

Non-Catalog Model

Frequency Mixer

TUF-2MH+

Level 13 (LO Power +13 dBm)

Important Note

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



Please click "Back", and then click "Contact Us" for Applications support.

CASE STYLE : B02

ELECTRICAL SPECIFICATIONS 50Ω @ +25°C					
Parameter		Min.	Typ.	Max.	Units
Frequency	LO (fL to fU)	50		1000	MHz
	RF (fL to fU)	50		1000	MHz
	IF	0		1000	MHz
Conversion Loss	mid band		6.0	7.5	dB
	Total Range			9.0	dB
LO-RF Isolation	Low Range	40	58		dB
	Mid Range	30	47		dB
	Upper Range	25	37		dB
LO-IF Isolation	Low Range	35	55		dB
	Mid Range	20	47		dB
	Upper Range	18	32		dB
1 dB Comp. Input Power			+9		dBm

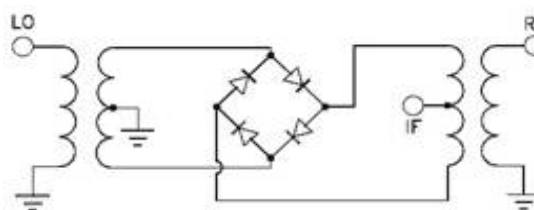
Notes: Low Range = 50 to 100 MHz Mid Range = 100 to 500 MHz Upper Range = 500 to 1000 MHz
mid band = 100 to 500 MHz

Non-hermetic

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

PIN CONNECTIONS	
LO	4
RF	1
IF	2
GROUND	3

Electrical Schematics



Frequency Mixer

TUF-2MH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)		
		@LO (dBm)		
		+10	+13	+16
10.1	40.1	6.12	5.68	5.39
50.4	80.4	6.18	5.77	5.50
90.7	120.7	6.16	5.70	5.44
131.0	161.0	6.06	5.62	5.41
171.3	201.3	6.13	5.65	5.42
211.5	241.5	5.94	5.54	5.36
251.8	281.8	6.06	5.62	5.40
292.1	322.1	5.96	5.55	5.39
332.4	362.4	5.93	5.61	5.43
372.7	402.7	5.96	5.62	5.44
413.0	443.0	5.85	5.55	5.40
453.3	483.3	5.98	5.61	5.45
493.6	523.6	5.99	5.67	5.45
533.9	563.9	6.00	5.74	5.54
574.2	604.2	6.02	5.77	5.61
614.4	644.4	6.10	5.76	5.59
654.7	684.7	6.14	5.83	5.65
695.0	725.0	6.14	5.91	5.74
735.3	765.3	6.25	6.03	5.86
775.6	805.6	6.25	6.07	5.92
815.9	845.9	6.31	6.14	6.01
856.2	886.2	6.38	6.15	6.00
896.5	926.5	6.61	6.27	6.06
916.6	946.6	6.65	6.29	6.09
956.9	986.9	6.79	6.35	6.12
977.1	1007.1	6.92	6.36	6.13
1017.3	1047.3	7.27	6.53	6.23
1037.5	1067.5	7.38	6.54	6.23
1077.8	1107.8	7.78	6.83	6.36
1097.9	1127.9	7.74	6.80	6.39
1138.2	1168.2	8.25	7.14	6.59
1158.4	1188.4	8.43	7.31	6.69
1198.7	1228.7	8.90	7.74	6.96
1218.8	1248.8	9.16	7.94	7.10
1259.1	1289.1	9.52	8.36	7.38
1279.2	1309.2	9.69	8.62	7.62
1319.5	1349.5	10.23	9.11	8.16
1339.7	1369.7	10.51	9.47	8.57
1380.0	1410.0	10.99	10.08	9.17
1400.1	1430.1	11.30	10.48	9.58

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+10	+13	+16
10.1	40.1	20.04	23.58	25.85
50.4	80.4	19.05	22.18	23.87
90.7	120.7	19.24	20.85	21.08
131.0	161.0	19.77	19.86	23.49
171.3	201.3	19.31	19.34	25.23
211.5	241.5	18.78	23.03	23.94
251.8	281.8	17.65	27.09	21.89
292.1	322.1	19.12	23.75	21.73
332.4	362.4	23.15	21.74	25.20
372.7	402.7	24.55	22.12	23.57
413.0	443.0	19.81	18.72	22.60
453.3	483.3	18.81	17.36	18.99
493.6	523.6	18.86	22.00	32.90
533.9	563.9	18.91	21.62	28.09
574.2	604.2	18.32	20.62	25.50
614.4	644.4	21.10	21.44	24.00
654.7	684.7	21.20	25.88	28.53
695.0	725.0	16.55	21.92	29.67
735.3	765.3	15.48	18.22	21.99
775.6	805.6	14.42	16.35	18.77
815.9	845.9	12.81	14.38	16.92
856.2	886.2	11.55	13.54	15.85
896.5	926.5	13.24	15.74	17.90
916.6	946.6	14.94	17.87	19.96
956.9	986.9	16.22	21.81	24.10
977.1	1007.1	15.86	24.18	27.52
1017.3	1047.3	13.19	22.75	26.10
1037.5	1067.5	12.36	22.69	23.82
1077.8	1107.8	11.33	18.02	23.05
1097.9	1127.9	12.04	18.86	28.04
1138.2	1168.2	11.56	18.12	26.78
1158.4	1188.4	12.44	18.18	28.80
1198.7	1228.7	12.59	16.88	23.70
1218.8	1248.8	12.90	16.59	23.49
1259.1	1289.1	13.48	15.66	21.19
1279.2	1309.2	14.08	15.68	20.63
1319.5	1349.5	14.08	15.99	18.12
1339.7	1369.7	14.01	15.56	17.13
1380.0	1410.0	14.56	15.22	16.40
1400.1	1430.1	14.46	14.46	15.47

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+9dBm (dB)		
		@LO (dBm)		
		+10	+13	+16
10.1	40.1	1.54	1.29	1.09
50.4	80.4	1.30	1.14	0.96
90.7	120.7	1.40	1.10	0.94
131.0	161.0	1.41	1.14	0.96
171.3	201.3	1.29	1.07	0.90
211.5	241.5	1.30	1.04	0.87
251.8	281.8	1.31	1.06	0.85
292.1	322.1	1.39	1.06	0.85
332.4	362.4	1.35	0.98	0.81
372.7	402.7	1.34	0.98	0.78
413.0	443.0	1.32	0.92	0.73
453.3	483.3	1.31	0.96	0.78
493.6	523.6	1.21	0.85	0.72
533.9	563.9	1.16	0.80	0.67
574.2	604.2	1.32	0.89	0.69
614.4	644.4	1.28	0.95	0.78
654.7	684.7	1.39	1.00	0.79
695.0	725.0	1.47	1.08	0.83
735.3	765.3	1.65	1.22	0.96
775.6	805.6	1.92	1.43	1.12
815.9	845.9	1.93	1.47	1.19
856.2	886.2	2.10	1.62	1.31
896.5	926.5	2.10	1.64	1.32
916.6	946.6	2.08	1.63	1.35
956.9	986.9	2.18	1.71	1.38
977.1	1007.1	2.20	1.77	1.46
1017.3	1047.3	2.19	1.91	1.54
1037.5	1067.5	2.14	1.91	1.56
1077.8	1107.8	1.98	1.87	1.55
1097.9	1127.9	1.91	1.81	1.50
1138.2	1168.2	1.62	1.67	1.44
1158.4	1188.4	1.56	1.62	1.40
1198.7	1228.7	1.26	1.43	1.34
1218.8	1248.8	1.15	1.34	1.33
1259.1	1289.1	1.03	1.22	1.38
1279.2	1309.2	0.89	1.10	1.32
1319.5	1349.5	0.71	1.01	1.21
1339.7	1369.7	0.57	0.93	1.14
1380.0	1410.0	0.32	0.70	1.07
1400.1	1430.1	0.18	0.52	0.94

Frequency Mixer

TUF-2MH+

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=500.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=50.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1000.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+13			+13			+13
400.0	100.1	5.72	10.0	60.1	5.84	950.0	50.1	7.15
390.3	109.9	5.67	30.0	80.1	5.77	930.0	70.1	7.20
380.5	119.6	5.68	50.0	100.1	5.67	910.0	90.1	7.20
370.8	129.4	5.66	70.0	120.1	5.72	890.0	110.1	7.08
361.0	139.1	5.63	90.0	140.1	5.75	870.0	130.1	6.99
351.3	148.9	5.58	110.0	160.1	5.70	850.0	150.1	6.99
341.5	158.6	5.59	130.0	180.1	5.78	830.0	170.1	7.02
331.8	168.4	5.61	150.0	200.1	5.77	810.0	190.1	6.92
322.0	178.1	5.55	170.0	220.1	5.78	790.0	210.1	6.90
312.3	187.9	5.57	190.0	240.1	5.74	770.0	230.1	6.85
302.5	197.6	5.57	210.0	260.1	5.81	750.0	250.1	6.80
292.8	207.4	5.52	230.0	280.1	5.86	730.0	270.1	6.89
283.0	217.1	5.51	250.0	300.1	5.79	710.0	290.1	6.84
273.3	226.9	5.50	270.0	320.1	5.78	690.0	310.1	6.88
263.5	236.6	5.53	290.0	340.1	5.81	670.0	330.1	6.88
253.8	246.4	5.50	310.0	360.1	5.87	650.0	350.1	6.93
244.0	256.1	5.53	330.0	380.1	5.80	630.0	370.1	6.94
234.3	265.9	5.57	350.0	400.1	5.83	610.0	390.1	6.93
224.5	275.6	5.54	370.0	420.1	5.87	590.0	410.1	6.92
214.8	285.4	5.51	390.0	440.1	5.76	570.0	430.1	6.93
205.0	295.1	5.58	410.0	460.1	5.77	550.0	450.1	6.95
195.3	304.9	5.58	430.0	480.1	5.84	530.0	470.1	6.90
185.5	314.6	5.55	450.0	500.1	5.81	510.0	490.1	6.91
175.8	324.4	5.56	470.0	520.1	5.76	490.0	510.1	6.90
166.0	334.1	5.57	510.0	560.1	5.88	450.0	550.1	6.87
156.3	343.9	5.57	530.0	580.1	5.85	430.0	570.1	6.87
146.5	353.6	5.55	570.0	620.1	5.91	390.0	610.1	6.82
136.8	363.4	5.56	590.0	640.1	5.94	370.0	630.1	6.82
127.0	373.1	5.59	630.0	680.1	6.04	330.0	670.1	6.74
117.3	382.9	5.57	650.0	700.1	6.04	310.0	690.1	6.73
107.5	392.6	5.58	690.0	740.1	6.11	270.0	730.1	6.70
97.8	402.4	5.59	710.0	760.1	6.13	250.0	750.1	6.72
88.0	412.1	5.57	750.0	800.1	6.00	210.0	790.1	6.75
78.3	421.9	5.53	770.0	820.1	5.93	190.0	810.1	6.72
68.5	431.6	5.58	810.0	860.1	5.88	150.0	850.1	6.69
58.8	441.4	5.59	830.0	880.1	5.87	130.0	870.1	6.78
49.0	451.1	5.60	870.0	920.1	5.75	90.0	910.1	6.79
39.3	460.9	5.57	890.0	940.1	5.73	70.0	930.1	6.67
19.8	480.4	5.65	930.0	980.1	5.64	30.0	970.1	6.53
10.0	490.1	5.73	950.0	1000.1	5.61	10.0	990.1	6.61

REV. X2
TUF-2MH+
100818
Page 2 of 5

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+10	+13	+16	+10	+13	+16
10.1	76.41	76.00	76.25	76.82	79.76	70.78
50.4	61.76	62.79	63.60	70.14	71.40	70.84
90.7	56.53	57.54	58.42	68.38	69.40	68.69
131.0	53.57	54.63	55.47	65.45	67.24	66.51
171.3	51.05	52.11	53.11	62.77	64.77	64.04
211.5	49.50	50.73	51.70	60.58	61.48	61.50
251.8	48.00	49.33	50.27	58.58	58.85	59.40
292.1	46.86	48.13	49.15	55.43	55.85	57.18
332.4	45.98	47.25	48.05	52.80	53.88	55.56
372.7	45.12	46.60	47.12	50.78	52.45	54.46
413.0	44.43	45.67	46.68	48.98	50.79	52.62
453.3	43.60	44.70	45.09	47.50	49.70	51.29
493.6	42.87	43.95	44.70	46.45	48.07	49.84
533.9	42.44	43.22	44.02	45.74	47.06	48.24
574.2	42.13	42.77	43.18	44.81	47.08	48.56
614.4	42.15	42.39	42.45	44.21	46.63	48.12
654.7	42.23	43.36	43.77	43.83	46.15	47.53
695.0	41.87	42.84	43.07	42.92	44.87	45.82
735.3	41.30	42.10	42.44	42.14	43.47	44.36
775.6	40.70	41.18	41.47	41.46	43.23	44.11
815.9	39.89	40.11	40.30	40.57	42.40	43.47
856.2	39.18	39.36	39.56	39.86	41.49	42.45
896.5	39.51	40.26	41.07	39.37	40.98	42.08
916.6	39.47	40.70	41.41	38.67	40.24	41.11
956.9	38.59	39.95	40.54	37.81	38.87	39.42
977.1	38.59	39.91	40.57	37.45	38.22	38.86
1017.3	37.57	38.95	39.73	36.38	37.02	37.52
1037.5	37.79	38.97	39.55	35.98	36.54	37.10
1077.8	37.18	38.51	39.18	35.34	35.97	36.64
1097.9	37.01	38.38	39.08	35.49	35.81	36.73
1138.2	36.70	37.99	38.86	35.81	36.21	37.17
1158.4	36.79	38.33	39.09	36.32	37.02	37.60
1198.7	36.70	38.19	38.94	36.06	37.12	37.61
1218.8	36.74	38.17	38.68	36.15	37.19	37.47
1259.1	36.82	38.06	38.85	35.82	36.71	37.05
1279.2	36.50	37.52	38.56	35.58	36.35	36.79
1319.5	36.53	37.47	38.25	35.43	36.06	36.19
1339.7	36.24	37.22	38.14	35.06	35.69	35.76
1380.0	36.06	36.86	37.53	35.01	35.50	35.15
1400.1	35.78	36.55	37.09	34.84	35.23	34.66

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+10	+13	+16
10.1	40.1	46.43	47.69	51.81
50.4	80.4	37.27	37.47	37.88
90.7	120.7	32.71	33.02	33.12
131.0	161.0	29.87	30.16	30.39
171.3	201.3	28.20	28.48	28.73
211.5	241.5	27.13	27.43	27.65
251.8	281.8	26.19	26.69	27.05
292.1	322.1	26.15	26.52	26.71
332.4	362.4	26.18	26.75	27.07
372.7	402.7	25.97	27.01	27.43
413.0	443.0	26.39	27.28	27.94
453.3	483.3	26.89	27.33	27.69
493.6	523.6	28.21	28.28	28.28
533.9	563.9	29.24	29.34	29.36
574.2	604.2	28.56	28.81	29.43
614.4	644.4	26.08	26.77	27.59
654.7	684.7	23.45	23.83	24.53
695.0	725.0	21.68	21.53	21.62
735.3	765.3	20.45	20.14	19.97
775.6	805.6	19.40	19.04	18.81
815.9	845.9	18.75	18.37	18.09
856.2	886.2	18.25	17.84	17.54
896.5	926.5	17.65	17.21	16.88
916.6	946.6	17.39	16.91	16.63
956.9	986.9	16.96	16.49	16.20
977.1	1007.1	16.92	16.45	16.18
1017.3	1047.3	16.79	16.41	16.23
1037.5	1067.5	16.76	16.44	16.31
1077.8	1107.8	16.63	16.34	16.27
1097.9	1127.9	16.46	16.25	16.25
1138.2	1168.2	16.44	16.19	16.13
1158.4	1188.4	16.38	16.24	16.09
1198.7	1228.7	16.20	16.24	16.14
1218.8	1248.8	16.12	16.20	16.25
1259.1	1289.1	15.91	16.04	16.11
1279.2	1309.2	15.76	15.97	16.02
1319.5	1349.5	15.44	15.73	15.74
1339.7	1369.7	15.26	15.56	15.61
1380.0	1410.0	14.89	15.15	15.17
1400.1	1430.1	14.68	14.91	14.94

Frequency Mixer

TUF-2MH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=1000.1MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+10	+13	+16		+10	+13	+16		+10	+13	+16
10.1	40.1	1.17	1.09	1.10	10.1	1.55	2.19	3.19	10.0	2.26	1.81	1.58
50.4	80.4	1.18	1.06	1.03	50.4	1.66	2.52	3.67	30.2	1.93	1.54	1.38
90.7	120.7	1.16	1.07	1.06	90.7	1.56	2.35	3.45	50.4	1.74	1.39	1.26
131.0	161.0	1.16	1.08	1.10	131.0	1.61	2.44	3.54	70.6	1.75	1.41	1.30
171.3	201.3	1.20	1.12	1.14	171.3	1.59	2.35	3.36	90.8	1.82	1.48	1.37
211.5	241.5	1.20	1.15	1.18	211.5	1.60	2.38	3.40	111.0	1.89	1.52	1.39
251.8	281.8	1.24	1.19	1.21	251.8	1.64	2.45	3.52	131.2	1.92	1.55	1.42
292.1	322.1	1.26	1.21	1.24	292.1	1.64	2.40	3.40	151.4	1.84	1.51	1.40
332.4	362.4	1.26	1.23	1.26	332.4	1.69	2.51	3.60	171.6	1.80	1.48	1.38
372.7	402.7	1.28	1.26	1.29	372.7	1.75	2.63	3.79	191.8	1.90	1.56	1.45
413.0	443.0	1.28	1.28	1.32	413.0	1.75	2.54	3.62	212.0	1.98	1.62	1.52
453.3	483.3	1.31	1.29	1.32	453.3	1.77	2.57	3.65	232.2	1.91	1.58	1.49
493.6	523.6	1.35	1.34	1.37	493.6	1.81	2.58	3.62	252.4	1.87	1.56	1.47
533.9	563.9	1.38	1.39	1.42	533.9	1.88	2.67	3.75	272.7	1.95	1.64	1.55
574.2	604.2	1.41	1.42	1.45	574.2	1.90	2.62	3.65	292.9	2.01	1.70	1.61
614.4	644.4	1.44	1.45	1.48	614.4	2.00	2.76	3.79	313.1	1.98	1.67	1.60
654.7	684.7	1.46	1.49	1.53	654.7	2.09	2.86	3.94	333.3	2.02	1.70	1.63
695.0	725.0	1.44	1.48	1.53	695.0	2.09	2.77	3.70	353.5	2.05	1.77	1.71
735.3	765.3	1.43	1.46	1.51	735.3	2.18	2.84	3.77	373.7	2.03	1.77	1.71
775.6	805.6	1.41	1.44	1.48	775.6	2.20	2.80	3.68	393.9	2.05	1.77	1.72
815.9	845.9	1.39	1.41	1.43	815.9	2.24	2.80	3.65	434.3	2.12	1.86	1.83
856.2	886.2	1.41	1.41	1.43	856.2	2.31	2.79	3.50	454.5	2.09	1.85	1.83
896.5	926.5	1.47	1.46	1.47	896.5	2.31	2.70	3.38	494.9	2.18	1.95	1.93
916.6	946.6	1.50	1.48	1.49	916.6	2.30	2.65	3.30	515.1	2.11	1.89	1.89
956.9	986.9	1.58	1.57	1.57	956.9	2.32	2.58	3.18	555.5	2.24	2.03	2.04
977.1	1007.1	1.65	1.63	1.63	977.1	2.36	2.63	3.21	575.7	2.25	2.05	2.07
1017.3	1047.3	1.80	1.75	1.74	1017.3	2.36	2.57	3.08	616.1	2.20	2.00	2.02
1037.5	1067.5	1.90	1.84	1.83	1037.5	2.41	2.64	3.12	636.3	2.24	2.06	2.10
1077.8	1107.8	2.08	2.00	1.97	1077.8	2.39	2.61	3.05	676.7	2.30	2.08	2.11
1097.9	1127.9	2.16	2.08	2.05	1097.9	2.38	2.53	2.92	696.9	2.30	2.08	2.11
1138.2	1168.2	2.40	2.28	2.22	1138.2	2.32	2.46	2.82	737.3	2.18	1.99	2.03
1158.4	1188.4	2.51	2.38	2.31	1158.4	2.30	2.44	2.77	757.6	2.30	2.08	2.11
1198.7	1228.7	2.76	2.61	2.51	1198.7	2.22	2.33	2.64	798.0	2.24	1.99	2.01
1218.8	1248.8	2.89	2.72	2.60	1218.8	2.17	2.30	2.59	818.2	2.18	1.93	1.94
1259.1	1289.1	3.12	2.96	2.79	1259.1	2.10	2.23	2.53	858.6	2.24	2.00	2.01
1279.2	1309.2	3.24	3.08	2.89	1279.2	2.05	2.13	2.42	878.8	2.28	1.99	1.97
1319.5	1349.5	3.45	3.29	3.13	1319.5	1.94	2.02	2.31	919.2	2.16	1.87	1.84
1339.7	1369.7	3.55	3.40	3.26	1339.7	1.90	1.96	2.25	939.4	2.08	1.81	1.79
1380.0	1410.0	3.65	3.54	3.40	1380.0	1.81	1.86	2.15	979.8	2.30	1.95	1.89
1400.1	1430.1	3.73	3.62	3.49	1400.1	1.73	1.83	2.13	1000.0	2.28	2.37	2.65

REV. X2
TUF-2MH+
100818
Page 4 of 5

Mini-Circuits®

IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS 9100 CERTIFIED • RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, instantly • For detailed performance specs & shopping online see



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	32	38	37	45	41	63	55	60	58	74
1	-	23	+0	29	12	33	21	41	45	45	56	61
2	81	66	68	60	62	66	59	57	58	82	59	65
3	>100	64	41	56	43	52	38	57	46	53	56	50
4	>100	81	77	68	76	69	72	73	76	83	77	83
5	>100	71	64	73	53	66	50	60	47	64	52	74
6	>100	97	88	94	79	84	77	85	75	89	79	84
7	>100	84	78	84	75	84	74	96	69	81	65	80
8	>100	>98	>98	>98	95	>98	92	89	95	85	86	83
9	>100	89	90	89	90	87	92	86	77	83	74	79
10	>100	>98	>98	>98	>98	>98	>98	95	93	95	88	95
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions:

RF IN: 500.1 MHz; 4.00 dBm.

LO IN: 530.01 MHz; +13.00 dBm

IF OUT: 29.91 MHz; -1.88 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	22	28	26	31	29	54	37	42	41	74
1	-	22	+0	28	11	32	20	37	44	37	46	51
2	>100	66	80	65	76	69	67	66	65	85	66	70
3	>100	>88	72	87	64	75	59	79	62	79	68	74
4	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
5	>100	>88	86	>88	>88	>88	88	>88	86	>88	85	>88
6	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
7	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
8	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
9	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
10	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions:

RF IN: 500.1 MHz; -6.00 dBm.

LO IN: 530.01 MHz; +13.00 dBm

IF OUT: 29.91 MHz; -11.88 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.

REV. X2

TUF-2MH+

100818

Page 5 of 5



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED • RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, instantly • For detailed performance specs & shopping online see

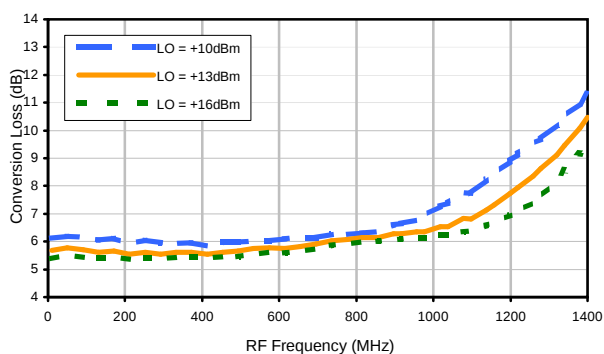


Frequency Mixer

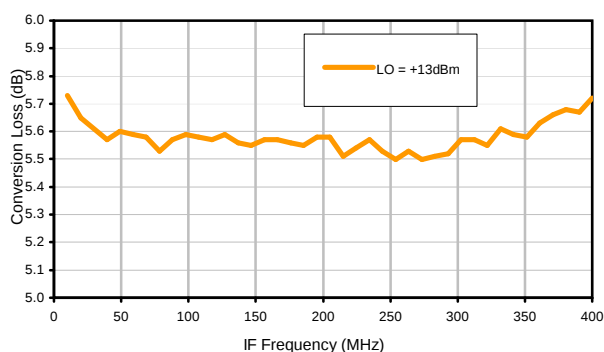
TUF-2MH+

Typical Performance Curves

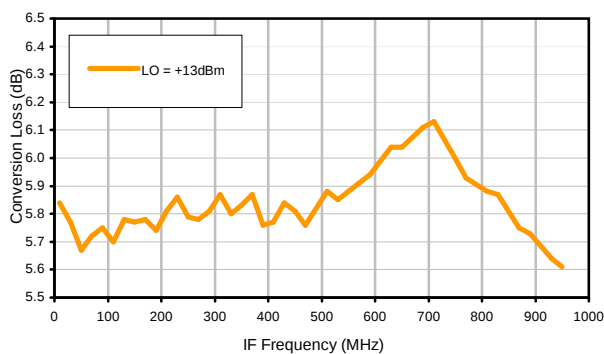
Conversion Loss @ IF=30MHz



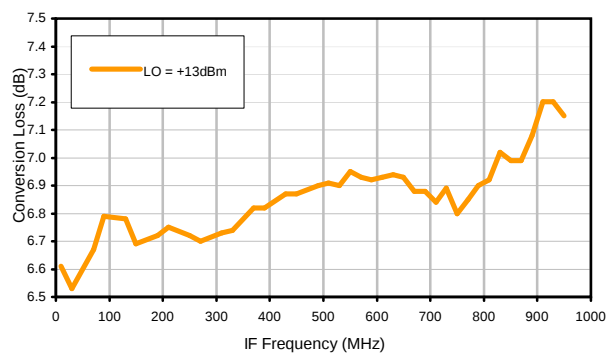
Conversion Loss vs. IF @ RF=500.1MHz



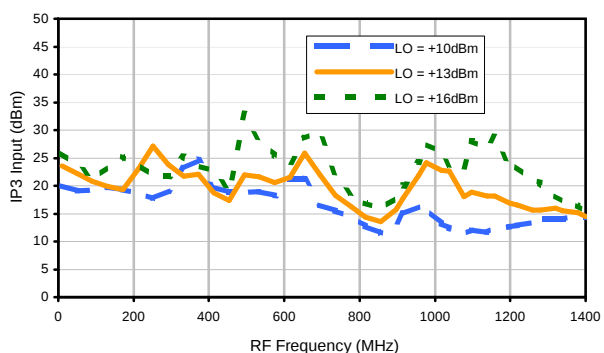
Conversion Loss vs. IF @ RF=50.1MHz



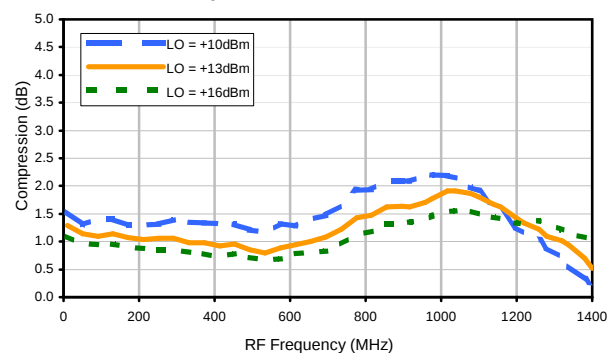
Conversion Loss vs. IF @ RF=1000.1MHz



IP3 Input



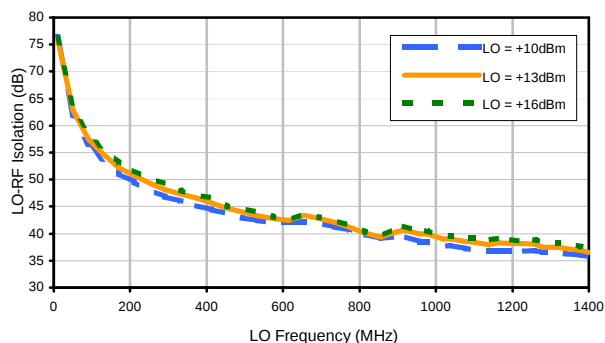
Compression @ RF IN=+9dBm



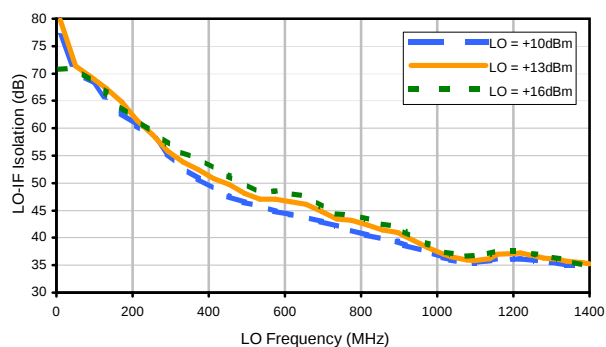
REV. X2
TUF-2MH+
100818
Page 1 of 3

Typical Performance Curves

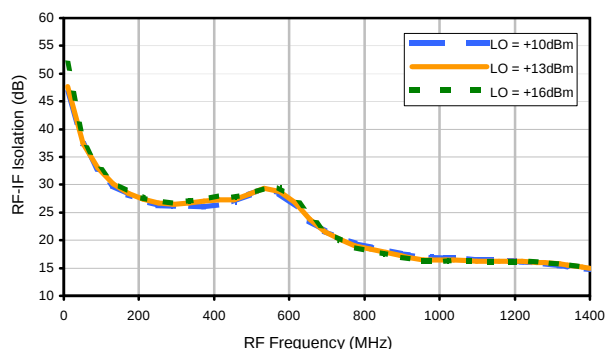
LO-RF Isolation



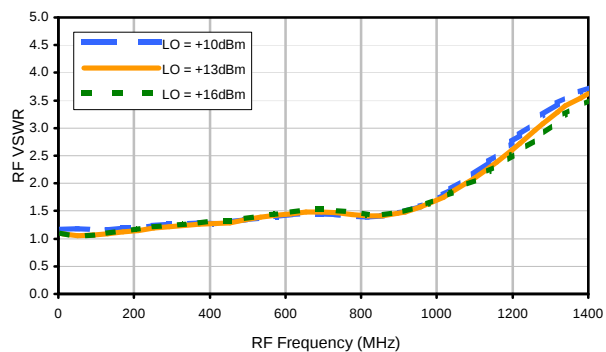
LO-IF Isolation



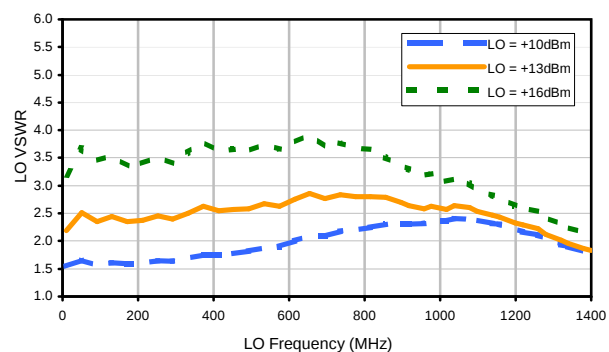
RF-IF Isolation



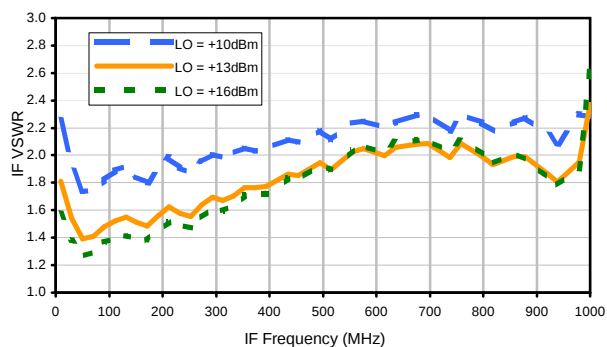
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	32	38	37	45	41	63	55	60	58	74
1	-	23	+0	29	12	33	21	41	45	45	56	61
2	81	66	68	60	62	66	59	57	58	82	59	65
3	>100	64	41	56	43	52	38	57	46	53	56	50
4	>100	81	77	68	76	69	72	73	76	83	77	83
5	>100	71	64	73	53	66	50	60	47	64	52	74
6	>100	97	88	94	79	84	77	85	75	89	79	84
7	>100	84	78	84	75	84	74	96	69	81	65	80
8	>100	>98	>98	>98	95	>98	92	89	95	85	86	83
9	>100	89	90	89	90	87	92	86	77	83	74	79
10	>100	>98	>98	>98	>98	>98	>98	95	93	95	88	95
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 500.1 MHz; 4.00 dBm.

LO IN: 530.01 MHz; +13.00 dBm

IF OUT: 29.91 MHz; -1.88 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	22	28	26	31	29	54	37	42	41	74
1	-	22	+0	28	11	32	20	37	44	37	46	51
2	>100	66	80	65	76	69	67	66	65	85	66	70
3	>100	>88	72	87	64	75	59	79	62	79	68	74
4	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
5	>100	>88	86	>88	>88	>88	88	>88	86	>88	85	>88
6	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
7	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
8	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
9	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
10	>100	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88	>88
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 500.1 MHz; -6.00 dBm.

LO IN: 530.01 MHz; +13.00 dBm

IF OUT: 29.91 MHz; -11.88 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.

REV. X2

TUF-2MH+

100818

Page 3 of 3



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED • RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0006 (718) 934-4500 Fax (718) 332-4661



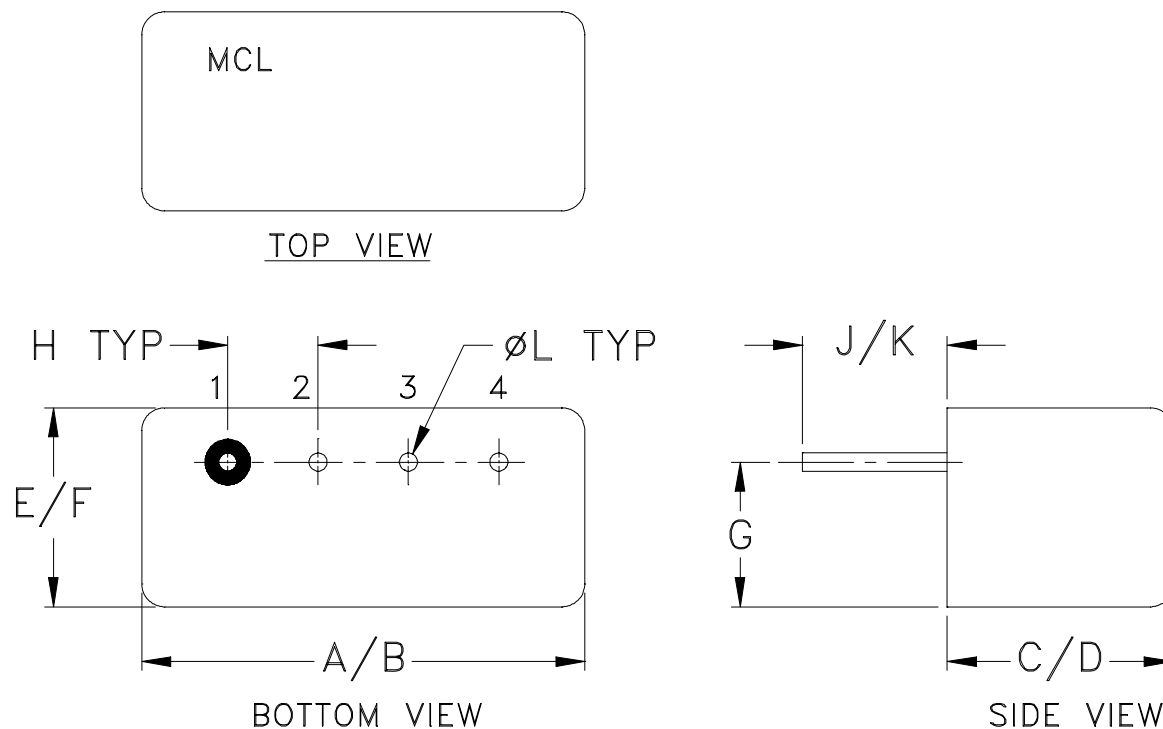
The Design Engineers Search Engine finds the model you need, instantly • For detailed performance specs & shopping online see



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.



INTERNET <http://www.minicircuits.com>

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

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