Surface Mount

Frequency Mixer

JMS-2LH

Level 10 (LO Power +10 dBm) 20 to 1000 MHz

Generic photo used for illustration purposes only

CASE STYLE: BH292

Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	50mW
IF Current	40mA

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

Pin Connections

LO	6
RF	3
IF	2
GROUND	1,4,5

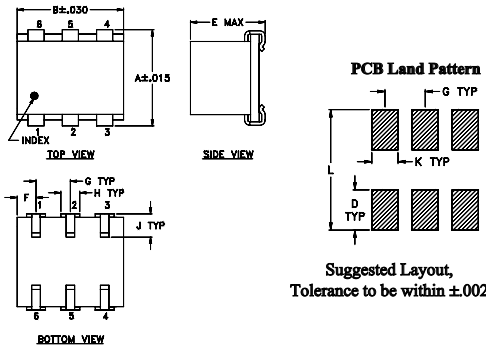
Features

- excellent L-R isolation, up to 60 dB typ.
- miniature surface mount
- J-leads for strain relief and excellent solderability

Applications

- up & down converters for receivers & transmitters
- UHF TV
- cellular/ISM/GSM

Outline Drawing

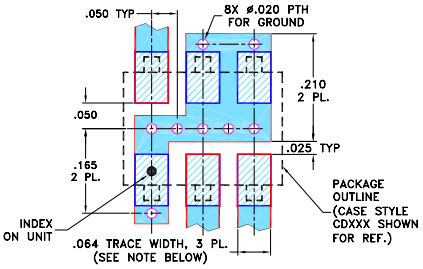


Outline Dimensions (inch / mm)

A	B	C	D	E	F	G
.280	.310	--	.100	.225	.055	.100
7.11	7.87	--	2.54	5.72	1.40	2.54

H	J	K	L	wt
.047	.065	.065	.300	grams
1.19	1.65	1.65	7.62	0.45

Demo Board MCL P/N: TB-03
Suggested PCB Layout (PL-052)



NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

Electrical Specifications

FREQUENCY (MHz)		CONVERSION LOSS (dB)				LO-RF ISOLATION (dB)						LO-IF ISOLATION (dB)						IP3 at center band (dBm)
		Mid-Band m			Total Range	L		M		U		L		M		U		
LO/RF f_L-f_U	IF	$\overline{X}$	σ	Max.	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.
20-1000	DC-1000	6.5	.10	7.5	9.0	60	40	48	25	37	20	45	30	35	20	27	11	20

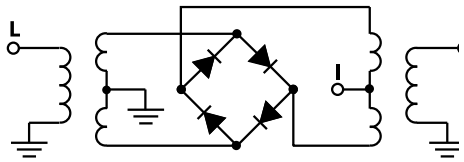
1 dB COMP.: +5 dBm typ.
Phase detection, positive polarity

L = low range [f_L to 10 f_L] m= mid band [$2f_L$ to $f_U/2$] M = mid range [10 f_L to $f_U/2$] U = upper range [$f_U/2$ to f_U]

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
20.10	50.10	6.74	62.98	61.31	1.24	2.28
40.10	70.10	6.75	58.93	57.30	1.22	2.22
100.10	130.10	6.72	51.46	49.64	1.23	2.21
150.10	180.10	6.70	48.38	46.49	1.24	2.24
200.10	230.10	6.65	46.01	43.92	1.26	2.21
255.27	285.27	6.64	44.26	42.27	1.26	2.25
310.45	340.45	6.60	42.75	40.85	1.29	2.20
365.62	395.62	6.59	41.54	39.67	1.30	2.27
420.79	450.79	6.55	40.42	38.53	1.34	2.28
475.96	505.96	6.54	39.69	37.65	1.35	2.21
500.10	530.10	6.51	39.42	37.42	1.37	2.23
558.72	588.72	6.54	38.36	36.11	1.39	2.29
613.89	643.89	6.57	37.95	35.34	1.43	2.37
669.07	699.07	6.59	37.29	34.51	1.48	2.33
724.24	754.24	6.60	36.99	34.33	1.52	2.48
779.41	809.41	6.66	36.37	33.21	1.55	2.39
834.58	864.58	6.71	36.41	32.42	1.58	2.53
889.76	919.76	6.82	35.95	31.60	1.55	2.53
944.93	974.93	6.88	36.03	31.80	1.54	2.45
1000.10	1030.10	6.97	35.70	31.47	1.51	2.67

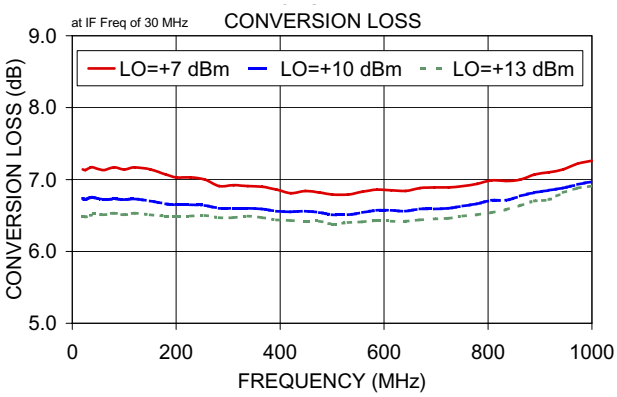
Electrical Schematic

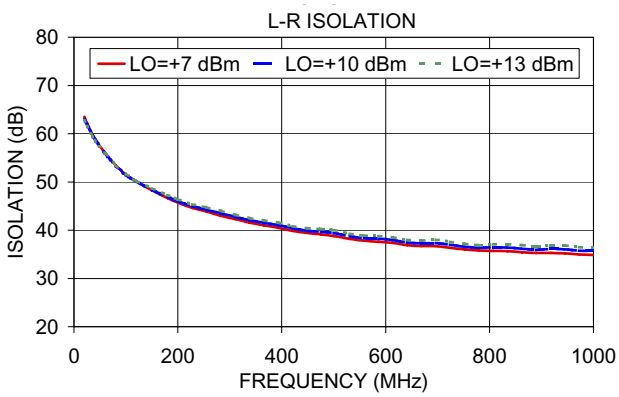


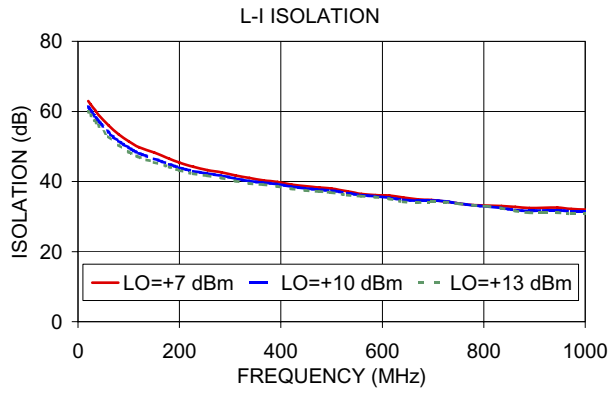
Notes
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp

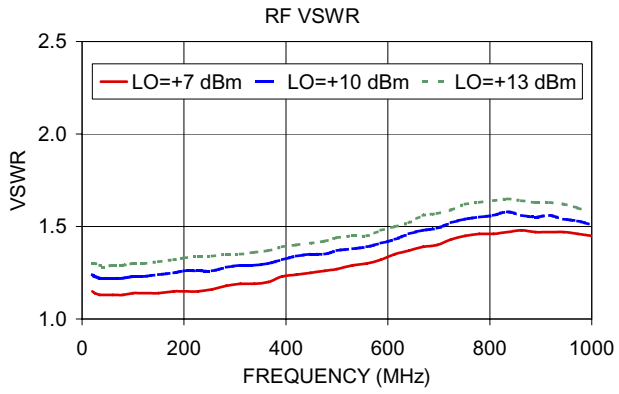
Performance Charts

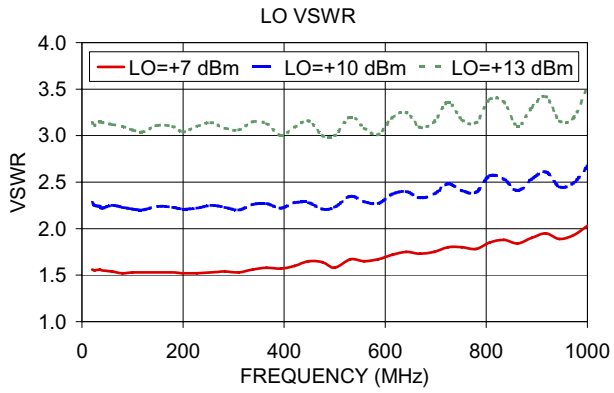
JMS-2LH

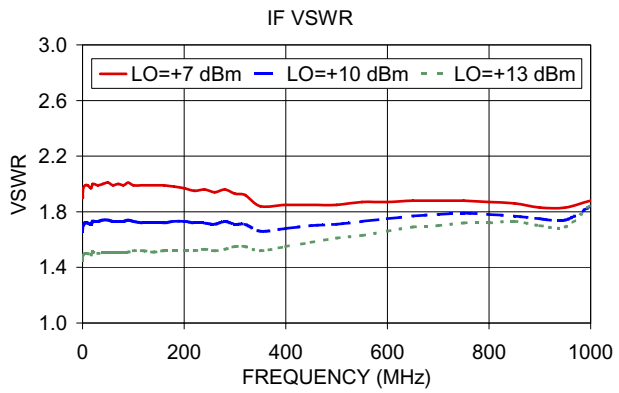












Notes
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp

Frequency Mixer JMS-2LH

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB) @LO (dBm)		
		+7	+10	+13
10.1	40.1	6.67	6.30	6.12
50.4	80.4	7.03	6.70	6.50
90.6	120.6	7.12	6.68	6.50
130.9	160.9	7.11	6.71	6.56
171.1	201.1	7.11	6.71	6.54
211.4	241.4	7.04	6.66	6.53
251.6	281.6	7.02	6.68	6.55
291.9	321.9	6.97	6.65	6.52
332.1	362.1	6.96	6.67	6.55
372.4	402.4	6.96	6.67	6.54
412.6	442.6	6.88	6.60	6.48
452.9	482.9	6.91	6.64	6.51
493.1	523.1	6.89	6.61	6.48
533.4	563.4	6.89	6.60	6.45
573.6	603.6	6.91	6.64	6.47
613.9	643.9	6.94	6.67	6.52
654.2	684.2	6.98	6.68	6.54
694.4	724.4	7.00	6.68	6.52
734.7	764.7	7.07	6.73	6.55
774.9	804.9	7.11	6.81	6.63
815.2	845.2	7.16	6.90	6.73
855.4	885.4	7.22	6.98	6.83
895.7	925.7	7.20	6.95	6.81
935.9	965.9	7.31	7.03	6.85
976.2	1006.2	7.34	7.01	6.82
1016.4	1046.4	7.35	6.96	6.78
1056.7	1086.7	7.46	6.97	6.78
1096.9	1126.9	7.61	6.99	6.76
1137.2	1167.2	7.86	7.11	6.82
1177.4	1207.4	8.07	7.29	6.88
1217.7	1247.7	8.28	7.53	7.01
1257.9	1287.9	8.47	7.78	7.20
1298.2	1328.2	8.68	8.04	7.48
1338.5	1368.5	8.97	8.29	7.76
1378.7	1408.7	9.29	8.60	8.03
1419.0	1449.0	9.67	8.98	8.33
1459.2	1489.2	9.96	9.32	8.68
1499.5	1529.5	10.23	9.64	8.97
1539.7	1569.7	10.51	9.91	9.24
1600.1	1630.1	10.88	10.30	9.66

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm) @LO (dBm)		
		+7	+10	+13
10.1	40.1	19.25	23.95	25.67
50.4	80.4	18.22	21.48	25.15
90.6	120.6	18.92	21.51	24.46
130.9	160.9	20.48	20.65	26.13
171.1	201.1	20.31	22.32	26.62
211.4	241.4	20.24	23.32	23.12
251.6	281.6	20.03	24.26	25.88
291.9	321.9	21.59	24.25	24.44
332.1	362.1	23.25	22.39	23.56
372.4	402.4	21.60	25.50	26.44
412.6	442.6	22.82	24.93	26.52
452.9	482.9	20.43	19.58	22.34
493.1	523.1	21.42	22.58	26.60
533.4	563.4	19.29	25.49	29.20
573.6	603.6	17.85	20.72	27.46
613.9	643.9	19.51	21.19	26.64
654.2	684.2	21.12	24.92	28.68
694.4	724.4	20.29	20.83	23.26
734.7	764.7	21.69	22.40	24.20
774.9	804.9	16.63	22.71	25.86
815.2	845.2	14.32	16.44	21.03
855.4	885.4	13.86	14.97	18.24
895.7	925.7	14.29	14.75	16.83
935.9	965.9	14.35	15.55	17.59
976.2	1006.2	17.00	16.75	18.26
1016.4	1046.4	20.36	19.08	21.60
1056.7	1086.7	24.35	23.34	23.17
1096.9	1126.9	15.91	24.10	19.89
1137.2	1167.2	11.60	24.51	20.91
1177.4	1207.4	9.65	16.65	29.15
1217.7	1247.7	9.02	13.44	25.77
1257.9	1287.9	9.08	12.28	20.14
1298.2	1328.2	9.47	11.80	16.09
1338.5	1368.5	9.96	12.36	15.69
1378.7	1408.7	10.00	12.70	16.01
1419.0	1449.0	9.93	11.96	14.78
1459.2	1489.2	10.11	11.53	14.29
1499.5	1529.5	10.09	11.50	15.19
1539.7	1569.7	10.15	11.54	18.17
1600.1	1630.1	11.11	13.76	19.02

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+5dBm (dB) @LO (dBm)		
		+7	+10	+13
10.1	40.1	0.60	0.40	0.22
50.4	80.4	0.69	0.46	0.32
90.6	120.6	0.64	0.51	0.36
130.9	160.9	0.74	0.50	0.36
171.1	201.1	0.70	0.48	0.32
211.4	241.4	0.80	0.51	0.36
251.6	281.6	0.74	0.49	0.36
291.9	321.9	0.80	0.50	0.34
332.1	362.1	0.79	0.52	0.36
372.4	402.4	0.81	0.51	0.36
412.6	442.6	0.77	0.50	0.38
452.9	482.9	0.79	0.52	0.41
493.1	523.1	0.81	0.53	0.43
533.4	563.4	0.68	0.47	0.39
573.6	603.6	0.66	0.43	0.35
613.9	643.9	0.72	0.46	0.36
654.2	684.2	0.72	0.49	0.40
694.4	724.4	0.83	0.58	0.48
734.7	764.7	0.84	0.62	0.50
774.9	804.9	0.91	0.68	0.56
815.2	845.2	1.00	0.72	0.61
855.4	885.4	1.04	0.73	0.63
895.7	925.7	1.24	0.89	0.76
935.9	965.9	1.30	0.98	0.81
976.2	1006.2	1.50	1.11	0.94
1016.4	1046.4	1.56	1.16	0.98
1056.7	1086.7	1.60	1.26	1.03
1096.9	1126.9	1.68	1.41	1.14
1137.2	1167.2	1.52	1.36	1.08
1177.4	1207.4	1.60	1.47	1.25
1217.7	1247.7	1.44	1.28	1.17
1257.9	1287.9	1.47	1.33	1.23
1298.2	1328.2	1.32	1.20	1.10
1338.5	1368.5	1.19	1.11	1.04
1378.7	1408.7	1.09	1.08	1.08
1419.0	1449.0	0.88	0.89	0.96
1459.2	1489.2	0.79	0.78	0.92
1499.5	1529.5	0.67	0.65	0.80
1539.7	1569.7	0.58	0.58	0.75
1600.1	1630.1	0.59	0.54	0.68

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=500.1MHz (dB)
		@LO (dBm)
		+10
460.0	40.1	6.71
448.5	51.6	6.71
436.9	63.2	6.74
425.4	74.7	6.70
413.8	86.3	6.70
402.3	97.8	6.67
390.8	109.3	6.61
379.2	120.9	6.59
367.7	132.4	6.55
356.2	143.9	6.51
344.6	155.5	6.52
333.1	167.0	6.54
321.5	178.6	6.49
310.0	190.1	6.49
298.5	201.6	6.49
286.9	213.2	6.47
275.4	224.7	6.47
263.8	236.3	6.48
252.3	247.8	6.45
240.8	259.3	6.49
229.2	270.9	6.50
217.7	282.4	6.49
206.2	293.9	6.50
194.6	305.5	6.51
183.1	317.0	6.50
171.5	328.6	6.50
160.0	340.1	6.52
148.5	351.6	6.52
136.9	363.2	6.54
125.4	374.7	6.56
113.8	386.3	6.55
102.3	397.8	6.54
90.8	409.3	6.54
79.2	420.9	6.52
67.7	432.4	6.53
56.2	443.9	6.56
44.6	455.5	6.54
33.1	467.0	6.56
21.5	478.6	6.57
10.0	490.1	6.72

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=10.1MHz (dB)
		@LO (dBm)
		+10
10.0	20.1	6.68
29.8	39.9	6.50
49.6	59.7	6.56
69.4	79.5	6.56
89.2	99.3	6.58
109.0	119.1	6.59
128.8	138.9	6.57
148.6	158.7	6.61
168.4	178.5	6.63
188.2	198.3	6.65
208.0	218.1	6.64
227.8	237.9	6.63
247.6	257.7	6.67
267.3	277.4	6.70
287.1	297.2	6.71
306.9	317.0	6.70
326.7	336.8	6.75
346.5	356.6	6.72
366.3	376.4	6.78
386.1	396.2	6.79
425.7	435.8	6.79
445.5	455.6	6.82
485.1	495.2	6.83
504.9	515.0	6.84
544.5	554.6	6.88
564.3	574.4	6.92
603.9	614.0	6.94
623.7	633.8	6.98
663.3	673.4	7.06
683.1	693.2	7.05
722.7	732.8	7.16
742.4	752.5	7.23
782.0	792.1	7.29
801.8	811.9	7.33
841.4	851.5	7.32
861.2	871.3	7.28
900.8	910.9	7.24
920.6	930.7	7.19
960.2	970.3	7.12
980.0	990.1	7.06

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1000.1MHz (dB)
		@LO (dBm)
		+10
990.0	10.1	7.32
970.0	30.1	7.23
950.0	50.1	7.18
930.0	70.1	7.15
910.0	90.1	7.10
890.0	110.1	7.02
870.0	130.1	6.94
850.0	150.1	6.93
830.0	170.1	6.91
810.0	190.1	6.86
790.0	210.1	6.84
770.0	230.1	6.81
750.0	250.1	6.77
730.0	270.1	6.83
710.0	290.1	6.83
690.0	310.1	6.78
670.0	330.1	6.76
650.0	350.1	6.79
630.0	370.1	6.79
610.0	390.1	6.79
570.0	430.1	6.79
550.0	450.1	6.82
510.0	490.1	6.82
490.0	510.1	6.83
450.0	550.1	6.87
430.0	570.1	6.87
390.0	610.1	6.88
370.0	630.1	6.89
330.0	670.1	6.91
310.0	690.1	6.89
270.0	730.1	6.89
250.0	750.1	6.91
210.0	790.1	6.93
190.0	810.1	6.93
150.0	850.1	7.03
130.0	870.1	7.03
90.0	910.1	7.03
70.0	930.1	7.04
30.0	970.1	7.02
10.0	990.1	7.03

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm)			LO-IF ISOLATION (dB) @LO (dBm)		
	+7	+10	+13	+7	+10	+13
10.1	71.40	70.26	70.23	60.11	66.75	61.64
50.4	57.19	57.28	56.94	52.63	51.26	49.78
90.6	52.51	52.44	52.18	48.34	46.75	45.24
130.9	49.34	49.19	49.16	45.51	43.50	42.17
171.1	47.16	47.17	47.27	43.07	41.27	40.44
211.4	45.53	45.51	45.45	41.45	39.91	38.92
251.6	44.28	44.42	44.29	40.38	38.88	37.84
291.9	43.17	43.21	43.19	39.64	38.15	37.15
332.1	42.08	42.14	42.07	38.69	37.32	36.11
372.4	41.19	41.33	41.24	38.06	36.52	35.25
412.6	40.40	40.50	40.44	37.34	35.77	34.70
452.9	39.72	39.73	39.89	36.64	35.18	33.98
493.1	38.96	39.08	39.16	35.92	34.71	33.87
533.4	38.23	38.35	38.43	34.89	33.56	32.75
573.6	37.67	37.86	38.10	34.37	33.11	31.93
613.9	37.16	37.35	37.62	33.21	32.55	31.80
654.2	36.82	36.97	37.06	32.16	31.75	31.35
694.4	36.41	36.53	36.67	31.27	30.55	30.37
734.7	35.96	36.36	36.70	30.72	29.45	29.12
774.9	35.38	35.81	36.16	30.54	29.27	28.38
815.2	34.95	35.22	35.55	29.90	29.06	28.13
855.4	34.80	34.95	35.24	29.17	28.74	28.06
895.7	34.50	34.70	34.90	28.31	28.36	27.99
935.9	34.44	34.61	34.88	27.60	27.84	27.85
976.2	34.40	34.71	34.99	26.82	27.17	27.19
1016.4	34.53	34.96	35.47	25.98	26.22	26.33
1056.7	34.76	35.46	36.06	25.31	25.47	25.54
1096.9	35.04	35.96	36.62	24.87	24.68	24.78
1137.2	35.42	36.52	37.34	25.22	24.36	24.32
1177.4	35.61	37.05	37.95	25.77	24.43	24.27
1217.7	35.67	37.52	38.64	26.04	24.73	24.11
1257.9	36.02	38.07	39.83	26.21	25.22	24.21
1298.2	36.22	38.30	40.72	26.14	25.65	24.61
1338.5	36.59	38.69	41.49	25.85	25.82	24.98
1378.7	37.08	39.36	42.20	25.78	26.21	25.71
1419.0	37.34	39.66	42.54	25.67	26.38	26.21
1459.2	37.96	40.06	42.72	25.55	26.50	26.67
1499.5	38.42	40.16	42.15	25.45	26.65	27.22
1539.7	38.81	40.31	41.70	25.41	26.89	27.93
1600.1	39.53	40.60	40.88	25.14	26.83	28.34

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB) @LO (dBm)		
		+7	+10	+13
10.1	40.1	46.94	46.98	43.51
50.4	80.4	38.46	37.88	37.42
90.6	120.6	33.40	33.11	32.80
130.9	160.9	30.62	30.43	30.17
171.1	201.1	28.89	28.52	28.29
211.4	241.4	27.39	27.09	26.98
251.6	281.6	26.26	26.14	25.98
291.9	321.9	25.57	25.36	25.22
332.1	362.1	25.00	24.82	24.71
372.4	402.4	24.71	24.46	24.38
412.6	442.6	24.28	24.24	24.10
452.9	482.9	23.96	23.94	23.86
493.1	523.1	23.50	23.47	23.40
533.4	563.4	23.12	23.00	22.89
573.6	603.6	22.80	22.71	22.66
613.9	643.9	22.09	22.21	22.33
654.2	684.2	21.02	21.20	21.39
694.4	724.4	20.02	20.17	20.51
734.7	764.7	19.08	19.25	19.41
774.9	804.9	18.09	18.23	18.35
815.2	845.2	17.20	17.40	17.45
855.4	885.4	16.43	16.54	16.60
895.7	925.7	15.89	15.90	15.95
935.9	965.9	15.42	15.39	15.46
976.2	1006.2	15.10	15.05	15.13
1016.4	1046.4	14.86	14.91	15.00
1056.7	1086.7	14.82	14.98	15.11
1096.9	1126.9	14.72	14.95	15.16
1137.2	1167.2	14.56	14.83	15.08
1177.4	1207.4	14.36	14.71	14.95
1217.7	1247.7	14.27	14.56	14.84
1257.9	1287.9	14.25	14.58	14.86
1298.2	1328.2	14.17	14.59	14.92
1338.5	1368.5	14.07	14.54	14.92
1378.7	1408.7	13.88	14.45	14.95
1419.0	1449.0	13.66	14.28	14.89
1459.2	1489.2	13.35	13.97	14.73
1499.5	1529.5	13.02	13.70	14.46
1539.7	1569.7	12.67	13.40	14.12
1600.1	1630.1	12.13	12.81	13.38

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1) @LO (dBm)		
		+7	+10	+13
10.1	40.1	1.22	1.29	1.34
50.4	80.4	1.14	1.23	1.30
90.6	120.6	1.15	1.24	1.31
130.9	160.9	1.16	1.25	1.32
171.1	201.1	1.17	1.26	1.33
211.4	241.4	1.18	1.28	1.34
251.6	281.6	1.19	1.28	1.34
291.9	321.9	1.20	1.29	1.36
332.1	362.1	1.21	1.30	1.36
372.4	402.4	1.23	1.32	1.38
412.6	442.6	1.25	1.34	1.40
452.9	482.9	1.26	1.35	1.41
493.1	523.1	1.28	1.37	1.43
533.4	563.4	1.30	1.38	1.45
573.6	603.6	1.31	1.39	1.46
613.9	643.9	1.35	1.42	1.48
654.2	684.2	1.38	1.47	1.54
694.4	724.4	1.42	1.52	1.59
734.7	764.7	1.44	1.55	1.63
774.9	804.9	1.46	1.56	1.64
815.2	845.2	1.46	1.55	1.63
855.4	885.4	1.47	1.55	1.62
895.7	925.7	1.48	1.56	1.63
935.9	965.9	1.49	1.57	1.64
976.2	1006.2	1.50	1.59	1.67
1016.4	1046.4	1.53	1.62	1.70
1056.7	1086.7	1.55	1.65	1.72
1096.9	1126.9	1.59	1.68	1.77
1137.2	1167.2	1.63	1.72	1.80
1177.4	1207.4	1.70	1.76	1.83
1217.7	1247.7	1.80	1.84	1.90
1257.9	1287.9	1.93	1.95	1.99
1298.2	1328.2	2.08	2.08	2.10
1338.5	1368.5	2.28	2.27	2.27
1378.7	1408.7	2.51	2.48	2.47
1419.0	1449.0	2.77	2.73	2.70
1459.2	1489.2	3.04	3.00	2.96
1499.5	1529.5	3.29	3.25	3.22
1539.7	1569.7	3.54	3.52	3.48
1600.1	1630.1	3.86	3.87	3.84

LO (MHz)	LO VSWR (:1) @LO (dBm)		
	+7	+10	+13
10.1	1.72	2.42	3.53
50.4	1.74	2.57	3.59
90.6	1.69	2.44	3.39
130.9	1.73	2.52	3.51
171.1	1.69	2.44	3.37
211.4	1.71	2.46	3.43
251.6	1.71	2.48	3.43
291.9	1.70	2.44	3.37
332.1	1.74	2.51	3.48
372.4	1.73	2.48	3.39
412.6	1.76	2.52	3.45
452.9	1.78	2.53	3.46
493.1	1.78	2.53	3.43
533.4	1.83	2.57	3.48
573.6	1.84	2.57	3.45
613.9	1.88	2.61	3.50
654.2	1.91	2.62	3.49
694.4	1.94	2.65	3.50
734.7	1.98	2.68	3.52
774.9	2.01	2.72	3.56
815.2	2.05	2.76	3.60
855.4	2.07	2.76	3.60
895.7	2.11	2.78	3.61
935.9	2.14	2.79	3.58
976.2	2.17	2.79	3.56
1016.4	2.22	2.81	3.56
1056.7	2.27	2.84	3.58
1096.9	2.33	2.90	3.62
1137.2	2.39	2.97	3.66
1177.4	2.44	3.03	3.71
1217.7	2.46	3.08	3.75
1257.9	2.51	3.13	3.80
1298.2	2.53	3.14	3.82
1338.5	2.56	3.16	3.85
1378.7	2.60	3.20	3.88
1419.0	2.61	3.19	3.86
1459.2	2.65	3.22	3.90
1499.5	2.67	3.21	3.88
1539.7	2.70	3.22	3.88
1600.1	2.70	3.17	3.80

IF (OUT) (MHz)	IF VSWR @LO=1000.1MHz (:1) @LO (dBm)		
	+7	+10	+13
10.1	1.99	1.76	1.52
30.1	1.90	1.65	1.45
50.1	1.93	1.64	1.45
70.1	1.91	1.64	1.47
90.1	1.94	1.65	1.47
110.1	1.88	1.63	1.44
130.1	1.92	1.65	1.47
150.1	1.92	1.65	1.47
170.1	1.88	1.62	1.45
190.1	1.89	1.64	1.46
210.1	1.90	1.66	1.48
230.1	1.88	1.64	1.47
250.1	1.88	1.63	1.47
270.1	1.91	1.67	1.51
290.1	1.90	1.67	1.50
310.1	1.86	1.64	1.47
330.1	1.85	1.64	1.48
350.1	1.87	1.66	1.52
370.1	1.87	1.66	1.53
390.1	1.86	1.67	1.53
430.1	1.84	1.66	1.53
450.1	1.81	1.64	1.52
490.1	1.85	1.69	1.59
510.1	1.83	1.68	1.58
550.1	1.82	1.69	1.61
570.1	1.83	1.71	1.64
610.1	1.85	1.74	1.67
630.1	1.85	1.74	1.68
670.1	1.84	1.74	1.70
690.1	1.87	1.77	1.74
730.1	1.83	1.74	1.71
750.1	1.82	1.74	1.71
790.1	1.83	1.75	1.75
810.1	1.84	1.75	1.75
850.1	1.81	1.73	1.72
870.1	1.79	1.70	1.70
910.1	1.81	1.72	1.72
930.1	1.81	1.71	1.71
970.1	1.80	1.69	1.68
990.1	1.83	1.72	1.72

Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	16	30	28	40	34	45	30	50	34	56
1	-	16	+0	33	12	45	18	35	37	43	45	50
2	90	72	42	60	41	68	42	66	45	62	42	63
3	>100	49	48	52	61	51	45	54	53	52	53	53
4	>100	71	58	70	58	67	60	68	56	63	65	73
5	>100	68	64	71	59	74	56	70	55	71	54	72
6	>100	88	79	80	84	79	77	79	70	77	69	78
7	>100	84	83	92	74	81	77	84	79	80	78	78
8	>100	>93	>93	>93	>93	88	86	85	84	85	81	84
9	>100	>93	>93	>93	90	92	83	88	82	91	82	90
10	>100	>93	>93	>93	>93	>93	>93	>93	92	>93	89	>93
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: **RF IN: 500.1 MHz; 0.00 dBm.**
LO IN: 530.01 MHz; +10.00 dBm
IF OUT: 29.91 MHz; -7.1 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	7	19	15	30	22	33	16	36	19	39
1	-	16	+0	33	12	43	18	32	40	37	38	44
2	>100	76	48	66	48	73	48	65	53	70	50	65
3	>100	67	68	71	69	71	60	82	64	77	65	74
4	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
5	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
6	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
7	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
8	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
9	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
10	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

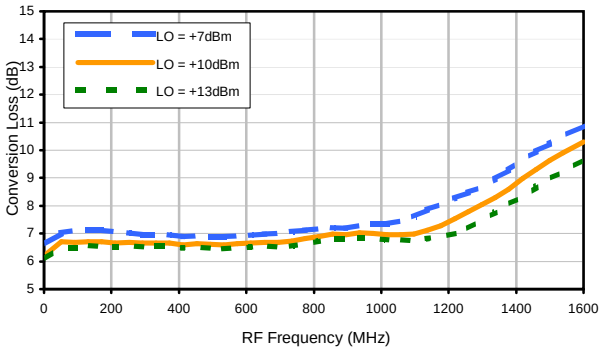
Test conditions: **RF IN: 500.1 MHz; -10.00 dBm.**
LO IN: 530.01 MHz; +10.00 dBm
IF OUT: 29.91 MHz; -16.7 dBm

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.

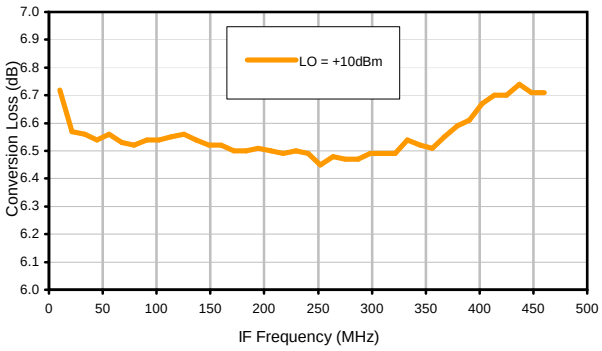
Frequency Mixer JMS-2LH

Typical Performance Curves

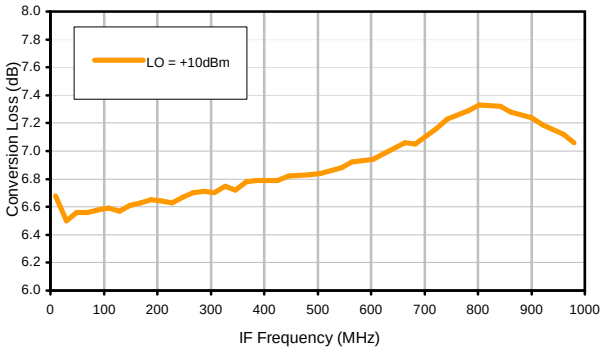
Conversion Loss @ IF=30MHz



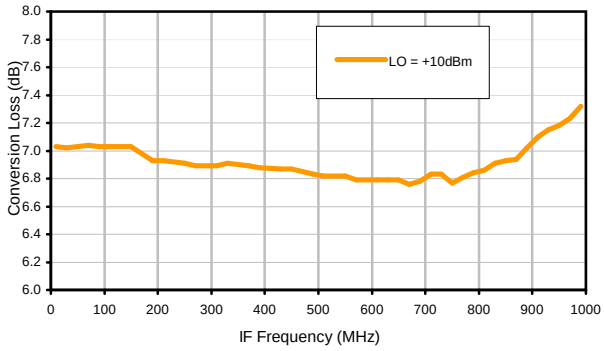
Conversion Loss vs. IF @ RF=500.1MHz



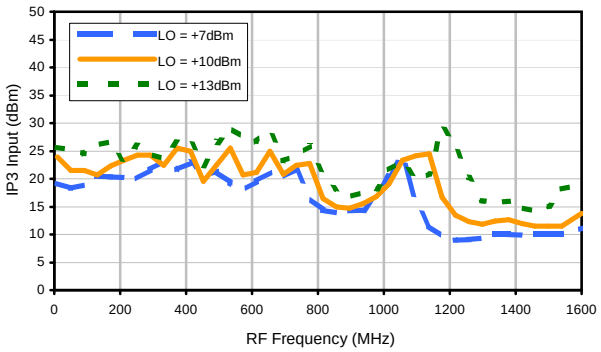
Conversion Loss vs. IF @ RF=10.1MHz



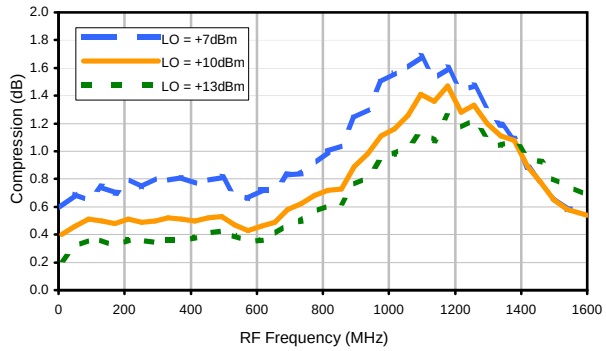
Conversion Loss vs. IF @ RF=1000.1MHz



IP3 Input

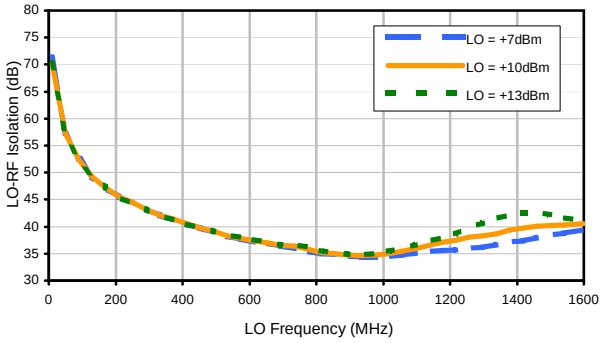


Compression @ RF IN=+5dBm

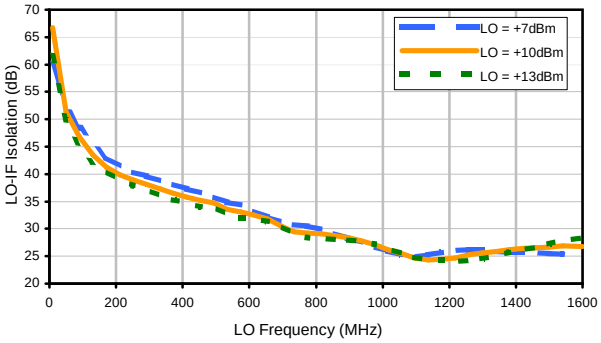


Typical Performance Curves

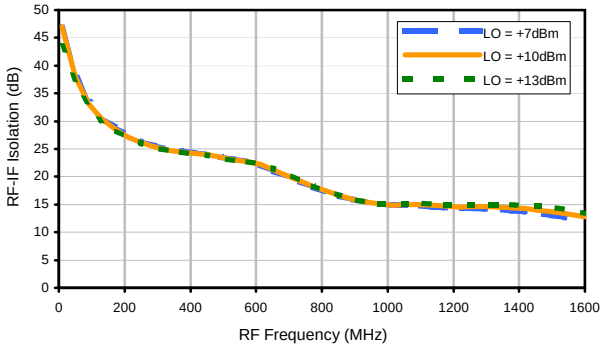
LO-RF Isolation



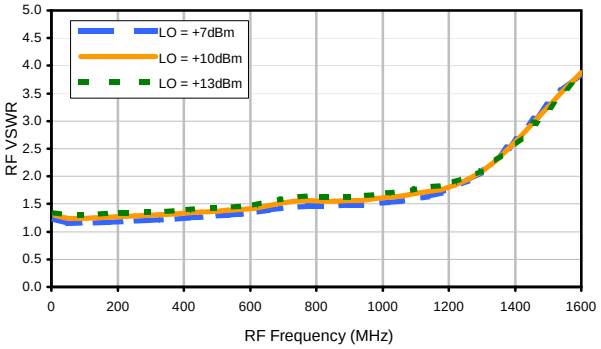
LO-IF Isolation



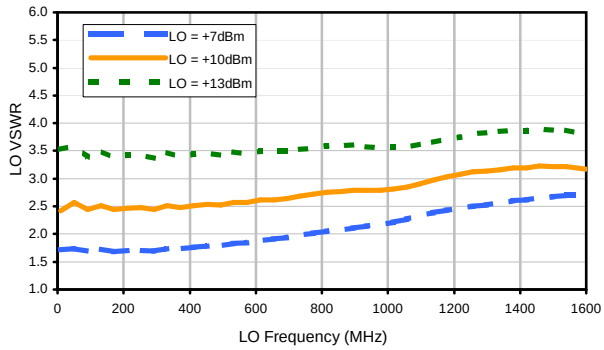
RF-IF Isolation



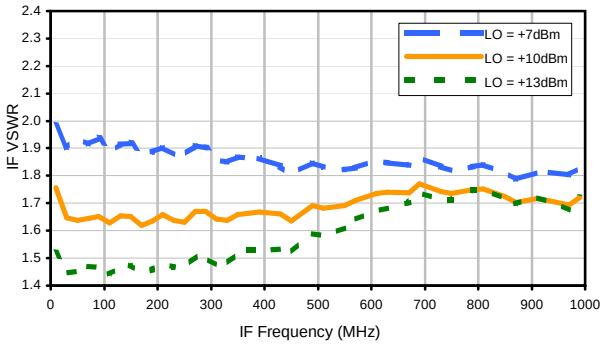
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	16	30	28	40	34	45	30	50	34	56
1	-	16	+0	33	12	45	18	35	37	43	45	50
2	90	72	42	60	41	68	42	66	45	62	42	63
3	>100	49	48	52	61	51	45	54	53	52	53	53
4	>100	71	58	70	58	67	60	68	56	63	65	73
5	>100	68	64	71	59	74	56	70	55	71	54	72
6	>100	88	79	80	84	79	77	79	70	77	69	78
7	>100	84	83	92	74	81	77	84	79	80	78	78
8	>100	>93	>93	>93	>93	88	86	85	84	85	81	84
9	>100	>93	>93	>93	90	92	83	88	82	91	82	90
10	>100	>93	>93	>93	>93	>93	>93	>93	92	>93	89	>93
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:
RF IN: 500.1 MHz; 0.00 dBm.
LO IN: 530.01 MHz; +10.00 dBm
IF OUT: 29.91 MHz; -7.1 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	7	19	15	30	22	33	16	36	19	39
1	-	16	+0	33	12	43	18	32	40	37	38	44
2	>100	76	48	66	48	73	48	65	53	70	50	65
3	>100	67	68	71	69	71	60	82	64	77	65	74
4	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
5	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
6	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
7	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
8	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
9	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
10	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

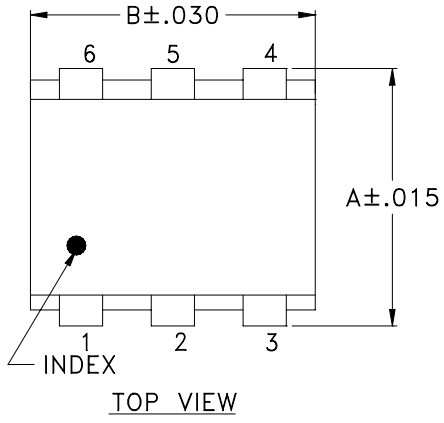
Test conditions:
RF IN: 500.1 MHz; -10.00 dBm.
LO IN: 530.01 MHz; +10.00 dBm
IF OUT: 29.91 MHz; -16.7 dBm

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.

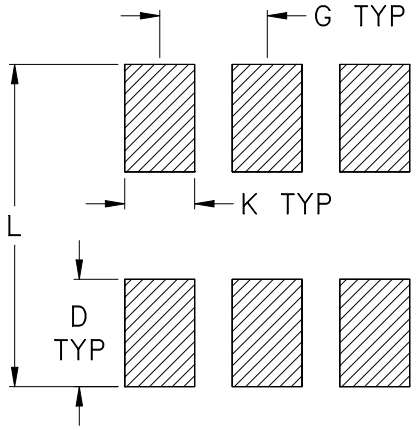
Case Style BH

BH292

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

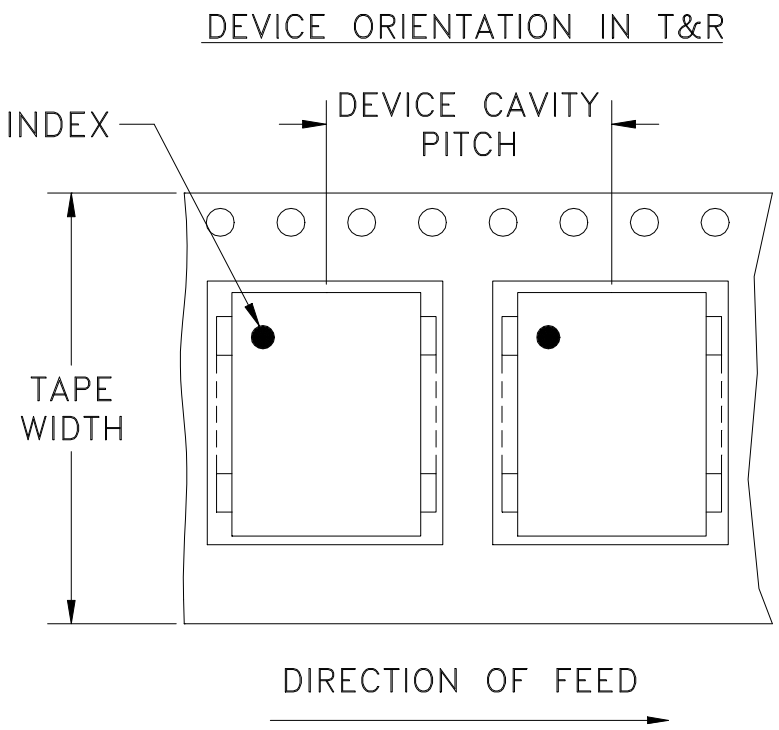
CASE #	A	B	C	D	E	F	G	H	J	K	L	WT. GRAM
BH292	.280 (7.11)	.310 (7.87)	- -	.100 (2.54)	.225 (5.72)	.055 (1.40)	.100 (2.54	.047 (1.19)	.065 (1.65)	.065 (1.65)	.300 (7.62)	.45

Dimensions are in inches (mm). Tolerances: 2Pl. ± .01; 3Pl. ± .005

Notes:
1. Case material: Ceramic.
2. Termination finish:
   For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
   For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

Mini-Circuits®
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

Tape & Reel Packaging TR-F24



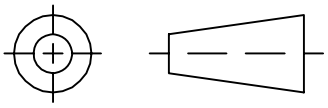
Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
16	12	13	500

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

Mini-Circuits®
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

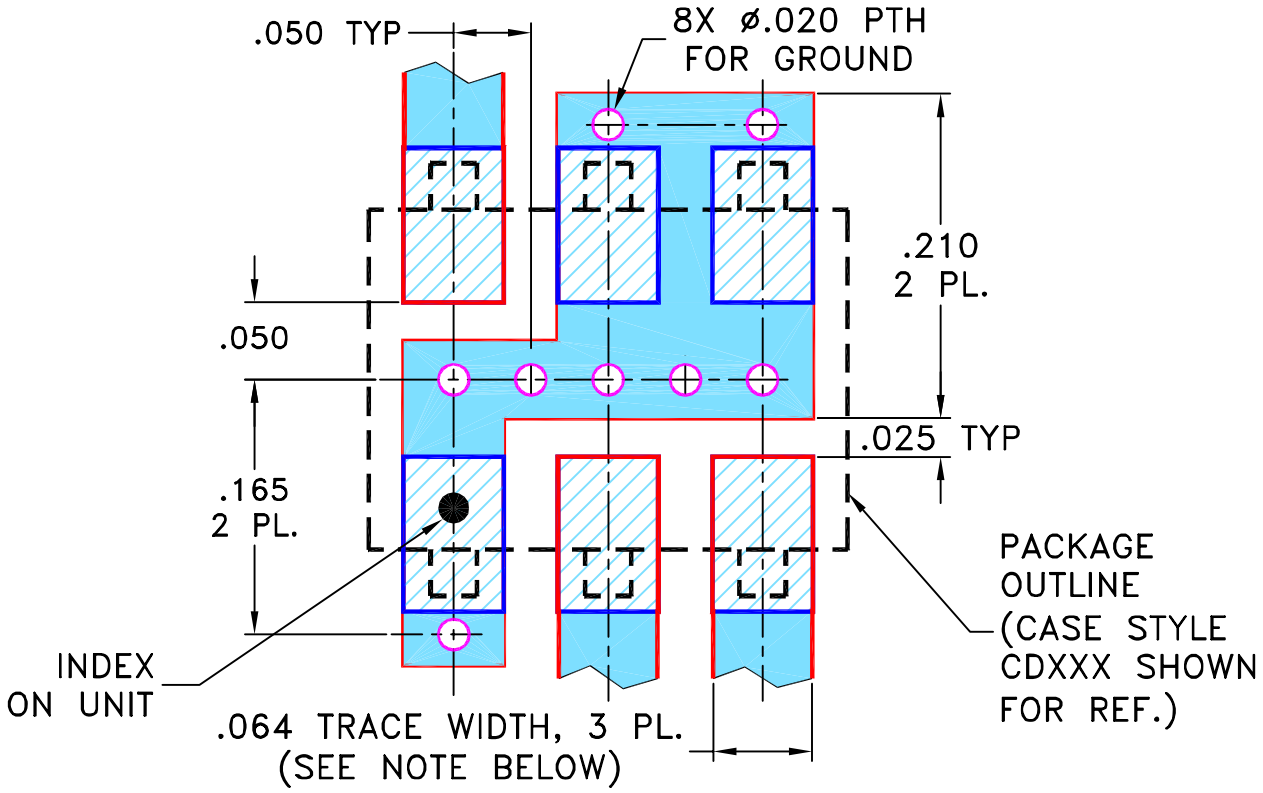
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
A	M101143	ADDED "gk" PIN CONNECTION,	10/10/05	MMG	DJ
		TT100 CASE STYLE & NOTE 2			
B	M102713	ADDED "...WITH SMOBC"	01/17/06	MMG	IL
C	M108637	REMOVED "PIN 1" , ADDED INDEX ON UNIT	12/01/06	MYG	FL

SUGGESTED MOUNTING CONFIGURATION FOR BH292, CD541/542/636/637, TT100/240 CASE STYLES, "gk", "ht", "hu", "nd", "w" PIN CONNECTIONS



NOTES:
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	MMG	07/17/02
TOLERANCES ON:	CHECKED	WL	08/02/02
2 PL DECIMALS ±	APPROVED	DJ	08/05/02
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

Mini-Circuits®

ASHEETA1.DWG REV:A DATE:01/12/95

Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

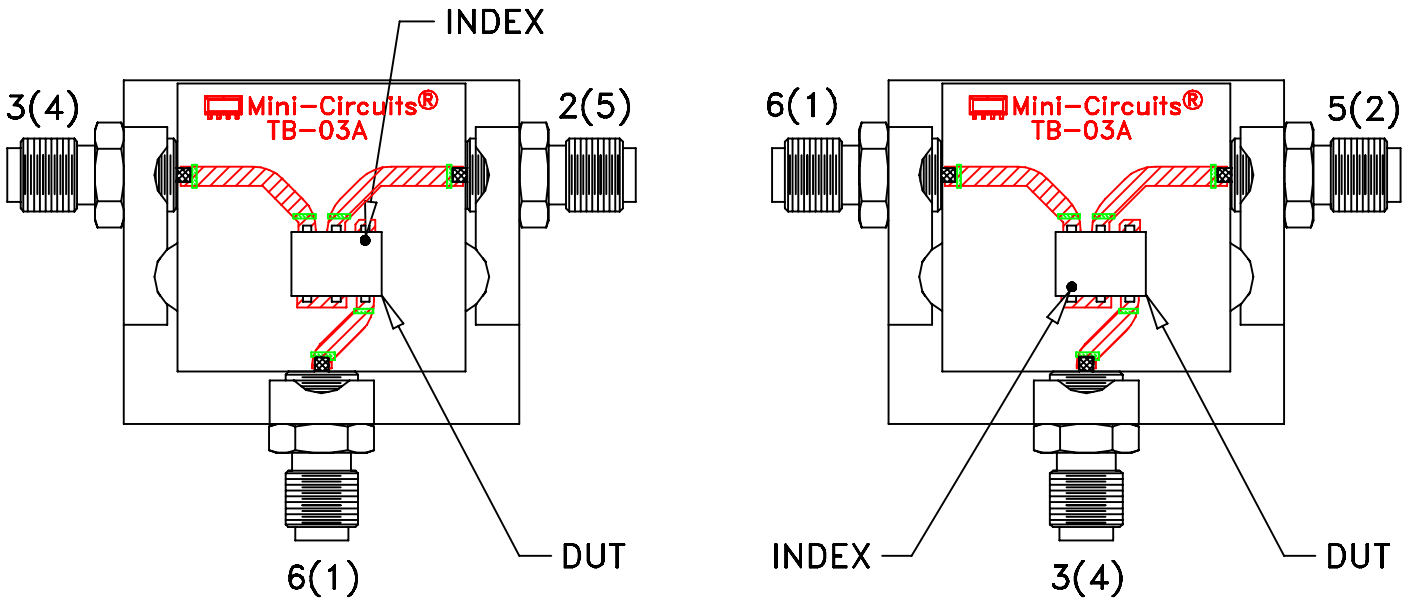
PL, gk/ht/hu/nd/w, BH292, CD541/542/636/637, TT100/240, TB-03

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-052	C

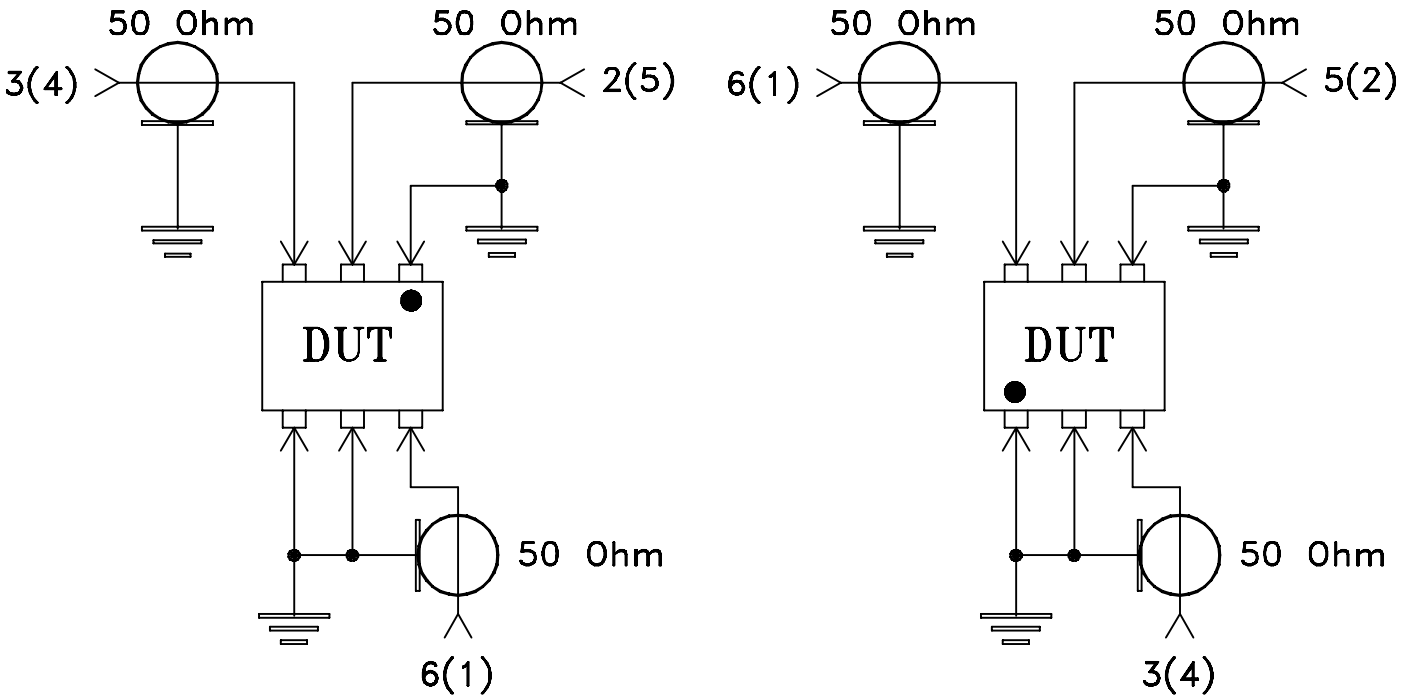
FILE:	SCALE:	SHEET:
98PL052	8:1	1 OF 1

Evaluation Board and Circuit

For Pin Connections and DUT Orientation Refer to Data Sheet of the DUT



TB-03



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.030 inch.

Mini-Circuits®

Mini-Circuits

Environmental Specifications ENV02T1

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	-40° to 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, 95% Coverage
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
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