

Frequency Mixer

TUF-860MHSM

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=+9dBm (dB)		
		@LO (dBm)					@LO (dBm)					@LO (dBm)		
		+10	+13	+16			+10	+13	+16			+10	+13	+16
100.1	130.1	12.56	10.34	9.85	100.1	130.1	14.92	22.83	19.80	100.1	130.1	-1.17	-0.12	-0.03
140.6	170.6	9.71	8.20	7.88	140.6	170.6	16.48	17.96	19.72	140.6	170.6	-0.37	0.03	-0.03
181.1	211.1	7.30	6.86	6.70	181.1	211.1	17.04	17.98	20.90	181.1	211.1	0.35	0.14	0.04
221.6	251.6	6.52	6.16	6.02	221.6	251.6	15.79	18.43	22.04	221.6	251.6	0.64	0.40	0.24
262.1	292.1	5.92	5.66	5.55	262.1	292.1	17.31	20.65	24.01	262.1	292.1	0.85	0.58	0.42
302.6	332.6	5.54	5.36	5.25	302.6	332.6	18.84	22.27	23.10	302.6	332.6	1.00	0.68	0.53
343.1	373.1	5.41	5.18	5.07	343.1	373.1	20.11	23.09	23.21	343.1	373.1	1.13	0.88	0.71
383.6	413.6	5.24	5.06	4.98	383.6	413.6	23.17	24.45	23.80	383.6	413.6	1.14	0.85	0.71
424.2	454.2	5.19	5.00	4.92	424.2	454.2	24.24	25.64	26.53	424.2	454.2	1.18	0.88	0.72
464.7	494.7	5.26	5.04	4.88	464.7	494.7	21.29	22.65	23.96	464.7	494.7	1.07	0.83	0.72
505.2	535.2	5.11	4.96	4.86	505.2	535.2	22.90	26.63	25.85	505.2	535.2	1.19	0.90	0.76
545.7	575.7	5.10	4.95	4.87	545.7	575.7	26.64	27.26	29.55	545.7	575.7	1.28	0.98	0.81
586.2	616.2	5.09	4.88	4.79	586.2	616.2	25.02	23.19	27.62	586.2	616.2	1.38	1.12	0.92
626.7	656.7	5.13	4.90	4.79	626.7	656.7	15.50	25.61	25.82	626.7	656.7	1.46	1.26	1.03
667.2	697.2	5.20	5.02	4.88	667.2	697.2	14.50	14.78	18.45	667.2	697.2	1.64	1.37	1.18
707.7	737.7	5.22	5.08	5.00	707.7	737.7	15.11	14.39	15.16	707.7	737.7	1.81	1.50	1.28
748.2	778.2	5.34	5.18	5.09	748.2	778.2	14.70	14.44	14.50	748.2	778.2	2.06	1.72	1.48
788.7	818.7	5.43	5.27	5.18	788.7	818.7	14.61	15.36	16.35	788.7	818.7	2.20	1.85	1.61
829.2	859.2	5.57	5.32	5.16	829.2	859.2	14.77	17.13	19.94	829.2	859.2	2.35	1.93	1.72
869.7	899.7	5.65	5.22	5.03	869.7	899.7	17.42	23.23	29.89	869.7	899.7	2.57	2.14	1.89
910.2	940.2	5.88	5.24	5.05	910.2	940.2	17.73	29.96	23.82	910.2	940.2	2.64	2.24	1.93
950.7	980.7	6.70	5.49	5.19	950.7	980.7	12.53	28.02	22.42	950.7	980.7	2.18	2.25	1.88
991.2	1021.2	7.12	5.79	5.27	991.2	1021.2	11.81	22.91	21.77	991.2	1021.2	1.78	2.08	1.87
1031.7	1061.7	7.38	6.26	5.50	1031.7	1061.7	13.23	17.82	21.24	1031.7	1061.7	1.47	1.67	1.65
1072.3	1102.3	7.36	6.46	5.72	1072.3	1102.3	15.35	18.10	19.10	1072.3	1102.3	1.38	1.44	1.43
1112.8	1142.8	7.32	6.59	5.97	1112.8	1142.8	17.28	17.80	18.62	1112.8	1142.8	1.44	1.37	1.27
1153.3	1183.3	7.34	6.78	6.16	1153.3	1183.3	18.67	19.47	19.12	1153.3	1183.3	1.33	1.16	1.09
1193.8	1223.8	7.37	6.97	6.47	1193.8	1223.8	19.73	20.28	21.25	1193.8	1223.8	1.29	1.01	0.90
1234.3	1264.3	7.44	7.10	6.74	1234.3	1264.3	20.43	20.99	22.70	1234.3	1264.3	1.14	0.84	0.66
1274.8	1304.8	7.50	7.22	6.94	1274.8	1304.8	20.62	22.78	24.68	1274.8	1304.8	1.03	0.76	0.59
1315.3	1345.3	7.64	7.39	7.13	1315.3	1345.3	20.08	23.25	22.71	1315.3	1345.3	0.95	0.66	0.53
1355.8	1385.8	7.84	7.57	7.29	1355.8	1385.8	21.33	22.51	21.88	1355.8	1385.8	0.82	0.58	0.50
1396.3	1426.3	7.99	7.61	7.24	1396.3	1426.3	21.22	21.46	22.23	1396.3	1426.3	0.79	0.60	0.57
1436.8	1466.8	8.07	7.54	7.24	1436.8	1466.8	20.79	22.23	22.97	1436.8	1466.8	0.67	0.56	0.51
1477.3	1507.3	8.16	7.67	7.52	1477.3	1507.3	19.33	24.84	23.22	1477.3	1507.3	0.61	0.50	0.39
1517.8	1547.8	8.40	8.04	7.94	1517.8	1547.8	22.83	28.42	25.75	1517.8	1547.8	0.55	0.37	0.31
1558.3	1588.3	8.71	8.47	8.37	1558.3	1588.3	27.44	27.02	26.51	1558.3	1588.3	0.48	0.29	0.28
1598.8	1628.8	8.96	8.76	8.70	1598.8	1628.8	24.86	23.25	26.30	1598.8	1628.8	0.43	0.26	0.24
1639.3	1669.3	9.32	9.15	9.11	1639.3	1669.3	23.42	22.09	25.65	1639.3	1669.3	0.33	0.20	0.19
1700.1	1730.1	10.31	10.07	9.99	1700.1	1730.1	23.77	22.15	23.38	1700.1	1730.1	0.22	0.15	0.14



Frequency Mixer

TUF-860MHSM

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=925.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=800.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1050.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+13			+13			+13
125.0	800.1	6.01	10.0	810.1	5.45	250.0	800.1	6.62
118.9	806.2	5.98	16.2	816.3	5.29	243.8	806.3	6.60
112.9	812.2	5.98	22.3	822.4	5.24	237.7	812.4	6.60
106.8	818.3	5.96	28.5	828.6	5.25	231.5	818.6	6.61
100.8	824.3	5.96	34.6	834.7	5.22	225.4	824.7	6.59
94.7	830.4	5.97	40.8	840.9	5.22	219.2	830.9	6.57
88.7	836.4	5.93	46.9	847.0	5.19	213.1	837.0	6.52
82.6	842.5	5.88	53.1	853.2	5.16	206.9	843.2	6.48
76.6	848.5	5.85	59.2	859.3	5.15	200.8	849.3	6.46
70.5	854.6	5.83	65.4	865.5	5.14	194.6	855.5	6.42
64.5	860.6	5.82	71.5	871.6	5.14	188.5	861.6	6.36
58.4	866.7	5.75	77.7	877.8	5.09	182.3	867.8	6.27
52.4	872.7	5.68	83.8	883.9	5.04	176.2	873.9	6.19
46.3	878.8	5.58	90.0	890.1	5.02	170.0	880.1	6.12
40.3	884.8	5.49	96.2	896.3	4.99	163.8	886.3	6.04
34.2	890.9	5.46	102.3	902.4	5.00	157.7	892.4	5.98
28.2	896.9	5.43	108.5	908.6	4.98	151.5	898.6	5.90
22.1	903.0	5.39	114.6	914.7	4.95	145.4	904.7	5.84
16.1	909.0	5.37	120.8	920.9	4.94	139.2	910.9	5.80
10.0	915.1	5.48	126.9	927.0	4.93	133.1	917.0	5.78
10.0	935.1	5.44	133.1	933.2	4.97	126.9	923.2	5.78
16.1	941.2	5.27	139.2	939.3	4.99	120.8	929.3	5.76
22.1	947.2	5.23	145.4	945.5	4.99	114.6	935.5	5.72
28.2	953.3	5.26	151.5	951.6	4.97	108.5	941.6	5.70
34.2	959.3	5.28	157.7	957.8	4.96	102.3	947.8	5.69
40.3	965.4	5.31	163.8	963.9	5.00	96.2	953.9	5.73
46.3	971.4	5.32	170.0	970.1	5.02	90.0	960.1	5.76
52.4	977.5	5.30	176.2	976.3	5.05	83.8	966.3	5.76
58.4	983.5	5.32	182.3	982.4	5.06	77.7	972.4	5.75
64.5	989.6	5.37	188.5	988.6	5.07	71.5	978.6	5.72
70.5	995.6	5.46	194.6	994.7	5.12	65.4	984.7	5.75
76.6	1001.7	5.51	200.8	1000.9	5.17	59.2	990.9	5.79
82.6	1007.7	5.53	206.9	1007.0	5.24	53.1	997.0	5.84
88.7	1013.8	5.57	213.1	1013.2	5.26	46.9	1003.2	5.84
94.7	1019.8	5.59	219.2	1019.3	5.31	40.8	1009.3	5.86
100.8	1025.9	5.68	225.4	1025.5	5.37	34.6	1015.5	5.91
106.8	1031.9	5.78	231.5	1031.6	5.46	28.5	1021.6	5.94
112.9	1038.0	5.83	237.7	1037.8	5.54	22.3	1027.8	6.02
118.9	1044.0	5.92	243.8	1043.9	5.63	16.2	1033.9	6.06
125.0	1050.1	5.98	250.0	1050.1	5.69	10.0	1040.1	6.22

Frequency Mixer

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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
100.1	59.10	60.08	61.37	66.57	49.96	47.01
140.6	64.42	59.00	57.02	47.26	45.92	47.29
181.1	53.38	52.55	52.63	46.54	47.24	49.13
221.6	47.93	48.84	49.82	47.48	50.83	50.75
262.1	44.38	46.24	47.83	52.49	56.48	52.43
302.6	42.46	44.14	45.63	72.18	57.46	51.51
343.1	41.06	42.89	44.32	52.32	57.72	52.42
383.6	40.42	43.22	45.03	47.20	49.34	48.18
424.2	39.57	41.93	43.66	43.32	45.47	45.88
464.7	36.78	38.58	40.11	40.55	41.45	42.52
505.2	35.52	37.28	38.89	38.41	39.72	40.21
545.7	34.92	36.73	38.38	38.22	40.12	41.09
586.2	34.83	36.45	37.84	38.28	41.37	43.05
626.7	36.84	38.10	39.14	38.66	41.41	42.24
667.2	40.43	41.77	41.84	37.79	41.18	42.23
707.7	42.46	43.33	42.87	35.40	38.98	41.42
748.2	40.08	40.54	40.32	33.03	35.80	37.87
788.7	37.07	37.70	37.74	31.04	33.71	35.84
829.2	35.17	36.23	36.69	29.94	32.60	34.82
869.7	33.51	34.95	36.13	29.01	31.35	33.14
910.2	31.80	33.50	34.51	27.56	29.40	31.16
950.7	30.91	32.60	33.54	26.97	28.41	30.21
991.2	31.08	32.35	33.29	27.74	28.02	29.84
1031.7	31.54	32.83	33.99	27.65	27.95	29.61
1072.3	31.75	33.24	34.51	27.71	28.69	30.18
1112.8	32.30	33.91	35.33	27.50	29.09	30.57
1153.3	32.10	34.12	35.56	26.96	29.06	30.92
1193.8	31.79	34.10	35.89	26.54	28.45	30.24
1234.3	31.09	33.19	35.10	26.08	27.64	28.81
1274.8	30.65	32.47	34.23	25.74	26.81	27.38
1315.3	30.28	31.75	33.12	25.33	25.82	25.72
1355.8	29.83	31.06	32.13	24.96	24.89	24.11
1396.3	29.58	30.60	31.45	24.71	24.00	22.59
1436.8	29.00	29.92	30.43	24.08	22.48	20.27
1477.3	28.73	29.29	29.35	23.29	20.13	17.87
1517.8	28.30	28.37	28.59	21.78	18.18	16.88
1558.3	27.70	27.60	27.84	20.16	17.48	16.57
1598.8	27.44	27.10	27.06	19.59	17.28	16.06
1639.3	27.08	26.22	25.81	19.62	16.87	15.37
1700.1	26.77	25.25	24.45	19.43	16.29	14.49

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+10	+13	+16
100.1	130.1	34.17	34.08	34.05
140.6	170.6	28.83	29.18	29.14
181.1	211.1	25.63	25.81	25.85
221.6	251.6	23.46	23.75	23.86
262.1	292.1	22.18	22.40	22.50
302.6	332.6	21.51	21.65	21.74
343.1	373.1	20.86	21.42	21.66
383.6	413.6	20.60	21.26	21.78
424.2	454.2	20.44	21.02	21.42
464.7	494.7	20.67	20.98	21.41
505.2	535.2	22.11	22.04	22.12
545.7	575.7	23.93	23.92	23.93
586.2	616.2	26.98	27.69	28.19
626.7	656.7	29.69	32.59	35.82
667.2	697.2	28.42	29.09	28.69
707.7	737.7	25.11	24.78	24.00
748.2	778.2	22.22	21.77	21.25
788.7	818.7	19.75	19.42	19.05
829.2	859.2	17.71	17.28	16.87
869.7	899.7	16.09	15.60	15.33
910.2	940.2	15.14	14.79	14.66
950.7	980.7	14.72	14.31	14.14
991.2	1021.2	14.64	14.12	14.02
1031.7	1061.7	14.73	14.24	14.08
1072.3	1102.3	14.62	14.28	14.16
1112.8	1142.8	14.50	14.28	14.20
1153.3	1183.3	14.33	14.21	14.08
1193.8	1223.8	14.07	14.02	14.00
1234.3	1264.3	13.75	13.76	13.82
1274.8	1304.8	13.53	13.56	13.66
1315.3	1345.3	13.25	13.35	13.46
1355.8	1385.8	13.02	13.05	13.14
1396.3	1426.3	12.71	12.70	12.62
1436.8	1466.8	12.45	12.19	12.00
1477.3	1507.3	12.07	11.60	11.22
1517.8	1547.8	11.46	10.88	10.41
1558.3	1588.3	10.83	10.19	9.71
1598.8	1628.8	10.11	9.51	9.04
1639.3	1669.3	9.25	8.64	8.23
1700.1	1730.1	8.15	7.53	7.18

Frequency Mixer

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Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)		
		@LO (dBm)		
		+10	+13	+16
100.1	130.1	16.26	11.77	10.56
140.6	170.6	8.72	6.89	6.24
181.1	211.1	5.03	4.51	4.25
221.6	251.6	3.76	3.38	3.20
262.1	292.1	2.89	2.67	2.57
302.6	332.6	2.36	2.22	2.16
343.1	373.1	2.06	1.93	1.87
383.6	413.6	1.81	1.73	1.69
424.2	454.2	1.65	1.59	1.56
464.7	494.7	1.51	1.45	1.42
505.2	535.2	1.36	1.32	1.31
545.7	575.7	1.28	1.24	1.23
586.2	616.2	1.21	1.16	1.19
626.7	656.7	1.15	1.13	1.20
667.2	697.2	1.12	1.09	1.15
707.7	737.7	1.11	1.08	1.11
748.2	778.2	1.14	1.10	1.09
788.7	818.7	1.20	1.15	1.11
829.2	859.2	1.28	1.20	1.14
869.7	899.7	1.37	1.26	1.20
910.2	940.2	1.55	1.41	1.35
950.7	980.7	1.85	1.61	1.53
991.2	1021.2	2.12	1.83	1.71
1031.7	1061.7	2.32	2.07	1.89
1072.3	1102.3	2.44	2.24	2.07
1112.8	1142.8	2.54	2.38	2.25
1153.3	1183.3	2.66	2.53	2.40
1193.8	1223.8	2.72	2.64	2.54
1234.3	1264.3	2.73	2.68	2.63
1274.8	1304.8	2.78	2.73	2.71
1315.3	1345.3	2.86	2.82	2.81
1355.8	1385.8	2.95	2.90	2.89
1396.3	1426.3	3.04	2.96	2.94
1436.8	1466.8	3.14	3.04	3.03
1477.3	1507.3	3.31	3.20	3.18
1517.8	1547.8	3.51	3.39	3.35
1558.3	1588.3	3.63	3.51	3.45
1598.8	1628.8	3.71	3.58	3.51
1639.3	1669.3	3.76	3.61	3.54
1700.1	1730.1	4.01	3.83	3.75

LO (MHz)	LO VSWR (:1)		
	@LO (dBm)		
	+10	+13	+16
100.1	52.65	22.29	8.99
140.6	12.61	5.66	4.79
181.1	6.09	3.67	3.75
221.6	3.34	2.96	3.54
262.1	2.49	2.52	3.26
302.6	1.99	2.31	3.12
343.1	1.81	2.28	3.17
383.6	1.55	2.11	2.99
424.2	1.48	2.15	3.09
464.7	1.40	2.08	2.99
505.2	1.36	2.08	3.00
545.7	1.35	2.09	3.02
586.2	1.35	2.06	2.96
626.7	1.40	2.10	3.00
667.2	1.44	2.10	2.96
707.7	1.48	2.15	3.03
748.2	1.54	2.16	3.03
788.7	1.57	2.14	2.99
829.2	1.63	2.15	2.98
869.7	1.68	2.10	2.87
910.2	1.77	2.13	2.90
950.7	1.93	2.26	2.96
991.2	2.02	2.37	3.03
1031.7	2.04	2.44	3.10
1072.3	2.07	2.48	3.14
1112.8	2.07	2.47	3.14
1153.3	2.10	2.48	3.16
1193.8	2.10	2.46	3.14
1234.3	2.11	2.42	3.10
1274.8	2.11	2.41	3.08
1315.3	2.09	2.33	2.95
1355.8	2.06	2.29	2.91
1396.3	1.99	2.18	2.75
1436.8	1.92	2.06	2.62
1477.3	1.82	1.95	2.49
1517.8	1.77	1.85	2.43
1558.3	1.79	1.91	2.50
1598.8	1.92	1.97	2.48
1639.3	2.09	2.06	2.52
1700.1	2.31	2.15	2.52

IF (OUT) (MHz)	IF VSWR @LO=1050.1MHz (:1)		
	@LO (dBm)		
	+10	+13	+16
10.0	2.52	1.90	1.49
16.2	2.56	1.83	1.48
22.3	2.57	1.87	1.51
28.5	2.48	1.80	1.44
34.6	2.45	1.78	1.43
40.8	2.42	1.76	1.40
46.9	2.37	1.72	1.38
53.1	2.31	1.68	1.34
59.2	2.31	1.68	1.34
65.4	2.29	1.67	1.33
71.5	2.33	1.68	1.34
77.7	2.36	1.71	1.36
83.8	2.42	1.75	1.40
90.0	2.47	1.79	1.43
96.2	2.52	1.83	1.46
102.3	2.57	1.86	1.49
108.5	2.60	1.87	1.50
114.6	2.62	1.88	1.51
120.8	2.61	1.87	1.50
126.9	2.59	1.85	1.49
133.1	2.56	1.83	1.46
139.2	2.54	1.81	1.46
145.4	2.51	1.81	1.45
151.5	2.52	1.80	1.45
157.7	2.53	1.82	1.47
163.8	2.57	1.84	1.49
170.0	2.59	1.86	1.51
176.2	2.60	1.88	1.52
182.3	2.61	1.89	1.54
188.5	2.61	1.90	1.55
194.6	2.61	1.89	1.55
200.8	2.62	1.89	1.54
206.9	2.62	1.90	1.55
213.1	2.63	1.90	1.55
219.2	2.63	1.91	1.55
225.4	2.64	1.92	1.57
231.5	2.65	1.95	1.59
237.7	2.66	1.96	1.60
243.8	2.69	1.97	1.62
250.0	2.70	1.98	1.63

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	14	41	14	24	42	40	55	55	47	59
1	-	9	+0	27	15	37	42	27	45	50	65	60
2	86	41	32	50	33	57	38	54	59	62	68	62
3	>100	54	38	44	43	42	43	61	48	36	63	59
4	100	53	64	56	55	64	48	65	57	52	58	61
5	>100	44	58	62	62	53	49	50	54	61	63	71
6	>100	65	58	73	67	75	60	58	56	64	64	67
7	>100	74	71	54	61	79	62	59	69	64	80	75
8	>100	82	79	82	63	69	85	72	69	77	66	89
9	>100	88	91	82	76	79	80	77	77	80	77	69
10	>100	84	86	>99	89	79	80	97	90	83	83	72
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 920.1 MHz; 4.00 dBm.
 LO IN: 950.01 MHz; +13.00 dBm
 IF OUT: 29.91 MHz; -1.46 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	5	28	3	14	37	30	42	49	35	39
1	-	9	+0	25	14	35	44	21	42	43	53	56
2	99	50	40	73	43	76	45	54	59	56	84	63
3	>100	82	61	61	61	59	71	66	72	59	75	86
4	>100	88	88	>89	76	82	73	82	81	>89	81	>89
5	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
6	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
7	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
8	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
9	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
10	>100	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89	>89
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 920.1 MHz; -6.00 dBm.
 LO IN: 950.01 MHz; +13.00 dBm
 IF OUT: 29.91 MHz; -11.3 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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