70	3.08	2.57	908.1	56.04	54.29	52.65	375.0	2.61	2.52	2.45
1000.1	930.1	3.82	3.18	2.69	930.1	54.29	51.10	48.26	380.0	2.67	2.57	2.51

REV. X2

HJK-ED10949A/1

101012

Page 4 of 5

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Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	22	41	31	34	64	43	59	60	65	64
1	-	48	+0	44	13	45	19	42	31	44	41	47
2	60	62	75	60	65	64	62	66	59	73	70	74
3	>90	69	53	69	53	67	54	66	51	63	52	65
4	>90	>86	>86	>86	>86	>86	>86	>86	86	83	81	>86
5	>90	>86	80	>86	80	>86	76	>86	76	82	72	79
6	>90	73	80	71	80	72	83	74	>86	78	>86	80
7	>90	>86	>86	83	>86	81	86	>86	>86	>86	>86	>86
8	>90	56	69	55	65	52	63	51	66	54	67	53
9	>90	76	65	77	75	70	73	59	66	62	64	65
10	>90	59	47	44	48	41	44	31	42	19	45	13
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 455 MHz; 2.00 dBm.
LO IN: 385 MHz; +17.00 dBm
IF OUT: 70 MHz; -4.28 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	32	49	42	45	57	55	57	69	63	59
1	-	53	+0	43	13	47	20	48	28	51	34	58
2	40	53	57	48	61	55	64	60	59	62	63	64
3	61	58	39	63	39	68	41	62	42	57	48	58
4	87	61	74	60	78	58	70	60	67	60	64	65
5	>90	77	56	71	56	74	54	74	54	73	53	66
6	>90	56	66	54	66	53	72	54	74	54	74	56
7	>90	75	79	71	66	64	61	67	60	70	58	77
8	>90	55	61	52	58	48	57	42	62	41	68	39
9	>90	71	69	72	64	63	63	59	61	63	55	61
10	>90	39	61	36	58	34	52	28	48	20	47	13
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 455 MHz; 12.00 dBm.
LO IN: 385 MHz; +17.00 dBm
IF OUT: 70 MHz; 5.68 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

HJK-ED10949A/1

101012

Page 5 of 5



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