Surface Mount

Frequency Mixer

JMS-1LH

Level 10 (LO Power +10 dBm) 2 to 500 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

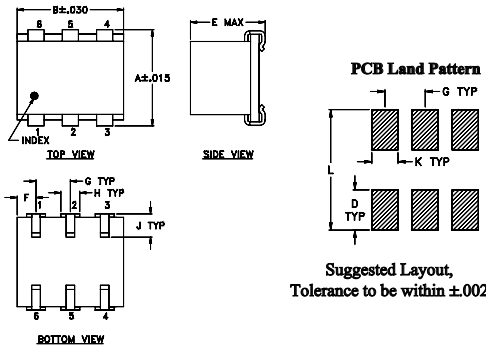
Features

- low conversion loss, 5.75 dB typ.
- miniature surface mount
- J-leads for strain relief and excellent solderability

Applications

- up & down converters for receivers & transmitters
- VHF/UHF

Outline Drawing

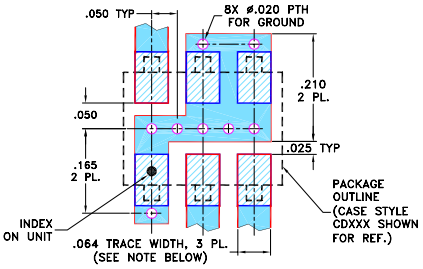


Outline Dimensions (inch / mm)

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.
2-500	DC-500	5.75	.10	7.0	8.0	55	50	45	30	40	25	55	45	45	25	30	20	16

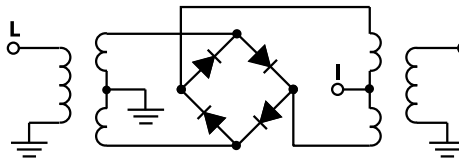
1 dB COMP.: +5 dBm typ.

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 +10dBm	LO +10dBm	LO +10dBm	LO +10dBm	LO +10dBm
10.10	40.10	5.60	65.00	53.51	1.13	2.56
49.80	79.80	5.71	61.31	46.92	1.04	2.48
89.50	119.50	5.70	56.90	42.98	1.03	2.35
129.20	159.20	5.77	53.33	40.82	1.05	2.44
168.90	198.90	5.78	50.64	39.38	1.06	2.35
208.60	238.60	5.78	48.27	38.49	1.08	2.40
248.30	278.30	5.80	46.07	37.77	1.08	2.41
287.90	317.90	5.85	44.70	36.82	1.10	2.39
327.60	357.60	5.85	43.25	35.90	1.14	2.48
367.30	397.30	5.81	41.23	34.68	1.16	2.44
407.00	437.00	5.87	40.00	33.85	1.15	2.50
446.70	476.70	5.98	39.88	32.68	1.17	2.53
486.40	516.40	5.92	39.70	31.09	1.24	2.51
526.10	556.10	5.87	39.38	29.76	1.33	2.54
565.80	595.80	5.90	38.47	28.55	1.40	2.56

Electrical Schematic



Notes

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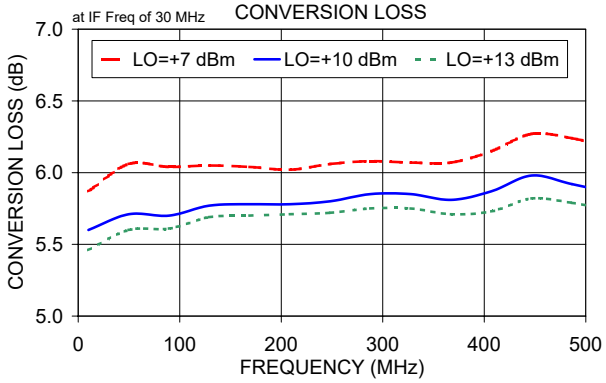
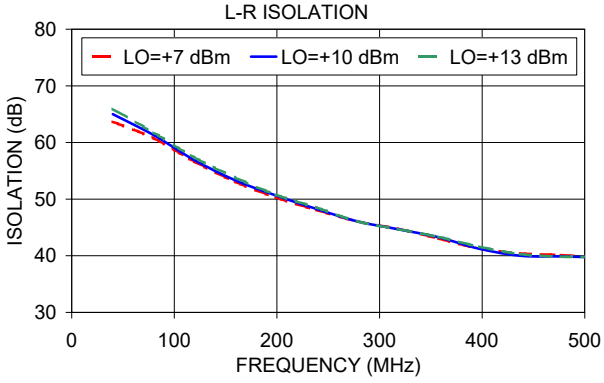
Performance Charts

JMS-1LH

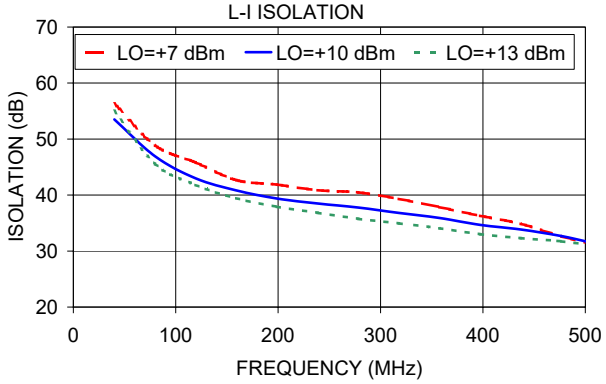
JMS-1LH+
CONVERSION LOSS
at IF Freq of 30 MHz



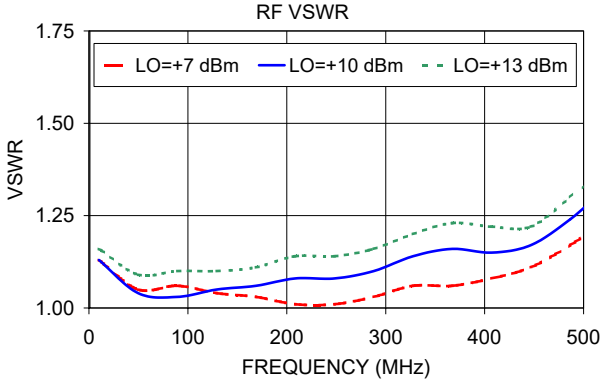
JMS-1LH+
L-R ISOLATION



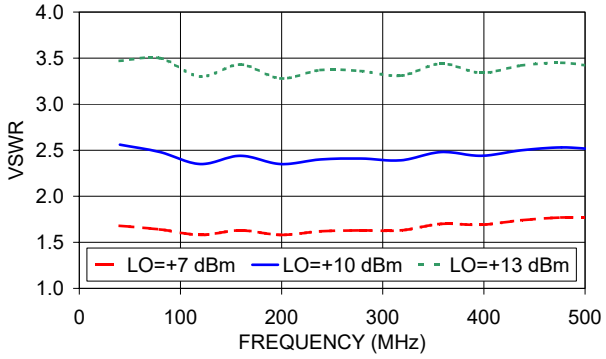
JMS-1LH+
L-I ISOLATION



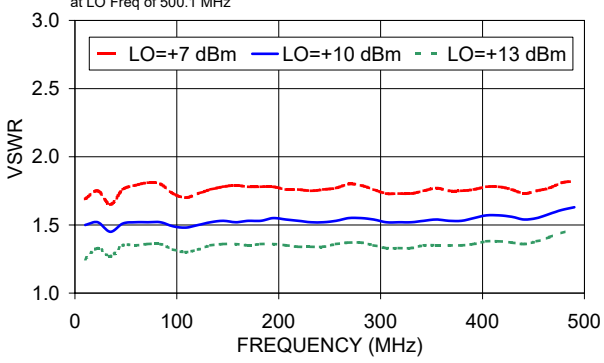
JMS-1LH+
RF VSWR



JMS-1LH+
LO VSWR



JMS-1LH+
IF VSWR
at LO Freq of 500.1 MHz



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Frequency Mixer JMS-1LH

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB) @LO (dBm)		
		+7	+10	+13
5.0	35.0	6.14	5.87	5.71
10.0	40.0	6.47	6.17	5.99
49.8	79.8	6.06	5.71	5.60
89.5	119.5	6.04	5.70	5.61
129.2	159.2	6.05	5.77	5.69
168.9	198.9	6.04	5.78	5.70
208.6	238.6	6.02	5.78	5.71
248.3	278.3	6.06	5.80	5.72
287.9	317.9	6.08	5.85	5.75
327.6	357.6	6.07	5.85	5.75
367.3	397.3	6.07	5.81	5.71
446.7	476.7	6.27	5.98	5.82
486.4	516.4	6.24	5.92	5.79
526.1	556.1	6.18	5.87	5.75
565.8	595.8	6.19	5.90	5.79
585.6	615.6	6.25	5.95	5.85
625.3	655.3	6.38	6.08	5.96
645.2	675.2	6.48	6.18	6.04
684.9	714.9	6.65	6.33	6.18
704.7	734.7	6.77	6.44	6.26
744.4	774.4	6.90	6.57	6.36
764.3	794.3	6.93	6.59	6.37
803.9	833.9	7.00	6.60	6.38
823.8	853.8	7.00	6.59	6.37
863.5	893.5	7.01	6.61	6.41
883.3	913.3	6.96	6.57	6.38
923.0	953.0	7.07	6.68	6.48
942.9	972.9	7.12	6.73	6.53
1002.4	1032.4	7.45	6.98	6.79
1042.1	1072.1	7.76	7.23	6.98
1061.9	1091.9	7.97	7.43	7.15
1101.6	1131.6	8.39	7.78	7.46
1121.5	1151.5	8.67	8.03	7.70
1161.2	1191.2	9.23	8.50	8.13
1181.0	1211.0	9.55	8.77	8.39
1220.7	1250.7	10.16	9.34	8.95
1240.6	1270.6	10.53	9.71	9.30
1280.3	1310.3	11.33	10.58	10.18
1300.1	1330.1	11.73	11.03	10.63

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm) @LO (dBm)		
		+7	+10	+13
10.1	40.1	21.57	24.56	28.68
49.8	79.8	20.21	22.22	23.03
89.5	119.5	21.22	22.99	23.67
129.2	159.2	22.02	21.38	27.95
168.9	198.9	20.01	22.54	21.67
208.6	238.6	19.80	24.62	20.50
248.3	278.3	22.66	19.82	17.34
287.9	317.9	20.64	19.50	18.48
327.6	357.6	23.59	17.91	17.61
367.3	397.3	16.56	16.06	17.93
407.0	437.0	14.17	13.67	15.16
446.7	476.7	15.83	14.72	15.49
486.4	516.4	19.97	17.79	21.11
526.1	556.1	27.65	19.59	21.73
565.8	595.8	22.09	19.42	19.37
585.6	615.6	21.23	18.56	19.53
625.3	655.3	14.44	16.86	19.07
645.2	675.2	11.95	15.45	19.17
684.9	714.9	8.70	11.27	15.87
704.7	734.7	7.89	9.64	13.34
744.4	774.4	7.17	8.21	10.61
764.3	794.3	7.33	8.45	10.63
803.9	833.9	7.60	9.21	11.71
863.5	893.5	8.92	11.36	14.59
883.3	913.3	9.45	12.12	15.61
923.0	953.0	10.48	13.36	17.50
942.9	972.9	11.19	14.20	19.49
982.6	1012.6	13.69	18.65	20.50
1002.4	1032.4	15.40	22.17	17.55
1042.1	1072.1	15.20	15.75	15.74
1061.9	1091.9	13.68	14.43	15.83
1101.6	1131.6	11.76	13.20	15.09
1121.5	1151.5	11.33	13.65	15.99
1161.2	1191.2	10.92	15.01	18.99
1181.0	1211.0	11.49	16.15	18.07
1220.7	1250.7	13.62	16.20	15.38
1240.6	1270.6	15.31	14.87	14.71
1280.3	1310.3	16.62	13.80	14.03
1300.1	1330.1	16.01	13.72	14.28

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+5dBm (dB) @LO (dBm)		
		+7	+10	+13
10.1	40.1	0.92	0.68	0.47
49.8	79.8	1.18	0.93	0.74
89.5	119.5	1.23	0.91	0.72
129.2	159.2	1.22	0.87	0.70
168.9	198.9	1.17	0.85	0.68
208.6	238.6	1.25	0.88	0.71
248.3	278.3	1.20	0.88	0.71
287.9	317.9	1.17	0.87	0.73
327.6	357.6	1.22	0.88	0.73
367.3	397.3	1.22	0.94	0.78
407.0	437.0	1.15	0.89	0.78
446.7	476.7	1.05	0.81	0.73
486.4	516.4	1.18	0.89	0.78
526.1	556.1	1.25	0.91	0.80
565.8	595.8	1.45	1.03	0.83
585.6	615.6	1.46	1.03	0.83
625.3	655.3	1.65	1.21	0.96
645.2	675.2	1.62	1.18	0.94
684.9	714.9	1.74	1.31	1.08
704.7	734.7	1.69	1.29	1.07
744.4	774.4	1.71	1.37	1.12
764.3	794.3	1.70	1.37	1.15
803.9	833.9	1.75	1.39	1.16
863.5	893.5	1.85	1.48	1.26
883.3	913.3	2.00	1.60	1.38
923.0	953.0	2.06	1.68	1.44
942.9	972.9	2.15	1.76	1.53
982.6	1012.6	2.19	1.83	1.59
1002.4	1032.4	2.16	1.85	1.64
1042.1	1072.1	2.19	1.90	1.70
1061.9	1091.9	2.11	1.88	1.69
1101.6	1131.6	2.18	2.01	1.84
1121.5	1151.5	2.10	1.97	1.81
1161.2	1191.2	2.01	1.96	1.83
1181.0	1211.0	1.98	1.97	1.87
1220.7	1250.7	1.80	1.87	1.80
1240.6	1270.6	1.71	1.76	1.73
1280.3	1310.3	1.37	1.41	1.45
1300.1	1330.1	1.24	1.25	1.30

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=250.1MHz (dB)
		@LO (dBm)
		+10
240.0	10.1	5.90
234.1	16.0	5.88
228.2	21.9	5.85
222.3	27.8	5.85
216.4	33.7	5.85
210.5	39.6	5.84
204.6	45.5	5.84
198.7	51.4	5.80
192.8	57.3	5.81
186.9	63.2	5.77
181.0	69.1	5.80
175.1	75.0	5.81
169.2	80.9	5.77
163.3	86.8	5.77
157.4	92.7	5.76
151.5	98.6	5.72
145.6	104.5	5.75
139.7	110.4	5.72
133.8	116.3	5.72
127.9	122.2	5.67
122.1	128.0	5.66
116.2	133.9	5.68
110.3	139.8	5.72
104.4	145.7	5.70
98.5	151.6	5.71
92.6	157.5	5.70
86.7	163.4	5.70
80.8	169.3	5.71
74.9	175.2	5.71
69.0	181.1	5.71
63.1	187.0	5.69
57.2	192.9	5.70
51.3	198.8	5.70
45.4	204.7	5.73
39.5	210.6	5.74
33.6	216.5	5.74
27.7	222.4	5.73
21.8	228.3	5.75
15.9	234.2	5.78
10.0	240.1	5.89

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=10.1MHz (dB)
		@LO (dBm)
		+10
10.0	20.1	5.75
22.3	32.4	5.65
34.6	44.7	5.64
46.9	57.0	5.68
59.2	69.3	5.66
71.5	81.6	5.72
83.8	93.9	5.72
96.2	106.3	5.71
108.5	118.6	5.72
120.8	130.9	5.71
133.1	143.2	5.71
145.4	155.5	5.76
157.7	167.8	5.79
170.0	180.1	5.79
182.3	192.4	5.81
194.6	204.7	5.80
206.9	217.0	5.82
219.2	229.3	5.83
231.5	241.6	5.83
243.8	253.9	5.85
256.2	266.3	5.88
268.5	278.6	5.88
280.8	290.9	5.89
293.1	303.2	5.92
305.4	315.5	5.93
317.7	327.8	5.98
330.0	340.1	5.98
342.3	352.4	5.96
354.6	364.7	5.96
366.9	377.0	5.97
379.2	389.3	5.97
391.5	401.6	5.96
403.8	413.9	5.94
416.2	426.3	5.96
428.5	438.6	5.99
440.8	450.9	6.03
453.1	463.2	6.04
465.4	475.5	6.03
477.7	487.8	6.01
490.0	500.1	6.02

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=500.1MHz (dB)
		@LO (dBm)
		+10
490.0	10.1	6.02
477.7	22.4	5.99
465.4	34.7	5.95
453.1	47.0	5.92
440.8	59.3	5.95
428.5	71.6	5.85
416.2	83.9	5.82
403.8	96.3	5.79
391.5	108.6	5.74
379.2	120.9	5.73
366.9	133.2	5.72
354.6	145.5	5.69
342.3	157.8	5.70
330.0	170.1	5.71
317.7	182.4	5.71
305.4	194.7	5.71
293.1	207.0	5.69
280.8	219.3	5.70
268.5	231.6	5.73
256.2	243.9	5.74
243.8	256.3	5.76
231.5	268.6	5.79
219.2	280.9	5.77
206.9	293.2	5.78
194.6	305.5	5.76
182.3	317.8	5.74
170.0	330.1	5.74
157.7	342.4	5.75
145.4	354.7	5.77
133.1	367.0	5.80
120.8	379.3	5.80
108.5	391.6	5.81
96.2	403.9	5.84
83.8	416.3	5.86
71.5	428.6	5.90
59.2	440.9	5.94
46.9	453.2	5.93
34.6	465.5	5.96
22.3	477.8	5.96
10.0	490.1	6.09

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm)			LO-IF ISOLATION (dB) @LO (dBm)		
	+7	+10	+13	+7	+10	+13
5.0	65.11	67.37	69.67	54.46	56.74	57.76
10.0	63.38	65.16	66.06	52.78	52.79	52.34
49.8	60.76	61.31	61.75	48.86	46.92	45.54
89.5	56.64	56.90	57.35	45.82	42.98	41.80
129.2	53.06	53.33	53.81	42.66	40.82	39.44
168.9	50.30	50.64	50.78	41.87	39.38	37.90
208.6	48.10	48.27	48.51	40.87	38.49	36.83
248.3	46.06	46.07	46.08	40.47	37.77	35.75
287.9	44.78	44.70	44.70	39.32	36.82	34.95
327.6	43.04	43.25	43.33	37.84	35.90	34.06
367.3	41.27	41.23	41.61	36.31	34.68	33.00
446.7	40.12	39.88	39.84	32.62	32.68	31.73
486.4	39.67	39.70	39.71	30.90	31.09	30.75
526.1	39.33	39.38	39.07	29.54	29.76	29.40
565.8	38.63	38.47	38.08	28.55	28.55	28.29
585.6	38.29	38.12	37.76	28.43	28.32	27.93
625.3	37.05	37.13	37.10	28.13	27.88	27.17
645.2	36.39	36.71	36.87	27.91	27.97	27.06
684.9	34.75	35.55	36.18	27.29	28.30	27.29
704.7	34.16	35.05	35.92	26.81	28.18	27.43
744.4	33.17	34.33	35.54	25.99	27.82	27.95
764.3	32.99	34.45	35.81	25.73	27.63	27.84
803.9	33.00	34.94	36.74	25.16	26.81	27.02
823.8	33.28	35.56	37.36	24.80	26.19	26.25
863.5	34.86	37.49	38.84	24.12	25.18	25.25
883.3	35.49	37.75	38.53	23.61	24.55	24.65
923.0	36.51	37.78	37.92	22.69	23.68	23.87
942.9	36.03	36.81	36.82	22.45	23.41	23.67
1002.4	33.92	34.02	34.00	22.32	23.15	23.46
1042.1	32.74	32.51	32.39	22.34	23.29	23.68
1061.9	31.89	31.55	31.36	22.41	23.44	23.83
1101.6	30.48	30.27	29.99	22.21	23.70	24.19
1121.5	29.91	29.72	29.26	22.11	23.87	24.44
1161.2	28.85	28.80	28.37	21.96	24.24	25.25
1181.0	28.44	28.47	28.11	21.77	24.29	25.53
1220.7	27.50	27.77	27.51	21.32	24.32	26.15
1240.6	27.15	27.55	27.33	21.24	24.46	26.57
1280.3	26.34	26.85	26.91	20.97	24.48	27.01
1300.1	25.96	26.57	26.69	20.96	24.62	27.43

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB) @LO (dBm)		
		+7	+10	+13
10.1	40.1	46.61	45.92	44.89
49.8	79.8	34.42	34.69	34.86
89.5	119.5	30.16	30.53	30.32
129.2	159.2	27.53	27.78	27.80
168.9	198.9	25.79	26.02	26.20
208.6	238.6	24.64	25.11	25.28
248.3	278.3	23.91	24.09	24.36
287.9	317.9	23.84	24.21	24.43
327.6	357.6	23.48	24.21	24.81
367.3	397.3	23.21	24.11	24.83
407.0	437.0	23.43	23.95	24.39
446.7	476.7	24.21	24.39	24.58
486.4	516.4	24.67	25.15	25.69
526.1	556.1	23.07	23.97	24.79
565.8	595.8	20.00	20.62	21.19
585.6	615.6	18.63	19.04	19.45
625.3	655.3	16.62	16.68	16.81
645.2	675.2	15.87	15.84	15.89
684.9	714.9	14.79	14.80	14.85
704.7	734.7	14.35	14.36	14.45
744.4	774.4	13.65	13.60	13.67
764.3	794.3	13.38	13.31	13.35
823.8	853.8	12.66	12.56	12.63
863.5	893.5	12.36	12.35	12.44
883.3	913.3	12.16	12.17	12.25
923.0	953.0	11.92	11.95	12.06
942.9	972.9	11.80	11.83	11.91
982.6	1012.6	11.61	11.70	11.87
1002.4	1032.4	11.52	11.64	11.80
1042.1	1072.1	11.38	11.53	11.67
1061.9	1091.9	11.22	11.42	11.60
1101.6	1131.6	10.93	11.15	11.32
1121.5	1151.5	10.70	10.93	11.14
1161.2	1191.2	10.25	10.45	10.59
1181.0	1211.0	9.96	10.18	10.26
1220.7	1250.7	9.39	9.55	9.58
1240.6	1270.6	9.09	9.20	9.21
1280.3	1310.3	8.54	8.58	8.48
1300.1	1330.1	8.27	8.23	8.19

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1) @LO (dBm)		
		+7	+10	+13
5.0	35.0	1.15	1.16	1.18
10.0	40.0	1.09	1.08	1.11
49.8	79.8	1.05	1.04	1.09
89.5	119.5	1.06	1.03	1.10
129.2	159.2	1.04	1.05	1.10
168.9	198.9	1.03	1.06	1.11
208.6	238.6	1.01	1.08	1.14
248.3	278.3	1.01	1.08	1.14
287.9	317.9	1.03	1.10	1.16
327.6	357.6	1.06	1.14	1.20
367.3	397.3	1.06	1.16	1.23
446.7	476.7	1.11	1.17	1.22
486.4	516.4	1.17	1.24	1.30
526.1	556.1	1.24	1.33	1.38
565.8	595.8	1.29	1.40	1.46
585.6	615.6	1.31	1.42	1.49
625.3	655.3	1.32	1.44	1.51
645.2	675.2	1.31	1.43	1.51
684.9	714.9	1.29	1.40	1.48
704.7	734.7	1.28	1.38	1.45
744.4	774.4	1.26	1.33	1.40
764.3	794.3	1.27	1.33	1.40
803.9	833.9	1.27	1.33	1.39
823.8	853.8	1.30	1.36	1.41
863.5	893.5	1.35	1.41	1.45
883.3	913.3	1.41	1.45	1.49
923.0	953.0	1.54	1.58	1.61
942.9	972.9	1.62	1.66	1.68
982.6	1012.6	1.82	1.85	1.87
1002.4	1032.4	1.94	1.96	1.97
1042.1	1072.1	2.22	2.21	2.21
1061.9	1091.9	2.37	2.34	2.33
1101.6	1131.6	2.67	2.60	2.56
1121.5	1151.5	2.81	2.72	2.67
1161.2	1191.2	3.03	2.92	2.84
1181.0	1211.0	3.12	2.99	2.90
1220.7	1250.7	3.24	3.11	3.02
1240.6	1270.6	3.29	3.16	3.06
1280.3	1310.3	3.35	3.23	3.14
1300.1	1330.1	3.34	3.23	3.14

LO (MHz)	LO VSWR (:1) @LO (dBm)		
	+7	+10	+13
5.0	1.61	2.42	3.53
10.0	1.58	2.33	3.49
49.8	1.64	2.48	3.50
89.5	1.58	2.35	3.30
129.2	1.63	2.44	3.43
168.9	1.58	2.35	3.28
208.6	1.62	2.40	3.37
248.3	1.63	2.41	3.36
287.9	1.63	2.39	3.31
327.6	1.70	2.48	3.44
367.3	1.69	2.44	3.34
446.7	1.77	2.53	3.45
486.4	1.77	2.51	3.41
526.1	1.81	2.54	3.46
565.8	1.85	2.56	3.45
585.6	1.88	2.59	3.47
625.3	1.95	2.65	3.52
645.2	1.97	2.66	3.52
684.9	2.01	2.72	3.56
704.7	2.03	2.74	3.59
744.4	2.03	2.73	3.58
764.3	2.04	2.74	3.59
803.9	2.03	2.72	3.56
823.8	2.00	2.69	3.53
863.5	1.99	2.67	3.52
883.3	1.99	2.68	3.53
923.0	1.99	2.68	3.50
942.9	2.00	2.68	3.50
982.6	2.07	2.73	3.55
1002.4	2.11	2.76	3.56
1042.1	2.15	2.77	3.56
1061.9	2.19	2.81	3.59
1101.6	2.28	2.86	3.62
1121.5	2.30	2.86	3.60
1161.2	2.37	2.92	3.65
1181.0	2.42	2.95	3.68
1220.7	2.48	2.97	3.67
1240.6	2.51	2.99	3.68
1280.3	2.60	3.05	3.73
1300.1	2.65	3.07	3.73

IF (OUT) (MHz)	IF VSWR @LO=500.1MHz (:1) @LO (dBm)		
	+7	+10	+13
5.0	1.31	1.18	1.08
10.0	1.31	1.18	1.08
22.4	1.75	1.52	1.33
34.7	1.65	1.45	1.27
47.0	1.76	1.51	1.35
59.3	1.79	1.52	1.35
71.6	1.81	1.52	1.36
83.9	1.80	1.52	1.36
96.3	1.73	1.49	1.32
108.6	1.70	1.48	1.30
120.9	1.73	1.50	1.32
133.2	1.76	1.52	1.35
145.5	1.78	1.53	1.36
157.8	1.79	1.52	1.36
170.1	1.78	1.53	1.35
182.4	1.78	1.53	1.36
194.7	1.78	1.55	1.36
207.0	1.76	1.54	1.35
219.3	1.76	1.53	1.34
231.6	1.75	1.52	1.34
243.9	1.76	1.52	1.34
256.3	1.77	1.53	1.36
268.6	1.80	1.55	1.37
280.9	1.79	1.55	1.37
293.2	1.76	1.54	1.35
305.5	1.73	1.52	1.33
330.1	1.73	1.52	1.33
342.4	1.75	1.53	1.35
354.7	1.77	1.54	1.35
367.0	1.75	1.53	1.35
379.3	1.75	1.53	1.35
391.6	1.76	1.55	1.36
403.9	1.78	1.57	1.38
416.3	1.78	1.57	1.38
428.6	1.76	1.56	1.37
440.9	1.73	1.54	1.36
453.2	1.75	1.55	1.38
465.5	1.77	1.58	1.41
477.8	1.81	1.61	1.44
490.1	1.82	1.63	1.47

Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	19	35	24	44	28	44	36	52	43	58
1	-	19	+0	30	12	34	18	32	26	54	46	54
2	93	60	40	71	40	58	40	53	40	51	44	62
3	>100	46	45	51	49	54	44	48	42	55	47	64
4	>100	70	59	71	58	70	57	66	53	64	50	64
5	>100	62	65	68	56	72	54	66	51	67	51	61
6	>100	74	65	86	67	79	69	78	69	77	66	80
7	>100	78	69	82	69	81	75	86	87	77	71	74
8	>100	86	79	82	79	90	77	91	77	87	80	82
9	>100	93	83	84	76	82	76	83	84	81	>94	93
10	>100	>94	92	>94	>94	>94	85	89	85	>94	79	>94
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:
RF IN: 250.1 MHz; 0.00 dBm.
LO IN: 280.01 MHz; +10.00 dBm
IF OUT: 29.91 MHz; -5.98 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	10	25	12	29	15	28	20	40	25	41
1	-	19	+0	29	12	32	17	30	25	53	44	45
2	>100	69	45	63	45	67	44	57	43	54	48	71
3	>100	66	64	70	65	>84	58	70	62	79	60	77
4	>100	>84	76	83	77	81	78	>84	75	>84	77	>84
5	>100	>84	>84	>84	>84	>84	83	>84	81	>84	82	>84
6	>100	>84	>84	>84	>84	>84	81	>84	>84	>84	>84	>84
7	>100	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84
8	>100	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84
9	>100	>84	>84	>84	>84	>84	>84	>84	>84	67	>84	>84
10	>100	>84	>84	>84	>84	>84	>84	>84	>84	>84	79	>84
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

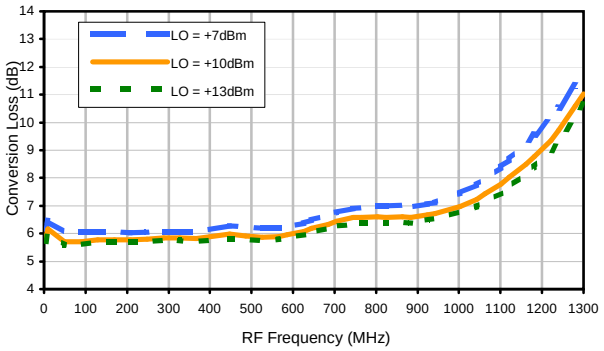
Test conditions:
RF IN: 250.1 MHz; -10.00 dBm.
LO IN: 280.01 MHz; +10.00 dBm
IF OUT: 29.91 MHz; -15.91 dBm

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.

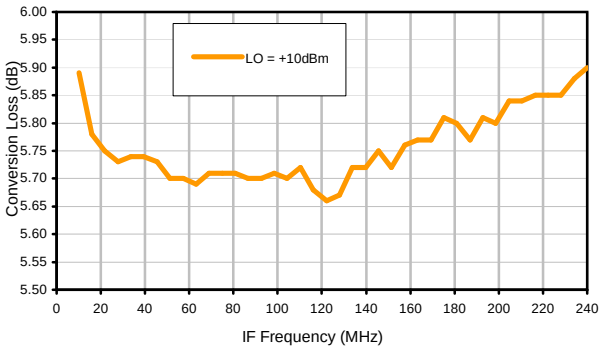
Frequency Mixer JMS-1LH

Typical Performance Curves

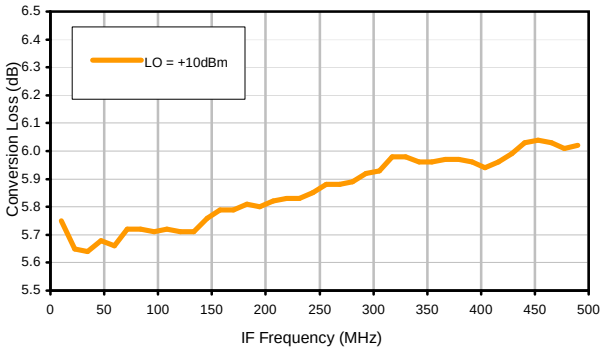
Conversion Loss @ IF=30MHz



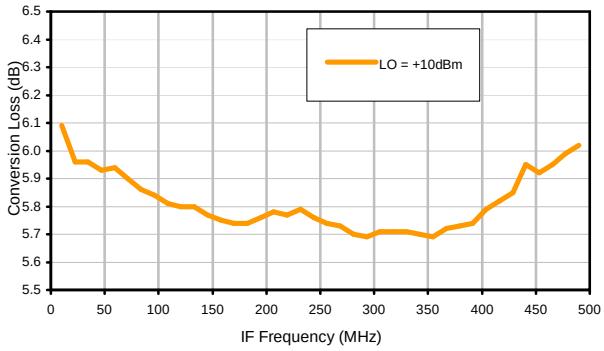
Conversion Loss vs. IF @ RF=250.1MHz



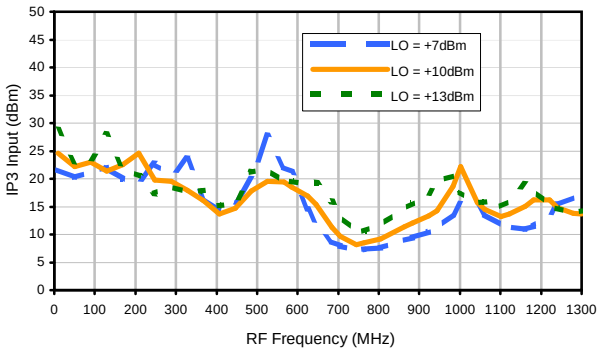
Conversion Loss vs. IF @ RF=10.1MHz



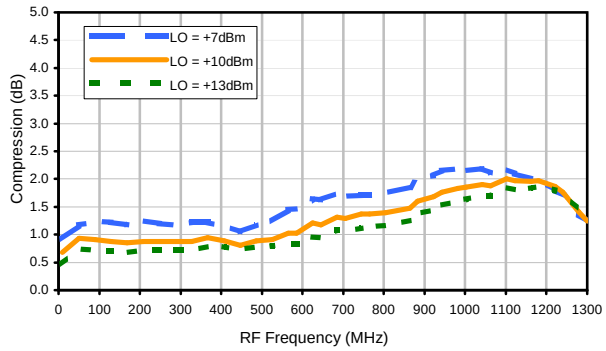
Conversion Loss vs. IF @ RF=500.1MHz



IP3 Input

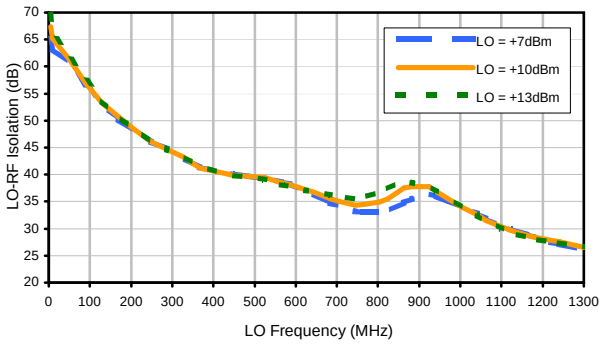


Compression @ RF IN=+5dBm

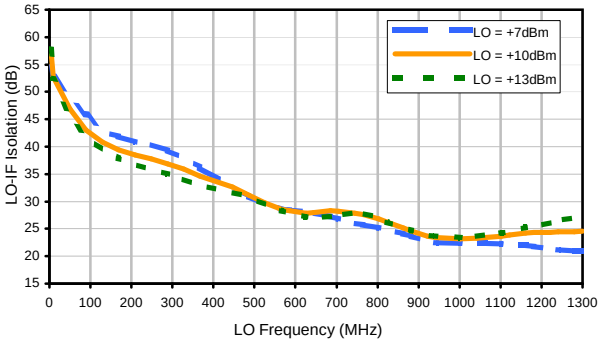


Typical Performance Curves

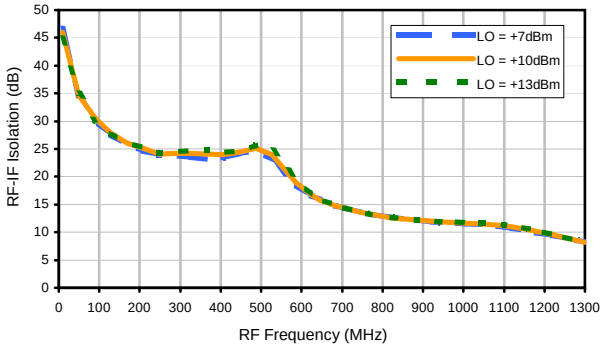
LO-RF Isolation



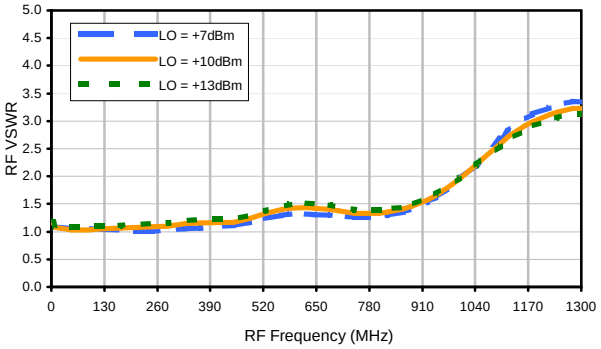
LO-IF Isolation



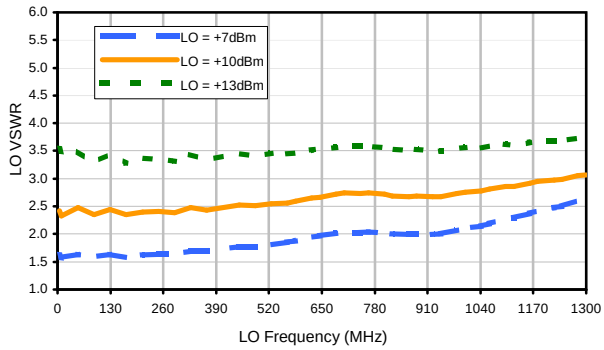
RF-IF Isolation



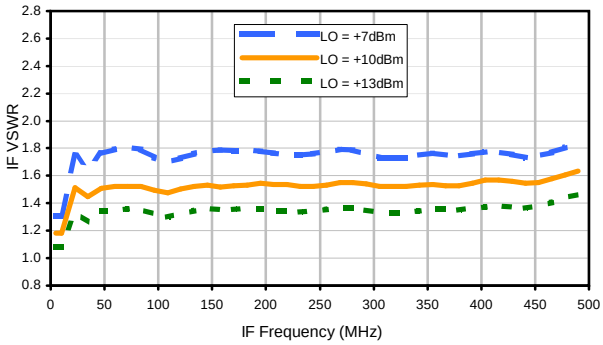
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	19	35	24	44	28	44	36	52	43	58
1	-	19	+0	30	12	34	18	32	26	54	46	54
2	93	60	40	71	40	58	40	53	40	51	44	62
3	>100	46	45	51	49	54	44	48	42	55	47	64
4	>100	70	59	71	58	70	57	66	53	64	50	64
5	>100	62	65	68	56	72	54	66	51	67	51	61
6	>100	74	65	86	67	79	69	78	69	77	66	80
7	>100	78	69	82	69	81	75	86	87	77	71	74
8	>100	86	79	82	79	90	77	91	77	87	80	82
9	>100	93	83	84	76	82	76	83	84	81	>94	93
10	>100	>94	92	>94	>94	>94	85	89	85	>94	79	>94
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:
RF IN: 250.1 MHz; 0.00 dBm.
LO IN: 280.01 MHz; +10.00 dBm
IF OUT: 29.91 MHz; -5.98 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	10	25	12	29	15	28	20	40	25	41
1	-	19	+0	29	12	32	17	30	25	53	44	45
2	>100	69	45	63	45	67	44	57	43	54	48	71
3	>100	66	64	70	65	>84	58	70	62	79	60	77
4	>100	>84	76	83	77	81	78	>84	75	>84	77	>84
5	>100	>84	>84	>84	>84	>84	83	>84	81	>84	82	>84
6	>100	>84	>84	>84	>84	>84	81	>84	>84	>84	>84	>84
7	>100	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84
8	>100	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84	>84
9	>100	>84	>84	>84	>84	>84	>84	>84	>84	67	>84	>84
10	>100	>84	>84	>84	>84	>84	>84	>84	>84	>84	79	>84
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

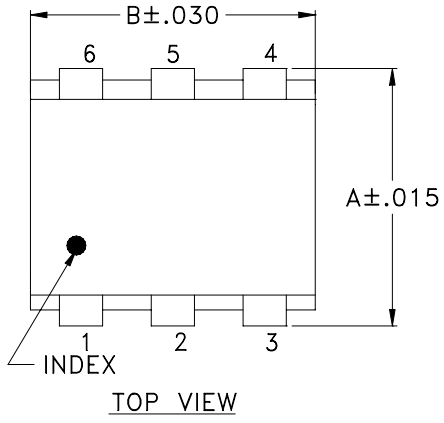
Test conditions:
RF IN: 250.1 MHz; -10.00 dBm.
LO IN: 280.01 MHz; +10.00 dBm
IF OUT: 29.91 MHz; -15.91 dBm

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.

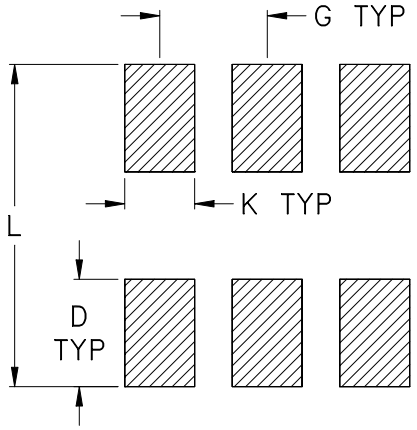
Case Style BH

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.

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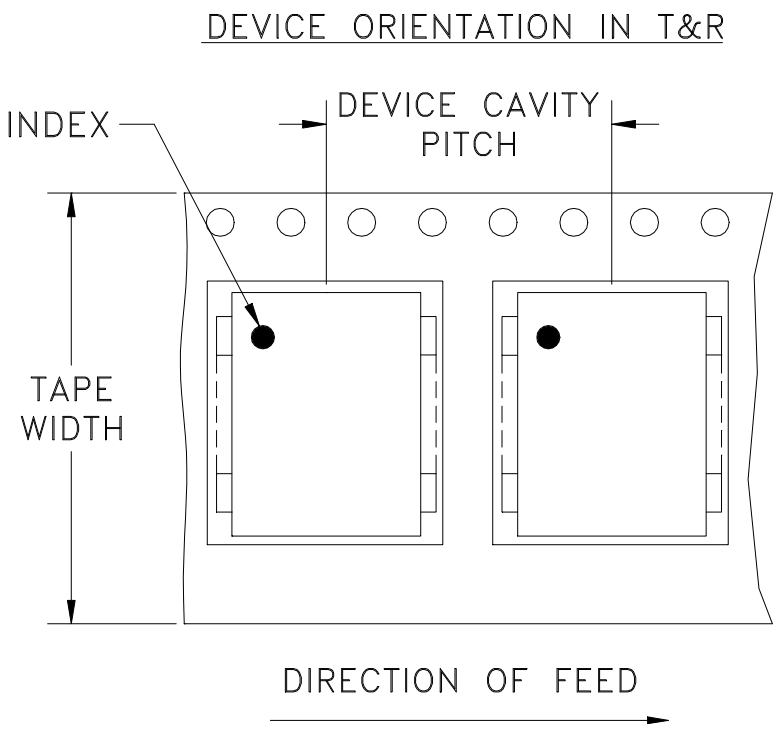

Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
16	12	13	500

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.

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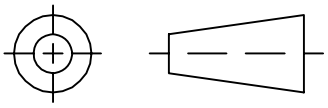
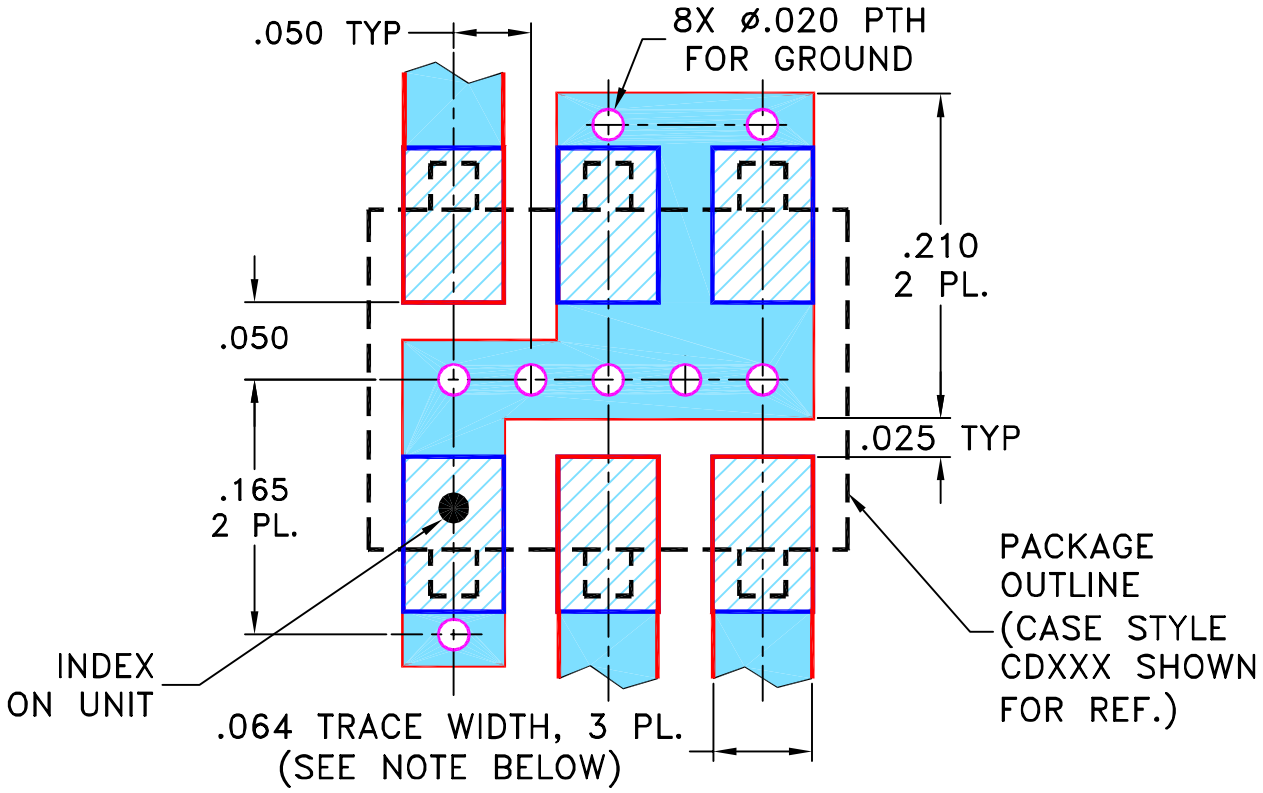
THIRD ANGLE PROJECTION



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 ±			

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

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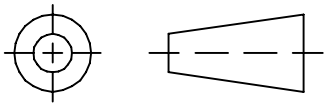
13 Neptune Avenue
Brooklyn NY 11235

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

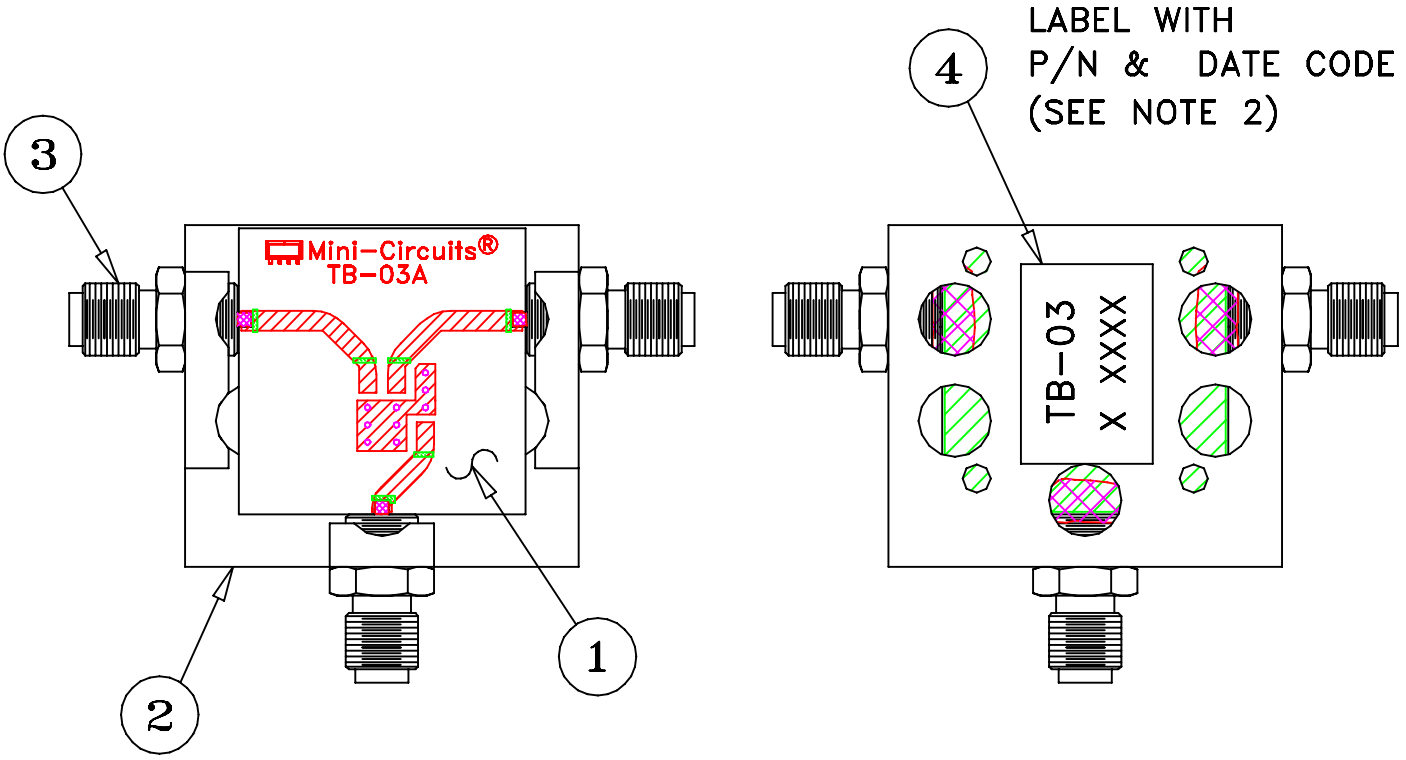
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-052	C

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

THIRD ANGLE PROJECTION



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
E	**M119737**	**UPDATED PCB**	**10.08**	**MF**	**AD**
F	M127659	UPDATED CARR	06.10	SW	SG
G	M127846	UPDATED SCHEMATIC DIAGRAM	06.10	SW	SG
H	M131840	UPDATED DWG	05.11	MF	AD



NOTES:

1. REFER TO -09 PAGE FOR ITEM DESCRIPTIONS. DESIGNATION NUMBERS ON -20 PAGE CORRESPOND TO THE NUMBERS ON -09 PAGE.
2. FOR TEXT HEIGHT & STYLE ON THE LABEL REFER TO: D3-G209.

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	S.WOLYNSKI	06.29.99
TOLERANCES ON:	CHECKED	SG	07.06.99
2 PL DECIMALS ±	APPROVED	MG	07.10.99
3 PL DECIMALS ±			
ANGLES ±			
FRACTIONS ±			

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

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

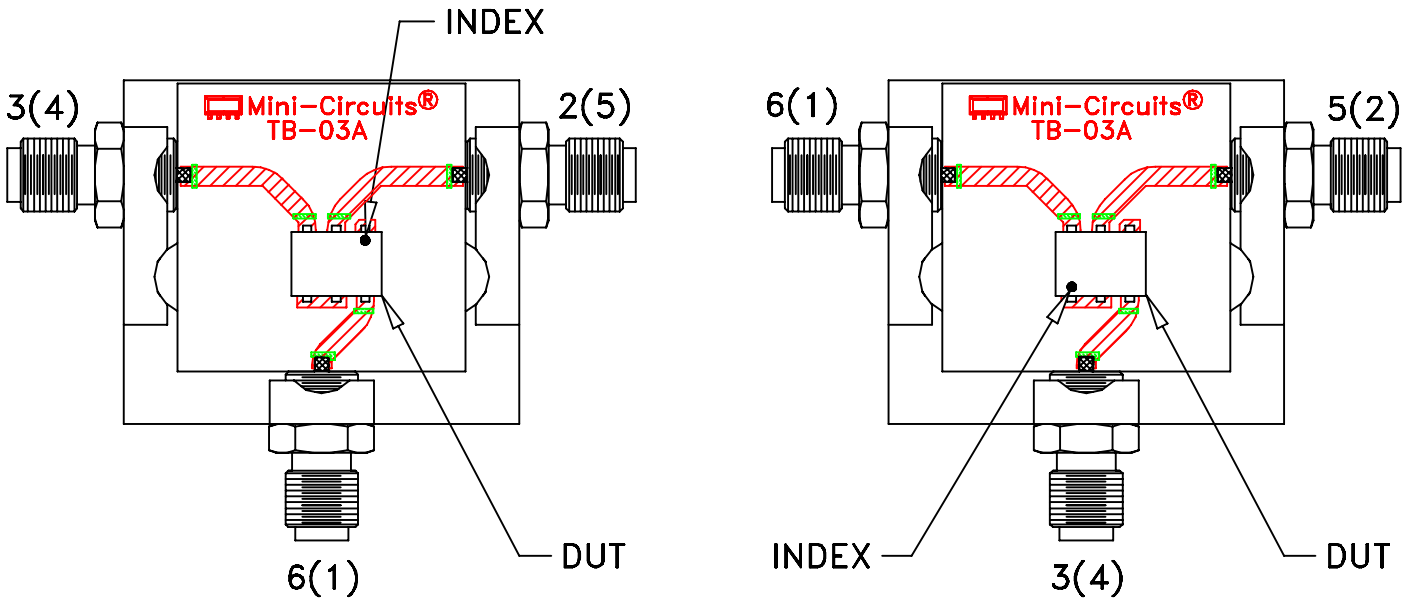
TB,ADE,CD542/636,06MX01,50

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	TB-03-20	H

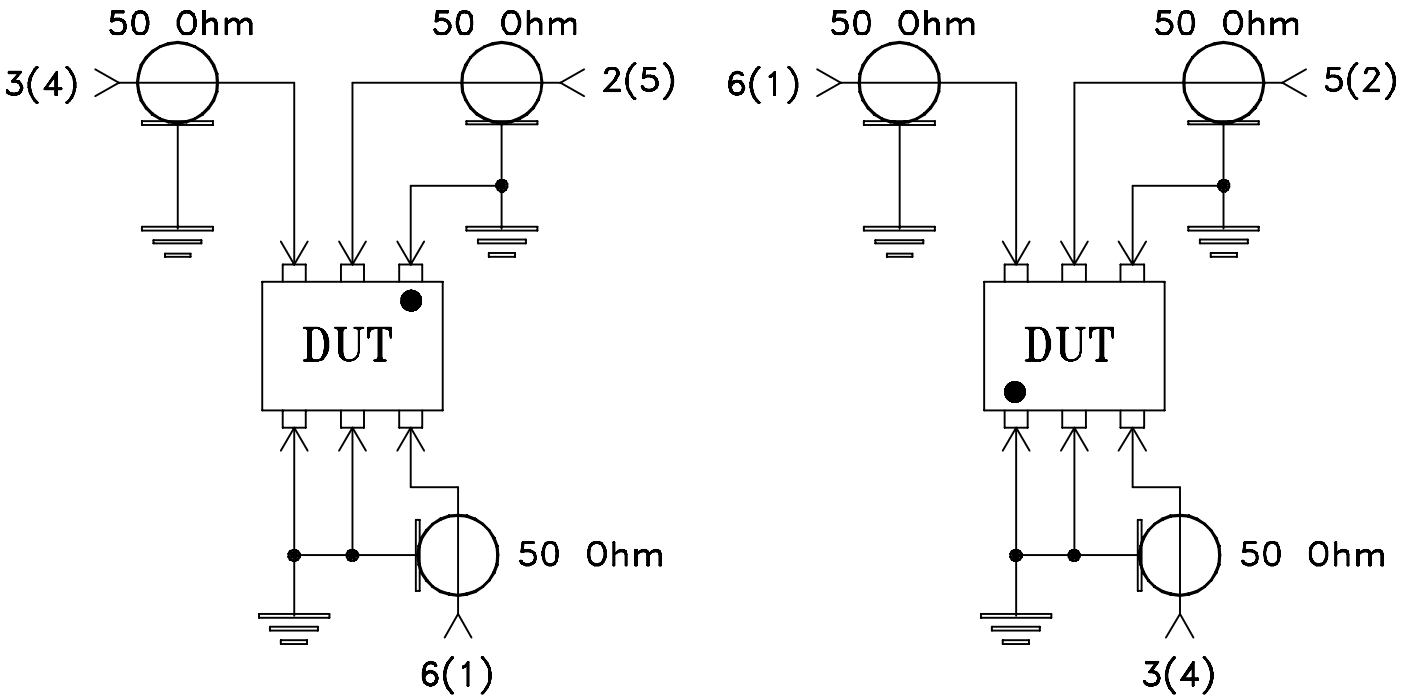
FILE:	SCALE:	SHEET:
WTB-03	1.5:1	1 OF 2

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.

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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