

Frequency Mixer

HJK-ED11354

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=21.4MHz (dB)		
		@LO (dBm)		
		+14	+17	+20
40.0	61.4	7.81	7.08	6.57
65.0	86.4	6.99	6.49	6.16
90.0	111.4	6.44	6.08	5.86
115.0	136.4	6.49	6.11	5.85
140.0	161.4	6.38	6.02	5.77
165.0	186.4	6.18	5.89	5.70
185.0	206.4	6.15	5.88	5.71
210.0	231.4	6.19	5.89	5.70
230.0	251.4	6.12	5.84	5.66
255.0	276.4	6.02	5.81	5.68
275.0	296.4	6.02	5.86	5.81
300.0	321.4	6.05	5.87	5.81
320.0	341.4	6.01	5.84	5.77
345.0	366.4	6.00	5.89	5.86
365.0	386.4	6.03	5.94	5.91
390.0	411.4	6.03	5.93	5.89
410.0	431.4	6.06	5.93	5.86
435.0	456.4	5.99	5.86	5.78
455.0	476.4	6.13	5.98	5.88
480.0	501.4	6.15	5.94	5.81
500.0	521.4	6.52	6.25	6.05
525.0	546.4	6.93	6.61	6.34
545.0	566.4	7.49	7.14	6.83
570.0	591.4	7.76	7.05	6.69
590.0	611.4	7.16	6.72	6.51
615.0	636.4	7.25	6.82	6.61
635.0	656.4	7.54	7.09	6.85
660.0	681.4	7.85	7.44	7.19
680.0	701.4	8.05	7.66	7.41
705.0	726.4	8.26	7.85	7.64
725.0	746.4	8.43	7.99	7.83
750.0	771.4	8.62	8.08	7.92
770.0	791.4	8.82	8.10	7.88
795.0	816.4	9.17	8.17	7.77
815.0	836.4	9.44	8.26	7.77
840.0	861.4	9.86	8.47	7.85
860.0	881.4	10.31	8.78	8.04
885.0	906.4	11.00	9.37	8.39
905.0	926.4	11.47	9.83	8.77
930.0	951.4	12.01	10.32	9.17

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+14	+17	+20
40.0	61.4	20.81	22.21	23.29
65.0	86.4	21.84	23.11	24.22
90.0	111.4	24.04	25.10	26.50
115.0	136.4	23.08	24.37	26.15
140.0	161.4	24.97	27.13	28.81
165.0	186.4	24.31	25.84	26.83
185.0	206.4	27.24	27.67	28.45
210.0	231.4	27.31	28.60	30.13
230.0	251.4	29.76	30.15	31.61
255.0	276.4	25.74	26.33	26.59
275.0	296.4	23.28	24.23	26.32
300.0	321.4	26.83	28.92	30.31
320.0	341.4	27.16	29.88	32.28
345.0	366.4	29.36	32.26	33.08
365.0	386.4	31.02	34.67	35.61
390.0	411.4	31.17	32.93	36.88
410.0	431.4	32.80	33.97	38.23
435.0	456.4	31.11	35.29	36.73
455.0	476.4	28.91	32.96	35.76
480.0	501.4	29.38	32.35	34.10
500.0	521.4	33.06	31.96	32.19
525.0	546.4	23.93	25.88	27.95
545.0	566.4	17.75	19.03	19.85
570.0	591.4	20.96	22.82	28.10
590.0	611.4	21.00	25.04	30.91
615.0	636.4	20.85	25.46	28.74
635.0	656.4	21.10	24.78	27.16
660.0	681.4	22.00	24.75	26.44
680.0	701.4	21.73	24.40	26.42
705.0	726.4	21.04	23.78	26.31
725.0	746.4	20.51	22.55	25.24
750.0	771.4	19.73	20.78	23.24
770.0	791.4	19.19	19.76	21.91
795.0	816.4	19.37	19.30	21.14
815.0	836.4	19.46	19.02	20.77
840.0	861.4	19.99	19.06	20.94
860.0	881.4	21.75	19.21	20.89
885.0	906.4	23.48	20.81	21.32
905.0	926.4	20.15	22.11	22.05
930.0	951.4	17.50	20.47	22.85

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+18dBm (dB)		
		@LO (dBm)		
		+14	+17	+20
40.0	61.4	1.67	0.99	0.48
65.0	86.4	1.29	0.53	0.25
90.0	111.4	1.23	0.55	0.34
115.0	136.4	1.23	0.57	0.35
140.0	161.4	1.09	0.54	0.35
165.0	186.4	0.89	0.52	0.34
185.0	206.4	0.98	0.57	0.38
210.0	231.4	0.92	0.52	0.34
230.0	251.4	0.87	0.47	0.30
255.0	276.4	0.80	0.41	0.25
275.0	296.4	0.91	0.44	0.29
300.0	321.4	0.57	0.41	0.30
320.0	341.4	0.45	0.33	0.25
345.0	366.4	0.36	0.25	0.18
365.0	386.4	0.33	0.20	0.15
390.0	411.4	0.31	0.18	0.12
410.0	431.4	0.21	0.12	0.08
435.0	456.4	0.27	0.16	0.10
455.0	476.4	0.24	0.16	0.10
480.0	501.4	0.33	0.23	0.16
500.0	521.4	0.36	0.09	0.07
525.0	546.4	1.38	0.46	0.08
545.0	566.4	2.47	1.60	1.26
570.0	591.4	1.67	0.97	0.57
590.0	611.4	1.80	0.92	0.43
615.0	636.4	1.58	1.00	0.43
635.0	656.4	1.45	0.99	0.51
660.0	681.4	1.39	0.96	0.60
680.0	701.4	1.50	1.01	0.68
705.0	726.4	1.70	1.10	0.75
725.0	746.4	1.86	1.21	0.80
750.0	771.4	2.12	1.49	1.06
770.0	791.4	2.36	1.82	1.37
795.0	816.4	2.50	2.08	1.71
815.0	836.4	2.58	2.31	1.93
840.0	861.4	2.49	2.38	2.08
860.0	881.4	2.43	2.34	2.08
885.0	906.4	2.55	2.22	1.96
905.0	926.4	3.03	2.39	1.93
930.0	951.4	3.53	2.72	2.00

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=415MHz (dB)
		@LO (dBm)
		+17
394.9	20.1	9.67
377.8	37.2	8.27
360.7	54.3	8.08
343.6	71.4	7.64
326.5	88.5	7.19
309.4	105.6	6.94
292.3	122.7	6.96
275.2	139.8	6.84
258.0	157.0	6.63
240.9	174.1	6.45
223.8	191.2	6.22
206.7	208.3	5.64
189.6	225.4	6.43
164.0	251.0	6.26
146.9	268.1	6.14
121.2	293.8	6.01
104.1	310.9	6.02
78.4	336.6	5.94
61.3	353.7	5.89
35.7	379.3	5.81
18.6	396.4	5.92
21.2	436.2	5.86
43.6	458.6	5.78
77.2	492.2	5.72
99.6	514.6	5.69
133.2	548.2	6.26
155.6	570.6	6.73
189.2	604.2	6.29
211.6	626.6	6.11
245.2	660.2	6.25
267.6	682.6	6.62
301.1	716.1	7.62
323.5	738.5	8.21
357.1	772.1	8.65
379.5	794.5	8.83
413.1	828.1	9.13
435.5	850.5	9.37
469.1	884.1	9.87
491.5	906.5	10.31
525.1	940.1	10.56

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=380.1MHz (dB)
		@LO (dBm)
		+17
10.0	390.1	6.43
20.0	400.1	5.97
30.0	410.1	5.87
40.0	420.1	5.77
50.0	430.1	5.76
60.0	440.1	5.81
70.0	450.1	5.78
80.0	460.1	5.85
90.0	470.1	5.85
100.0	480.1	5.73
120.0	500.1	5.75
130.0	510.1	5.83
150.0	530.1	5.86
160.0	540.1	5.96
180.0	560.1	6.49
190.0	570.1	6.66
210.0	590.1	6.80
220.0	600.1	6.56
240.0	620.1	6.29
250.0	630.1	6.25
270.0	650.1	6.28
280.0	660.1	6.37
300.0	680.1	6.73
310.0	690.1	6.99
330.0	710.1	7.51
340.0	720.1	7.78
360.0	740.1	8.25
370.0	750.1	8.41
390.0	770.1	8.75
400.0	780.1	8.81
420.0	800.1	9.01
430.0	810.1	9.09
450.0	830.1	9.21
460.0	840.1	9.27
480.0	860.1	9.51
490.0	870.1	9.67
510.0	890.1	10.07
520.0	900.1	10.25
540.0	920.1	10.50
550.0	930.1	10.54

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=450.1MHz (dB)
		@LO (dBm)
		+17
440.0	10.1	13.98
430.0	20.1	10.07
420.0	30.1	8.86
410.0	40.1	8.51
400.0	50.1	8.32
390.0	60.1	8.16
380.0	70.1	8.07
370.0	80.1	7.75
360.0	90.1	7.61
350.0	100.1	7.32
340.0	110.1	7.17
330.0	120.1	7.30
320.0	130.1	7.24
310.0	140.1	7.24
300.0	150.1	7.25
290.0	160.1	7.04
280.0	170.1	6.88
270.0	180.1	6.79
260.0	190.1	6.67
250.0	200.1	6.52
240.0	210.1	6.39
230.0	220.1	5.86
220.0	230.1	6.34
210.0	240.1	6.65
200.0	250.1	6.55
190.0	260.1	6.57
180.0	270.1	6.40
170.0	280.1	6.36
160.0	290.1	6.27
150.0	300.1	6.23
140.0	310.1	6.37
130.0	320.1	6.25
110.0	340.1	6.14
100.0	350.1	6.01
80.0	370.1	5.98
70.0	380.1	5.90
50.0	400.1	5.84
40.0	410.1	5.82
20.0	430.1	5.94
10.0	440.1	6.34

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+14	+17	+20	+14	+17	+20
61.4	57.01	57.65	58.36	54.08	53.75	53.50
86.4	56.00	56.94	57.78	52.34	52.25	52.18
111.4	54.97	56.13	57.30	50.93	50.97	51.01
136.4	53.31	54.64	55.89	49.63	49.83	49.93
161.4	52.39	53.91	55.16	48.58	48.86	49.05
186.4	51.39	52.90	54.13	47.57	47.70	47.68
206.4	50.82	52.24	53.22	46.93	47.31	47.67
231.4	49.48	51.37	53.06	46.03	46.38	46.69
251.4	49.12	51.32	53.24	45.27	45.44	45.63
276.4	47.78	49.62	51.26	43.67	43.46	43.25
296.4	45.30	45.91	46.51	43.31	43.61	44.12
321.4	45.37	46.79	48.16	43.54	44.05	44.53
341.4	45.19	46.66	48.12	42.87	43.18	43.41
366.4	45.16	46.97	48.68	41.65	42.02	42.22
386.4	45.25	47.51	49.50	40.31	40.81	41.21
411.4	45.93	48.61	50.82	37.71	38.05	38.46
431.4	47.46	51.30	54.69	35.78	35.98	36.27
456.4	48.78	53.83	60.17	34.14	34.08	34.15
476.4	47.70	50.60	52.83	33.48	33.29	33.20
501.4	46.49	47.21	47.59	32.47	32.28	32.17
521.4	41.96	42.03	42.11	31.79	31.61	31.51
546.4	37.34	37.47	37.58	30.31	29.91	29.65
566.4	32.51	32.86	33.19	30.08	29.43	28.92
591.4	31.12	33.03	34.98	37.43	41.07	44.43
611.4	31.52	32.75	34.02	51.40	60.88	55.45
636.4	33.78	34.66	35.55	49.44	49.95	48.87
656.4	35.12	35.75	36.42	43.58	43.23	43.37
681.4	37.24	37.61	38.09	42.48	41.54	41.44
701.4	38.36	38.65	38.96	42.01	40.75	40.31
726.4	40.10	40.43	40.70	42.68	41.11	40.47
746.4	41.29	41.69	41.86	42.86	41.29	40.43
771.4	42.22	42.74	42.95	43.32	41.75	40.82
791.4	42.50	43.26	43.70	43.77	42.28	41.37
816.4	42.99	43.94	44.55	44.15	42.97	42.13
836.4	43.39	44.58	45.35	44.57	43.67	42.96
861.4	43.79	45.08	45.96	44.76	44.20	43.94
881.4	43.96	45.51	46.54	45.26	45.06	45.16
906.4	43.89	45.48	46.60	45.39	45.78	46.41
926.4	43.81	45.43	46.81	45.40	46.32	47.33
951.4	43.24	44.27	45.22	44.52	45.87	47.52

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+14	+17	+20
40.0	61.4	58.49	53.73	45.55
65.0	86.4	51.96	47.00	46.54
90.0	111.4	54.59	49.88	43.52
115.0	136.4	47.72	45.03	44.73
140.0	161.4	62.48	55.55	48.89
165.0	186.4	49.50	46.66	43.95
185.0	206.4	52.32	47.82	43.89
210.0	231.4	54.93	49.43	45.07
230.0	251.4	54.55	56.92	55.42
255.0	276.4	57.64	49.65	45.17
275.0	296.4	48.34	47.48	46.18
300.0	321.4	50.95	55.55	57.22
320.0	341.4	49.18	54.37	61.76
345.0	366.4	47.42	52.86	63.23
365.0	386.4	44.67	47.57	49.82
390.0	411.4	45.99	47.11	47.24
410.0	431.4	46.30	47.68	47.31
435.0	456.4	44.12	45.72	45.91
455.0	476.4	43.26	44.85	45.92
480.0	501.4	43.64	44.79	45.58
500.0	521.4	43.25	44.54	45.92
525.0	546.4	42.30	43.65	44.99
545.0	566.4	40.18	41.30	42.55
570.0	591.4	36.22	40.57	57.47
590.0	611.4	36.33	43.46	59.83
615.0	636.4	36.50	42.46	53.78
635.0	656.4	35.26	39.16	43.92
660.0	681.4	34.06	38.20	42.62
680.0	701.4	32.12	36.26	40.10
705.0	726.4	29.56	33.56	37.70
725.0	746.4	28.10	31.81	36.23
750.0	771.4	26.70	29.75	33.70
770.0	791.4	25.94	28.45	32.25
795.0	816.4	25.43	26.91	30.02
815.0	836.4	25.16	26.07	28.87
840.0	861.4	24.92	25.21	27.92
860.0	881.4	24.82	24.51	27.18
885.0	906.4	25.05	23.92	27.10
905.0	926.4	25.14	23.35	26.13
930.0	951.4	24.89	22.71	25.18

Frequency Mixer

HJK-ED11354

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=475MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+14	+17	+20		+14	+17	+20		+14	+17	+20
40.0	61.4	2.32	2.09	1.94	61.4	28.03	27.59	27.16	10.0	1.47	1.42	1.39
65.0	86.4	1.57	1.42	1.33	86.4	13.19	12.99	12.89	20.0	1.36	1.29	1.24
90.0	111.4	1.36	1.23	1.14	111.4	10.89	10.75	10.69	30.0	1.32	1.26	1.21
115.0	136.4	1.29	1.15	1.07	136.4	9.74	9.69	9.63	40.0	1.29	1.23	1.19
140.0	161.4	1.18	1.05	1.04	161.4	8.95	8.90	8.86	50.0	1.29	1.23	1.19
165.0	186.4	1.09	1.04	1.11	186.4	8.31	8.27	8.20	60.0	1.37	1.31	1.26
185.0	206.4	1.07	1.06	1.15	206.4	7.83	7.76	7.73	70.0	1.49	1.43	1.38
210.0	231.4	1.05	1.09	1.18	231.4	7.20	7.14	7.08	80.0	1.58	1.52	1.49
230.0	251.4	1.06	1.13	1.21	251.4	6.66	6.58	6.53	90.0	1.59	1.54	1.51
255.0	276.4	1.10	1.18	1.26	276.4	5.91	5.85	5.77	100.0	1.62	1.56	1.53
275.0	296.4	1.13	1.26	1.39	296.4	5.28	5.22	5.16	110.0	1.72	1.66	1.62
300.0	321.4	1.18	1.32	1.45	321.4	4.50	4.44	4.40	120.0	1.81	1.76	1.73
320.0	341.4	1.22	1.35	1.47	341.4	3.86	3.80	3.76	130.0	1.86	1.81	1.79
345.0	366.4	1.24	1.36	1.46	366.4	3.07	3.03	2.99	140.0	1.83	1.79	1.76
365.0	386.4	1.22	1.32	1.41	386.4	2.50	2.46	2.43	150.0	1.87	1.81	1.77
390.0	411.4	1.17	1.26	1.33	411.4	1.88	1.85	1.83	160.0	2.03	1.97	1.92
410.0	431.4	1.13	1.21	1.29	431.4	1.53	1.52	1.51	170.0	2.20	2.13	2.09
435.0	456.4	1.09	1.14	1.20	456.4	1.49	1.52	1.54	180.0	2.25	2.19	2.16
455.0	476.4	1.14	1.13	1.15	476.4	1.85	1.89	1.93	190.0	2.24	2.17	2.13
480.0	501.4	1.28	1.25	1.23	501.4	2.65	2.71	2.77	200.0	2.30	2.23	2.18
500.0	521.4	1.44	1.40	1.37	521.4	3.53	3.62	3.70	210.0	2.46	2.39	2.33
525.0	546.4	1.70	1.66	1.62	546.4	4.80	4.91	5.00	220.0	2.59	2.51	2.46
545.0	566.4	1.89	1.85	1.80	566.4	5.66	5.72	5.77	230.0	2.56	2.48	2.43
570.0	591.4	1.70	1.86	2.05	591.4	6.94	7.17	7.44	240.0	2.52	2.43	2.37
590.0	611.4	1.88	1.99	2.10	611.4	9.18	9.48	9.79	250.0	2.63	2.54	2.46
615.0	636.4	2.08	2.14	2.22	636.4	12.52	12.71	12.99	260.0	2.85	2.74	2.66
635.0	656.4	2.22	2.28	2.35	656.4	15.13	15.26	15.39	270.0	2.96	2.86	2.78
660.0	681.4	2.32	2.43	2.50	681.4	18.11	18.30	18.30	280.0	2.95	2.84	2.76
680.0	701.4	2.37	2.52	2.63	701.4	20.95	21.20	21.20	290.0	2.95	2.84	2.75
705.0	726.4	2.40	2.62	2.80	726.4	23.81	24.14	23.81	300.0	3.10	2.97	2.87
725.0	746.4	2.39	2.62	2.84	746.4	26.33	26.33	25.56	320.0	3.27	3.14	3.03
750.0	771.4	2.36	2.56	2.80	771.4	31.03	30.49	29.96	330.0	3.19	3.05	2.94
770.0	791.4	2.34	2.48	2.73	791.4	35.46	34.75	34.07	350.0	3.42	3.25	3.12
795.0	816.4	2.43	2.44	2.67	816.4	39.49	38.61	37.77	360.0	3.60	3.42	3.28
815.0	836.4	2.54	2.44	2.62	836.4	42.38	40.41	38.61	380.0	3.54	3.36	3.22
840.0	861.4	2.69	2.49	2.60	861.4	45.72	43.44	40.41	390.0	3.62	3.43	3.28
860.0	881.4	2.86	2.59	2.64	881.4	48.26	45.72	43.44	410.0	3.87	3.68	3.51
885.0	906.4	3.12	2.78	2.75	906.4	48.26	46.96	45.72	420.0	3.75	3.56	3.40
905.0	926.4	3.34	2.96	2.86	926.4	48.26	46.96	43.44	440.0	3.90	3.70	3.51
930.0	951.4	3.53	3.10	2.92	951.4	46.96	44.55	40.41	450.0	4.07	3.90	3.73

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	16	25	39	41	45	50	50	56	56	60
1	-	44	+0	48	11	49	37	56	39	61	44	53
2	63	57	56	54	51	57	67	72	71	80	68	73
3	>90	79	67	75	69	69	66	76	69	80	68	79
4	>90	>87	>87	>87	>87	>87	84	>87	>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: 415 MHz; 3.00 dBm.

LO IN: 436.4 MHz; +17.00 dBm

IF OUT: 21.4 MHz; -3.31 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	29	34	45	54	55	58	53	69	60	63
1	-	44	+0	44	11	58	36	65	44	63	43	59
2	43	46	50	47	47	50	62	69	71	72	70	69
3	71	66	45	64	46	65	44	67	60	75	54	74
4	>90	83	92	71	70	66	65	68	81	81	78	80
5	>90	87	76	76	68	73	74	70	65	77	72	85
6	>90	>97	96	91	88	77	89	75	80	78	82	93
7	>90	>97	87	>97	84	89	85	85	80	79	88	87
8	>90	>97	>97	>97	>97	>97	95	89	90	88	87	88
9	>90	>97	>97	>97	>97	>97	93	92	88	>97	84	89
10	>90	>97	>97	>97	>97	>97	>97	>97	>97	>97	>97	>97
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 415 MHz; 13.00 dBm.

LO IN: 436.4 MHz; +17.00 dBm

IF OUT: 21.4 MHz; 6.64 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

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