

Frequency Mixer

TUF-860SM

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)		
		@LO (dBm)		
		+4	+7	+10
100.1	130.1	12.03	10.75	10.34
140.4	170.4	9.48	8.65	8.30
180.6	210.6	7.69	7.28	7.11
220.9	250.9	6.87	6.54	6.33
261.1	291.1	6.26	5.96	5.82
301.4	331.4	5.80	5.61	5.43
341.7	371.7	5.65	5.42	5.24
381.9	411.9	5.46	5.24	5.05
422.2	452.2	5.39	5.17	5.01
462.4	492.4	5.38	5.16	4.98
502.7	532.7	5.27	5.01	4.87
543.0	573.0	5.32	5.07	4.84
583.2	613.2	5.26	5.06	4.91
623.5	653.5	5.27	5.07	4.95
663.7	693.7	5.33	5.12	5.00
704.0	734.0	5.37	5.16	4.99
744.3	774.3	5.45	5.20	5.06
784.5	814.5	5.58	5.26	5.08
824.8	854.8	5.80	5.37	5.13
865.0	895.0	6.07	5.56	5.18
905.3	935.3	6.30	5.74	5.26
945.6	975.6	6.60	6.04	5.53
985.8	1015.8	6.80	6.16	5.63
1026.1	1056.1	7.17	6.53	5.97
1066.3	1096.3	7.46	6.87	6.27
1106.6	1136.6	7.66	7.08	6.57
1146.9	1176.9	7.82	7.25	6.73
1187.1	1217.1	7.86	7.28	6.69
1227.4	1257.4	7.84	7.18	6.60
1267.6	1297.6	7.76	7.13	6.69
1307.9	1337.9	7.79	7.25	6.95
1348.2	1378.2	7.97	7.58	7.37
1388.4	1418.4	8.34	7.97	7.79
1428.7	1458.7	8.73	8.42	8.17
1468.9	1498.9	9.11	8.80	8.57
1509.2	1539.2	9.42	9.09	8.83
1549.5	1579.5	9.75	9.37	9.27
1589.7	1619.7	10.10	9.88	9.71
1630.0	1660.0	10.48	10.29	10.17
1650.1	1680.1	10.81	10.64	10.51

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+4	+7	+10
100.1	130.1	15.24	15.37	15.23
140.4	170.4	13.50	12.03	13.82
180.6	210.6	10.41	11.91	13.05
220.9	250.9	9.84	11.46	12.88
261.1	291.1	9.87	11.69	13.92
301.4	331.4	10.11	11.24	13.22
341.7	371.7	10.35	12.01	14.82
381.9	411.9	11.20	12.95	14.57
422.2	452.2	13.27	16.76	25.37
462.4	492.4	10.73	12.94	14.16
502.7	532.7	10.16	12.31	14.07
543.0	573.0	12.31	12.40	13.58
583.2	613.2	16.38	16.66	14.75
623.5	653.5	14.19	15.38	17.62
663.7	693.7	11.71	11.17	12.45
704.0	734.0	21.24	15.02	15.30
744.3	774.3	15.31	21.82	24.01
784.5	814.5	16.56	16.56	22.53
824.8	854.8	8.29	18.90	17.72
865.0	895.0	5.24	10.92	18.82
905.3	935.3	3.75	7.13	16.31
945.6	975.6	3.65	6.08	12.01
985.8	1015.8	4.56	6.39	10.65
1026.1	1056.1	5.91	7.00	9.62
1066.3	1096.3	6.86	8.63	10.81
1106.6	1136.6	6.18	7.36	9.47
1146.9	1176.9	5.96	6.42	8.22
1187.1	1217.1	5.83	6.59	8.79
1227.4	1257.4	7.36	10.39	15.61
1267.6	1297.6	9.91	14.06	16.69
1307.9	1337.9	12.34	15.80	18.79
1348.2	1378.2	13.72	15.67	18.22
1388.4	1418.4	12.97	15.01	22.51
1428.7	1458.7	12.60	16.44	18.58
1468.9	1498.9	12.71	16.18	17.57
1509.2	1539.2	12.79	15.08	17.53
1549.5	1579.5	12.63	15.25	15.54
1589.7	1619.7	13.92	13.75	18.74
1630.0	1660.0	16.94	17.94	20.29
1650.1	1680.1	14.33	19.02	19.33

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+1dBm (dB)		
		@LO (dBm)		
		+4	+7	+10
100.1	130.1	-0.11	0.00	-0.03
140.4	170.4	0.07	0.04	-0.01
180.6	210.6	0.23	0.10	0.02
220.9	250.9	0.41	0.24	0.12
261.1	291.1	0.62	0.37	0.23
301.4	331.4	0.74	0.46	0.33
341.7	371.7	0.84	0.58	0.43
381.9	411.9	0.87	0.62	0.47
422.2	452.2	0.89	0.65	0.48
462.4	492.4	0.89	0.63	0.46
502.7	532.7	0.96	0.72	0.52
543.0	573.0	1.00	0.75	0.57
583.2	613.2	1.10	0.82	0.61
623.5	653.5	1.20	0.90	0.68
663.7	693.7	1.29	0.94	0.71
704.0	734.0	1.39	1.00	0.76
744.3	774.3	1.52	1.07	0.79
784.5	814.5	1.66	1.23	0.91
824.8	854.8	1.78	1.43	1.10
865.0	895.0	1.87	1.56	1.27
905.3	935.3	1.97	1.72	1.47
945.6	975.6	1.89	1.66	1.44
985.8	1015.8	1.76	1.61	1.41
1026.1	1056.1	1.49	1.38	1.23
1066.3	1096.3	1.26	1.15	1.04
1106.6	1136.6	1.15	0.99	0.89
1146.9	1176.9	1.00	0.80	0.72
1187.1	1217.1	0.99	0.78	0.65
1227.4	1257.4	0.95	0.70	0.56
1267.6	1297.6	0.95	0.66	0.45
1307.9	1337.9	0.89	0.55	0.37
1348.2	1378.2	0.67	0.40	0.27
1388.4	1418.4	0.52	0.32	0.22
1428.7	1458.7	0.36	0.24	0.18
1468.9	1498.9	0.32	0.21	0.17
1509.2	1539.2	0.30	0.20	0.16
1549.5	1579.5	0.24	0.16	0.13
1589.7	1619.7	0.24	0.16	0.12
1630.0	1660.0	0.24	0.16	0.12
1650.1	1680.1	0.24	0.15	0.11

Frequency Mixer

TUF-860SM

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)
		+7			+7			+7
125.0	800.1	5.50	10.0	810.1	5.23	250.0	800.1	5.85
118.9	806.2	5.47	16.2	816.3	5.25	243.8	806.3	5.85
112.9	812.2	5.47	22.3	822.4	5.25	237.7	812.4	5.86
106.8	818.3	5.45	28.5	828.6	5.28	231.5	818.6	5.86
100.8	824.3	5.47	34.6	834.7	5.29	225.4	824.7	5.84
94.7	830.4	5.50	40.8	840.9	5.29	219.2	830.9	5.84
88.7	836.4	5.49	46.9	847.0	5.28	213.1	837.0	5.82
82.6	842.5	5.49	53.1	853.2	5.28	206.9	843.2	5.85
76.6	848.5	5.50	59.2	859.3	5.31	200.8	849.3	5.88
70.5	854.6	5.52	65.4	865.5	5.35	194.6	855.5	5.92
64.5	860.6	5.57	71.5	871.6	5.38	188.5	861.6	5.93
58.4	866.7	5.57	77.7	877.8	5.38	182.3	867.8	5.93
52.4	872.7	5.57	83.8	883.9	5.36	176.2	873.9	5.96
46.3	878.8	5.56	90.0	890.1	5.38	170.0	880.1	5.98
40.3	884.8	5.58	96.2	896.3	5.41	163.8	886.3	6.05
34.2	890.9	5.65	102.3	902.4	5.46	157.7	892.4	6.08
28.2	896.9	5.68	108.5	908.6	5.43	151.5	898.6	6.08
22.1	903.0	5.72	114.6	914.7	5.42	145.4	904.7	6.11
16.1	909.0	5.67	120.8	920.9	5.43	139.2	910.9	6.09
10.0	915.1	5.64	126.9	927.0	5.48	133.1	917.0	6.15
10.0	935.1	5.79	133.1	933.2	5.55	126.9	923.2	6.22
16.1	941.2	5.78	139.2	939.3	5.56	120.8	929.3	6.22
22.1	947.2	5.81	145.4	945.5	5.55	114.6	935.5	6.21
28.2	953.3	5.85	151.5	951.6	5.53	108.5	941.6	6.20
34.2	959.3	5.91	157.7	957.8	5.54	102.3	947.8	6.25
40.3	965.4	5.92	163.8	963.9	5.57	96.2	953.9	6.33
46.3	971.4	5.88	170.0	970.1	5.56	90.0	960.1	6.40
52.4	977.5	5.83	176.2	976.3	5.55	83.8	966.3	6.40
58.4	983.5	5.84	182.3	982.4	5.51	77.7	972.4	6.37
64.5	989.6	5.91	188.5	988.6	5.52	71.5	978.6	6.38
70.5	995.6	5.95	194.6	994.7	5.56	65.4	984.7	6.43
76.6	1001.7	5.94	200.8	1000.9	5.58	59.2	990.9	6.48
82.6	1007.7	5.89	206.9	1007.0	5.58	53.1	997.0	6.49
88.7	1013.8	5.88	213.1	1013.2	5.54	46.9	1003.2	6.46
94.7	1019.8	5.91	219.2	1019.3	5.55	40.8	1009.3	6.45
100.8	1025.9	5.95	225.4	1025.5	5.57	34.6	1015.5	6.50
106.8	1031.9	5.98	231.5	1031.6	5.63	28.5	1021.6	6.58
112.9	1038.0	5.99	237.7	1037.8	5.67	22.3	1027.8	6.62
118.9	1044.0	5.98	243.8	1043.9	5.66	16.2	1033.9	6.60
125.0	1050.1	6.00	250.0	1050.1	5.66	10.0	1040.1	6.54

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Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+4	+7	+10	+4	+7	+10
100.1	52.32	52.79	52.87	53.64	49.78	48.87
140.4	53.05	52.34	50.82	48.60	48.07	49.02
180.6	50.82	49.49	48.61	48.57	49.41	49.97
220.9	47.09	46.67	46.47	51.05	51.57	51.15
261.1	44.07	44.49	44.78	54.69	53.81	52.06
301.4	42.14	42.72	43.22	55.38	53.24	51.33
341.7	40.64	41.47	42.02	53.31	52.20	50.39
381.9	39.66	40.78	41.40	47.52	48.57	48.56
422.2	38.51	39.56	40.36	44.56	45.77	46.57
462.4	36.75	37.82	38.72	41.66	42.64	43.53
502.7	36.02	36.93	37.71	40.20	41.28	42.31
543.0	35.44	36.27	36.97	40.31	41.41	42.54
583.2	35.32	36.26	36.83	40.46	41.54	42.34
623.5	35.85	36.67	37.20	40.10	41.64	42.45
663.7	35.94	36.53	36.82	39.24	41.49	42.71
704.0	35.96	36.20	36.29	37.75	40.34	42.10
744.3	35.47	35.76	35.84	36.07	38.87	41.26
784.5	34.91	35.37	35.50	34.53	37.23	39.73
824.8	33.94	34.62	34.86	33.16	35.61	37.94
865.0	32.98	33.78	34.13	32.24	34.54	36.86
905.3	32.52	33.30	33.70	31.70	33.92	36.27
945.6	31.82	32.65	33.18	31.57	33.45	35.62
985.8	32.06	32.79	33.29	31.48	33.23	35.34
1026.1	32.10	33.08	33.60	31.27	33.13	35.12
1066.3	31.89	32.86	33.58	31.41	33.27	35.08
1106.6	32.19	33.12	33.82	31.35	33.16	34.74
1146.9	31.94	32.67	33.33	31.24	32.77	33.86
1187.1	31.96	32.50	33.11	31.12	32.10	32.30
1227.4	31.48	31.81	32.29	30.64	30.55	29.72
1267.6	31.00	31.06	31.34	29.43	28.10	27.36
1307.9	30.87	30.72	30.70	27.68	26.32	25.79
1348.2	30.84	30.44	30.24	26.53	25.16	24.46
1388.4	30.95	30.29	29.94	26.06	24.45	23.47
1428.7	30.99	30.07	29.43	25.94	23.83	22.41
1468.9	30.75	29.72	28.98	25.40	23.08	21.51
1509.2	30.39	29.17	28.30	24.90	22.31	20.58
1549.5	29.68	28.38	27.47	24.05	21.50	19.74
1589.7	28.79	27.60	26.72	22.94	20.54	18.78
1630.0	27.78	26.58	25.70	21.94	19.79	18.08
1650.1	27.21	26.21	25.45	21.15	19.15	17.55

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+4	+7	+10
100.1	130.1	36.64	36.21	36.03
140.4	170.4	31.34	31.22	30.99
180.6	210.6	27.95	27.93	27.97
220.9	250.9	25.74	25.79	25.74
261.1	291.1	24.43	24.44	24.51
301.4	331.4	23.72	23.74	23.71
341.7	371.7	23.37	23.63	23.81
381.9	411.9	23.31	23.91	24.30
422.2	452.2	22.96	23.38	23.80
462.4	492.4	23.42	23.44	23.46
502.7	532.7	24.67	24.57	24.49
543.0	573.0	27.32	27.06	26.76
583.2	613.2	29.96	30.64	31.16
623.5	653.5	28.07	28.72	29.32
663.7	693.7	24.69	24.79	24.84
704.0	734.0	22.32	22.19	22.13
744.3	774.3	20.18	19.87	19.84
784.5	814.5	18.74	18.46	18.29
824.8	854.8	17.52	17.25	17.08
865.0	895.0	16.54	16.24	16.26
905.3	935.3	15.97	15.67	15.59
945.6	975.6	15.52	15.31	15.19
985.8	1015.8	15.30	15.21	15.24
1026.1	1056.1	15.42	15.45	15.45
1066.3	1096.3	15.43	15.48	15.58
1106.6	1136.6	15.27	15.48	15.56
1146.9	1176.9	15.23	15.41	15.58
1187.1	1217.1	15.15	15.36	15.47
1227.4	1257.4	15.11	15.39	15.49
1267.6	1297.6	15.22	15.70	15.84
1307.9	1337.9	15.24	15.56	15.59
1348.2	1378.2	14.95	15.06	14.91
1388.4	1418.4	14.32	14.19	13.92
1428.7	1458.7	13.53	13.22	12.80
1468.9	1498.9	12.63	12.21	11.71
1509.2	1539.2	11.73	11.25	10.75
1549.5	1579.5	10.93	10.25	9.70
1589.7	1619.7	10.20	9.42	8.85
1630.0	1660.0	9.30	8.54	8.05
1650.1	1680.1	8.94	8.14	7.66

Frequency Mixer

TUF-860SM

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=1050.1MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+4	+7	+10		+4	+7	+10		+4	+7	+10
100.1	130.1	15.67	13.60	12.61	100.1	15.39	9.79	6.56	10.0	2.23	1.93	1.62
140.4	170.4	8.95	7.70	7.22	140.4	6.01	4.46	4.42	16.2	2.32	1.95	1.67
180.6	210.6	5.54	5.10	4.89	180.6	3.84	3.35	3.71	22.3	2.49	2.09	1.82
220.9	250.9	4.09	3.84	3.70	220.9	2.80	2.97	3.62	28.5	2.48	2.10	1.81
261.1	291.1	3.19	3.03	2.95	261.1	2.27	2.65	3.38	34.6	2.47	2.13	1.85
301.4	331.4	2.61	2.51	2.46	301.4	2.01	2.54	3.31	40.8	2.49	2.17	1.88
341.7	371.7	2.24	2.15	2.12	341.7	1.89	2.51	3.35	46.9	2.51	2.19	1.90
381.9	411.9	1.96	1.91	1.88	381.9	1.74	2.38	3.21	53.1	2.49	2.18	1.91
422.2	452.2	1.77	1.74	1.73	422.2	1.73	2.44	3.30	59.2	2.49	2.19	1.92
462.4	492.4	1.58	1.56	1.56	462.4	1.67	2.37	3.22	65.4	2.51	2.20	1.92
502.7	532.7	1.42	1.43	1.46	502.7	1.66	2.38	3.25	71.5	2.50	2.19	1.91
543.0	573.0	1.32	1.34	1.39	543.0	1.68	2.40	3.26	77.7	2.51	2.20	1.92
583.2	613.2	1.24	1.28	1.35	583.2	1.68	2.39	3.23	83.8	2.52	2.19	1.92
623.5	653.5	1.21	1.27	1.34	623.5	1.73	2.46	3.32	90.0	2.53	2.20	1.92
663.7	693.7	1.20	1.28	1.35	663.7	1.73	2.43	3.27	96.2	2.53	2.19	1.92
704.0	734.0	1.20	1.30	1.39	704.0	1.77	2.46	3.30	102.3	2.56	2.21	1.93
744.3	774.3	1.21	1.33	1.41	744.3	1.80	2.44	3.25	108.5	2.56	2.21	1.93
784.5	814.5	1.14	1.26	1.33	784.5	1.85	2.46	3.26	114.6	2.56	2.21	1.93
824.8	854.8	1.02	1.14	1.21	824.8	1.96	2.57	3.35	120.8	2.56	2.22	1.93
865.0	895.0	1.10	1.06	1.12	865.0	2.02	2.62	3.38	126.9	2.56	2.21	1.93
905.3	935.3	1.27	1.18	1.16	905.3	2.08	2.71	3.48	133.1	2.55	2.21	1.93
945.6	975.6	1.49	1.39	1.34	945.6	2.11	2.73	3.50	139.2	2.56	2.22	1.94
985.8	1015.8	1.75	1.64	1.56	985.8	2.15	2.78	3.56	145.4	2.57	2.24	1.96
1026.1	1056.1	2.08	1.96	1.85	1026.1	2.17	2.79	3.58	151.5	2.59	2.26	1.98
1066.3	1096.3	2.43	2.31	2.21	1066.3	2.19	2.80	3.60	157.7	2.62	2.28	2.01
1106.6	1136.6	2.74	2.63	2.54	1106.6	2.20	2.79	3.59	163.8	2.65	2.32	2.04
1146.9	1176.9	3.02	2.92	2.83	1146.9	2.18	2.75	3.53	170.0	2.67	2.33	2.06
1187.1	1217.1	3.23	3.15	3.05	1187.1	2.17	2.71	3.48	176.2	2.67	2.34	2.07
1227.4	1257.4	3.42	3.33	3.27	1227.4	2.12	2.61	3.36	182.3	2.67	2.33	2.05
1267.6	1297.6	3.59	3.52	3.48	1267.6	2.07	2.56	3.33	188.5	2.64	2.31	2.03
1307.9	1337.9	3.73	3.69	3.66	1307.9	2.07	2.54	3.31	194.6	2.61	2.28	2.01
1348.2	1378.2	3.90	3.89	3.86	1348.2	2.15	2.61	3.37	200.8	2.59	2.26	1.98
1388.4	1418.4	4.13	4.13	4.11	1388.4	2.30	2.71	3.43	206.9	2.56	2.23	1.96
1428.7	1458.7	4.36	4.35	4.34	1428.7	2.47	2.80	3.47	213.1	2.56	2.23	1.96
1468.9	1498.9	4.46	4.44	4.41	1468.9	2.65	2.94	3.59	219.2	2.57	2.24	1.97
1509.2	1539.2	4.42	4.40	4.35	1509.2	2.83	3.03	3.62	225.4	2.59	2.26	2.00
1549.5	1579.5	4.42	4.34	4.29	1549.5	3.01	3.17	3.74	231.5	2.61	2.29	2.03
1589.7	1619.7	4.44	4.32	4.25	1589.7	3.17	3.26	3.78	237.7	2.65	2.33	2.07
1630.0	1660.0	4.45	4.29	4.19	1630.0	3.35	3.36	3.83	243.8	2.68	2.36	2.10
1650.1	1680.1	4.51	4.31	4.17	1650.1	3.42	3.43	3.90	250.0	2.69	2.37	2.12

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	9	26	8	32	27	62	57	44	41	50
1	-	11	+0	25	13	50	33	38	56	57	58	50
2	>100	51	40	55	43	58	51	69	62	>80	>80	71
3	>100	74	49	62	48	56	53	69	64	74	>80	>80
4	>100	>80	>80	>80	76	>80	72	79	>80	>80	>80	>80
5	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
6	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
7	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
8	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
9	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
10	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 920.10 MHz; -14.00 dBm.
LO IN: 950.01 MHz; +7.00 dBm
IF OUT: 29.91 MHz; -19.89 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	17	42	19	43	39	78	68	57	79	60
1	-	11	+0	27	14	54	35	47	64	62	60	56
2	85	45	35	53	39	52	43	66	61	85	79	67
3	>100	51	34	45	38	42	44	56	45	54	74	72
4	>100	72	61	58	56	58	54	63	61	71	69	85
5	>100	61	56	71	49	59	46	54	52	69	60	73
6	>100	>90	75	85	75	72	63	67	63	69	74	88
7	>100	>90	85	72	78	88	74	72	66	67	66	83
8	>100	>90	>90	>90	>90	>90	>90	83	84	83	74	90
9	>100	>90	>90	>90	>90	88	88	>90	83	81	79	78
10	>100	>90	>90	>90	>90	>90	>90	>90	>90	>90	86	86
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 920.10 MHz; -4.00 dBm.
LO IN: 950.01 MHz; +7.00 dBm
IF OUT: 29.91 MHz; -9.85 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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