

Frequency Mixer

HJK-ED13513/2

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=50MHz (dB)		
		@LO (dBm)		
		+19	+20	+21
430.0	480.0	6.81	6.79	6.73
470.0	520.0	6.90	6.87	6.84
530.0	580.0	6.99	6.93	6.90
570.0	620.0	7.07	7.05	6.98
630.0	680.0	7.14	7.11	7.05
670.0	720.0	7.26	7.19	7.15
730.0	780.0	7.16	7.11	7.04
770.0	820.0	7.33	7.25	7.20
930.0	980.0	7.61	7.54	7.47
970.0	1020.0	7.38	7.32	7.25
1030.0	1080.0	7.20	7.15	7.09
1070.0	1120.0	7.14	7.07	7.02
1110.0	1160.0	7.10	7.04	6.98
1136.0	1186.0	7.07	7.02	6.97
1140.0	1190.0	7.08	7.03	6.97
1146.0	1196.0	7.06	7.01	6.97
1150.0	1200.0	7.06	7.00	6.94
1156.0	1206.0	7.05	6.98	6.95
1160.0	1210.0	7.04	6.99	6.95
1168.0	1218.0	7.06	6.99	6.94
1170.0	1220.0	7.05	7.00	6.94
1236.0	1286.0	7.08	7.03	6.98
1280.0	1330.0	7.15	7.09	7.04
1346.0	1396.0	7.27	7.22	7.17
1390.0	1440.0	7.36	7.31	7.27
1434.0	1484.0	7.50	7.44	7.40
1500.0	1550.0	7.63	7.59	7.56
1600.0	1650.0	7.91	7.89	7.86
1750.0	1800.0	8.32	8.29	8.27
1850.0	1900.0	8.56	8.53	8.51
2000.0	2050.0	8.95	8.92	8.87
2100.0	2150.0	9.10	9.06	9.01
2250.0	2300.0	9.04	8.98	8.95
2350.0	2400.0	9.04	8.96	8.90
2500.0	2550.0	9.24	9.22	9.16
2600.0	2650.0	9.59	9.55	9.48
2750.0	2800.0	10.33	10.25	10.21
2800.0	2850.0	10.85	10.80	10.74

RF (IN) (MHz)	LO (MHz)	IP-3 INPUT (dBm)		
		@LO (dBm)		
		+19	+20	+21
430.0	480.0	29.23	30.09	30.36
470.0	520.0	30.82	32.15	33.28
530.0	580.0	30.33	30.70	31.72
570.0	620.0	30.13	30.93	31.76
630.0	680.0	29.14	29.49	31.28
670.0	720.0	28.38	29.99	30.09
730.0	780.0	28.10	28.77	30.27
770.0	820.0	26.46	27.08	28.67
930.0	980.0	25.48	26.89	28.55
970.0	1020.0	26.93	28.46	29.17
1030.0	1080.0	26.50	27.11	28.75
1070.0	1120.0	26.38	27.57	28.77
1110.0	1160.0	26.63	27.75	29.39
1136.0	1186.0	27.05	27.88	29.31
1140.0	1190.0	27.00	28.37	29.37
1146.0	1196.0	27.21	28.37	29.49
1150.0	1200.0	27.04	28.36	29.35
1156.0	1206.0	27.19	28.46	29.56
1160.0	1210.0	27.17	28.39	30.09
1168.0	1218.0	27.22	28.50	29.94
1170.0	1220.0	27.59	28.51	29.73
1236.0	1286.0	27.44	28.74	29.87
1280.0	1330.0	27.99	28.79	29.96
1346.0	1396.0	28.36	29.74	31.38
1390.0	1440.0	29.55	31.06	32.03
1434.0	1484.0	29.76	31.22	32.35
1500.0	1550.0	29.86	30.87	32.17
1600.0	1650.0	29.88	30.48	33.61
1750.0	1800.0	31.65	32.49	35.02
1850.0	1900.0	31.76	35.52	37.52
2000.0	2050.0	33.35	36.39	38.29
2100.0	2150.0	31.82	34.51	36.97
2250.0	2300.0	30.14	31.48	33.72
2350.0	2400.0	28.55	29.99	31.34
2500.0	2550.0	27.33	28.38	29.75
2600.0	2650.0	27.09	28.25	29.42
2750.0	2800.0	25.79	26.84	28.16
2800.0	2850.0	25.80	27.02	28.08

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+10dBm (dB)		
		@LO (dBm)		
		+19	+20	+21
430.0	480.0	0.11	0.06	0.06
470.0	520.0	0.06	0.05	0.05
530.0	580.0	0.06	0.06	0.06
570.0	620.0	0.09	0.05	0.07
630.0	680.0	0.10	0.07	0.08
670.0	720.0	0.10	0.06	0.05
730.0	780.0	0.13	0.08	0.07
770.0	820.0	0.08	0.07	0.05
930.0	980.0	0.21	0.15	0.11
970.0	1020.0	0.11	0.07	0.06
1030.0	1080.0	0.12	0.08	0.08
1070.0	1120.0	0.11	0.10	0.08
1110.0	1160.0	0.10	0.08	0.07
1136.0	1186.0	0.12	0.11	0.09
1140.0	1190.0	0.11	0.09	0.08
1146.0	1196.0	0.12	0.10	0.08
1150.0	1200.0	0.11	0.09	0.10
1156.0	1206.0	0.11	0.11	0.07
1160.0	1210.0	0.12	0.09	0.07
1168.0	1218.0	0.10	0.10	0.09
1170.0	1220.0	0.11	0.09	0.07
1236.0	1286.0	0.10	0.08	0.06
1280.0	1330.0	0.09	0.07	0.06
1346.0	1396.0	0.09	0.04	0.05
1390.0	1440.0	0.09	0.08	0.05
1434.0	1484.0	0.08	0.08	0.07
1500.0	1550.0	0.09	0.04	0.01
1600.0	1650.0	0.06	0.04	0.03
1750.0	1800.0	0.05	0.05	0.03
1850.0	1900.0	0.07	0.06	0.04
2000.0	2050.0	0.05	0.03	0.04
2100.0	2150.0	0.05	0.03	0.03
2250.0	2300.0	0.17	0.16	0.12
2350.0	2400.0	0.07	0.04	0.03
2500.0	2550.0	0.17	0.10	0.07
2600.0	2650.0	0.22	0.13	0.10
2750.0	2800.0	0.33	0.29	0.26
2800.0	2850.0	0.31	0.25	0.24

Frequency Mixer

HJK-ED13513/2

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1151.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1134.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1168.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+20			+20			+20
1110.1	41.0	11.88	1106.1	28.0	13.03	1130.1	38.0	12.08
1050.1	101.0	9.86	1078.7	55.4	11.16	1110.1	58.0	11.06
990.1	161.0	9.18	1051.3	82.8	10.24	1070.1	98.0	9.83
930.1	221.0	8.77	1023.9	110.2	9.69	1050.1	118.0	9.55
890.1	261.0	8.55	991.0	143.1	9.33	1010.1	158.0	9.19
830.1	321.0	8.27	963.6	170.5	9.08	990.1	178.0	8.98
770.1	381.0	7.80	936.2	197.9	8.90	950.1	218.0	8.80
710.1	441.0	7.44	908.8	225.3	8.73	930.1	238.0	8.70
650.1	501.0	7.34	881.4	252.7	8.58	890.1	278.0	8.47
590.1	561.0	7.23	854.0	280.1	8.44	870.1	298.0	8.41
530.1	621.0	7.11	821.1	313.0	8.27	830.1	338.0	8.17
470.1	681.0	7.09	793.7	340.4	8.11	810.1	358.0	7.99
430.1	721.0	7.09	766.3	367.8	7.85	770.1	398.0	7.73
370.1	781.0	7.17	738.9	395.2	7.69	750.1	418.0	7.60
310.1	841.0	8.16	711.5	422.6	7.54	730.1	438.0	7.49
250.1	901.0	11.13	684.1	450.0	7.43	690.1	478.0	7.42
190.1	961.0	8.20	656.7	477.4	7.38	670.1	498.0	7.37
130.1	1021.0	7.23	623.9	510.2	7.32	630.1	538.0	7.25
70.1	1081.0	7.07	596.5	537.6	7.22	610.1	558.0	7.21
10.1	1141.0	7.11	569.1	565.0	7.17	570.1	598.0	7.11
10.1	1161.1	7.11	541.7	592.4	7.08	550.1	618.0	7.02
135.1	1286.1	7.00	514.3	619.8	7.05	510.1	658.0	7.06
260.1	1411.1	6.98	486.9	647.2	7.03	490.1	678.0	7.11
385.1	1536.1	7.19	454.0	680.1	7.06	450.1	718.0	7.15
510.1	1661.1	7.52	426.6	707.5	7.06	430.1	738.0	7.19
635.1	1786.1	7.53	399.2	734.9	7.10	390.1	778.0	7.27
760.1	1911.1	7.53	371.8	762.3	7.10	370.1	798.0	7.34
885.1	2036.1	7.65	344.4	789.7	7.32	350.1	818.0	7.65
1010.1	2161.1	7.75	317.0	817.1	7.67	310.1	858.0	8.50
1260.1	2411.1	8.27	289.6	844.5	8.27	290.1	878.0	9.90
1385.1	2536.1	8.89	256.7	877.4	10.01	250.1	918.0	10.88
1510.1	2661.1	9.31	201.9	932.2	10.27	230.1	938.0	9.71
1635.1	2786.1	9.25	174.5	959.6	8.26	190.1	978.0	7.63
1760.1	2911.1	9.02	147.1	987.0	7.46	170.1	998.0	7.32
1885.1	3036.1	9.34	119.7	1014.4	7.26	130.1	1038.0	7.18
2010.1	3161.1	9.99	86.8	1047.3	7.12	110.1	1058.0	7.14
2135.1	3286.1	10.67	59.4	1074.7	7.08	70.1	1098.0	7.06
2260.1	3411.1	11.24	32.0	1102.1	7.05	50.1	1118.0	7.06
2385.1	3536.1	11.83	10.1	1124.0	7.11	10.1	1158.0	7.05

Frequency Mixer

HJK-ED13513/2

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)		
	+19	+20	+21	+19	+20	+21			+19	+20	+21
480.0	45.67	45.81	45.95	45.22	45.42	45.57	430.0	480.0	39.63	39.17	38.60
520.0	46.72	46.84	46.93	45.73	45.83	45.94	470.0	520.0	39.31	39.35	38.55
580.0	50.12	50.34	50.59	47.00	47.12	47.22	530.0	580.0	38.30	37.99	37.96
620.0	50.52	50.68	50.83	48.08	48.22	48.37	570.0	620.0	35.41	35.28	34.88
680.0	52.53	52.79	53.03	46.70	46.81	46.95	630.0	680.0	35.48	35.38	35.44
720.0	53.15	53.45	53.73	44.37	44.45	44.56	670.0	720.0	33.86	33.67	33.28
780.0	53.41	53.78	54.12	41.32	41.31	41.34	730.0	780.0	34.91	35.02	35.06
820.0	53.68	54.08	54.44	38.97	38.95	38.89	770.0	820.0	33.95	34.03	34.12
980.0	47.97	48.20	48.41	43.20	43.17	43.18	930.0	980.0	34.28	34.41	34.14
1020.0	46.96	47.15	47.34	44.87	44.80	44.77	970.0	1020.0	32.96	32.90	32.71
1080.0	46.22	46.36	46.50	45.57	45.50	45.44	1030.0	1080.0	31.80	31.58	31.20
1120.0	45.50	45.60	45.70	45.71	45.61	45.56	1070.0	1120.0	31.76	31.68	31.36
1180.0	43.94	43.95	43.95	45.86	45.73	45.59	1110.0	1160.0	31.68	31.66	31.53
1186.0	43.81	43.81	43.81	45.92	45.80	45.64	1136.0	1186.0	31.62	31.42	31.28
1190.0	43.78	43.77	43.74	46.05	45.90	45.75	1140.0	1190.0	31.66	31.52	31.50
1196.0	43.75	43.74	43.70	46.32	46.14	45.98	1146.0	1196.0	31.68	31.57	31.53
1200.0	43.73	43.72	43.68	46.45	46.30	46.12	1150.0	1200.0	31.66	31.59	31.53
1206.0	43.64	43.64	43.61	46.61	46.46	46.26	1156.0	1206.0	31.49	31.51	31.36
1210.0	43.52	43.51	43.47	46.70	46.51	46.33	1160.0	1210.0	31.34	31.35	31.27
1216.0	43.28	43.24	43.22	46.77	46.57	46.36	1168.0	1218.0	31.28	31.09	31.05
1220.0	43.14	43.08	43.06	46.78	46.57	46.35	1170.0	1220.0	31.16	31.22	30.96
1286.0	43.94	43.92	43.95	47.63	47.33	47.05	1236.0	1286.0	31.26	31.20	31.25
1330.0	45.42	45.42	45.46	48.03	47.72	47.42	1280.0	1330.0	31.14	31.31	31.25
1396.0	47.45	47.40	47.35	48.63	48.23	47.83	1346.0	1396.0	31.63	31.73	31.77
1440.0	47.62	47.51	47.43	47.43	47.00	46.59	1390.0	1440.0	32.20	32.30	32.42
1484.0	47.55	47.41	47.32	46.19	45.83	45.45	1434.0	1484.0	33.33	33.48	33.49
1550.0	46.42	46.32	46.28	43.94	43.63	43.30	1500.0	1550.0	36.37	36.56	36.58
1650.0	45.64	45.53	45.51	41.34	41.12	40.92	1600.0	1650.0	45.75	45.83	46.30
1800.0	45.55	45.43	45.36	37.84	37.70	37.57	1750.0	1800.0	46.29	46.38	45.17
1900.0	47.31	47.15	47.13	36.88	36.81	36.73	1850.0	1900.0	38.79	38.87	38.38
2050.0	49.00	48.84	48.79	35.78	35.74	35.70	2000.0	2050.0	34.40	34.09	34.04
2150.0	47.74	47.56	47.50	34.48	34.43	34.40	2100.0	2150.0	33.79	33.52	33.40
2300.0	46.76	46.62	46.60	32.97	32.95	32.93	2250.0	2300.0	35.75	35.41	35.32
2400.0	45.72	45.59	45.58	32.33	32.32	32.31	2350.0	2400.0	34.91	34.92	34.81
2550.0	42.43	42.40	42.37	32.65	32.66	32.66	2500.0	2550.0	33.05	33.15	33.41
2650.0	39.90	39.88	39.86	34.09	34.12	34.16	2600.0	2650.0	33.62	33.66	34.01
2800.0	39.51	39.49	39.49	38.04	38.11	38.17	2750.0	2800.0	36.87	37.08	37.36
2850.0	40.43	40.43	40.43	39.90	39.97	40.04	2800.0	2850.0	39.24	39.75	40.13

Frequency Mixer

HJK-ED13513/2

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=2200MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+19	+20	+21		+19	+20	+21		+19	+20	+21
430.0	480.0	1.65	1.64	1.64	480.0	6.87	6.87	6.86	10.0	1.72	1.76	1.81
470.0	520.0	1.67	1.66	1.65	520.0	6.57	6.56	6.54	20.0	1.70	1.74	1.78
530.0	580.0	1.70	1.69	1.67	580.0	6.05	6.05	6.04	25.0	1.69	1.73	1.77
570.0	620.0	1.73	1.72	1.70	620.0	5.71	5.69	5.68	35.0	1.68	1.72	1.76
630.0	680.0	1.78	1.76	1.73	680.0	5.31	5.31	5.29	50.0	1.67	1.72	1.76
670.0	720.0	1.81	1.78	1.76	720.0	5.07	5.06	5.05	75.0	1.66	1.70	1.74
730.0	780.0	1.87	1.84	1.81	780.0	4.79	4.78	4.77	100.0	1.64	1.69	1.72
770.0	820.0	1.85	1.82	1.78	820.0	4.54	4.53	4.52	150.0	1.56	1.60	1.63
930.0	980.0	1.85	1.82	1.79	980.0	4.40	4.40	4.39	275.0	1.37	1.40	1.42
970.0	1020.0	1.89	1.86	1.83	1020.0	4.48	4.48	4.47	325.0	1.31	1.33	1.34
1030.0	1080.0	1.78	1.76	1.73	1080.0	4.44	4.43	4.42	375.0	1.31	1.32	1.32
1070.0	1120.0	1.70	1.67	1.65	1120.0	4.46	4.46	4.46	425.0	1.37	1.36	1.35
1110.0	1160.0	1.59	1.57	1.55	1180.0	4.39	4.38	4.37	450.0	1.42	1.41	1.40
1136.0	1186.0	1.53	1.50	1.48	1186.0	4.37	4.36	4.35	500.0	1.50	1.48	1.47
1140.0	1190.0	1.52	1.50	1.48	1190.0	4.38	4.38	4.37	550.0	1.62	1.60	1.58
1146.0	1196.0	1.50	1.48	1.46	1196.0	4.37	4.37	4.36	600.0	1.73	1.71	1.68
1150.0	1200.0	1.49	1.47	1.45	1200.0	4.39	4.39	4.38	625.0	1.76	1.73	1.71
1156.0	1206.0	1.47	1.45	1.43	1206.0	4.38	4.37	4.37	675.0	1.84	1.81	1.79
1160.0	1210.0	1.46	1.44	1.42	1210.0	4.39	4.39	4.39	725.0	1.89	1.86	1.83
1168.0	1218.0	1.43	1.41	1.40	1216.0	4.39	4.38	4.38	775.0	1.93	1.90	1.87
1170.0	1220.0	1.43	1.41	1.39	1220.0	4.40	4.40	4.40	800.0	1.90	1.87	1.84
1236.0	1286.0	1.23	1.21	1.20	1286.0	4.33	4.32	4.31	850.0	1.87	1.84	1.81
1280.0	1330.0	1.12	1.11	1.10	1330.0	4.37	4.37	4.37	900.0	1.83	1.79	1.76
1346.0	1396.0	1.07	1.09	1.10	1396.0	4.35	4.34	4.34	950.0	1.72	1.68	1.66
1390.0	1440.0	1.16	1.18	1.20	1440.0	4.32	4.32	4.31	1000.0	1.62	1.59	1.56
1434.0	1484.0	1.25	1.26	1.28	1484.0	4.31	4.30	4.30	1150.0	1.33	1.30	1.28
1500.0	1550.0	1.42	1.44	1.46	1550.0	4.22	4.21	4.20	1250.0	1.20	1.18	1.17
1600.0	1650.0	1.64	1.66	1.67	1650.0	4.08	4.07	4.06	1350.0	1.31	1.32	1.33
1750.0	1800.0	1.83	1.84	1.85	1800.0	3.79	3.79	3.79	1400.0	1.41	1.43	1.44
1850.0	1900.0	1.88	1.89	1.89	1900.0	3.52	3.52	3.51	1500.0	1.61	1.64	1.66
2000.0	2050.0	1.87	1.87	1.86	2050.0	3.23	3.23	3.23	1600.0	1.86	1.90	1.93
2100.0	2150.0	1.86	1.84	1.83	2150.0	3.14	3.14	3.15	1700.0	2.04	2.08	2.11
2250.0	2300.0	1.85	1.82	1.79	2300.0	3.11	3.10	3.09	1750.0	2.08	2.13	2.16
2350.0	2400.0	1.76	1.74	1.71	2400.0	3.21	3.21	3.20	1850.0	2.23	2.27	2.31
2500.0	2550.0	1.56	1.55	1.53	2550.0	3.40	3.40	3.40	1950.0	2.26	2.30	2.34
2600.0	2650.0	1.58	1.58	1.58	2650.0	3.38	3.38	3.37	2050.0	2.24	2.27	2.30
2750.0	2800.0	2.01	2.03	2.05	2800.0	3.16	3.15	3.14	2100.0	2.23	2.26	2.29
2800.0	2850.0	2.21	2.24	2.26	2850.0	3.07	3.06	3.05	2150.0	2.28	2.32	2.34

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	--	--	5.72	7.70	29.48	23.27	31.60	29.57	21.89	49.98	47.17	46.72
1	--	23.18	--	39.87	17.38	44.23	34.82	43.30	38.82	43.78	47.37	56.64
2	99.81	74.18	71.62	77.53	76.63	90.08	89.79	89.30	85.92	92.76	83.59	85.84
3	124.18	98.72	92.93	91.29	101.37	97.67	95.45	104.75	103.89	101.65	105.51	101.10
4	125.50	113.29	113.08	109.48	113.12	109.74	114.49	115.56	115.01	115.70	115.18	115.09
5	125.25	112.92	114.66	114.20	110.86	112.70	113.72	113.56	113.41	112.58	114.31	113.75
6	124.10	114.29	112.29	115.53	107.17	115.88	108.12	115.90	113.91	113.62	115.74	114.65
7	124.95	114.71	116.12	115.11	113.58	107.53	113.91	109.41	115.28	112.36	112.06	114.48
8	125.10	111.60	113.19	113.14	114.54	108.67	104.87	104.69	112.21	114.48	115.10	116.37
9	125.25	115.89	115.15	114.86	115.93	114.16	110.04	113.65	108.83	114.51	112.03	113.55
10	124.22	115.51	115.17	116.34	112.70	114.17	114.37	108.22	96.55	110.08	113.93	113.76
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 1151.00 MHz; -5.00 dBm.
LO IN: 1700.00 MHz; +20.00 dBm
IF OUT: 549 MHz; -12.85 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	--	--	15.49	17.88	39.07	33.28	41.69	38.28	31.95	58.96	61.87	58.28
1	--	23.24	--	40.06	17.39	44.47	35.16	43.50	39.10	44.03	47.62	56.97
2	83.27	64.45	61.56	68.73	65.02	78.16	80.13	79.65	73.68	80.11	71.34	77.32
3	104.99	80.92	68.85	72.87	71.47	77.97	72.46	85.19	84.40	81.07	84.20	82.19
4	121.49	117.77	96.31	101.24	105.90	109.62	103.24	106.14	110.87	112.43	118.87	98.26
5	119.13	120.92	121.43	120.36	115.20	116.57	118.55	120.78	122.96	122.07	123.37	123.95
6	119.00	123.13	121.55	121.88	115.95	121.92	116.09	120.63	121.20	123.27	123.30	120.58
7	119.99	123.13	122.86	120.49	121.72	111.96	120.36	116.60	121.31	121.11	124.33	122.87
8	118.92	122.91	121.41	118.20	120.76	118.52	115.15	117.67	116.85	123.35	120.72	121.54
9	118.72	122.13	121.77	121.37	121.06	122.93	115.55	121.83	112.03	121.84	121.34	122.74
10	120.08	122.00	122.73	121.51	122.57	118.47	120.31	113.34	117.48	114.80	121.56	122.11
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 1151.00 MHz; 5.00 dBm.
LO IN: 1700.00 MHz; +20.00 dBm
IF OUT: 549 MHz; -2.87 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