

Frequency Mixer

TUF-2MH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)		
		@LO (dBm)		
		+10	+13	+16
10.1	40.1	6.12	5.68	5.39
50.4	80.4	6.18	5.77	5.50
90.7	120.7	6.16	5.70	5.44
131.0	161.0	6.06	5.62	5.41
171.3	201.3	6.13	5.65	5.42
211.5	241.5	5.94	5.54	5.36
251.8	281.8	6.06	5.62	5.40
292.1	322.1	5.96	5.55	5.39
332.4	362.4	5.93	5.61	5.43
372.7	402.7	5.96	5.62	5.44
413.0	443.0	5.85	5.55	5.40
453.3	483.3	5.98	5.61	5.45
493.6	523.6	5.99	5.67	5.45
533.9	563.9	6.00	5.74	5.54
574.2	604.2	6.02	5.77	5.61
614.4	644.4	6.10	5.76	5.59
654.7	684.7	6.14	5.83	5.65
695.0	725.0	6.14	5.91	5.74
735.3	765.3	6.25	6.03	5.86
775.6	805.6	6.25	6.07	5.92
815.9	845.9	6.31	6.14	6.01
856.2	886.2	6.38	6.15	6.00
896.5	926.5	6.61	6.27	6.06
916.6	946.6	6.65	6.29	6.09
956.9	986.9	6.79	6.35	6.12
977.1	1007.1	6.92	6.36	6.13
1017.3	1047.3	7.27	6.53	6.23
1037.5	1067.5	7.38	6.54	6.23
1077.8	1107.8	7.78	6.83	6.36
1097.9	1127.9	7.74	6.80	6.39
1138.2	1168.2	8.25	7.14	6.59
1158.4	1188.4	8.43	7.31	6.69
1198.7	1228.7	8.90	7.74	6.96
1218.8	1248.8	9.16	7.94	7.10
1259.1	1289.1	9.52	8.36	7.38
1279.2	1309.2	9.69	8.62	7.62
1319.5	1349.5	10.23	9.11	8.16
1339.7	1369.7	10.51	9.47	8.57
1380.0	1410.0	10.99	10.08	9.17
1400.1	1430.1	11.30	10.48	9.58

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+10	+13	+16
10.1	40.1	20.04	23.58	25.85
50.4	80.4	19.05	22.18	23.87
90.7	120.7	19.24	20.85	21.08
131.0	161.0	19.77	19.86	23.49
171.3	201.3	19.31	19.34	25.23
211.5	241.5	18.78	23.03	23.94
251.8	281.8	17.65	27.09	21.89
292.1	322.1	19.12	23.75	21.73
332.4	362.4	23.15	21.74	25.20
372.7	402.7	24.55	22.12	23.57
413.0	443.0	19.81	18.72	22.60
453.3	483.3	18.81	17.36	18.99
493.6	523.6	18.86	22.00	32.90
533.9	563.9	18.91	21.62	28.09
574.2	604.2	18.32	20.62	25.50
614.4	644.4	21.10	21.44	24.00
654.7	684.7	21.20	25.88	28.53
695.0	725.0	16.55	21.92	29.67
735.3	765.3	15.48	18.22	21.99
775.6	805.6	14.42	16.35	18.77
815.9	845.9	12.81	14.38	16.92
856.2	886.2	11.55	13.54	15.85
896.5	926.5	13.24	15.74	17.90
916.6	946.6	14.94	17.87	19.96
956.9	986.9	16.22	21.81	24.10
977.1	1007.1	15.86	24.18	27.52
1017.3	1047.3	13.19	22.75	26.10
1037.5	1067.5	12.36	22.69	23.82
1077.8	1107.8	11.33	18.02	23.05
1097.9	1127.9	12.04	18.86	28.04
1138.2	1168.2	11.56	18.12	26.78
1158.4	1188.4	12.44	18.18	28.80
1198.7	1228.7	12.59	16.88	23.70
1218.8	1248.8	12.90	16.59	23.49
1259.1	1289.1	13.48	15.66	21.19
1279.2	1309.2	14.08	15.68	20.63
1319.5	1349.5	14.08	15.99	18.12
1339.7	1369.7	14.01	15.56	17.13
1380.0	1410.0	14.56	15.22	16.40
1400.1	1430.1	14.46	14.46	15.47

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+9dBm (dB)		
		@LO (dBm)		
		+10	+13	+16
10.1	40.1	1.54	1.29	1.09
50.4	80.4	1.30	1.14	0.96
90.7	120.7	1.40	1.10	0.94
131.0	161.0	1.41	1.14	0.96
171.3	201.3	1.29	1.07	0.90
211.5	241.5	1.30	1.04	0.87
251.8	281.8	1.31	1.06	0.85
292.1	322.1	1.39	1.06	0.85
332.4	362.4	1.35	0.98	0.81
372.7	402.7	1.34	0.98	0.78
413.0	443.0	1.32	0.92	0.73
453.3	483.3	1.31	0.96	0.78
493.6	523.6	1.21	0.85	0.72
533.9	563.9	1.16	0.80	0.67
574.2	604.2	1.32	0.89	0.69
614.4	644.4	1.28	0.95	0.78
654.7	684.7	1.39	1.00	0.79
695.0	725.0	1.47	1.08	0.83
735.3	765.3	1.65	1.22	0.96
775.6	805.6	1.92	1.43	1.12
815.9	845.9	1.93	1.47	1.19
856.2	886.2	2.10	1.62	1.31
896.5	926.5	2.10	1.64	1.32
916.6	946.6	2.08	1.63	1.35
956.9	986.9	2.18	1.71	1.38
977.1	1007.1	2.20	1.77	1.46
1017.3	1047.3	2.19	1.91	1.54
1037.5	1067.5	2.14	1.91	1.56
1077.8	1107.8	1.98	1.87	1.55
1097.9	1127.9	1.91	1.81	1.50
1138.2	1168.2	1.62	1.67	1.44
1158.4	1188.4	1.56	1.62	1.40
1198.7	1228.7	1.26	1.43	1.34
1218.8	1248.8	1.15	1.34	1.33
1259.1	1289.1	1.03	1.22	1.38
1279.2	1309.2	0.89	1.10	1.32
1319.5	1349.5	0.71	1.01	1.21
1339.7	1369.7	0.57	0.93	1.14
1380.0	1410.0	0.32	0.70	1.07
1400.1	1430.1	0.18	0.52	0.94

Frequency Mixer

TUF-2MH+

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)
		+13			+13			+13
400.0	100.1	5.72	10.0	60.1	5.84	950.0	50.1	7.15
390.3	109.9	5.67	30.0	80.1	5.77	930.0	70.1	7.20
380.5	119.6	5.68	50.0	100.1	5.67	910.0	90.1	7.20
370.8	129.4	5.66	70.0	120.1	5.72	890.0	110.1	7.08
361.0	139.1	5.63	90.0	140.1	5.75	870.0	130.1	6.99
351.3	148.9	5.58	110.0	160.1	5.70	850.0	150.1	6.99
341.5	158.6	5.59	130.0	180.1	5.78	830.0	170.1	7.02
331.8	168.4	5.61	150.0	200.1	5.77	810.0	190.1	6.92
322.0	178.1	5.55	170.0	220.1	5.78	790.0	210.1	6.90
312.3	187.9	5.57	190.0	240.1	5.74	770.0	230.1	6.85
302.5	197.6	5.57	210.0	260.1	5.81	750.0	250.1	6.80
292.8	207.4	5.52	230.0	280.1	5.86	730.0	270.1	6.89
283.0	217.1	5.51	250.0	300.1	5.79	710.0	290.1	6.84
273.3	226.9	5.50	270.0	320.1	5.78	690.0	310.1	6.88
263.5	236.6	5.53	290.0	340.1	5.81	670.0	330.1	6.88
253.8	246.4	5.50	310.0	360.1	5.87	650.0	350.1	6.93
244.0	256.1	5.53	330.0	380.1	5.80	630.0	370.1	6.94
234.3	265.9	5.57	350.0	400.1	5.83	610.0	390.1	6.93
224.5	275.6	5.54	370.0	420.1	5.87	590.0	410.1	6.92
214.8	285.4	5.51	390.0	440.1	5.76	570.0	430.1	6.93
205.0	295.1	5.58	410.0	460.1	5.77	550.0	450.1	6.95
195.3	304.9	5.58	430.0	480.1	5.84	530.0	470.1	6.90
185.5	314.6	5.55	450.0	500.1	5.81	510.0	490.1	6.91
175.8	324.4	5.56	470.0	520.1	5.76	490.0	510.1	6.90
166.0	334.1	5.57	510.0	560.1	5.88	450.0	550.1	6.87
156.3	343.9	5.57	530.0	580.1	5.85	430.0	570.1	6.87
146.5	353.6	5.55	570.0	620.1	5.91	390.0	610.1	6.82
136.8	363.4	5.56	590.0	640.1	5.94	370.0	630.1	6.82
127.0	373.1	5.59	630.0	680.1	6.04	330.0	670.1	6.74
117.3	382.9	5.57	650.0	700.1	6.04	310.0	690.1	6.73
107.5	392.6	5.58	690.0	740.1	6.11	270.0	730.1	6.70
97.8	402.4	5.59	710.0	760.1	6.13	250.0	750.1	6.72
88.0	412.1	5.57	750.0	800.1	6.00	210.0	790.1	6.75
78.3	421.9	5.53	770.0	820.1	5.93	190.0	810.1	6.72
68.5	431.6	5.58	810.0	860.1	5.88	150.0	850.1	6.69
58.8	441.4	5.59	830.0	880.1	5.87	130.0	870.1	6.78
49.0	451.1	5.60	870.0	920.1	5.75	90.0	910.1	6.79
39.3	460.9	5.57	890.0	940.1	5.73	70.0	930.1	6.67
19.8	480.4	5.65	930.0	980.1	5.64	30.0	970.1	6.53
10.0	490.1	5.73	950.0	1000.1	5.61	10.0	990.1	6.61

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Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+10	+13	+16	+10	+13	+16
10.1	76.41	76.00	76.25	76.82	79.76	70.78
50.4	61.76	62.79	63.60	70.14	71.40	70.84
90.7	56.53	57.54	58.42	68.38	69.40	68.69
131.0	53.57	54.63	55.47	65.45	67.24	66.51
171.3	51.05	52.11	53.11	62.77	64.77	64.04
211.5	49.50	50.73	51.70	60.58	61.48	61.50
251.8	48.00	49.33	50.27	58.58	58.85	59.40
292.1	46.86	48.13	49.15	55.43	55.85	57.18
332.4	45.98	47.25	48.05	52.80	53.88	55.56
372.7	45.12	46.60	47.12	50.78	52.45	54.46
413.0	44.43	45.67	46.68	48.98	50.79	52.62
453.3	43.60	44.70	45.09	47.50	49.70	51.29
493.6	42.87	43.95	44.70	46.45	48.07	49.84
533.9	42.44	43.22	44.02	45.74	47.06	48.24
574.2	42.13	42.77	43.18	44.81	47.08	48.56
614.4	42.15	42.39	42.45	44.21	46.63	48.12
654.7	42.23	43.36	43.77	43.83	46.15	47.53
695.0	41.87	42.84	43.07	42.92	44.87	45.82
735.3	41.30	42.10	42.44	42.14	43.47	44.36
775.6	40.70	41.18	41.47	41.46	43.23	44.11
815.9	39.89	40.11	40.30	40.57	42.40	43.47
856.2	39.18	39.36	39.56	39.86	41.49	42.45
896.5	39.51	40.26	41.07	39.37	40.98	42.08
916.6	39.47	40.70	41.41	38.67	40.24	41.11
956.9	38.59	39.95	40.54	37.81	38.87	39.42
977.1	38.59	39.91	40.57	37.45	38.22	38.86
1017.3	37.57	38.95	39.73	36.38	37.02	37.52
1037.5	37.79	38.97	39.55	35.98	36.54	37.10
1077.8	37.18	38.51	39.18	35.34	35.97	36.64
1097.9	37.01	38.38	39.08	35.49	35.81	36.73
1138.2	36.70	37.99	38.86	35.81	36.21	37.17
1158.4	36.79	38.33	39.09	36.32	37.02	37.60
1198.7	36.70	38.19	38.94	36.06	37.12	37.61
1218.8	36.74	38.17	38.68	36.15	37.19	37.47
1259.1	36.82	38.06	38.85	35.82	36.71	37.05
1279.2	36.50	37.52	38.56	35.58	36.35	36.79
1319.5	36.53	37.47	38.25	35.43	36.06	36.19
1339.7	36.24	37.22	38.14	35.06	35.69	35.76
1380.0	36.06	36.86	37.53	35.01	35.50	35.15
1400.1	35.78	36.55	37.09	34.84	35.23	34.66

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+10	+13	+16
10.1	40.1	46.43	47.69	51.81
50.4	80.4	37.27	37.47	37.88
90.7	120.7	32.71	33.02	33.12
131.0	161.0	29.87	30.16	30.39
171.3	201.3	28.20	28.48	28.73
211.5	241.5	27.13	27.43	27.65
251.8	281.8	26.19	26.69	27.05
292.1	322.1	26.15	26.52	26.71
332.4	362.4	26.18	26.75	27.07
372.7	402.7	25.97	27.01	27.43
413.0	443.0	26.39	27.28	27.94
453.3	483.3	26.89	27.33	27.69
493.6	523.6	28.21	28.28	28.28
533.9	563.9	29.24	29.34	29.36
574.2	604.2	28.56	28.81	29.43
614.4	644.4	26.08	26.77	27.59
654.7	684.7	23.45	23.83	24.53
695.0	725.0	21.68	21.53	21.62
735.3	765.3	20.45	20.14	19.97
775.6	805.6	19.40	19.04	18.81
815.9	845.9	18.75	18.37	18.09
856.2	886.2	18.25	17.84	17.54
896.5	926.5	17.65	17.21	16.88
916.6	946.6	17.39	16.91	16.63
956.9	986.9	16.96	16.49	16.20
977.1	1007.1	16.92	16.45	16.18
1017.3	1047.3	16.79	16.41	16.23
1037.5	1067.5	16.76	16.44	16.31
1077.8	1107.8	16.63	16.34	16.27
1097.9	1127.9	16.46	16.25	16.25
1138.2	1168.2	16.44	16.19	16.13
1158.4	1188.4	16.38	16.24	16.09
1198.7	1228.7	16.20	16.24	16.14
1218.8	1248.8	16.12	16.20	16.25
1259.1	1289.1	15.91	16.04	16.11
1279.2	1309.2	15.76	15.97	16.02
1319.5	1349.5	15.44	15.73	15.74
1339.7	1369.7	15.26	15.56	15.61
1380.0	1410.0	14.89	15.15	15.17
1400.1	1430.1	14.68	14.91	14.94

Frequency Mixer

TUF-2MH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=1000.1MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+10	+13	+16		+10	+13	+16		+10	+13	+16
10.1	40.1	1.17	1.09	1.10	10.1	1.55	2.19	3.19	10.0	2.26	1.81	1.58
50.4	80.4	1.18	1.06	1.03	50.4	1.66	2.52	3.67	30.2	1.93	1.54	1.38
90.7	120.7	1.16	1.07	1.06	90.7	1.56	2.35	3.45	50.4	1.74	1.39	1.26
131.0	161.0	1.16	1.08	1.10	131.0	1.61	2.44	3.54	70.6	1.75	1.41	1.30
171.3	201.3	1.20	1.12	1.14	171.3	1.59	2.35	3.36	90.8	1.82	1.48	1.37
211.5	241.5	1.20	1.15	1.18	211.5	1.60	2.38	3.40	111.0	1.89	1.52	1.39
251.8	281.8	1.24	1.19	1.21	251.8	1.64	2.45	3.52	131.2	1.92	1.55	1.42
292.1	322.1	1.26	1.21	1.24	292.1	1.64	2.40	3.40	151.4	1.84	1.51	1.40
332.4	362.4	1.26	1.23	1.26	332.4	1.69	2.51	3.60	171.6	1.80	1.48	1.38
372.7	402.7	1.28	1.26	1.29	372.7	1.75	2.63	3.79	191.8	1.90	1.56	1.45
413.0	443.0	1.28	1.28	1.32	413.0	1.75	2.54	3.62	212.0	1.98	1.62	1.52
453.3	483.3	1.31	1.29	1.32	453.3	1.77	2.57	3.65	232.2	1.91	1.58	1.49
493.6	523.6	1.35	1.34	1.37	493.6	1.81	2.58	3.62	252.4	1.87	1.56	1.47
533.9	563.9	1.38	1.39	1.42	533.9	1.88	2.67	3.75	272.7	1.95	1.64	1.55
574.2	604.2	1.41	1.42	1.45	574.2	1.90	2.62	3.65	292.9	2.01	1.70	1.61
614.4	644.4	1.44	1.45	1.48	614.4	2.00	2.76	3.79	313.1	1.98	1.67	1.60
654.7	684.7	1.46	1.49	1.53	654.7	2.09	2.86	3.94	333.3	2.02	1.70	1.63
695.0	725.0	1.44	1.48	1.53	695.0	2.09	2.77	3.70	353.5	2.05	1.77	1.71
735.3	765.3	1.43	1.46	1.51	735.3	2.18	2.84	3.77	373.7	2.03	1.77	1.71
775.6	805.6	1.41	1.44	1.48	775.6	2.20	2.80	3.68	393.9	2.05	1.77	1.72
815.9	845.9	1.39	1.41	1.43	815.9	2.24	2.80	3.65	434.3	2.12	1.86	1.83
856.2	886.2	1.41	1.41	1.43	856.2	2.31	2.79	3.50	454.5	2.09	1.85	1.83
896.5	926.5	1.47	1.46	1.47	896.5	2.31	2.70	3.38	494.9	2.18	1.95	1.93
916.6	946.6	1.50	1.48	1.49	916.6	2.30	2.65	3.30	515.1	2.11	1.89	1.89
956.9	986.9	1.58	1.57	1.57	956.9	2.32	2.58	3.18	555.5	2.24	2.03	2.04
977.1	1007.1	1.65	1.63	1.63	977.1	2.36	2.63	3.21	575.7	2.25	2.05	2.07
1017.3	1047.3	1.80	1.75	1.74	1017.3	2.36	2.57	3.08	616.1	2.20	2.00	2.02
1037.5	1067.5	1.90	1.84	1.83	1037.5	2.41	2.64	3.12	636.3	2.24	2.06	2.10
1077.8	1107.8	2.08	2.00	1.97	1077.8	2.39	2.61	3.05	676.7	2.30	2.08	2.11
1097.9	1127.9	2.16	2.08	2.05	1097.9	2.38	2.53	2.92	696.9	2.30	2.08	2.11
1138.2	1168.2	2.40	2.28	2.22	1138.2	2.32	2.46	2.82	737.3	2.18	1.99	2.03
1158.4	1188.4	2.51	2.38	2.31	1158.4	2.30	2.44	2.77	757.6	2.30	2.08	2.11
1198.7	1228.7	2.76	2.61	2.51	1198.7	2.22	2.33	2.64	798.0	2.24	1.99	2.01
1218.8	1248.8	2.89	2.72	2.60	1218.8	2.17	2.30	2.59	818.2	2.18	1.93	1.94
1259.1	1289.1	3.12	2.96	2.79	1259.1	2.10	2.23	2.53	858.6	2.24	2.00	2.01
1279.2	1309.2	3.24	3.08	2.89	1279.2	2.05	2.13	2.42	878.8	2.28	1.99	1.97
1319.5	1349.5	3.45	3.29	3.13	1319.5	1.94	2.02	2.31	919.2	2.16	1.87	1.84
1339.7	1369.7	3.55	3.40	3.26	1339.7	1.90	1.96	2.25	939.4	2.08	1.81	1.79
1380.0	1410.0	3.65	3.54	3.40	1380.0	1.81	1.86	2.15	979.8	2.30	1.95	1.89
1400.1	1430.1	3.73	3.62	3.49	1400.1	1.73	1.83	2.13	1000.0	2.28	2.37	2.65

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Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	32	38	37	45	41	63	55	60	58	74
1	-	23	+0	29	12	33	21	41	45	45	56	61
2	81	66	68	60	62	66	59	57	58	82	59	65
3	>100	64	41	56	43	52	38	57	46	53	56	50
4	>100	81	77	68	76	69	72	73	76	83	77	83
5	>100	71	64	73	53	66	50	60	47	64	52	74
6	>100	97	88	94	79	84	77	85	75	89	79	84
7	>100	84	78	84	75	84	74	96	69	81	65	80
8	>100	>98	>98	>98	95	>98	92	89	95	85	86	83
9	>100	89	90	89	90	87	92	86	77	83	74	79
10	>100	>98	>98	>98	>98	>98	>98	95	93	95	88	95
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 500.1 MHz; 4.00 dBm.

LO IN: 530.01 MHz; +13.00 dBm

IF OUT: 29.91 MHz; -1.88 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	22	28	26	31	29	54	37	42	41	74
1	-	22	+0	28	11	32	20	37	44	37	46	51
2	>100	66	80	65	76	69	67	66	65	85	66	70
3	>100	>88	72	87	64	75	59	79	62	79	68	74
4	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
5	>100	>88	86	>88	>88	>88	88	>88	86	>88	85	>88
6	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
7	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
8	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
9	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
10	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 500.1 MHz; -6.00 dBm.

LO IN: 530.01 MHz; +13.00 dBm

IF OUT: 29.91 MHz; -11.88 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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