

Frequency Mixer

Level 17 (LO Power +17 dBm) 20 to 1500 MHz

TUF-5H+

Maximum Ratings

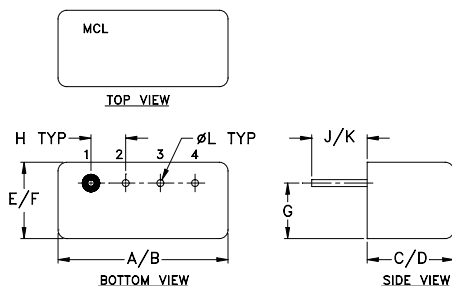
Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
RF Power	200mW
IF Current	40mA

Permanent damage may occur if any of these limits are exceeded.

Pin Connections

LO	4
RF	1
IF	2
GROUND	3
CASE GROUND	3

Outline Drawing



Outline Dimensions (inch/mm)

A	B	C	D	E	F
.480	.500	.240	.255	.210	.230
12.19	12.70	6.10	6.48	5.33	5.84
G	H	J	K	L	wt
.16	.100	.14	.20	.020	grams
4.06	2.54	3.56	5.08	0.51	1.9

Features

- wideband, 20 to 1500 MHz
- low conversion loss, 7.5 dB typ.
- high L-R isolation, 50 dB typ.
- rugged welded construction

Applications

- satellite distribution
- cellular
- GSM/ISM



Generic photo used for illustration purposes only

CASE STYLE: B02

+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Electrical Specifications

FREQUENCY (MHz)		CONVERSION LOSS (dB)				LO-RF ISOLATION (dB)						LO-IF ISOLATION (dB)						IP3 @ CENTER BAND (dBm)
LO/RF	IF	Mid-Band		Total Range Max.		L		M		U		L		M		U		
		$\overline{X}$	σ			Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	
20-1500	DC-1000	7.50	0.17	8.5	9.0	62	55	50	40	38	25	40	25	29	18	20	8	20

1 dB COMP.: +14 dBm typ.

L = low range [f_L to $10 f_L$]

M = mid range [$10 f_L$ to $f_U/2$]

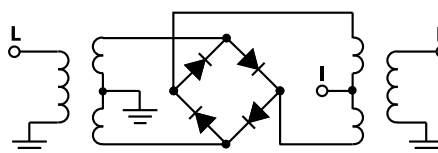
U = upper range [$f_U/2$ to f_U]

m = mid band [$2f_L$ to $f_U/2$]

Typical Performance Data

Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)
RF	LO	LO +17dBm	LO +17dBm	LO +17dBm	LO +17dBm	LO +17dBm
20.00	50.00	6.69	76.70	54.80	1.64	1.69
50.00	80.00	6.37	69.50	48.00	1.53	1.71
110.00	140.00	5.99	65.00	43.50	1.61	1.63
200.00	230.00	5.98	61.10	39.10	1.64	1.63
320.00	350.00	6.13	58.30	36.40	1.80	1.58
500.00	530.00	6.49	56.50	33.60	1.94	1.62
635.00	665.00	6.96	50.80	31.50	2.02	1.62
740.00	770.00	7.59	47.20	30.20	2.32	1.69
845.00	875.00	8.29	46.10	29.80	2.73	1.77
950.00	980.00	8.38	44.20	28.60	3.05	1.89
1000.00	1030.00	8.21	41.40	27.80	3.16	1.86
1055.00	1085.00	7.97	38.90	27.10	3.29	1.84
1100.00	1130.00	7.98	36.60	25.20	3.59	1.93
1200.00	1230.00	7.63	37.20	24.10	3.70	2.03
1250.00	1280.00	7.55	36.30	22.90	3.65	2.08
1300.00	1330.00	7.47	35.00	21.70	3.58	2.08
1350.00	1380.00	7.23	34.50	21.10	3.45	2.14
1400.00	1730.00	7.30	34.00	19.90	3.21	2.24
1470.00	1500.00	7.17	33.80	19.30	3.06	2.24
1500.00	1470.00	7.21	33.30	17.00	2.92	2.37

Electrical Schematic

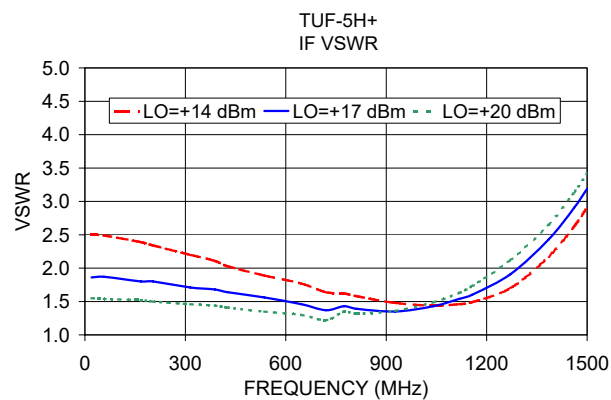
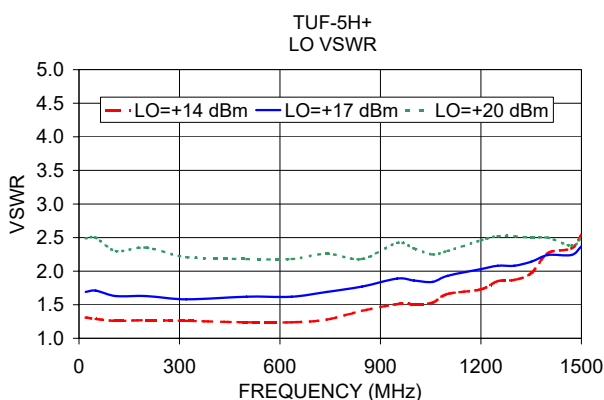
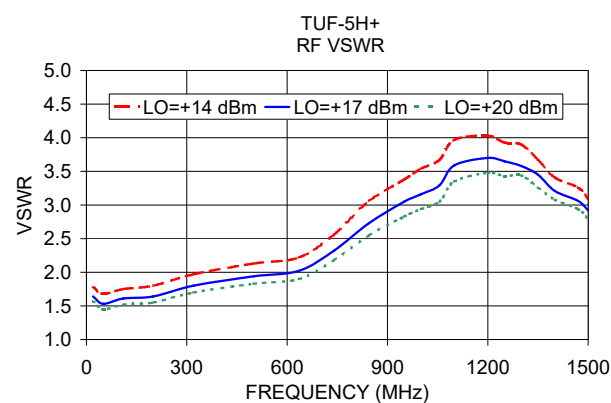
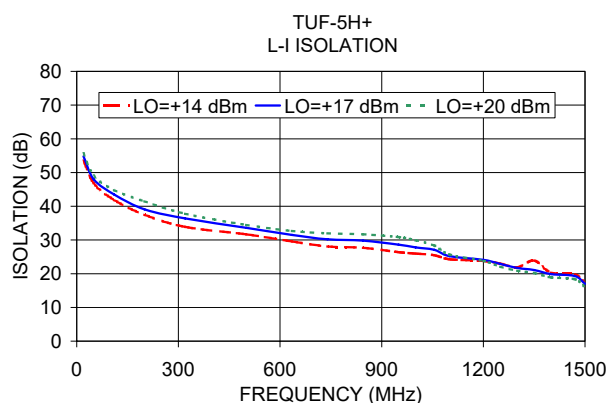
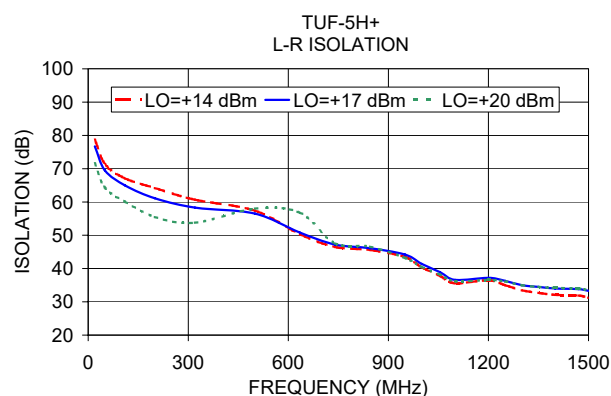
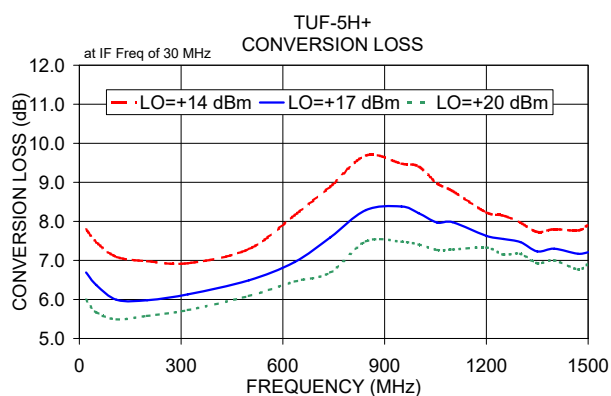


Notes

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
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Frequency Mixer

TUF-5H+

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	7.63	6.39	6.06	10.1	40.1	21.78	24.66	26.34	10.1	40.1	0.50	0.30	0.25
70.7	100.7	7.06	6.20	5.72	70.7	100.7	23.24	26.78	28.24	70.7	100.7	0.89	0.42	0.25
131.3	161.3	6.97	6.03	5.63	131.3	161.3	24.23	28.03	23.23	131.3	161.3	1.08	0.47	0.27
191.9	221.9	6.94	6.03	5.71	191.9	221.9	23.72	22.65	22.26	191.9	221.9	1.13	0.50	0.25
252.5	282.5	6.88	6.12	5.80	252.5	282.5	24.59	20.37	21.87	252.5	282.5	1.20	0.52	0.24
313.1	343.1	6.91	6.20	5.91	313.1	343.1	20.45	20.27	22.39	313.1	343.1	1.13	0.41	0.22
373.7	403.7	7.01	6.32	6.06	373.7	403.7	18.81	20.35	22.23	373.7	403.7	1.21	0.44	0.23
434.3	464.3	7.09	6.41	6.11	434.3	464.3	18.05	19.62	23.85	434.3	464.3	1.27	0.52	0.34
474.7	504.7	7.14	6.48	6.22	474.7	504.7	18.37	19.53	21.65	474.7	504.7	1.29	0.62	0.39
535.2	565.2	7.43	6.66	6.37	535.2	565.2	17.16	20.71	22.65	535.2	565.2	1.27	0.83	0.50
575.6	605.6	7.73	6.83	6.40	575.6	605.6	16.11	20.28	24.66	575.6	605.6	1.29	0.91	0.66
636.2	666.2	8.16	7.28	6.73	636.2	666.2	16.26	17.90	21.84	636.2	666.2	1.27	0.77	0.68
676.6	706.6	8.49	7.58	7.06	676.6	706.6	17.09	18.24	20.45	676.6	706.6	1.10	0.64	0.54
737.2	767.2	9.19	7.99	7.42	737.2	767.2	18.20	19.74	21.21	737.2	767.2	0.74	0.54	0.41
777.6	807.6	9.68	8.18	7.47	777.6	807.6	17.60	19.99	21.98	777.6	807.6	0.29	0.43	0.43
838.2	868.2	10.47	8.30	7.26	838.2	868.2	15.89	20.36	25.36	838.2	868.2	-0.39	0.44	0.66
878.6	908.6	10.76	8.33	7.25	878.6	908.6	15.30	21.28	25.65	878.6	908.6	-0.70	0.56	0.76
939.2	969.2	10.41	8.66	7.41	939.2	969.2	16.50	20.39	23.38	939.2	969.2	-0.56	0.27	0.67
979.6	1009.6	9.86	8.64	7.47	979.6	1009.6	18.58	20.11	22.21	979.6	1009.6	-0.23	0.11	0.56
1040.2	1070.2	9.28	8.48	7.70	1040.2	1070.2	20.15	20.64	20.52	1040.2	1070.2	0.08	0.09	0.34
1080.6	1110.6	9.01	8.37	7.73	1080.6	1110.6	20.56	20.57	19.48	1080.6	1110.6	0.33	0.16	0.28
1141.2	1171.2	8.67	8.19	7.72	1141.2	1171.2	21.80	20.53	19.16	1141.2	1171.2	0.52	0.19	0.24
1181.6	1211.6	8.50	8.10	7.75	1181.6	1211.6	23.51	21.28	19.45	1181.6	1211.6	0.67	0.24	0.23
1242.2	1272.2	8.34	7.94	7.66	1242.2	1272.2	25.15	21.79	21.00	1242.2	1272.2	0.90	0.36	0.29
1282.6	1312.6	8.18	7.79	7.53	1282.6	1312.6	24.50	21.81	23.69	1282.6	1312.6	1.00	0.49	0.41
1343.2	1373.2	8.07	7.55	7.28	1343.2	1373.2	23.18	25.22	23.89	1343.2	1373.2	1.30	0.68	0.54
1383.6	1413.6	8.16	7.52	7.20	1383.6	1413.6	21.98	25.33	22.62	1383.6	1413.6	1.38	0.73	0.58
1444.2	1474.2	8.28	7.45	6.95	1444.2	1474.2	20.06	22.75	22.07	1444.2	1474.2	1.37	0.78	0.65
1484.6	1514.6	8.32	7.31	6.79	1484.6	1514.6	19.39	20.26	21.85	1484.6	1514.6	1.59	0.92	0.67
1545.1	1575.1	8.26	6.97	6.67	1545.1	1575.1	20.08	19.19	24.15	1545.1	1575.1	1.65	1.13	0.52
1585.5	1615.5	8.40	6.95	6.71	1585.5	1615.5	19.85	20.27	25.41	1585.5	1615.5	1.84	1.26	0.46
1646.1	1676.1	8.02	6.97	6.80	1646.1	1676.1	17.47	22.63	29.70	1646.1	1676.1	2.06	1.16	0.40
1686.5	1716.5	8.32	7.10	6.90	1686.5	1716.5	17.34	23.10	29.33	1686.5	1716.5	2.04	1.18	0.42
1747.1	1777.1	8.96	7.38	7.14	1747.1	1777.1	17.46	23.83	29.73	1747.1	1777.1	1.81	1.10	0.42
1787.5	1817.5	9.58	7.69	7.34	1787.5	1817.5	18.25	25.00	29.08	1787.5	1817.5	1.58	1.17	0.42
1848.1	1878.1	11.30	8.11	7.57	1848.1	1878.1	22.78	24.82	32.04	1848.1	1878.1	0.51	1.15	0.42
1888.5	1918.5	13.05	8.56	7.66	1888.5	1918.5	17.49	24.54	30.89	1888.5	1918.5	-0.67	1.11	0.48
1949.1	1979.1	14.44	9.21	7.83	1949.1	1979.1	14.29	22.79	30.60	1949.1	1979.1	-1.47	0.95	0.56
1989.5	2019.5	15.99	9.75	8.05	1989.5	2019.5	12.17	22.27	26.65	1989.5	2019.5	-2.52	0.75	0.49
2050.1	2080.1	16.87	10.23	8.20	2050.1	2080.1	11.23	23.47	24.46	2050.1	2080.1	-3.19	0.58	0.58

REV. X2

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Frequency Mixer

TUF-5H+

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=750.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=20.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1500.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+17			+17			+17
710.0	40.1	6.63	10.0	30.1	6.71	1000.0	500.1	8.56
692.1	58.0	6.68	30.2	50.3	6.59	979.8	520.3	8.46
674.1	76.0	6.89	50.4	70.5	6.57	959.6	540.5	8.40
656.2	93.9	6.76	70.6	90.7	6.73	939.4	560.7	8.43
638.2	111.9	6.71	90.8	110.9	6.57	919.2	580.9	8.36
620.3	129.8	6.59	111.0	131.1	6.49	899.0	601.1	8.41
602.3	147.8	6.67	131.2	151.3	6.54	878.8	621.3	8.39
584.4	165.7	6.66	151.4	171.5	6.60	858.6	641.5	8.48
566.4	183.7	6.82	171.6	191.7	6.47	838.4	661.7	8.54
548.5	201.6	6.81	191.8	211.9	6.46	818.2	681.9	8.47
530.5	219.6	6.89	212.0	232.1	6.47	798.0	702.1	8.49
512.6	237.5	6.88	232.2	252.3	6.36	777.8	722.3	8.35
494.6	255.5	6.98	252.4	272.5	6.41	757.6	742.5	8.31
476.7	273.4	6.99	272.7	292.8	6.36	737.3	762.8	8.03
458.7	291.4	7.09	292.9	313.0	6.33	717.1	783.0	8.01
440.8	309.3	7.16	313.1	333.2	6.32	696.9	803.2	8.00
422.8	327.3	7.11	333.3	353.4	6.30	676.7	823.4	7.85
404.9	345.2	7.03	353.5	373.6	6.36	656.5	843.6	7.83
386.9	363.2	7.04	373.7	393.8	6.29	636.3	863.8	7.75
369.0	381.1	7.11	393.9	414.0	6.28	616.1	884.0	7.65
351.0	399.1	7.22	434.3	454.4	6.29	575.7	924.4	7.47
333.1	417.0	7.23	454.5	474.6	6.34	555.5	944.6	7.50
315.1	435.0	7.26	494.9	515.0	6.30	515.1	985.0	7.47
297.2	452.9	7.26	515.1	535.2	6.24	494.9	1005.2	7.50
279.2	470.9	7.35	555.5	575.6	6.34	454.5	1045.6	7.69
261.3	488.8	7.44	575.7	595.8	6.31	434.3	1065.8	7.71
243.3	506.8	7.41	616.1	636.2	6.40	393.9	1106.2	7.78
225.4	524.7	7.45	636.3	656.4	6.52	373.7	1126.4	7.84
207.4	542.7	7.45	676.7	696.8	6.54	333.3	1166.8	7.78
189.5	560.6	7.52	696.9	717.0	6.54	313.1	1187.0	7.84
171.5	578.6	7.48	737.3	757.4	6.73	272.7	1227.4	7.85
153.6	596.5	7.59	757.6	777.7	6.67	252.4	1247.7	7.84
135.6	614.5	7.61	798.0	818.1	6.73	212.0	1288.1	7.77
117.7	632.4	7.74	818.2	838.3	6.76	191.8	1308.3	7.69
99.7	650.4	7.77	858.6	878.7	6.84	151.4	1348.7	7.64
81.8	668.3	7.90	878.8	898.9	6.91	131.2	1368.9	7.57
63.8	686.3	7.90	919.2	939.3	7.15	90.8	1409.3	7.49
45.9	704.2	7.96	939.4	959.5	7.31	70.6	1429.5	7.52
27.9	722.2	7.95	979.8	999.9	7.58	30.2	1469.9	7.44
10.0	740.1	8.13	1000.0	1020.1	7.61	10.0	1490.1	7.50

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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	86.73	84.43	83.51	56.04	57.24	60.21
70.7	71.74	71.49	71.46	38.92	41.03	43.06
131.3	66.20	65.95	66.48	33.81	36.23	38.84
191.9	63.03	63.29	63.71	30.94	33.55	36.23
252.5	60.51	61.81	62.96	29.08	32.14	34.51
313.1	58.86	59.95	60.47	27.96	30.80	32.98
373.7	57.53	58.67	59.19	26.95	29.46	31.62
434.3	56.11	57.94	59.08	25.72	28.36	30.50
474.7	54.46	55.83	56.79	25.13	27.55	29.84
535.2	52.02	52.60	52.59	24.01	26.58	28.66
575.6	51.41	51.79	52.03	23.33	26.03	28.22
636.2	50.12	51.02	50.66	22.64	24.99	27.52
676.6	49.71	51.20	51.54	22.50	24.42	26.69
737.2	48.96	50.89	52.05	22.42	24.09	25.84
777.6	48.42	49.84	50.54	22.37	24.02	25.46
838.2	48.30	49.04	49.61	22.09	23.65	24.47
878.6	48.98	48.80	49.22	21.85	23.24	23.72
939.2	50.28	48.76	48.46	21.15	22.38	22.61
979.6	50.85	49.54	48.49	20.80	21.76	21.87
1040.2	51.22	50.91	49.71	20.46	21.04	21.05
1080.6	51.73	51.78	50.68	20.46	20.81	20.65
1141.2	51.72	51.56	49.34	20.10	20.31	20.03
1181.6	51.47	50.52	47.46	20.03	20.04	19.66
1242.2	50.40	49.82	48.10	19.88	19.57	18.94
1282.6	49.53	49.12	47.50	19.55	19.07	18.02
1343.2	48.77	49.18	48.55	18.74	17.91	16.71
1383.6	48.32	48.95	47.66	17.92	16.99	15.59
1444.2	48.94	49.07	46.92	16.76	15.58	14.25
1484.6	48.67	47.96	45.14	16.07	14.82	13.56
1545.1	49.05	46.41	43.48	14.82	13.67	12.89
1585.5	48.19	45.39	43.06	14.11	13.16	12.42
1646.1	46.38	44.11	42.01	13.29	12.54	11.95
1686.5	45.17	43.65	41.69	12.64	12.21	11.64
1747.1	45.01	44.47	42.92	11.82	11.66	11.22
1787.5	44.74	44.33	43.44	11.26	11.20	11.02
1848.1	45.91	45.31	44.83	10.67	10.74	10.69
1888.5	46.80	45.34	45.08	10.29	10.42	10.51
1949.1	46.83	45.15	44.28	9.93	10.09	10.14
1989.5	46.79	44.99	43.67	9.73	9.90	10.04
2050.1	45.92	43.60	41.88	9.38	9.64	9.75

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+14	+17	+20
10.1	40.1	59.27	62.65	60.61
70.7	100.7	47.23	46.82	46.63
131.3	161.3	42.09	41.71	41.28
191.9	221.9	38.95	38.49	38.06
252.5	282.5	37.09	36.46	35.93
313.1	343.1	35.54	34.71	34.21
373.7	403.7	33.61	32.81	32.29
434.3	464.3	32.24	31.44	31.14
474.7	504.7	31.55	30.64	30.13
535.2	565.2	30.82	29.88	29.37
575.6	605.6	30.34	29.46	28.98
636.2	666.2	29.68	28.91	28.35
676.6	706.6	28.96	28.30	27.75
737.2	767.2	28.01	27.41	26.91
777.6	807.6	27.80	27.30	27.05
838.2	868.2	28.73	28.07	27.94
878.6	908.6	29.88	28.63	28.32
939.2	969.2	32.83	30.88	29.81
979.6	1009.6	34.80	32.83	31.22
1040.2	1070.2	37.14	36.23	34.37
1080.6	1110.6	37.10	36.99	36.43
1141.2	1171.2	35.47	36.08	37.93
1181.6	1211.6	34.21	34.83	37.11
1242.2	1272.2	33.39	33.92	35.22
1282.6	1312.6	32.99	33.22	33.40
1343.2	1373.2	33.54	33.44	32.54
1383.6	1413.6	33.39	33.08	31.97
1444.2	1474.2	33.10	32.28	31.11
1484.6	1514.6	32.62	31.74	30.71
1545.1	1575.1	32.07	31.49	30.84
1585.5	1615.5	31.98	31.54	30.88
1646.1	1676.1	32.35	32.15	31.89
1686.5	1716.5	32.53	32.48	32.29
1747.1	1777.1	32.49	33.19	33.06
1787.5	1817.5	32.34	33.31	33.37
1848.1	1878.1	31.47	33.17	33.47
1888.5	1918.5	30.85	32.81	33.34
1949.1	1979.1	30.34	32.29	33.02
1989.5	2019.5	30.15	32.26	32.99
2050.1	2080.1	30.03	32.29	33.05

Frequency Mixer

TUF-5H+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=1500.1MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+14	+17	+20		+14	+17	+20		+14	+17	+20
10.1	40.1	2.03	1.85	1.77	10.1	1.05	1.45	2.04	10.0	2.35	1.80	1.49
70.7	100.7	1.48	1.27	1.14	70.7	1.02	1.50	2.19	30.2	2.03	1.52	1.22
131.3	161.3	1.49	1.24	1.09	131.3	1.03	1.51	2.23	50.4	1.82	1.38	1.13
191.9	221.9	1.53	1.26	1.14	191.9	1.03	1.46	2.10	70.6	1.80	1.35	1.09
252.5	282.5	1.56	1.31	1.21	252.5	1.03	1.48	2.16	90.8	1.86	1.40	1.13
313.1	343.1	1.60	1.36	1.28	313.1	1.05	1.48	2.14	111.0	1.98	1.48	1.18
373.7	403.7	1.64	1.43	1.36	373.7	1.09	1.49	2.17	131.2	2.02	1.52	1.22
434.3	464.3	1.70	1.51	1.43	434.3	1.13	1.55	2.19	151.4	1.93	1.45	1.16
474.7	504.7	1.74	1.57	1.49	474.7	1.18	1.55	2.16	171.6	1.87	1.40	1.11
535.2	565.2	1.90	1.71	1.62	535.2	1.23	1.61	2.21	191.8	1.96	1.47	1.17
575.6	605.6	2.08	1.86	1.75	575.6	1.26	1.61	2.17	212.0	2.03	1.52	1.21
636.2	666.2	2.40	2.20	2.06	636.2	1.29	1.67	2.23	232.2	1.98	1.48	1.17
676.6	706.6	2.66	2.45	2.31	676.6	1.33	1.68	2.22	252.4	1.96	1.46	1.17
737.2	767.2	3.12	2.84	2.68	737.2	1.39	1.73	2.25	272.7	2.00	1.49	1.19
777.6	807.6	3.43	3.07	2.86	777.6	1.43	1.73	2.22	292.9	2.02	1.51	1.20
838.2	868.2	3.90	3.34	3.03	838.2	1.50	1.79	2.24	313.1	2.03	1.52	1.20
878.6	908.6	4.16	3.50	3.17	878.6	1.53	1.79	2.21	333.3	2.09	1.56	1.25
939.2	969.2	4.32	3.80	3.41	939.2	1.59	1.90	2.31	353.5	2.07	1.54	1.23
979.6	1009.6	4.28	3.91	3.54	979.6	1.59	1.92	2.34	373.7	2.04	1.51	1.20
1040.2	1070.2	4.17	3.92	3.64	1040.2	1.64	1.98	2.41	393.9	2.10	1.56	1.25
1080.6	1110.6	4.09	3.88	3.63	1080.6	1.67	1.97	2.39	434.3	2.15	1.60	1.26
1141.2	1171.2	3.88	3.72	3.50	1141.2	1.72	2.01	2.42	454.5	2.16	1.60	1.27
1181.6	1211.6	3.74	3.58	3.40	1181.6	1.75	2.02	2.41	494.9	2.26	1.68	1.33
1242.2	1272.2	3.60	3.43	3.24	1242.2	1.80	2.04	2.42	515.1	2.24	1.65	1.32
1282.6	1312.6	3.54	3.34	3.13	1282.6	1.83	2.04	2.39	555.5	2.33	1.72	1.37
1343.2	1373.2	3.48	3.19	2.95	1343.2	1.88	2.06	2.39	575.7	2.34	1.73	1.37
1383.6	1413.6	3.46	3.09	2.82	1383.6	1.91	2.03	2.33	616.1	2.39	1.77	1.42
1444.2	1474.2	3.37	2.86	2.55	1444.2	1.95	2.03	2.30	636.3	2.35	1.73	1.38
1484.6	1514.6	3.27	2.67	2.37	1484.6	1.96	2.00	2.26	676.7	2.49	1.85	1.47
1545.1	1575.1	3.05	2.39	2.20	1545.1	2.02	2.01	2.32	696.9	2.53	1.87	1.49
1585.5	1615.5	2.97	2.32	2.14	1585.5	2.07	2.08	2.35	737.3	2.42	1.80	1.45
1646.1	1676.1	2.75	2.28	2.12	1646.1	2.29	2.23	2.47	757.6	2.50	1.86	1.48
1686.5	1716.5	2.85	2.36	2.18	1686.5	2.43	2.34	2.51	798.0	2.60	1.93	1.56
1747.1	1777.1	3.06	2.52	2.34	1747.1	2.82	2.53	2.65	818.2	2.56	1.93	1.57
1787.5	1817.5	3.22	2.63	2.44	1787.5	3.05	2.65	2.69	858.6	2.52	1.89	1.53
1848.1	1878.1	3.55	2.74	2.51	1848.1	3.43	2.87	2.86	878.8	2.63	1.97	1.61
1888.5	1918.5	3.84	2.78	2.52	1888.5	3.64	3.01	2.90	919.2	2.60	1.98	1.66
1949.1	1979.1	3.94	2.81	2.50	1949.1	3.83	3.26	3.08	939.4	2.50	1.92	1.63
1989.5	2019.5	4.09	2.88	2.51	1989.5	3.92	3.38	3.12	979.8	2.59	1.99	1.67
2050.1	2080.1	4.19	2.96	2.52	2050.1	4.13	3.67	3.34	1000.0	2.66	2.06	1.76

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Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+2	31	16	37	11	45	34	50	41	56
1	-	20	+0	35	32	34	23	63	42	57	45	51
2	83	71	60	67	53	63	50	76	48	60	52	66
3	>100	84	56	72	50	74	62	77	66	76	65	84
4	>100	>91	89	>91	81	85	81	>91	83	88	81	87
5	>100	>91	>91	>91	>91	>91	78	>91	>91	>91	89	>91
6	>100	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91
7	>100	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91
8	>100	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91
9	>100	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91
10	>100	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions:

RF IN: 750.1 MHz; -1.00 dBm.
LO IN: 780.01 MHz; +17.00 dBm
IF OUT: 29.91 MHz; -8.91 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	9	41	26	51	26	53	41	66	56	76
1	-	20	+0	36	27	38	33	59	45	69	53	59
2	72	61	39	63	36	62	50	61	48	61	52	74
3	>100	60	38	51	31	53	43	59	41	67	57	74
4	>100	77	65	71	46	65	44	66	59	74	51	87
5	>100	72	63	66	67	67	54	65	64	63	54	75
6	>100	82	74	80	91	78	60	72	63	78	69	72
7	>100	95	81	85	67	77	64	79	58	75	74	82
8	>100	>102	92	88	77	89	85	85	65	82	63	80
9	>100	98	>102	>102	87	94	84	95	73	78	67	78
10	>100	>102	>102	>102	100	>102	85	97	95	83	68	78
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions:

RF IN: 750.1 MHz; 9.00 dBm.
LO IN: 780.01 MHz; +17.00 dBm
IF OUT: 29.91 MHz; 1.59 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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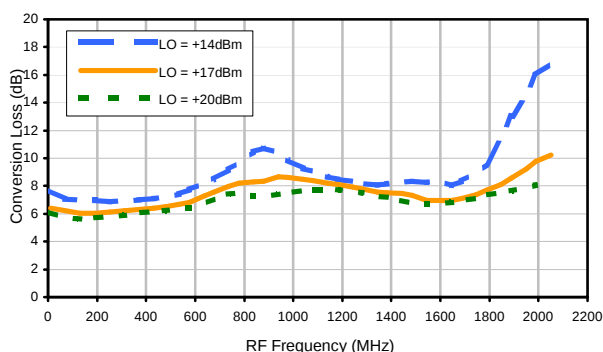


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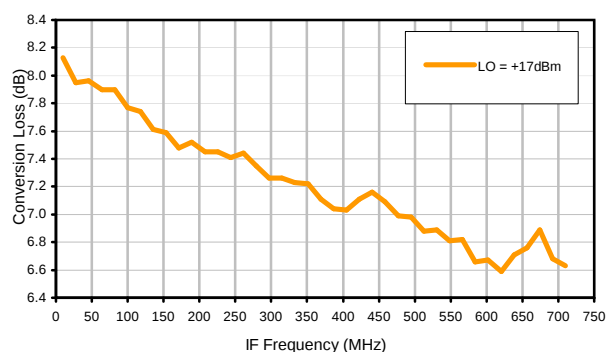


Typical Performance Curves

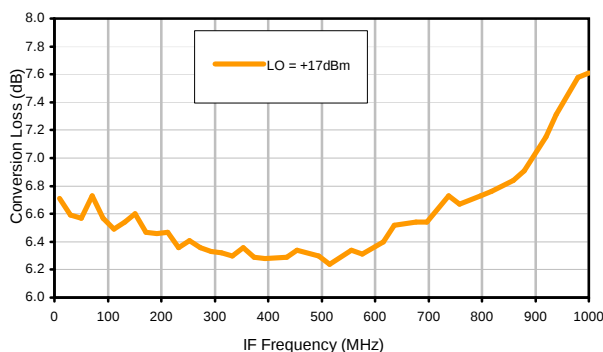
Conversion Loss @ IF=30MHz



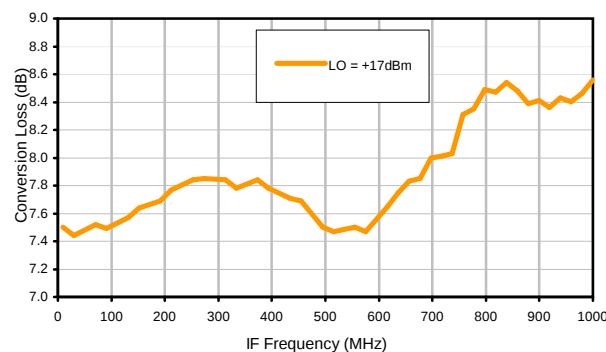
Conversion Loss vs. IF @ RF=750.1MHz



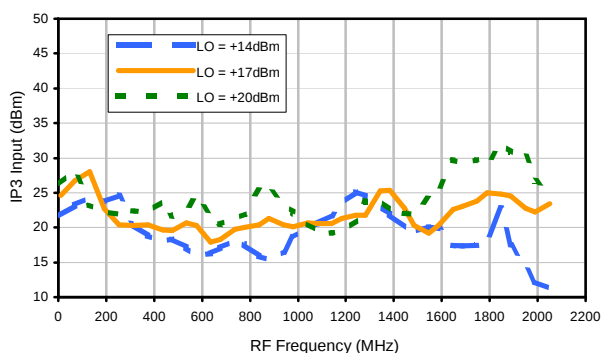
Conversion Loss vs. IF @ RF=20.1MHz



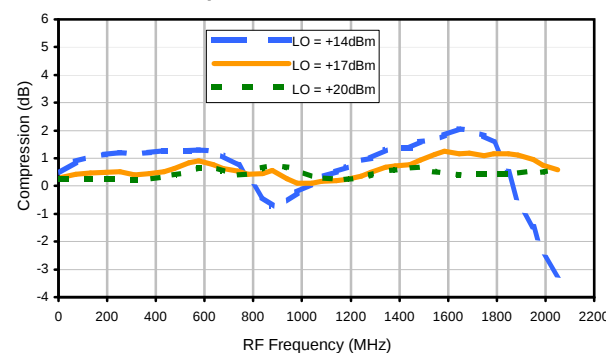
Conversion Loss vs. IF @ RF=1500.1MHz



IP3 Input

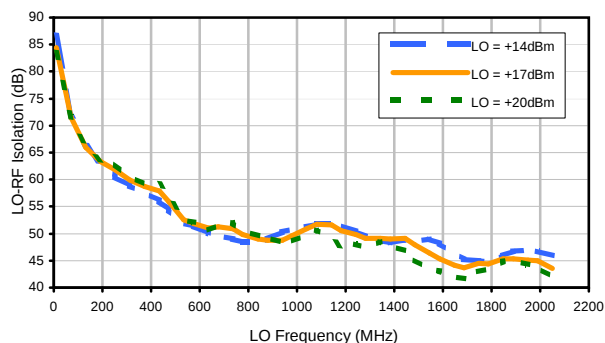


Compression @ RF IN=+14dBm

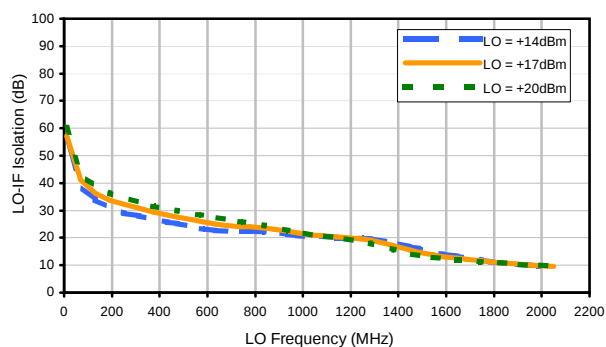


Typical Performance Curves

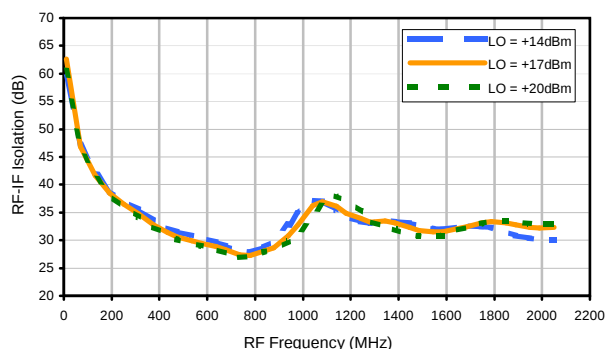
LO-RF Isolation



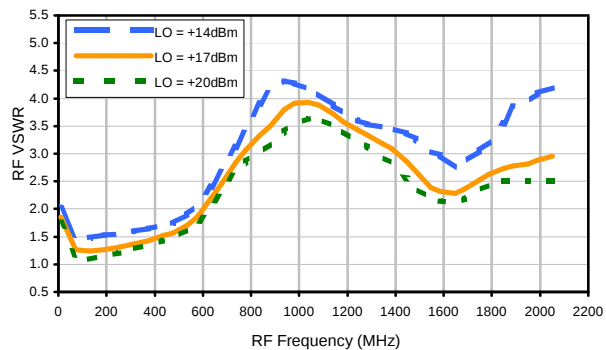
LO-IF Isolation



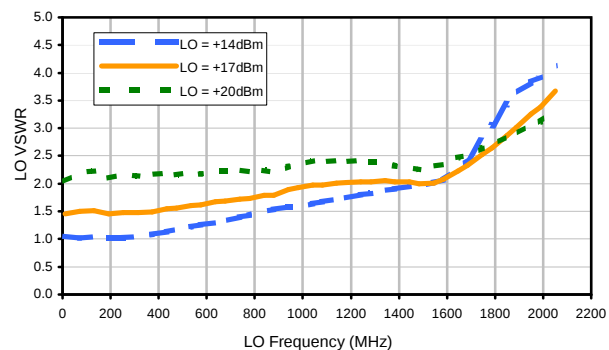
RF-IF Isolation



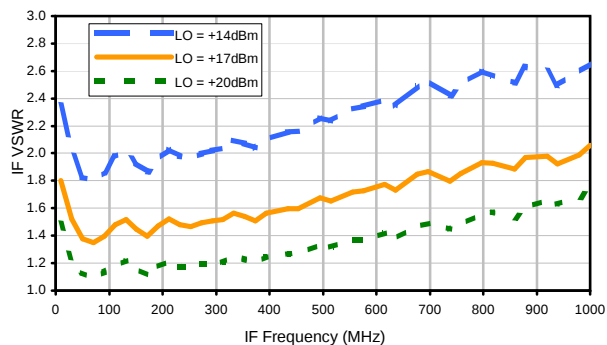
RF VSWR



LO VSWR



IF VSWR



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Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+2	31	16	37	11	45	34	50	41	56
1	-	20	+0	35	32	34	23	63	42	57	45	51
2	83	71	60	67	53	63	50	76	48	60	52	66
3	>100	84	56	72	50	74	62	77	66	76	65	84
4	>100	>91	89	>91	81	85	81	>91	83	88	81	87
5	>100	>91	>91	>91	>91	>91	78	>91	>91	>91	89	>91
6	>100	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91
7	>100	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91
8	>100	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91
9	>100	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91
10	>100	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 750.1 MHz; -1.00 dBm.

LO IN: 780.01 MHz; +17.00 dBm

IF OUT: 29.91 MHz; -8.91 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	9	41	26	51	26	53	41	66	56	76
1	-	20	+0	36	27	38	33	59	45	69	53	59
2	72	61	39	63	36	62	50	61	48	61	52	74
3	>100	60	38	51	31	53	43	59	41	67	57	74
4	>100	77	65	71	46	65	44	66	59	74	51	87
5	>100	72	63	66	67	67	54	65	64	63	54	75
6	>100	82	74	80	91	78	60	72	63	78	69	72
7	>100	95	81	85	67	77	64	79	58	75	74	82
8	>100	>102	92	88	77	89	85	85	65	82	63	80
9	>100	98	>102	>102	87	94	84	95	73	78	67	78
10	>100	>102	>102	>102	100	>102	85	97	95	83	68	78
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 750.1 MHz; 9.00 dBm.

LO IN: 780.01 MHz; +17.00 dBm

IF OUT: 29.91 MHz; 1.59 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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B02

B13

Outline Dimensions



CASE#	A	B	C	D	E	F	G	H	J	K	L	WT, GRAM
B02	.480 (12.19)	.500 (12.70)	.240 (6.10)	.255 (6.48)	.210 (5.33)	.230 (5.84)	.16 (4.06)	.100 (2.54)	.14 (3.56)	.20 (5.08)	.020 (.51)	1.9
B13			.390 (9.91)	.405 (10.29)								2.3

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .03$; 3 Pl. $\pm .015$

Notes:

- Header material: C.R.S.
Pin material: #52 alloy.
Cover material: Cupro-Nickel.
- Pin finish: Electro Tin-Silver.
- Tolerance on pin diameter $\pm .005$ inch.
- Glass meniscus 0.015 inch max.
- Blue bead indicates Pin 1. Pin numbers do not appear on unit, for reference only.



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All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-55° to 100°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Moisture Resistance	10 cycles, 24 hours per cycle	MIL-STD-202, Method 106, Condition A, except 50°C and end point electrical test done within 12 hours
Solderability	10X Magnification	J-STD-002, 95% Coverage
Resistance to Solder Heat	260°C for 10 seconds	MIL-STD-202, Method 210, Condition B
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215
Terminal Strength	4 1/2 Pound Pull	MIL-STD-202, Method 211, Condition A



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Specification	Test/Inspection Condition	Reference/Spec
Barometric Pressure	100,000 Feet	MIL-STD-202, Method 105, Condition D