

Frequency Mixer

TUF-2H

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)			RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)			RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+14dBm (dB)		
		@LO (dBm)					@LO (dBm)					@LO (dBm)		
		+14	+17	+20			+14	+17	+20			+14	+17	+20
10.1	40.1	7.49	6.47	5.90	10.1	40.1	22.26	26.49	29.40	10.1	40.1	0.65	0.28	0.14
51.1	81.1	7.47	6.51	6.04	51.1	81.1	22.06	25.46	29.44	51.1	81.1	0.78	0.25	0.13
92.0	122.0	7.43	6.46	5.99	92.0	122.0	21.94	25.10	27.69	92.0	122.0	0.53	0.24	0.12
133.0	163.0	7.23	6.34	5.92	133.0	163.0	24.06	26.83	25.79	133.0	163.0	0.80	0.31	0.17
173.9	203.9	7.31	6.41	5.95	173.9	203.9	23.00	24.77	25.45	173.9	203.9	0.49	0.22	0.15
214.9	244.9	7.20	6.25	5.88	214.9	244.9	23.69	23.02	29.32	214.9	244.9	0.69	0.30	0.19
255.8	285.8	7.15	6.26	5.95	255.8	285.8	22.91	25.23	24.39	255.8	285.8	0.76	0.36	0.17
296.8	326.8	7.13	6.21	5.95	296.8	326.8	20.77	27.16	22.42	296.8	326.8	0.71	0.36	0.19
337.7	367.7	7.02	6.23	6.02	337.7	367.7	22.30	27.02	22.54	337.7	367.7	0.89	0.33	0.15
378.7	408.7	6.92	6.22	6.08	378.7	408.7	22.94	23.10	22.83	378.7	408.7	0.98	0.36	0.15
419.6	449.6	6.92	6.24	6.09	419.6	449.6	23.59	21.83	22.50	419.6	449.6	0.99	0.40	0.18
440.1	470.1	6.81	6.19	6.07	440.1	470.1	31.36	20.58	22.15	440.1	470.1	1.06	0.43	0.19
481.1	511.1	6.92	6.32	6.20	481.1	511.1	28.73	19.96	21.03	481.1	511.1	1.04	0.39	0.19
501.5	531.5	6.87	6.34	6.21	501.5	531.5	25.93	20.35	21.76	501.5	531.5	1.12	0.40	0.18
542.5	572.5	6.98	6.51	6.33	542.5	572.5	23.01	20.45	22.47	542.5	572.5	1.08	0.36	0.18
563.0	593.0	6.93	6.51	6.35	563.0	593.0	21.92	20.79	23.44	563.0	593.0	1.24	0.39	0.21
603.9	633.9	7.06	6.60	6.48	603.9	633.9	20.87	20.57	22.63	603.9	633.9	1.20	0.38	0.21
624.4	654.4	7.02	6.60	6.50	624.4	654.4	19.90	20.64	22.49	624.4	654.4	1.29	0.46	0.25
665.3	695.3	7.11	6.67	6.58	665.3	695.3	19.63	20.75	22.28	665.3	695.3	1.35	0.49	0.27
685.8	715.8	7.10	6.69	6.59	685.8	715.8	19.28	21.10	22.39	685.8	715.8	1.29	0.52	0.26
726.8	756.8	7.18	6.79	6.68	726.8	756.8	17.99	20.74	22.66	726.8	756.8	1.40	0.55	0.31
747.2	777.2	7.17	6.83	6.72	747.2	777.2	17.76	20.13	22.79	747.2	777.2	1.44	0.57	0.33
788.2	818.2	7.29	6.98	6.88	788.2	818.2	16.78	18.38	21.79	788.2	818.2	1.43	0.58	0.34
808.7	838.7	7.35	7.05	6.95	808.7	838.7	16.08	17.79	20.93	808.7	838.7	1.47	0.62	0.35
849.6	879.6	7.50	7.23	7.16	849.6	879.6	15.61	17.04	18.96	849.6	879.6	1.57	0.72	0.38
870.1	900.1	7.62	7.35	7.29	870.1	900.1	15.47	16.96	18.99	870.1	900.1	1.50	0.61	0.35
911.1	941.1	7.83	7.54	7.46	911.1	941.1	14.99	16.37	18.59	911.1	941.1	1.56	0.66	0.31
931.5	961.5	8.02	7.66	7.56	931.5	961.5	15.16	16.56	18.93	931.5	961.5	1.54	0.61	0.26
972.5	1002.5	8.28	7.78	7.64	972.5	1002.5	15.19	17.20	20.10	972.5	1002.5	1.45	0.60	0.23
993.0	1023.0	8.45	7.82	7.63	993.0	1023.0	14.97	17.78	21.32	993.0	1023.0	1.41	0.65	0.24
1033.9	1063.9	8.86	7.89	7.62	1033.9	1063.9	14.70	19.20	23.21	1033.9	1063.9	1.32	0.71	0.30
1054.4	1084.4	8.95	7.90	7.58	1054.4	1084.4	14.89	20.00	24.11	1054.4	1084.4	1.19	0.70	0.34
1095.3	1125.3	9.48	8.08	7.63	1095.3	1125.3	14.18	20.61	25.36	1095.3	1125.3	0.84	0.74	0.40
1115.8	1145.8	9.74	8.18	7.65	1115.8	1145.8	13.89	20.86	26.17	1115.8	1145.8	0.68	0.74	0.43
1156.8	1186.8	10.38	8.55	7.85	1156.8	1186.8	13.48	20.13	27.69	1156.8	1186.8	0.14	0.57	0.45
1177.2	1207.2	10.68	8.74	7.85	1177.2	1207.2	13.08	19.11	28.62	1177.2	1207.2	-0.07	0.53	0.52
1218.2	1248.2	11.37	9.29	8.13	1218.2	1248.2	13.07	17.78	28.45	1218.2	1248.2	-0.49	0.31	0.55
1238.7	1268.7	11.52	9.43	8.22	1238.7	1268.7	13.35	17.81	27.56	1238.7	1268.7	-0.71	0.21	0.55
1279.6	1309.6	12.12	9.95	8.64	1279.6	1309.6	13.53	17.82	24.90	1279.6	1309.6	-1.10	-0.03	0.43
1300.1	1330.1	12.52	10.30	8.89	1300.1	1330.1	13.80	17.98	24.60	1300.1	1330.1	-1.25	-0.17	0.39



Frequency Mixer

TUF-2H

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=500.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=50.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1000.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+17			+17			+17
400.0	100.1	6.49	10.0	60.1	6.47	950.0	50.1	7.82
390.3	109.9	6.51	30.0	80.1	6.56	930.0	70.1	7.77
380.5	119.6	6.51	50.0	100.1	6.39	910.0	90.1	7.79
370.8	129.4	6.44	70.0	120.1	6.46	890.0	110.1	7.61
361.0	139.1	6.45	90.0	140.1	6.50	870.0	130.1	7.54
351.3	148.9	6.32	110.0	160.1	6.42	850.0	150.1	7.55
341.5	158.6	6.37	130.0	180.1	6.52	830.0	170.1	7.57
331.8	168.4	6.41	150.0	200.1	6.50	810.0	190.1	7.42
322.0	178.1	6.32	170.0	220.1	6.53	790.0	210.1	7.33
312.3	187.9	6.40	190.0	240.1	6.46	770.0	230.1	7.24
302.5	197.6	6.34	210.0	260.1	6.53	750.0	250.1	7.24
292.8	207.4	6.23	230.0	280.1	6.64	730.0	270.1	7.21
283.0	217.1	6.25	250.0	300.1	6.51	710.0	290.1	7.12
273.3	226.9	6.15	270.0	320.1	6.51	690.0	310.1	7.19
263.5	236.6	6.18	290.0	340.1	6.56	670.0	330.1	7.17
253.8	246.4	6.17	310.0	360.1	6.58	650.0	350.1	7.24
244.0	256.1	6.11	330.0	380.1	6.52	630.0	370.1	7.27
234.3	265.9	6.20	350.0	400.1	6.51	610.0	390.1	7.28
224.5	275.6	6.17	370.0	420.1	6.57	590.0	410.1	7.35
214.8	285.4	6.11	390.0	440.1	6.45	570.0	430.1	7.38
205.0	295.1	6.17	410.0	460.1	6.51	550.0	450.1	7.47
195.3	304.9	6.14	430.0	480.1	6.53	530.0	470.1	7.46
185.5	314.6	6.13	450.0	500.1	6.47	510.0	490.1	7.50
175.8	324.4	6.13	470.0	520.1	6.41	490.0	510.1	7.51
166.0	334.1	6.16	510.0	560.1	6.49	450.0	550.1	7.62
156.3	343.9	6.18	530.0	580.1	6.44	430.0	570.1	7.56
146.5	353.6	6.15	570.0	620.1	6.50	390.0	610.1	7.59
136.8	363.4	6.17	590.0	640.1	6.49	370.0	630.1	7.63
127.0	373.1	6.25	630.0	680.1	6.62	330.0	670.1	7.60
117.3	382.9	6.18	650.0	700.1	6.63	310.0	690.1	7.66
107.5	392.6	6.18	690.0	740.1	6.63	270.0	730.1	7.65
97.8	402.4	6.23	710.0	760.1	6.67	250.0	750.1	7.70
88.0	412.1	6.21	750.0	800.1	6.67	210.0	790.1	7.79
78.3	421.9	6.19	770.0	820.1	6.61	190.0	810.1	7.83
68.5	431.6	6.23	810.0	860.1	6.58	150.0	850.1	7.96
58.8	441.4	6.25	830.0	880.1	6.52	130.0	870.1	7.96
49.0	451.1	6.26	870.0	920.1	6.41	90.0	910.1	8.01
39.3	460.9	6.26	890.0	940.1	6.40	70.0	930.1	8.02
19.8	480.4	6.35	930.0	980.1	6.35	30.0	970.1	8.02
10.0	490.1	6.35	950.0	1000.1	6.32	10.0	990.1	7.93

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Frequency Mixer

TUF-2H

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	70.94	74.41	77.00	61.80	62.70	62.57
51.1	59.58	61.76	63.70	58.56	61.13	62.32
92.0	54.72	56.70	58.69	55.36	59.26	60.73
133.0	51.54	53.70	55.84	52.66	57.79	58.69
173.9	49.31	51.39	53.46	50.64	55.36	57.73
214.9	47.65	49.77	52.06	48.67	53.89	55.66
255.8	46.20	48.52	50.91	46.94	52.27	51.68
296.8	45.07	47.28	49.99	45.67	49.91	49.69
337.7	44.10	46.34	49.00	44.42	46.40	47.10
378.7	43.07	45.77	48.27	43.19	43.68	45.07
419.6	42.19	45.45	48.32	41.98	42.27	44.30
440.1	41.91	45.26	48.25	40.44	41.09	43.19
481.1	41.23	44.05	46.60	39.21	39.96	41.81
501.5	40.70	43.75	46.04	38.09	39.19	41.03
542.5	39.97	42.45	44.60	36.96	37.84	39.41
563.0	39.62	41.77	43.92	36.07	37.16	38.63
603.9	39.31	41.20	43.40	35.15	36.61	38.09
624.4	39.06	40.90	43.26	34.40	36.07	37.79
665.3	39.11	41.05	43.23	33.39	35.26	37.35
685.8	38.98	41.24	43.32	32.97	35.02	37.07
726.8	39.34	42.45	44.86	32.24	34.36	36.26
747.2	39.51	42.97	45.53	31.94	34.09	35.89
788.2	39.67	43.16	45.62	31.54	33.58	35.11
808.7	39.66	42.80	44.90	31.21	33.29	34.65
849.6	39.90	42.55	43.90	30.63	32.72	33.75
870.1	39.40	41.79	43.11	30.11	32.22	33.54
911.1	38.93	40.69	41.46	29.52	31.53	32.85
931.5	38.57	40.02	40.79	29.20	31.14	32.49
972.5	37.80	39.09	40.11	28.49	30.16	31.48
993.0	37.22	38.45	39.55	28.27	29.88	31.12
1033.9	36.41	38.02	39.27	27.56	29.04	30.08
1054.4	35.55	37.24	38.80	27.19	28.45	29.63
1095.3	34.37	36.15	37.64	26.67	27.74	28.78
1115.8	33.79	35.65	37.17	26.32	27.41	28.42
1156.8	32.63	34.44	36.07	25.84	26.66	27.60
1177.2	32.28	33.93	35.45	25.65	26.40	27.30
1218.2	31.57	33.17	34.81	25.21	25.83	26.61
1238.7	31.12	32.79	34.48	24.93	25.60	26.37
1279.6	30.72	32.22	33.80	24.70	25.28	25.91
1300.1	30.52	32.09	33.63	24.57	25.33	25.93

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+14	+17	+20
10.1	40.1	47.85	48.27	47.51
51.1	81.1	33.41	33.69	33.99
92.0	122.0	28.69	28.99	29.35
133.0	163.0	25.89	26.38	26.65
173.9	203.9	23.97	24.42	24.83
214.9	244.9	22.67	23.31	23.66
255.8	285.8	21.96	22.51	23.01
296.8	326.8	21.38	22.12	22.50
337.7	367.7	20.91	22.03	22.42
378.7	408.7	20.67	21.84	22.48
419.6	449.6	20.58	21.64	22.43
440.1	470.1	20.98	21.93	22.81
481.1	511.1	21.36	21.95	22.46
501.5	531.5	21.96	22.48	22.67
542.5	572.5	22.32	23.03	23.15
563.0	593.0	22.44	22.95	23.19
603.9	633.9	22.28	22.61	23.13
624.4	654.4	21.65	21.99	22.79
665.3	695.3	20.12	20.56	21.45
685.8	715.8	19.30	19.68	20.55
726.8	756.8	17.63	17.89	18.36
747.2	777.2	17.06	17.13	17.38
788.2	818.2	15.97	15.75	15.60
808.7	838.7	15.55	15.36	15.17
849.6	879.6	14.92	14.60	14.40
870.1	900.1	14.57	14.19	13.93
911.1	941.1	14.18	13.74	13.53
931.5	961.5	13.93	13.51	13.36
972.5	1002.5	13.65	13.27	13.07
993.0	1023.0	13.55	13.15	12.91
1033.9	1063.9	13.36	12.91	12.56
1054.4	1084.4	13.23	12.76	12.37
1095.3	1125.3	13.03	12.53	12.16
1115.8	1145.8	12.86	12.40	12.04
1156.8	1186.8	12.57	12.19	11.89
1177.2	1207.2	12.44	12.14	11.89
1218.2	1248.2	12.18	12.04	11.93
1238.7	1268.7	12.06	12.02	12.01
1279.6	1309.6	11.80	11.91	12.05
1300.1	1330.1	11.63	11.78	11.96

Frequency Mixer

TUF-2H

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)		
		@LO (dBm)		
		+14	+17	+20
10.1	40.1	1.34	1.14	1.07
51.1	81.1	1.36	1.16	1.05
92.0	122.0	1.38	1.17	1.05
133.0	163.0	1.35	1.15	1.04
173.9	203.9	1.35	1.17	1.06
214.9	244.9	1.35	1.15	1.07
255.8	285.8	1.34	1.15	1.09
296.8	326.8	1.36	1.15	1.10
337.7	367.7	1.34	1.14	1.11
378.7	408.7	1.31	1.12	1.13
419.6	449.6	1.31	1.11	1.13
440.1	470.1	1.28	1.11	1.14
481.1	511.1	1.28	1.10	1.12
501.5	531.5	1.25	1.11	1.13
542.5	572.5	1.25	1.12	1.14
563.0	593.0	1.23	1.12	1.15
603.9	633.9	1.23	1.13	1.16
624.4	654.4	1.22	1.14	1.17
665.3	695.3	1.21	1.14	1.17
685.8	715.8	1.19	1.14	1.19
726.8	756.8	1.17	1.13	1.17
747.2	777.2	1.16	1.12	1.17
788.2	818.2	1.14	1.09	1.13
808.7	838.7	1.12	1.08	1.12
849.6	879.6	1.12	1.05	1.07
870.1	900.1	1.12	1.05	1.07
911.1	941.1	1.16	1.09	1.10
931.5	961.5	1.19	1.12	1.13
972.5	1002.5	1.26	1.20	1.22
993.0	1023.0	1.30	1.24	1.26
1033.9	1063.9	1.40	1.34	1.35
1054.4	1084.4	1.43	1.37	1.38
1095.3	1125.3	1.55	1.47	1.47
1115.8	1145.8	1.61	1.51	1.51
1156.8	1186.8	1.73	1.62	1.60
1177.2	1207.2	1.79	1.67	1.64
1218.2	1248.2	1.91	1.79	1.74
1238.7	1268.7	1.96	1.84	1.79
1279.6	1309.6	2.08	1.96	1.89
1300.1	1330.1	2.13	2.01	1.94

LO (MHz)	LO VSWR (:1)		
	@LO (dBm)		
	+14	+17	+20
10.1	1.09	1.49	2.09
51.1	1.06	1.53	2.29
92.0	1.04	1.47	2.17
133.0	1.06	1.49	2.22
173.9	1.05	1.45	2.10
214.9	1.05	1.46	2.13
255.8	1.06	1.45	2.12
296.8	1.06	1.43	2.07
337.7	1.06	1.46	2.13
378.7	1.07	1.42	2.10
419.6	1.08	1.44	2.10
440.1	1.08	1.45	2.10
481.1	1.08	1.42	2.06
501.5	1.11	1.44	2.07
542.5	1.11	1.46	2.09
563.0	1.12	1.46	2.08
603.9	1.13	1.46	2.08
624.4	1.14	1.47	2.10
665.3	1.15	1.47	2.07
685.8	1.16	1.48	2.07
726.8	1.17	1.50	2.09
747.2	1.18	1.53	2.11
788.2	1.19	1.51	2.08
808.7	1.21	1.53	2.10
849.6	1.21	1.56	2.10
870.1	1.23	1.53	2.09
911.1	1.24	1.55	2.11
931.5	1.25	1.58	2.15
972.5	1.27	1.56	2.09
993.0	1.28	1.56	2.09
1033.9	1.30	1.59	2.09
1054.4	1.31	1.57	2.09
1095.3	1.33	1.60	2.10
1115.8	1.34	1.62	2.14
1156.8	1.35	1.64	2.14
1177.2	1.36	1.66	2.15
1218.2	1.37	1.69	2.17
1238.7	1.37	1.69	2.18
1279.6	1.39	1.71	2.20
1300.1	1.40	1.74	2.22

IF (OUT) (MHz)	IF VSWR @LO=1000.1MHz (:1)		
	@LO (dBm)		
	+14	+17	+20
10.0	2.90	2.34	2.10
30.2	2.69	2.14	1.91
50.4	2.56	2.03	1.80
70.6	2.58	2.05	1.82
90.8	2.59	2.06	1.84
111.0	2.64	2.11	1.88
131.2	2.71	2.16	1.92
151.4	2.65	2.11	1.89
171.6	2.56	2.05	1.83
191.8	2.63	2.11	1.89
212.0	2.68	2.16	1.94
232.2	2.61	2.11	1.89
252.4	2.59	2.09	1.87
272.7	2.66	2.15	1.94
292.9	2.64	2.16	1.96
313.1	2.59	2.12	1.92
333.3	2.65	2.16	1.96
353.5	2.66	2.19	1.99
373.7	2.59	2.14	1.96
393.9	2.59	2.14	1.95
434.3	2.60	2.16	2.00
454.5	2.58	2.13	1.97
494.9	2.63	2.19	2.03
515.1	2.54	2.11	1.96
555.5	2.61	2.18	2.02
575.7	2.59	2.17	2.02
616.1	2.57	2.13	1.97
636.3	2.55	2.13	1.98
676.7	2.60	2.15	1.99
696.9	2.63	2.17	2.00
737.3	2.50	2.05	1.88
757.6	2.57	2.12	1.93
798.0	2.55	2.07	1.87
818.2	2.52	2.04	1.83
858.6	2.48	2.01	1.81
878.8	2.52	2.04	1.81
919.2	2.49	1.99	1.74
939.4	2.40	1.92	1.68
979.8	2.48	1.99	1.73
1000.0	2.21	1.86	1.77

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	14	31	16	30	40	39	33	36	41	56
1	-	16	+0	23	13	32	28	37	38	32	41	36
2	90	59	51	54	50	61	48	58	84	75	59	57
3	>100	64	52	77	51	63	50	68	56	71	65	64
4	>100	80	>93	82	89	87	86	84	>93	89	86	92
5	>100	>93	86	87	83	87	80	83	79	88	86	>93
6	>100	>93	>93	>93	>93	>93	>93	>93	>93	>93	93	>93
7	>100	>93	>93	>93	>93	>93	>93	>93	>93	>93	>93	>93
8	>100	>93	>93	>93	>93	>93	>93	>93	>93	>93	>93	>93
9	>100	>93	>93	>93	>93	>93	>93	>93	>93	>93	>93	>93
10	>100	>93	>93	>93	>93	>93	>93	>93	>93	>93	>93	>93
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 500.1 MHz; -1.00 dBm.
 LO IN: 530.01 MHz; +17.00 dBm
 IF OUT: 29.91 MHz; -7.4 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	25	44	29	48	53	50	55	48	64	69
1	-	16	+0	25	13	32	28	41	45	40	52	41
2	74	58	46	52	43	64	42	55	65	66	56	59
3	>100	49	37	52	38	46	37	58	50	52	51	48
4	>100	65	65	66	60	61	59	64	56	64	77	77
5	>100	83	53	60	50	62	49	56	48	68	55	70
6	>100	83	80	73	75	72	69	72	69	71	68	77
7	>100	77	86	80	65	66	62	68	62	65	61	73
8	>100	91	97	89	89	85	81	86	77	81	76	79
9	>100	91	93	92	90	82	75	72	70	73	71	72
10	>100	91	94	96	>103	101	96	>103	85	99	83	86
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 500.1 MHz; 9.00 dBm.
 LO IN: 530.01 MHz; +17.00 dBm
 IF OUT: 29.91 MHz; 2.61 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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