

Frequency Mixer

TUF-R3SM+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)		
		@LO (dBm)		
		+4	+7	+10
0.10	30.10	5.79	5.38	5.22
0.11	30.11	5.74	5.34	5.19
0.12	30.12	5.67	5.27	5.13
0.13	30.13	5.64	5.24	5.10
0.14	30.14	5.61	5.22	5.08
0.15	30.15	5.52	5.14	5.00
0.16	30.16	5.48	5.13	4.98
0.17	30.17	5.46	5.10	4.97
0.18	30.18	5.43	5.08	4.94
0.19	30.19	5.41	5.06	4.92
3.00	33.00	4.92	4.60	4.48
5.00	35.00	4.91	4.58	4.48
7.00	37.00	4.91	4.58	4.47
9.00	39.00	4.93	4.59	4.48
70.00	100.00	4.99	4.69	4.59
170.00	200.00	5.08	4.79	4.70
180.00	210.00	5.08	4.80	4.73
220.00	250.00	5.21	4.86	4.74
230.00	260.00	5.26	4.89	4.75
250.00	280.00	5.35	4.99	4.82
270.00	300.00	5.42	5.10	4.95
290.00	320.00	5.43	5.15	5.04
310.00	340.00	5.46	5.18	5.08
330.00	360.00	5.50	5.21	5.13
350.00	380.00	5.57	5.29	5.22
370.00	400.00	5.68	5.37	5.29
380.00	410.00	5.77	5.42	5.32
390.00	420.00	5.86	5.48	5.36
400.00	430.00	6.00	5.56	5.39
410.00	440.00	6.11	5.66	5.44
420.00	450.00	6.20	5.76	5.48
470.00	500.00	6.51	6.07	5.79
520.00	550.00	6.84	6.34	5.92
570.00	600.00	6.89	6.20	5.91

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+4	+7	+10
0.10	30.10	17.43	17.48	19.09
0.11	30.11	17.59	17.62	19.91
0.12	30.12	17.49	17.15	19.19
0.13	30.13	17.34	17.37	19.45
0.14	30.14	17.18	17.72	19.04
0.15	30.15	17.59	17.31	19.50
0.16	30.16	17.66	17.41	19.53
0.17	30.17	18.18	17.35	19.12
0.18	30.18	17.43	17.30	18.83
0.19	30.19	17.92	16.99	19.23
3.00	33.00	18.06	18.09	20.99
5.00	35.00	17.67	19.10	22.65
7.00	37.00	20.66	18.72	22.47
9.00	39.00	15.43	19.54	19.78
70.00	100.00	18.45	21.05	16.54
170.00	200.00	9.88	9.42	10.40
180.00	210.00	9.09	9.44	11.19
220.00	250.00	10.60	10.89	13.10
230.00	260.00	11.26	12.05	15.29
250.00	280.00	11.89	13.03	16.17
270.00	300.00	10.45	10.74	12.57
290.00	320.00	9.52	10.18	11.58
310.00	340.00	9.32	9.92	11.95
330.00	360.00	9.08	10.47	13.48
350.00	380.00	9.43	11.70	14.39
370.00	400.00	10.02	12.66	16.21
380.00	410.00	7.73	11.05	14.26
390.00	420.00	6.31	10.43	14.50
400.00	430.00	4.38	9.00	13.35
410.00	440.00	2.17	6.20	10.80
420.00	450.00	0.77	4.00	8.74
470.00	500.00	-0.56	0.18	2.17
520.00	550.00	2.32	4.17	6.43
570.00	600.00	7.66	12.26	15.43

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+1dBm (dB)		
		@LO (dBm)		
		+4	+7	+10
0.10	30.10	1.08	1.03	0.86
0.11	30.11	1.10	1.03	0.84
0.12	30.12	1.18	1.11	0.90
0.13	30.13	1.16	1.09	0.88
0.14	30.14	1.20	1.11	0.91
0.15	30.15	1.22	1.12	0.91
0.16	30.16	1.28	1.14	0.94
0.17	30.17	1.27	1.13	0.91
0.18	30.18	1.29	1.15	0.94
0.19	30.19	1.31	1.17	0.96
3.00	33.00	1.63	1.46	1.21
5.00	35.00	1.66	1.49	1.22
7.00	37.00	1.68	1.51	1.26
9.00	39.00	1.65	1.48	1.24
70.00	100.00	1.56	1.37	1.12
170.00	200.00	1.38	1.22	0.98
180.00	210.00	1.34	1.18	0.93
220.00	250.00	1.36	1.23	1.00
230.00	260.00	1.31	1.18	0.97
250.00	280.00	1.28	1.17	0.98
270.00	300.00	1.28	1.17	0.98
290.00	320.00	1.45	1.28	1.06
310.00	340.00	1.65	1.43	1.19
330.00	360.00	1.86	1.57	1.28
350.00	380.00	1.93	1.59	1.30
370.00	400.00	2.18	1.80	1.47
380.00	410.00	2.20	1.82	1.49
390.00	420.00	2.37	1.99	1.62
400.00	430.00	2.42	2.10	1.71
410.00	440.00	2.49	2.20	1.81
420.00	450.00	2.56	2.30	1.91
470.00	500.00	2.57	2.32	1.95
520.00	550.00	2.59	2.35	2.07
570.00	600.00	2.55	2.35	1.99

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Frequency Mixer

TUF-R3SM+

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=200 MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=0.15 MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=400 MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+7			+7			+7
199.90	0.10	5.08	0.10	0.25	5.22	399.90	0.10	5.99
199.89	0.11	5.08	0.15	0.30	5.16	399.89	0.11	5.98
199.88	0.12	5.07	0.35	0.50	5.19	399.88	0.12	5.98
199.87	0.13	5.09	0.60	0.75	5.21	399.87	0.13	5.97
199.86	0.14	5.09	0.85	1.00	5.17	399.86	0.14	5.98
199.85	0.15	5.09	1.85	2.00	5.18	399.85	0.15	5.96
199.84	0.16	5.08	5.85	6.00	5.20	399.84	0.16	5.96
199.83	0.17	5.09	9.85	10.00	5.19	399.83	0.17	5.96
199.82	0.18	5.08	19.85	20.00	5.19	399.82	0.18	5.96
199.80	0.20	5.08	29.85	30.00	5.17	399.80	0.20	5.97
199.50	0.50	5.08	39.85	40.00	5.20	399.30	0.70	5.94
199.20	0.80	5.08	79.85	80.00	5.22	398.80	1.20	5.94
198.90	1.10	5.06	119.85	120.00	5.31	398.30	1.70	5.95
198.60	1.40	5.07	159.85	160.00	5.37	397.80	2.20	5.94
198.30	1.70	5.07	169.85	170.00	5.34	397.30	2.70	5.94
198.00	2.00	5.07	184.85	185.00	5.33	397.00	3.00	5.94
196.00	4.00	5.08	199.85	200.00	5.38	394.00	6.00	5.92
194.00	6.00	5.08	214.85	215.00	5.37	389.50	10.50	5.88
192.00	8.00	5.07	229.85	230.00	5.33	369.50	30.50	5.78
190.00	10.00	5.07	244.85	245.00	5.33	349.50	50.50	5.69
180.00	20.00	5.08	259.85	260.00	5.40	329.50	70.50	5.66
170.00	30.00	4.99	273.85	274.00	5.53	309.50	90.50	5.66
159.00	41.00	4.95	287.85	288.00	5.67	289.50	110.50	5.70
139.00	61.00	4.91	301.85	302.00	5.78	269.50	130.50	5.66
119.00	81.00	4.92	315.85	316.00	5.81	249.50	150.50	5.65
99.00	101.00	4.91	329.85	330.00	5.76	229.50	170.50	5.68
79.00	121.00	4.86	343.85	344.00	5.72	214.50	185.50	5.68
59.00	141.00	4.91	357.85	358.00	5.63	199.50	200.50	5.72
39.00	161.00	4.91	371.85	372.00	5.47	184.50	215.50	5.75
30.00	170.00	4.88	385.85	386.00	5.44	169.50	230.50	5.79
10.00	190.00	4.89	399.85	400.00	5.40	139.50	260.50	5.76
9.00	191.00	4.91	429.85	430.00	5.31	109.50	290.50	5.70
7.00	193.00	4.91	459.85	460.00	5.33	79.50	320.50	5.63
5.00	195.00	4.92	489.85	490.00	5.38	49.50	350.50	5.60
3.00	197.00	4.92	519.85	520.00	5.32	19.50	380.50	5.46
1.00	199.00	4.95	549.85	550.00	5.34	10.00	390.00	5.48
0.85	199.15	4.93	579.85	580.00	5.36	5.50	394.50	5.51
0.70	199.30	4.94	609.85	610.00	5.41	1.00	399.00	5.56
0.55	199.45	4.96	639.85	640.00	5.50	0.75	399.25	5.56
0.40	199.60	4.96	669.85	670.00	5.59	0.50	399.50	5.56
0.25	199.75	4.97	699.85	700.00	5.83	0.25	399.75	5.61

Frequency Mixer

TUF-R3SM+

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+4	+7	+10	+4	+7	+10
30.10	68.75	68.89	68.54	56.43	55.47	54.74
30.11	68.73	68.78	68.57	56.51	55.50	54.70
30.12	68.84	68.69	68.52	56.46	55.47	54.71
30.13	68.93	69.12	68.42	56.42	55.44	54.68
30.14	69.24	69.13	68.49	56.36	55.40	54.66
30.15	68.72	68.92	68.38	56.48	55.50	54.67
30.16	69.23	68.90	68.38	56.39	55.43	54.68
30.17	68.48	68.94	68.76	56.43	55.41	54.68
30.18	68.64	68.65	68.52	56.41	55.43	54.69
30.19	68.81	69.28	68.62	56.44	55.44	54.64
33.00	67.88	68.03	67.83	55.96	54.92	54.07
35.00	67.93	67.90	67.41	56.08	54.80	53.86
37.00	67.35	67.62	67.20	55.94	54.60	53.65
39.00	66.82	66.93	66.78	55.58	54.30	53.23
100.00	60.86	61.43	61.50	51.73	49.77	48.10
200.00	56.16	56.89	57.64	43.33	43.87	43.99
210.00	52.48	52.94	54.75	41.97	42.55	42.68
250.00	52.61	52.88	53.54	40.37	41.07	41.67
260.00	55.49	55.41	56.00	41.03	41.87	42.47
280.00	58.21	57.89	56.81	40.55	41.02	41.52
300.00	60.19	58.15	55.81	41.49	42.79	43.21
320.00	64.98	58.15	53.72	40.70	42.34	42.73
340.00	58.29	53.30	49.32	38.66	40.28	40.82
360.00	59.74	54.80	50.96	37.72	40.01	41.86
380.00	59.04	55.87	54.50	36.07	38.40	40.58
400.00	54.95	53.78	53.34	34.43	36.55	38.75
410.00	58.07	56.98	57.95	34.52	36.73	38.93
420.00	55.93	55.72	56.88	34.10	36.06	38.09
430.00	53.78	52.45	51.85	33.58	35.70	37.76
440.00	52.16	51.32	50.86	33.82	35.95	38.00
450.00	51.46	51.09	51.44	34.06	35.85	37.86
500.00	51.68	53.68	57.15	35.17	36.37	37.83
550.00	48.67	50.67	51.99	36.81	36.14	34.29
600.00	42.40	40.86	39.88	32.70	29.62	27.87

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+4	+7	+10
0.10	30.10	48.66	47.12	46.13
0.11	30.11	48.35	47.09	46.26
0.12	30.12	48.57	47.03	46.14
0.13	30.13	48.87	46.75	46.06
0.14	30.14	48.29	47.21	45.92
0.15	30.15	48.42	46.90	45.88
0.16	30.16	48.39	47.07	45.78
0.17	30.17	48.43	46.74	45.85
0.18	30.18	48.42	46.66	45.94
0.19	30.19	48.75	46.92	45.92
3.00	33.00	45.90	44.84	44.08
5.00	35.00	44.65	44.18	42.42
7.00	37.00	42.70	42.07	41.71
9.00	39.00	41.31	40.83	40.39
70.00	100.00	26.96	27.11	27.21
170.00	200.00	23.64	24.28	24.85
180.00	210.00	23.45	24.13	24.78
220.00	250.00	23.46	23.78	24.13
230.00	260.00	24.01	24.24	24.50
250.00	280.00	25.49	25.71	25.98
270.00	300.00	26.67	27.34	28.00
290.00	320.00	24.90	25.60	26.32
310.00	340.00	21.78	22.14	22.48
330.00	360.00	19.49	19.68	19.81
350.00	380.00	17.84	17.85	17.86
370.00	400.00	16.83	16.74	16.68
380.00	410.00	16.48	16.39	16.33
390.00	420.00	16.23	16.13	16.06
400.00	430.00	15.92	15.81	15.72
410.00	440.00	15.73	15.63	15.54
420.00	450.00	15.61	15.51	15.44
470.00	500.00	15.36	15.25	15.19
520.00	550.00	15.72	15.59	15.51
570.00	600.00	14.33	14.19	14.12

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Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+4	+7	+10		+4	+7	+10		+4	+7	+10
0.10	30.10	1.77	1.73	1.70	30.10	1.89	2.75	4.00	0.10	1.71	1.49	1.34
0.11	30.11	1.70	1.66	1.64	30.11	1.89	2.75	4.00	0.18	1.69	1.47	1.32
0.12	30.12	1.65	1.61	1.58	30.12	1.89	2.75	4.00	0.41	1.74	1.50	1.35
0.13	30.13	1.61	1.57	1.54	30.13	1.89	2.76	4.01	3.00	1.80	1.55	1.39
0.14	30.14	1.57	1.53	1.50	30.14	1.89	2.75	4.01	5.00	1.81	1.56	1.40
0.15	30.15	1.54	1.50	1.47	30.15	1.89	2.75	4.00	7.00	1.81	1.56	1.40
0.16	30.16	1.52	1.48	1.45	30.16	1.89	2.75	4.00	9.00	1.81	1.56	1.40
0.17	30.17	1.50	1.45	1.43	30.17	1.89	2.74	4.00	11.00	1.81	1.56	1.40
0.18	30.18	1.48	1.43	1.41	30.18	1.89	2.75	3.99	41.00	1.83	1.58	1.42
0.19	30.19	1.46	1.42	1.39	30.19	1.89	2.75	4.01	71.00	1.86	1.61	1.46
3.00	33.00	1.36	1.26	1.19	33.00	1.79	2.59	3.75	101.00	1.89	1.65	1.50
5.00	35.00	1.37	1.27	1.19	35.00	1.77	2.54	3.67	131.00	1.92	1.70	1.56
7.00	37.00	1.38	1.27	1.20	37.00	1.78	2.57	3.71	161.00	1.96	1.75	1.63
9.00	39.00	1.39	1.27	1.19	39.00	1.82	2.62	3.80	171.00	1.97	1.77	1.65
70.00	100.00	1.33	1.22	1.14	100.00	1.83	2.60	3.72	181.00	1.98	1.79	1.67
170.00	200.00	1.16	1.07	1.01	200.00	1.92	2.76	3.93	191.00	1.99	1.81	1.69
180.00	210.00	1.18	1.09	1.03	210.00	1.85	2.58	3.53	201.00	1.99	1.82	1.71
220.00	250.00	1.13	1.05	1.02	250.00	1.89	2.70	3.83	211.00	2.00	1.83	1.73
230.00	260.00	1.11	1.03	1.03	260.00	1.93	2.73	3.85	221.00	2.00	1.84	1.75
250.00	280.00	1.06	1.03	1.09	280.00	1.91	2.63	3.70	230.00	2.00	1.85	1.76
270.00	300.00	1.03	1.05	1.11	300.00	2.00	2.88	4.15	250.00	2.00	1.86	1.79
290.00	320.00	1.04	1.11	1.18	320.00	1.91	2.64	3.58	270.00	1.99	1.87	1.80
310.00	340.00	1.09	1.17	1.23	340.00	2.04	2.83	4.08	290.00	1.98	1.86	1.81
330.00	360.00	1.12	1.20	1.25	360.00	1.96	2.58	3.45	310.00	1.96	1.85	1.81
350.00	380.00	1.14	1.19	1.23	380.00	2.14	2.97	4.25	330.00	1.93	1.83	1.79
370.00	400.00	1.11	1.15	1.18	400.00	2.09	2.70	3.51	350.00	1.92	1.82	1.78
380.00	410.00	1.10	1.13	1.16	410.00	2.12	2.76	3.61	370.00	1.89	1.79	1.76
390.00	420.00	1.09	1.11	1.12	420.00	2.26	3.03	4.16	375.00	1.88	1.78	1.75
400.00	430.00	1.10	1.09	1.10	430.00	2.34	3.16	4.37	380.00	1.88	1.78	1.74
410.00	440.00	1.13	1.09	1.07	440.00	2.22	2.89	3.74	385.00	1.88	1.78	1.74
420.00	450.00	1.15	1.09	1.05	450.00	2.15	2.78	3.56	390.00	1.87	1.77	1.74
470.00	500.00	1.34	1.27	1.21	500.00	2.29	3.03	3.96	395.75	1.87	1.77	1.74
520.00	550.00	1.61	1.52	1.45	550.00	2.42	3.24	4.41	397.75	1.88	1.78	1.74
570.00	600.00	1.89	1.79	1.73	600.00	2.50	3.41	4.79	399.75	1.96	1.89	1.87

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Harmonics Tables

RF HARMONICS ORDER	(-dBm)											
	(-dBc)											
0	-	-	13	26	17	37	18	47	23	42	47	53
1	-	19	+0	25	12	34	18	40	42	48	50	47
2	> 90	61	52	61	52	68	56	69	59	> 71	56	> 71
3	> 90	59	52	59	53	60	51	60	62	69	> 71	> 71
4	> 90	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71
5	> 90	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71
6	> 90	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71
7	> 90	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71
8	> 90	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71
9	> 90	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71
10	> 90	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71	> 71
RF CAL												

LO HARMONICS ORDER

Test conditions: RF IN: 200.00 MHz; -14.00 dBm.
LO IN: 230.00 MHz; +7.00 dBm
IF OUT: 30.00 MHz; -18.97 dBm

RF HARMONICS ORDER	(-dBm)											
	(-dBc)											
0	-	-	22	37	27	45	28	58	35	57	55	65
1	-	19	+0	28	12	33	20	49	43	55	51	54
2	73	56	44	64	46	58	54	69	52	69	53	68
3	> 90	50	36	45	37	46	34	69	42	55	60	61
4	> 90	62	67	70	63	> 81	57	72	57	78	70	> 81
5	> 90	68	59	61	51	59	50	57	53	57	75	67
6	> 90	> 81	80	> 81	> 81	79	73	76	70	76	70	> 81
7	> 90	> 81	74	> 81	66	69	67	69	62	73	61	67
8	> 90	> 81	> 81	> 81	78	> 81	> 81	78	> 81	75	> 81	> 81
9	> 90	> 81	> 81	> 81	> 81	> 81	> 81	79	78	> 81	> 81	79
10	> 90	> 81	> 81	> 81	> 81	> 81	> 81	> 81	> 81	79	> 81	> 81
RF CAL												

LO HARMONICS ORDER

Test conditions: RF IN: 200.00 MHz; -4.00 dBm.
LO IN: 230.00 MHz; +7.00 dBm
IF OUT: 30.00 MHz; -9.23 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.