

Frequency Mixer

HJK-ED13765/1

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=110MHz (dB)		
		@LO (dBm)		
		+14	+17	+19
300.0	410.0	7.38	7.33	7.62
310.0	420.0	7.37	7.32	7.58
320.0	430.0	7.25	7.19	7.40
330.0	440.0	7.10	7.02	7.13
340.0	450.0	6.98	6.88	6.94
350.0	460.0	7.01	6.92	6.94
355.0	465.0	7.06	6.96	6.97
360.0	470.0	7.10	7.01	7.01
365.0	475.0	7.13	7.03	7.02
370.0	480.0	7.13	7.02	7.02
375.0	485.0	7.11	7.00	6.99
380.0	490.0	7.09	6.98	6.97
385.0	495.0	7.07	6.96	6.93
390.0	500.0	7.03	6.91	6.88
395.0	505.0	7.00	6.88	6.85
400.0	510.0	7.01	6.89	6.85
405.0	515.0	7.05	6.92	6.88
410.0	520.0	7.10	6.97	6.92
415.0	525.0	7.19	7.06	7.00
420.0	530.0	7.29	7.15	7.09
425.0	535.0	7.35	7.21	7.14
430.0	540.0	7.37	7.22	7.15
440.0	550.0	7.33	7.18	7.10
450.0	560.0	7.28	7.12	7.04
460.0	570.0	7.34	7.19	7.10
470.0	580.0	7.47	7.32	7.24
480.0	590.0	7.65	7.49	7.40
490.0	600.0	7.74	7.56	7.47
500.0	610.0	7.74	7.55	7.44
510.0	620.0	7.69	7.48	7.38
520.0	630.0	7.76	7.56	7.45
530.0	640.0	7.95	7.74	7.63
540.0	650.0	8.14	7.91	7.78
550.0	660.0	8.17	7.93	7.80
560.0	670.0	8.14	7.89	7.75
570.0	680.0	8.20	7.95	7.81
580.0	690.0	8.37	8.10	7.95
590.0	700.0	8.59	8.31	8.15
600.0	710.0	8.73	8.43	8.27
610.0	720.0	8.75	8.45	8.28

RF (IN) (MHz)	LO (MHz)	IP-3 INPUT (dBm)		
		@LO (dBm)		
		+14	+17	+19
300.0	410.0	27.74	33.59	39.58
310.0	420.0	29.08	34.48	36.05
320.0	430.0	31.29	36.09	35.62
330.0	440.0	32.07	36.52	34.97
340.0	450.0	34.08	42.24	39.94
350.0	460.0	34.53	39.77	37.90
355.0	465.0	36.21	42.53	38.96
360.0	470.0	35.90	43.57	41.24
365.0	475.0	34.73	38.30	39.26
370.0	480.0	35.11	36.59	40.67
375.0	485.0	35.34	36.45	41.24
380.0	490.0	35.10	36.29	42.64
385.0	495.0	36.56	38.06	40.24
390.0	500.0	38.55	39.00	42.67
395.0	505.0	37.48	41.07	41.17
400.0	510.0	38.02	40.32	39.43
405.0	515.0	37.28	44.50	40.65
410.0	520.0	35.00	40.63	43.13
415.0	525.0	33.76	37.22	40.03
420.0	530.0	33.12	36.27	39.02
425.0	535.0	32.17	35.33	38.38
430.0	540.0	31.46	34.55	36.85
440.0	550.0	31.48	34.61	37.30
450.0	560.0	29.94	32.76	34.88
460.0	570.0	28.91	31.56	33.73
470.0	580.0	28.25	31.06	33.18
480.0	590.0	27.89	30.77	33.15
490.0	600.0	27.24	30.20	32.20
500.0	610.0	26.30	28.77	30.62
510.0	620.0	25.97	28.17	30.10
520.0	630.0	25.10	27.24	28.91
530.0	640.0	25.06	26.95	28.92
540.0	650.0	24.44	26.33	28.30
550.0	660.0	24.29	26.00	27.98
560.0	670.0	23.50	25.06	26.91
570.0	680.0	23.09	24.39	26.00
580.0	690.0	22.50	23.72	25.19
590.0	700.0	22.41	23.59	24.94
600.0	710.0	21.99	23.20	24.51
610.0	720.0	21.42	22.79	24.05

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+20dBm (dB)		
		@LO (dBm)		
		+14	+17	+19
300.0	410.0	0.25	0.08	-0.08
310.0	420.0	0.18	0.05	-0.11
320.0	430.0	0.13	0.05	-0.13
330.0	440.0	0.15	-0.03	-0.17
340.0	450.0	0.12	0.05	-0.03
350.0	460.0	0.11	0.05	0.00
355.0	465.0	0.11	0.05	0.01
360.0	470.0	0.16	0.08	0.05
365.0	475.0	0.12	0.05	0.02
370.0	480.0	0.14	0.07	0.04
375.0	485.0	0.15	0.07	0.04
380.0	490.0	0.15	0.07	0.04
385.0	495.0	0.14	0.06	0.05
390.0	500.0	0.15	0.06	0.04
395.0	505.0	0.18	0.09	0.07
400.0	510.0	0.16	0.06	0.04
405.0	515.0	0.17	0.07	0.05
410.0	520.0	0.16	0.06	0.04
415.0	525.0	0.16	0.06	0.04
420.0	530.0	0.13	0.04	0.02
425.0	535.0	0.12	0.02	0.01
430.0	540.0	0.13	0.04	0.02
440.0	550.0	0.19	0.10	-0.15
450.0	560.0	0.15	0.02	-0.01
460.0	570.0	0.23	0.04	0.00
470.0	580.0	0.34	0.09	0.02
480.0	590.0	0.41	0.11	0.04
490.0	600.0	0.50	0.15	0.06
500.0	610.0	0.61	0.19	0.08
510.0	620.0	0.69	0.22	0.09
520.0	630.0	0.73	0.22	0.09
530.0	640.0	0.78	0.23	0.09
540.0	650.0	0.76	0.19	0.05
550.0	660.0	0.81	0.18	0.04
560.0	670.0	1.16	0.34	0.11
570.0	680.0	1.64	0.58	0.23
580.0	690.0	1.81	0.69	0.30
590.0	700.0	1.82	0.70	0.29
600.0	710.0	1.92	0.74	0.30
610.0	720.0	2.07	0.83	0.34

Frequency Mixer

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Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=450MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=350MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=550MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+17			+17			+17
125.0	325.0	10.58	40.0	390.0	11.32	235.0	315.0	11.37
121.0	329.0	10.20	50.0	400.0	9.90	231.0	319.0	11.06
115.0	335.0	9.87	60.0	410.0	8.95	223.0	327.0	10.35
111.0	339.0	9.70	70.0	420.0	8.11	219.0	331.0	10.12
107.0	343.0	9.45	80.0	430.0	7.71	215.0	335.0	10.00
101.0	349.0	8.99	100.0	450.0	7.01	207.0	343.0	9.52
97.0	353.0	8.72	110.0	460.0	6.92	203.0	347.0	9.13
91.0	359.0	8.47	120.0	470.0	6.76	199.0	351.0	8.75
87.0	363.0	8.39	130.0	480.0	6.62	195.0	355.0	8.41
83.0	367.0	8.32	140.0	490.0	6.53	187.0	363.0	7.92
77.0	373.0	8.29	150.0	500.0	6.44	183.0	367.0	7.70
73.0	377.0	8.40	160.0	510.0	6.38	179.0	371.0	7.53
69.0	381.0	8.58	170.0	520.0	6.40	171.0	379.0	7.28
63.0	387.0	8.87	180.0	530.0	6.39	167.0	383.0	7.21
59.0	391.0	8.97	190.0	540.0	6.45	163.0	387.0	7.16
55.0	395.0	9.25	210.0	560.0	6.41	155.0	395.0	7.14
49.0	401.0	9.97	220.0	570.0	6.49	151.0	399.0	7.13
45.0	405.0	10.47	230.0	580.0	6.56	147.0	403.0	7.19
41.0	409.0	11.05	240.0	590.0	6.63	139.0	411.0	7.26
35.0	415.0	10.36	250.0	600.0	6.78	135.0	415.0	7.27
30.0	420.0	12.86	260.0	610.0	6.95	131.0	419.0	7.28
60.0	450.0	8.75	270.0	620.0	7.01	127.0	423.0	7.31
90.0	480.0	7.33	280.0	630.0	7.13	119.0	431.0	7.48
120.0	510.0	6.81	290.0	640.0	7.23	115.0	435.0	7.51
150.0	540.0	6.66	300.0	650.0	7.28	111.0	439.0	7.57
180.0	570.0	6.60	320.0	670.0	7.47	103.0	447.0	7.66
210.0	600.0	6.68	330.0	680.0	7.65	99.0	451.0	7.68
240.0	630.0	6.92	340.0	690.0	7.97	95.0	455.0	7.76
270.0	660.0	7.33	350.0	700.0	8.40	87.0	463.0	8.05
300.0	690.0	7.74	360.0	710.0	8.57	83.0	467.0	8.15
325.0	715.0	8.13	370.0	720.0	8.86	79.0	471.0	8.21
340.0	730.0	8.39	380.0	730.0	8.98	71.0	479.0	8.54
355.0	745.0	8.83	390.0	740.0	9.15	67.0	483.0	8.80
370.0	760.0	9.20	400.0	750.0	9.35	63.0	487.0	9.05
385.0	775.0	9.53	410.0	760.0	9.39	59.0	491.0	9.19
400.0	790.0	9.76	430.0	780.0	9.83	51.0	499.0	9.95
415.0	805.0	10.01	440.0	790.0	10.09	47.0	503.0	10.38
430.0	820.0	10.37	450.0	800.0	10.51	43.0	507.0	10.88
460.0	850.0	11.12	460.0	810.0	10.70	35.0	515.0	11.37

Frequency Mixer

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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)		
	+14	+17	+19	+14	+17	+19			+14	+17	+19
410.0	48.05	48.95	46.09	34.59	34.37	34.34	300.0	410.0	33.30	28.63	22.78
420.0	49.09	49.20	46.08	34.16	34.03	34.08	310.0	420.0	34.24	29.49	23.50
430.0	49.84	49.17	46.38	33.76	33.70	33.87	320.0	430.0	35.05	30.79	24.71
440.0	50.46	48.88	47.39	33.52	33.50	33.84	330.0	440.0	35.48	31.66	26.22
450.0	50.47	48.83	47.50	33.72	33.74	34.04	340.0	450.0	36.10	33.20	28.49
460.0	50.00	48.49	47.27	33.66	33.72	34.08	350.0	460.0	36.53	34.13	30.14
465.0	49.73	48.38	47.29	33.57	33.65	34.08	355.0	465.0	36.89	34.78	31.05
470.0	49.54	48.29	47.36	33.60	33.72	34.23	360.0	470.0	37.31	35.41	31.96
475.0	49.34	48.19	47.53	33.81	33.96	34.57	365.0	475.0	37.70	36.01	32.82
480.0	49.17	48.69	48.01	33.91	34.03	34.75	370.0	480.0	38.23	38.34	33.82
485.0	49.08	48.62	48.49	33.77	33.89	34.71	375.0	485.0	38.89	39.13	35.41
490.0	48.72	48.25	48.56	33.71	33.85	34.72	380.0	490.0	39.16	39.54	36.82
495.0	48.29	47.64	48.54	33.90	34.09	34.95	385.0	495.0	39.35	38.89	38.05
500.0	47.96	47.51	48.58	34.18	34.38	35.21	390.0	500.0	39.79	40.31	39.74
505.0	47.96	47.65	48.73	34.46	34.75	35.43	395.0	505.0	40.41	40.85	41.44
510.0	47.93	47.57	48.79	34.69	34.97	35.58	400.0	510.0	40.76	41.62	42.88
515.0	47.85	47.44	48.58	34.78	35.05	35.59	405.0	515.0	40.99	41.90	43.90
520.0	47.88	47.38	48.50	34.79	35.03	35.55	410.0	520.0	41.40	42.10	44.90
525.0	47.87	47.38	48.33	35.06	35.34	35.81	415.0	525.0	41.60	42.39	45.53
530.0	47.83	47.35	48.09	35.51	35.82	36.27	420.0	530.0	41.93	42.80	46.21
535.0	47.81	47.33	47.83	35.78	36.10	36.52	425.0	535.0	42.45	43.45	46.91
540.0	47.87	47.39	47.74	35.89	36.21	36.60	430.0	540.0	42.82	43.86	47.18
550.0	47.80	47.31	47.45	36.35	36.71	37.10	440.0	550.0	42.92	44.15	46.99
560.0	47.93	47.42	47.50	37.14	37.56	37.95	450.0	560.0	43.44	45.00	47.68
570.0	47.94	47.41	47.43	37.58	38.02	38.37	460.0	570.0	43.63	45.39	47.24
580.0	48.38	47.80	47.65	38.09	38.59	38.92	470.0	580.0	43.52	45.42	46.41
590.0	49.10	48.47	48.30	39.06	39.59	39.94	480.0	590.0	43.94	45.73	47.36
600.0	49.87	49.23	48.98	39.55	40.09	40.45	490.0	600.0	43.92	45.30	47.11
610.0	50.01	49.39	49.09	40.07	40.63	41.03	500.0	610.0	44.05	44.94	46.58
620.0	50.21	49.62	49.33	40.74	41.32	41.74	510.0	620.0	43.85	44.26	45.34
630.0	50.42	49.82	49.59	40.86	41.41	41.84	520.0	630.0	44.02	44.22	45.57
640.0	50.51	49.91	49.64	41.55	42.14	42.59	530.0	640.0	44.28	44.48	46.49
650.0	50.76	50.12	49.68	42.14	42.70	43.12	540.0	650.0	44.43	44.53	46.01
660.0	51.27	50.58	50.02	42.41	42.92	43.31	550.0	660.0	44.48	44.43	45.46
670.0	51.73	51.00	50.46	43.16	43.67	44.06	560.0	670.0	44.29	44.13	44.77
680.0	52.07	51.26	50.77	43.69	44.17	44.52	570.0	680.0	44.16	44.04	44.26
690.0	52.90	51.96	51.55	44.32	44.79	45.13	580.0	690.0	44.24	44.22	44.09
700.0	54.01	52.88	52.44	45.22	45.68	46.02	590.0	700.0	44.30	44.36	44.13
710.0	55.25	53.92	53.34	45.75	46.19	46.52	600.0	710.0	44.08	44.17	44.16
720.0	56.21	54.70	54.03	46.12	46.58	46.91	610.0	720.0	43.91	44.07	44.12

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=540MHz (:1)		
		@LO (dBm)					@LO (dBm)				@LO (dBm)		
		+14	+17	+19			+14	+17	+19		+14	+17	+19
300.0	410.0	1.66	1.73	1.83		410.0	3.53	3.10	2.52	70.0	3.09	3.06	3.05
310.0	420.0	1.66	1.73	1.82		420.0	2.94	2.61	2.20	80.0	2.58	2.57	2.56
320.0	430.0	1.67	1.74	1.84		430.0	2.44	2.20	1.93	90.0	2.24	2.24	2.24
330.0	440.0	1.70	1.76	1.85		440.0	2.01	1.85	1.71	100.0	1.96	1.97	1.97
340.0	450.0	1.76	1.82	1.91		450.0	1.65	1.55	1.52	110.0	1.72	1.72	1.73
350.0	460.0	1.80	1.85	1.92		460.0	1.36	1.30	1.39	120.0	1.52	1.53	1.54
355.0	465.0	1.85	1.90	1.96		465.0	1.23	1.19	1.35	130.0	1.38	1.39	1.40
360.0	470.0	1.89	1.94	2.00		470.0	1.12	1.10	1.34	140.0	1.26	1.28	1.29
365.0	475.0	1.90	1.95	2.00		475.0	1.06	1.10	1.36	150.0	1.16	1.18	1.20
370.0	480.0	1.93	1.98	2.02		480.0	1.12	1.14	1.40	160.0	1.06	1.08	1.10
375.0	485.0	1.98	2.02	2.06		485.0	1.23	1.26	1.48	170.0	1.04	1.04	1.06
380.0	490.0	1.99	2.03	2.07		490.0	1.35	1.38	1.57	180.0	1.14	1.13	1.13
385.0	495.0	2.03	2.06	2.10		495.0	1.49	1.52	1.67	190.0	1.22	1.20	1.19
390.0	500.0	2.08	2.12	2.15		500.0	1.64	1.67	1.80	200.0	1.29	1.27	1.26
395.0	505.0	2.13	2.16	2.19		505.0	1.80	1.83	1.94	210.0	1.39	1.36	1.35
400.0	510.0	2.15	2.19	2.22		510.0	1.97	2.01	2.10	220.0	1.51	1.48	1.46
405.0	515.0	2.20	2.23	2.26		515.0	2.16	2.20	2.28	230.0	1.63	1.60	1.57
410.0	520.0	2.27	2.30	2.33		520.0	2.36	2.41	2.48	240.0	1.74	1.70	1.68
415.0	525.0	2.31	2.34	2.36		525.0	2.58	2.63	2.68	250.0	1.82	1.78	1.75
420.0	530.0	2.36	2.38	2.40		530.0	2.82	2.87	2.92	260.0	1.92	1.87	1.84
425.0	535.0	2.40	2.42	2.44		535.0	3.07	3.13	3.17	270.0	2.04	2.00	1.96
430.0	540.0	2.44	2.46	2.47		540.0	3.34	3.40	3.45	280.0	2.23	2.16	2.13
440.0	550.0	2.46	2.47	2.48		550.0	3.93	4.00	4.05	290.0	2.35	2.28	2.24
450.0	560.0	2.53	2.54	2.55		560.0	4.59	4.67	4.73	300.0	2.45	2.37	2.32
460.0	570.0	2.60	2.61	2.62		570.0	5.32	5.41	5.47	310.0	2.56	2.48	2.43
470.0	580.0	2.71	2.72	2.73		580.0	6.11	6.22	6.27	320.0	2.73	2.64	2.58
480.0	590.0	2.83	2.83	2.83		590.0	6.96	7.10	7.17	330.0	2.93	2.83	2.77
490.0	600.0	2.90	2.89	2.89		600.0	7.88	8.08	8.18	340.0	3.10	3.00	2.93
500.0	610.0	2.94	2.93	2.92		610.0	8.88	9.14	9.28	350.0	3.19	3.07	3.01
510.0	620.0	2.97	2.95	2.94		620.0	9.96	10.29	10.49	360.0	3.25	3.13	3.05
520.0	630.0	3.10	3.08	3.07		630.0	11.13	11.57	11.84	370.0	3.40	3.28	3.20
530.0	640.0	3.22	3.19	3.17		640.0	12.52	13.15	13.54	380.0	3.65	3.51	3.43
540.0	650.0	3.34	3.31	3.29		650.0	14.08	14.93	15.41	390.0	3.87	3.72	3.64
550.0	660.0	3.37	3.33	3.31		660.0	15.61	16.62	17.13	400.0	4.00	3.85	3.76
560.0	670.0	3.37	3.33	3.31		670.0	16.94	18.06	18.56	410.0	4.12	3.95	3.85
570.0	680.0	3.39	3.36	3.33		680.0	17.97	19.18	19.71	420.0	4.27	4.10	4.00
580.0	690.0	3.53	3.49	3.47		690.0	18.75	20.01	20.57	430.0	4.53	4.36	4.25
590.0	700.0	3.70	3.66	3.64		700.0	19.51	20.79	21.35	440.0	4.80	4.62	4.51
600.0	710.0	3.79	3.75	3.72		710.0	20.21	21.52	22.04	450.0	4.97	4.77	4.65
610.0	720.0	3.76	3.72	3.69		720.0	21.00	22.34	22.74	460.0	5.04	4.84	4.71

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	---	--	10.45	39.53	48.12	51.82	39.06	43.98	30.03	42.32	45.69	48.28
1	---	33.55	--	50.74	34.03	55.63	34.03	51.87	33.75	40.57	41.74	62.60
2	99.53	74.52	56.62	62.05	68.88	90.74	89.14	79.61	80.29	66.81	66.43	74.11
3	114.11	113.56	79.26	86.12	77.00	92.42	120.94	103.87	85.63	94.63	70.56	89.74
4	114.31	121.54	111.93	110.66	98.93	110.01	107.86	121.80	111.70	118.90	101.41	104.27
5	116.77	120.43	121.35	123.25	95.80	111.30	97.08	119.82	115.28	120.55	113.05	111.61
6	112.07	121.05	115.97	122.45	109.14	110.34	96.94	112.15	118.46	118.32	114.32	118.67
7	114.34	118.84	121.34	120.78	119.78	121.46	108.44	113.50	119.62	122.93	120.19	121.21
8	114.04	119.64	120.00	119.62	121.09	121.78	108.97	111.80	113.68	121.44	120.68	121.53
9	114.11	121.16	120.32	120.30	119.97	119.00	120.72	105.86	115.48	104.23	123.27	120.84
10	112.93	120.19	120.56	119.52	121.05	121.15	121.93	119.20	113.31	110.26	115.41	122.76
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions: RF IN:390.00 MHz; 0 dBm.
LO IN: 500.00 MHz; +17.00 dBm
IF OUT: 110.00 MHz; -7.07 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	---	--	20.22	48.41	59.90	56.38	47.96	51.43	40.31	50.47	52.94	62.57
1	---	33.95	--	45.57	35.23	42.74	33.69	44.99	35.73	56.14	47.43	50.69
2	89.66	67.61	46.64	53.67	60.25	75.02	81.47	69.00	66.11	57.34	57.14	68.03
3	104.24	86.94	58.98	71.88	59.77	75.42	86.55	84.65	66.45	76.25	51.45	69.56
4	104.44	104.95	111.82	85.41	81.75	82.35	89.83	105.28	91.90	103.02	83.46	83.06
5	106.90	105.40	103.03	105.32	76.41	88.00	80.08	102.26	99.94	110.17	93.11	89.12
6	102.20	121.63	123.62	124.38	111.98	101.22	95.82	100.14	123.40	115.33	111.18	109.24
7	104.47	110.22	112.82	119.80	121.02	111.46	93.79	96.98	106.56	122.22	116.70	113.56
8	104.17	120.99	119.01	122.63	123.50	123.41	119.60	113.75	113.42	122.82	122.93	122.46
9	104.24	118.48	120.59	122.03	122.42	122.50	120.47	115.39	117.88	118.16	123.60	121.70
10	103.06	114.88	118.92	119.35	122.36	123.50	121.29	122.14	118.07	108.59	117.07	123.06
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions: RF IN:390.00 MHz; 10 dBm.
LO IN: 500.00 MHz; +17.00 dBm
IF OUT: 110.00 MHz; 2.80 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 represents the Harmonics level of the RF Input Signal to the mixer