

Non-Catalog Model

Frequency Mixer

Level 7 (LO Power +7 dBm)

TUF-5X

Important Note

This is a non-catalog model and can be manufactured on specific request.
Pricing and delivery information can be supplied upon request.



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CASE STYLE : B02

ELECTRICAL SPECIFICATIONS 50Ω @ +25°C					
Parameter		Min.	Typ.	Max.	Units
Frequency	LO (fL to fU)	1		1500	MHz
	RF (fL to fU)	1		1500	MHz
	IF	1		1000	MHz
Conversion Loss	mid band		5.9	7.0	dB
	Total Range			9.0	dB
LO-RF Isolation	Low Range	40	60		dB
	Mid Range	20	40		dB
	Upper Range	17	28		dB
LO-IF Isolation	Low Range	45	60		dB
	Mid Range	25	45		dB
	Upper Range	20	38		dB
1 dB Comp. Input Power			+1		dBm

Notes: Low Range = [fL to 10fL]
mid band = [2fL to fU/2]

Mid Range = [10fL to fU/2]

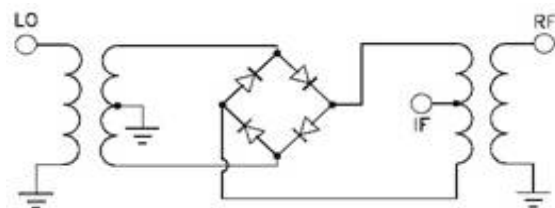
Upper Range = [fU/2 to fU]

Non-hermetic

MAXIMUM RATINGS	
Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
RF Power	50mW
IF Current	40mA

PIN CONNECTIONS	
LO	4
RF	2
IF	1
GROUND	3

Electrical Schematics



Frequency Mixer

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Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)		
		@LO (dBm)		
		+4	+7	+10
10.1	40.1	6.01	5.72	5.31
70.1	100.1	6.36	6.07	5.90
130.1	160.1	6.55	6.22	6.05
190.1	220.1	6.59	6.28	6.11
250.1	280.1	6.78	6.44	6.23
310.1	340.1	6.73	6.39	6.19
370.1	400.1	6.70	6.36	6.18
430.1	460.1	6.93	6.54	6.31
470.1	500.1	6.86	6.51	6.29
530.1	560.1	7.10	6.69	6.44
570.1	600.1	7.03	6.66	6.43
630.1	660.1	7.15	6.76	6.51
670.1	700.1	7.11	6.77	6.54
730.1	760.1	7.04	6.67	6.45
770.1	800.1	7.00	6.62	6.43
830.1	860.1	7.00	6.57	6.35
870.1	900.1	7.09	6.63	6.38
930.1	960.1	7.11	6.62	6.36
970.1	1000.1	7.24	6.76	6.45
1030.1	1060.1	7.25	6.84	6.54
1070.1	1100.1	7.24	6.87	6.59
1130.1	1160.1	7.30	6.93	6.68
1170.1	1200.1	7.24	6.88	6.63
1230.1	1260.1	7.31	6.91	6.66
1270.1	1300.1	7.27	6.88	6.67
1330.1	1360.1	7.30	6.93	6.75
1370.1	1400.1	7.35	7.00	6.84
1430.1	1460.1	7.44	7.11	6.95
1470.1	1500.1	7.61	7.28	7.14
1530.1	1560.1	7.77	7.41	7.27
1570.1	1600.1	8.03	7.65	7.52
1630.1	1660.1	8.25	7.86	7.73
1670.1	1700.1	8.57	8.15	8.01
1730.1	1760.1	8.83	8.41	8.29
1770.1	1800.1	9.18	8.70	8.58
1830.1	1860.1	9.46	8.99	8.87
1870.1	1900.1	9.81	9.29	9.13
1930.1	1960.1	10.13	9.58	9.38
1970.1	2000.1	10.50	9.85	9.59
2030.1	2060.1	10.84	10.13	9.80

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+4	+7	+10
10.1	40.1	15.19	17.45	18.29
70.1	100.1	11.30	13.15	17.16
130.1	160.1	12.87	17.68	20.98
190.1	220.1	17.93	14.78	14.99
250.1	280.1	15.33	14.15	15.18
310.1	340.1	13.02	13.44	15.39
370.1	400.1	12.12	12.99	15.22
430.1	460.1	10.25	11.71	13.57
470.1	500.1	9.55	11.14	13.59
530.1	560.1	8.03	9.59	11.50
570.1	600.1	7.80	9.35	10.72
630.1	660.1	7.54	9.36	10.85
670.1	700.1	7.17	8.58	10.01
730.1	760.1	7.73	9.98	12.16
770.1	800.1	7.55	9.50	11.93
830.1	860.1	9.11	10.08	11.69
870.1	900.1	9.32	10.61	11.77
930.1	960.1	10.47	12.53	13.62
970.1	1000.1	8.97	11.45	12.97
1030.1	1060.1	7.31	8.71	10.34
1070.1	1100.1	6.64	7.54	8.59
1130.1	1160.1	6.44	7.06	7.86
1170.1	1200.1	6.96	7.86	8.74
1230.1	1260.1	8.68	10.81	12.17
1270.1	1300.1	8.93	11.12	13.46
1330.1	1360.1	9.79	12.92	15.59
1370.1	1400.1	9.75	13.09	15.40
1430.1	1460.1	10.56	13.96	15.31
1470.1	1500.1	9.81	13.54	15.10
1530.1	1560.1	9.76	13.68	15.03
1570.1	1600.1	9.08	13.52	15.71
1630.1	1660.1	9.70	14.13	17.24
1670.1	1700.1	9.53	13.88	17.80
1730.1	1760.1	11.31	15.03	18.59
1770.1	1800.1	12.22	14.84	18.25
1830.1	1860.1	10.49	15.09	18.20
1870.1	1900.1	8.50	13.63	18.28
1930.1	1960.1	6.65	11.55	17.59
1970.1	2000.1	5.60	9.82	16.58
2030.1	2060.1	5.42	9.33	16.40

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+1dBm (dB)		
		@LO (dBm)		
		+4	+7	+10
10.1	40.1	1.01	1.17	0.94
70.1	100.1	1.23	0.90	0.65
130.1	160.1	1.25	0.92	0.70
190.1	220.1	1.51	1.16	0.91
250.1	280.1	1.37	1.07	0.85
310.1	340.1	1.48	1.19	0.96
370.1	400.1	1.74	1.43	1.19
430.1	460.1	1.59	1.33	1.14
470.1	500.1	1.74	1.45	1.23
530.1	560.1	1.62	1.36	1.19
570.1	600.1	1.67	1.42	1.22
630.1	660.1	1.63	1.37	1.21
670.1	700.1	1.62	1.32	1.14
730.1	760.1	1.65	1.38	1.20
770.1	800.1	1.64	1.38	1.19
830.1	860.1	1.58	1.35	1.16
870.1	900.1	1.52	1.32	1.14
930.1	960.1	1.47	1.28	1.12
970.1	1000.1	1.34	1.13	1.03
1030.1	1060.1	1.29	1.00	0.88
1070.1	1100.1	1.30	0.96	0.80
1130.1	1160.1	1.30	0.93	0.74
1170.1	1200.1	1.42	1.00	0.77
1230.1	1260.1	1.36	0.90	0.64
1270.1	1300.1	1.49	0.92	0.62
1330.1	1360.1	1.35	0.71	0.43
1370.1	1400.1	1.41	0.69	0.40
1430.1	1460.1	1.19	0.54	0.30
1470.1	1500.1	1.27	0.55	0.30
1530.1	1560.1	1.17	0.48	0.25
1570.1	1600.1	1.25	0.51	0.26
1630.1	1660.1	1.13	0.47	0.23
1670.1	1700.1	1.18	0.51	0.24
1730.1	1760.1	1.09	0.50	0.24
1770.1	1800.1	1.13	0.54	0.26
1830.1	1860.1	1.16	0.62	0.31
1870.1	1900.1	1.25	0.73	0.37
1930.1	1960.1	1.30	0.80	0.47
1970.1	2000.1	1.39	0.92	0.55
2030.1	2060.1	1.42	0.99	0.65

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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)=10.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1500.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+7			+7			+7
740.0	10.1	6.76	10.0	20.1	6.33	1490.0	10.1	10.39
720.0	30.1	6.79	50.0	60.1	5.83	1450.0	50.1	10.04
700.0	50.1	6.77	90.0	100.1	5.36	1410.0	90.1	9.62
680.0	70.1	6.77	130.0	140.1	5.71	1370.0	130.1	9.25
660.0	90.1	6.71	170.0	180.1	5.59	1330.0	170.1	9.08
640.0	110.1	6.70	210.0	220.1	5.45	1290.0	210.1	8.76
620.0	130.1	6.72	250.0	260.1	5.37	1250.0	250.1	8.50
600.0	150.1	6.65	290.0	300.1	5.66	1210.0	290.1	8.35
580.0	170.1	6.67	330.0	340.1	5.89	1170.0	330.1	8.12
560.0	190.1	6.55	370.0	380.1	5.48	1130.0	370.1	8.01
540.0	210.1	6.58	410.0	420.1	5.61	1090.0	410.1	7.84
520.0	230.1	6.56	450.0	460.1	5.67	1050.0	450.1	7.69
500.0	250.1	6.64	490.0	500.1	5.78	1010.0	490.1	7.59
480.0	270.1	6.61	530.0	540.1	5.51	970.0	530.1	7.48
460.0	290.1	6.52	570.0	580.1	5.66	930.0	570.1	7.41
440.0	310.1	6.54	610.0	620.1	5.69	890.0	610.1	7.25
420.0	330.1	6.48	650.0	660.1	5.90	850.0	650.1	7.16
400.0	350.1	6.44	690.0	700.1	6.24	810.0	690.1	7.09
380.0	370.1	6.53	730.0	740.1	5.87	770.0	730.1	7.03
360.0	390.1	6.47	770.0	780.1	6.08	730.0	770.1	6.95
340.0	410.1	6.58	810.0	820.1	5.81	690.0	810.1	7.04
320.0	430.1	6.53	850.0	860.1	6.20	650.0	850.1	7.05
300.0	450.1	6.46	890.0	900.1	6.28	610.0	890.1	7.10
280.0	470.1	6.50	930.0	940.1	6.61	570.0	930.1	7.15
260.0	490.1	6.51	970.0	980.1	6.90	530.0	970.1	7.15
240.0	510.1	6.40	1010.0	1020.1	6.76	490.0	1010.1	7.07
220.0	530.1	6.56	1050.0	1060.1	7.13	450.0	1050.1	7.16
200.0	550.1	6.53	1090.0	1100.1	7.14	410.0	1090.1	7.10
180.0	570.1	6.48	1130.0	1140.1	7.69	370.0	1130.1	6.96
160.0	590.1	6.48	1170.0	1180.1	7.90	330.0	1170.1	7.09
140.0	610.1	6.52	1210.0	1220.1	8.18	290.0	1210.1	7.16
130.0	620.1	6.62	1250.0	1260.1	8.24	250.0	1250.1	7.16
110.0	640.1	6.58	1290.0	1300.1	8.25	210.0	1290.1	7.21
100.0	650.1	6.65	1330.0	1340.1	8.71	190.0	1310.1	7.21
80.0	670.1	6.72	1370.0	1380.1	8.92	150.0	1350.1	7.23
70.0	680.1	6.58	1430.0	1440.1	9.09	130.0	1370.1	7.23
50.0	700.1	6.61	1470.0	1480.1	9.53	90.0	1410.1	7.26
40.0	710.1	6.59	1530.0	1540.1	10.07	70.0	1430.1	7.25
20.0	730.1	6.58	1570.0	1580.1	10.35	30.0	1470.1	7.31
10.0	740.1	6.98	1630.0	1640.1	10.47	10.0	1490.1	7.67

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+4	+7	+10	+4	+7	+10
40.1	54.68	51.61	49.88	51.07	50.36	49.85
100.1	50.10	46.12	44.01	44.13	43.59	43.10
160.1	47.93	43.74	41.37	40.68	40.02	39.47
220.1	45.81	42.17	39.72	38.47	37.77	37.21
280.1	42.38	40.14	38.01	36.57	35.83	35.29
340.1	38.69	37.67	36.16	35.04	34.39	33.88
400.1	36.05	35.99	35.10	33.63	33.00	32.52
460.1	33.49	33.90	33.38	32.51	32.01	31.60
500.1	32.26	32.98	32.74	31.65	31.18	30.81
560.1	30.29	31.05	31.16	30.78	30.28	29.91
600.1	29.58	30.29	30.34	30.31	29.89	29.56
660.1	28.09	29.06	29.20	29.56	29.17	28.87
700.1	27.54	28.92	29.24	29.15	28.87	28.60
760.1	26.10	27.90	28.76	28.48	28.29	28.08
800.1	25.81	27.54	28.43	28.18	28.00	27.82
860.1	24.82	26.59	27.87	27.81	27.74	27.57
900.1	24.46	26.05	27.34	27.57	27.55	27.44
960.1	23.98	25.59	27.08	27.36	27.35	27.37
1000.1	23.75	25.15	26.40	27.32	27.38	27.32
1060.1	23.99	25.64	26.84	27.30	27.47	27.50
1100.1	23.85	25.65	26.90	27.40	27.60	27.63
1160.1	23.62	25.83	27.58	27.67	27.92	28.00
1200.1	23.17	25.42	27.35	27.93	28.19	28.33
1260.1	23.01	25.26	27.21	28.44	28.72	28.82
1300.1	22.61	24.71	26.57	28.89	29.15	29.31
1360.1	22.65	24.56	26.15	29.62	29.89	29.96
1400.1	22.48	24.27	25.71	30.14	30.49	30.61
1460.1	22.67	24.22	25.34	31.16	31.71	32.01
1500.1	22.65	24.14	25.15	31.50	32.15	32.64
1560.1	22.88	24.00	24.75	32.98	33.90	34.81
1600.1	22.84	23.88	24.59	33.53	34.53	35.66
1660.1	23.06	23.84	24.31	35.68	37.30	39.25
1700.1	22.91	23.63	23.95	36.73	38.65	40.97
1760.1	23.10	23.60	23.82	40.21	43.93	49.81
1800.1	22.96	23.31	23.58	42.08	46.96	50.57
1860.1	23.01	23.35	23.54	45.91	49.29	44.66
1900.1	22.78	23.19	23.32	42.25	42.84	40.18
1960.1	22.65	23.10	23.31	39.49	39.29	37.31
2000.1	22.32	22.74	23.08	35.86	36.05	35.08
2060.1	21.68	22.22	22.62	33.27	33.50	32.71

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+4	+7	+10
10.1	40.1	47.97	48.17	46.72
70.1	100.1	32.73	32.65	32.61
130.1	160.1	28.34	28.34	28.35
190.1	220.1	25.66	25.72	25.77
250.1	280.1	24.51	24.63	24.74
310.1	340.1	23.79	24.00	24.15
370.1	400.1	23.38	23.65	23.85
430.1	460.1	23.58	23.82	23.99
470.1	500.1	23.40	23.67	23.80
530.1	560.1	23.21	23.54	24.05
570.1	600.1	22.69	23.02	23.34
630.1	660.1	20.92	21.12	21.06
670.1	700.1	20.05	20.07	20.10
730.1	760.1	18.59	18.60	18.74
770.1	800.1	17.76	17.88	17.89
830.1	860.1	17.33	17.30	17.30
870.1	900.1	17.12	17.11	17.12
930.1	960.1	16.99	16.99	16.94
970.1	1000.1	17.09	17.06	17.06
1030.1	1060.1	17.18	17.13	17.09
1070.1	1100.1	17.32	17.38	17.31
1130.1	1160.1	17.59	17.76	17.73
1170.1	1200.1	17.60	17.71	17.71
1230.1	1260.1	17.28	17.24	17.16
1270.1	1300.1	16.77	16.66	16.48
1330.1	1360.1	15.50	15.18	14.92
1370.1	1400.1	14.65	14.22	13.94
1430.1	1460.1	13.43	12.92	12.59
1470.1	1500.1	12.76	12.11	11.68
1530.1	1560.1	11.64	10.96	10.56
1570.1	1600.1	11.09	10.33	9.87
1630.1	1660.1	10.10	9.40	8.97
1670.1	1700.1	9.71	8.92	8.51
1730.1	1760.1	9.02	8.31	7.96
1770.1	1800.1	8.75	7.99	7.61
1830.1	1860.1	8.36	7.67	7.34
1870.1	1900.1	8.28	7.59	7.25
1930.1	1960.1	7.96	7.42	7.13
1970.1	2000.1	7.91	7.46	7.20
2030.1	2060.1	7.50	7.19	6.98

Frequency Mixer

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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=1500.1MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+4	+7	+10		+4	+7	+10		+4	+7	+10
10.1	40.1	1.43	1.09	1.06	40.1	1.95	2.96	4.36	10.1	1.13	1.11	1.13
70.1	100.1	1.18	1.05	1.03	100.1	1.90	2.78	3.92	30.1	1.06	1.04	1.09
130.1	160.1	1.22	1.09	1.03	160.1	1.87	2.68	3.68	50.1	1.05	1.02	1.08
190.1	220.1	1.31	1.19	1.12	220.1	1.81	2.54	3.45	70.1	1.04	1.03	1.08
250.1	280.1	1.36	1.24	1.17	280.1	1.92	2.71	3.67	90.1	1.07	1.01	1.07
310.1	340.1	1.41	1.28	1.20	340.1	2.03	2.87	3.90	110.1	1.05	1.03	1.09
370.1	400.1	1.51	1.38	1.30	400.1	2.01	2.80	3.74	130.1	1.05	1.03	1.09
430.1	460.1	1.58	1.45	1.36	460.1	2.04	2.80	3.71	150.1	1.06	1.03	1.08
470.1	500.1	1.62	1.49	1.41	500.1	2.15	2.98	4.02	190.1	1.06	1.04	1.08
530.1	560.1	1.67	1.54	1.46	560.1	2.21	3.02	4.03	210.1	1.05	1.06	1.12
570.1	600.1	1.72	1.59	1.51	600.1	2.30	3.14	4.18	250.1	1.07	1.08	1.12
630.1	660.1	1.75	1.64	1.58	660.1	2.35	3.18	4.20	270.1	1.06	1.09	1.15
670.1	700.1	1.77	1.68	1.63	700.1	2.45	3.30	4.35	310.1	1.09	1.11	1.16
730.1	760.1	1.75	1.68	1.67	760.1	2.51	3.31	4.34	330.1	1.09	1.10	1.15
770.1	800.1	1.74	1.66	1.66	800.1	2.60	3.43	4.47	370.1	1.13	1.16	1.21
830.1	860.1	1.73	1.65	1.66	860.1	2.69	3.51	4.53	390.1	1.15	1.18	1.22
870.1	900.1	1.74	1.63	1.62	900.1	2.78	3.61	4.63	430.1	1.17	1.19	1.23
930.1	960.1	1.75	1.64	1.60	960.1	2.88	3.70	4.72	450.1	1.22	1.25	1.29
970.1	1000.1	1.77	1.66	1.60	1000.1	2.95	3.76	4.77	490.1	1.28	1.31	1.35
1030.1	1060.1	1.77	1.71	1.66	1060.1	3.07	3.86	4.87	510.1	1.27	1.30	1.34
1070.1	1100.1	1.73	1.69	1.66	1100.1	3.10	3.85	4.83	550.1	1.37	1.40	1.44
1130.1	1160.1	1.70	1.68	1.67	1160.1	3.18	3.91	4.88	570.1	1.40	1.42	1.45
1170.1	1200.1	1.61	1.60	1.61	1200.1	3.16	3.83	4.75	610.1	1.45	1.47	1.50
1230.1	1260.1	1.54	1.56	1.62	1260.1	3.20	3.83	4.75	630.1	1.53	1.55	1.57
1270.1	1300.1	1.46	1.51	1.58	1300.1	3.20	3.79	4.66	670.1	1.63	1.65	1.67
1330.1	1360.1	1.42	1.52	1.60	1360.1	3.40	3.95	4.80	690.1	1.70	1.72	1.74
1370.1	1400.1	1.35	1.46	1.55	1400.1	3.54	4.00	4.77	730.1	1.83	1.85	1.87
1430.1	1460.1	1.33	1.46	1.57	1460.1	3.83	4.20	4.91	750.1	1.87	1.89	1.90
1470.1	1500.1	1.26	1.40	1.52	1500.1	4.03	4.27	4.89	790.1	2.02	2.03	2.04
1530.1	1560.1	1.24	1.40	1.53	1560.1	4.29	4.42	4.98	810.1	2.09	2.10	2.10
1570.1	1600.1	1.19	1.38	1.51	1600.1	4.51	4.50	4.96	850.1	2.24	2.25	2.25
1630.1	1660.1	1.19	1.38	1.51	1660.1	4.72	4.60	4.99	870.1	2.39	2.41	2.41
1670.1	1700.1	1.17	1.39	1.54	1700.1	4.95	4.68	4.96	910.1	2.53	2.54	2.54
1730.1	1760.1	1.19	1.41	1.55	1760.1	5.13	4.77	4.96	930.1	2.65	2.67	2.67
1770.1	1800.1	1.19	1.44	1.58	1800.1	5.33	4.82	4.92	970.1	2.85	2.88	2.87
1830.1	1860.1	1.21	1.43	1.57	1860.1	5.42	4.87	4.89	990.1	2.86	2.88	2.87
1870.1	1900.1	1.22	1.44	1.58	1900.1	5.61	4.92	4.84	1030.1	3.12	3.14	3.14
1930.1	1960.1	1.21	1.41	1.52	1960.1	5.65	4.92	4.79	1050.1	3.23	3.25	3.25
1970.1	2000.1	1.21	1.40	1.51	2000.1	5.74	4.92	4.72	1090.1	3.35	3.37	3.37
2030.1	2060.1	1.15	1.30	1.39	2060.1	5.72	4.89	4.64	1110.1	3.57	3.60	3.59

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	1	10	20	24	14	30	29	41	38	50
1	-	12	+0	39	17	28	31	40	38	40	48	44
2	78	52	54	45	51	59	52	53	44	56	50	57
3	>90	62	61	>69	59	>69	67	60	>69	66	66	64
4	>90	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69
5	>90	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69
6	>90	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69
7	>90	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69
8	>90	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69
9	>90	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69
10	>90	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions: RF IN: 750.1 MHz; -14.00 dBm.
LO IN: 780.1 MHz; +7.00 dBm
IF OUT: 30 MHz; -20.69 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	10	20	28	38	28	48	50	65	59	63
1	-	11	+0	36	17	33	35	43	47	52	65	64
2	58	52	49	43	46	52	56	51	41	54	54	65
3	>90	40	40	59	39	54	51	45	54	57	57	58
4	>90	71	71	55	59	51	58	65	60	61	53	64
5	>90	72	>79	72	64	65	56	77	63	59	74	69
6	>90	76	78	>79	76	66	76	61	70	73	69	71
7	>90	>79	>79	>79	>79	>79	73	78	67	76	73	74
8	>90	>79	>79	>79	>79	>79	>79	>79	>79	76	>79	>79
9	>90	>79	>79	>79	>79	>79	>79	>79	>79	>79	>79	>79
10	>90	>79	>79	>79	>79	>79	>79	>79	>79	>79	>79	>79
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions: RF IN: 750.1 MHz; -4.00 dBm.
LO IN: 780.1 MHz; +7.00 dBm
IF OUT: 30 MHz; -10.75 dBm

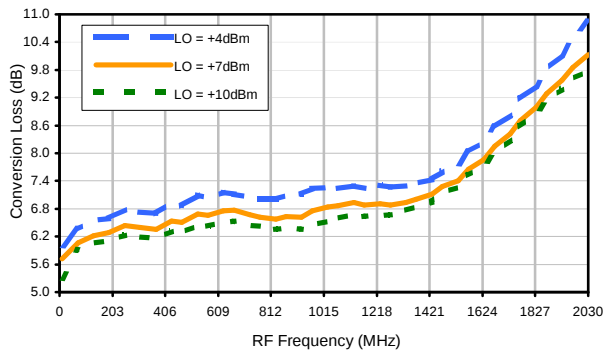
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

Frequency Mixer

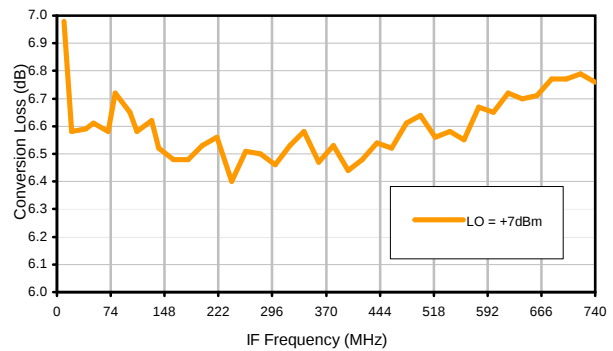
TUF-5X

Typical Performance Curves

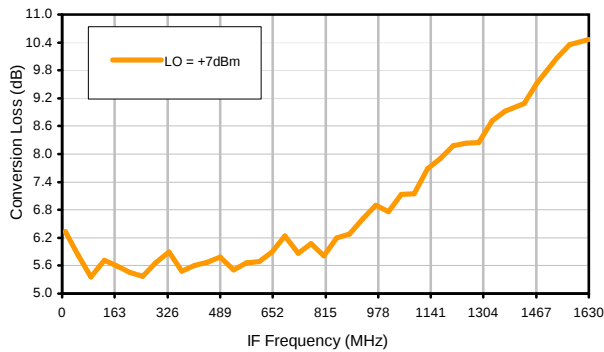
Conversion Loss @ IF=30MHz



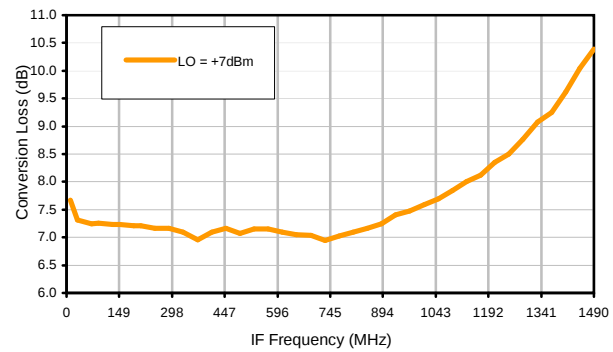
Conversion Loss vs. IF @ RF=750.1MHz



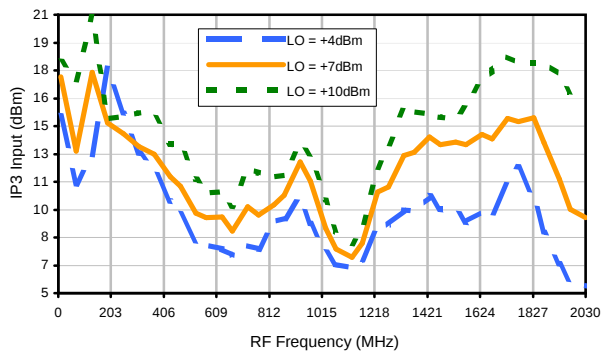
Conversion Loss vs. IF @ RF=10.1MHz



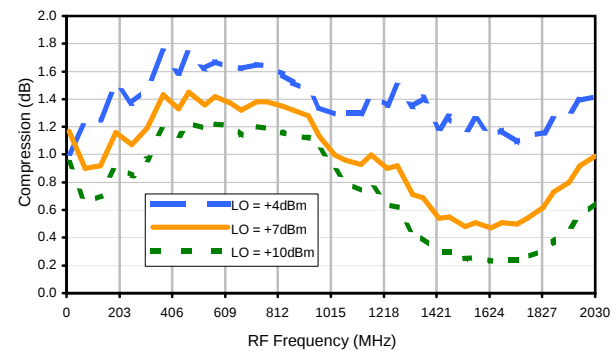
Conversion Loss vs. IF @ RF=1500.1MHz



IP3 Input

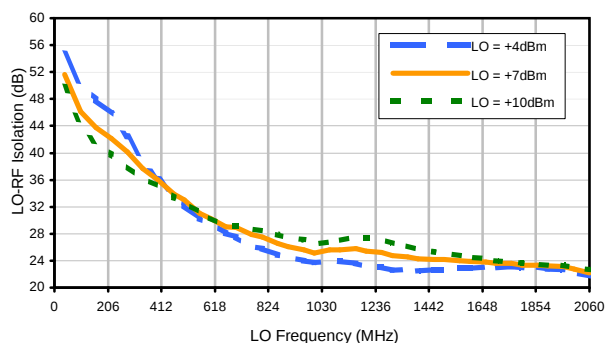


Compression @ RF IN=+1dBm

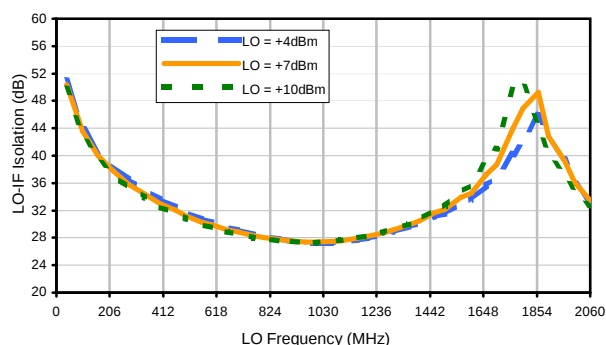


Typical Performance Curves

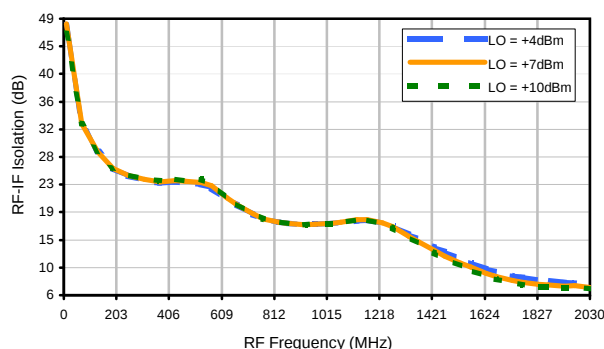
LO-RF Isolation



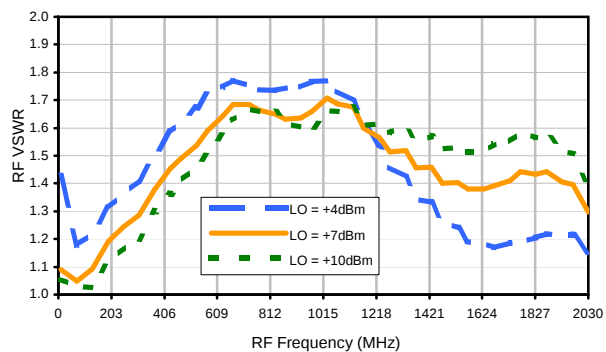
LO-IF Isolation



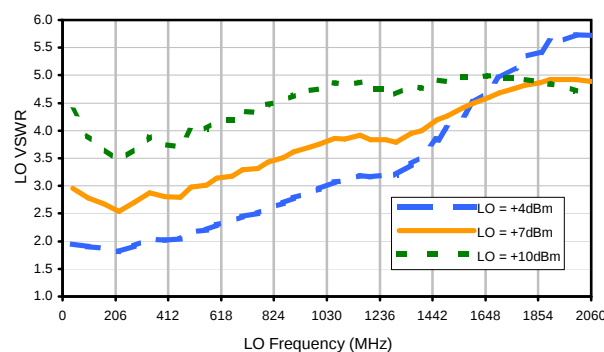
RF-IF Isolation



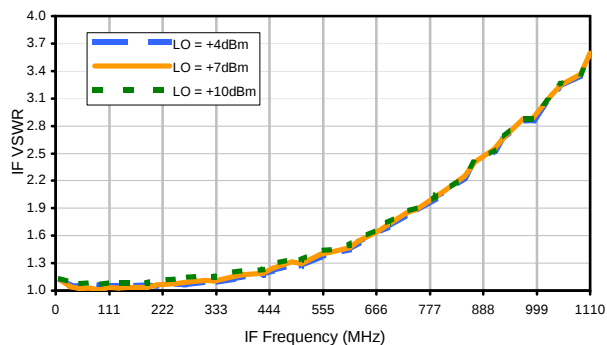
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	1	10	20	24	14	30	29	41	38	50
1	-	12	+0	39	17	28	31	40	38	40	48	44
2	78	52	54	45	51	59	52	53	44	56	50	57
3	>90	62	61	>69	59	>69	67	60	>69	66	66	64
4	>90	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69
5	>90	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69
6	>90	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69
7	>90	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69
8	>90	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69
9	>90	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69
10	>90	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69	>69
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions: RF IN: 750.1 MHz; -14.00 dBm.
LO IN: 780.1 MHz; +7.00 dBm
IF OUT: 30 MHz; -20.69 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	10	20	28	38	28	48	50	65	59	63
1	-	11	+0	36	17	33	35	43	47	52	65	64
2	58	52	49	43	46	52	56	51	41	54	54	65
3	>90	40	40	59	39	54	51	45	54	57	57	58
4	>90	71	71	55	59	51	58	65	60	61	53	64
5	>90	72	>79	72	64	65	56	77	63	59	74	69
6	>90	76	78	>79	76	66	76	61	70	73	69	71
7	>90	>79	>79	>79	>79	>79	73	78	67	76	73	74
8	>90	>79	>79	>79	>79	>79	>79	>79	>79	76	>79	>79
9	>90	>79	>79	>79	>79	>79	>79	>79	>79	>79	>79	>79
10	>90	>79	>79	>79	>79	>79	>79	>79	>79	>79	>79	>79
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

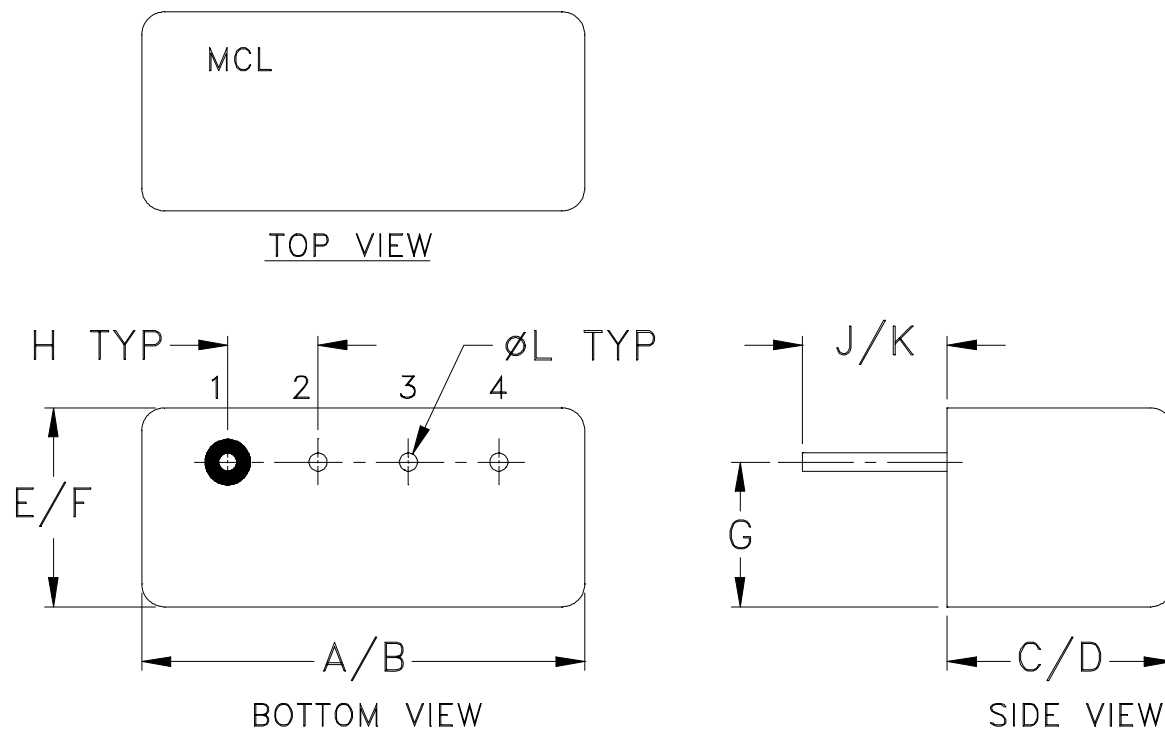
Test conditions: RF IN: 750.1 MHz; -4.00 dBm.
LO IN: 780.1 MHz; +7.00 dBm
IF OUT: 30 MHz; -10.75 dBm

- 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.

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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Mini-Circuits ISO 9001 & ISO 14001 Certified



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



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
Barometric Pressure	100,000 Feet	MIL-STD-202, Method 105, Condition D