Surface Mount

Frequency Mixer

JMS-1+

Level 7 (LO Power +7 dBm) 2 to 500 MHz

Generic photo used for illustration purposes only

CASE STYLE: BH292

+RoHS Compliant

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

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

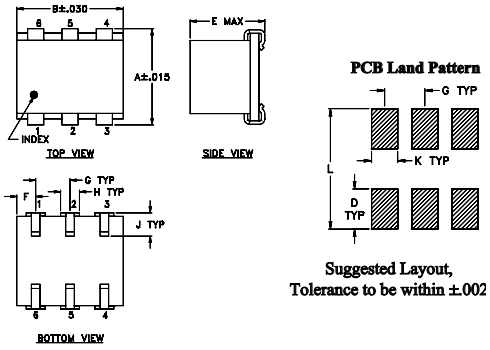
Features

- 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
- HF/VHF/UHF

Outline Drawing

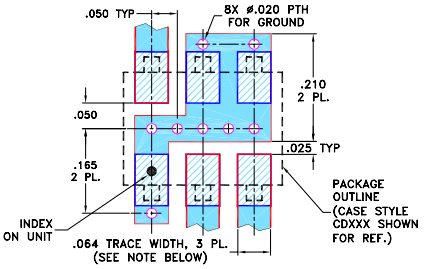


Outline Dimensions (inch / mm)

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

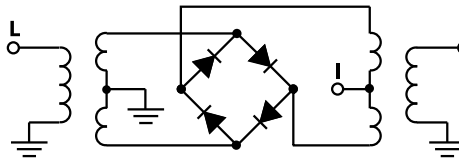
1 dB COMP.: +1 dBm typ.

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 +7dBm	LO +7dBm	LO +7dBm	LO +7dBm	LO +7dBm
0.50	30.50	7.45	89.00	64.40	1.11	2.27
1.00	31.00	6.68	82.65	64.35	1.05	2.27
2.00	32.00	6.15	76.59	63.49	1.02	2.43
5.00	35.00	5.84	68.78	59.68	1.01	2.52
10.00	40.00	5.78	63.45	55.38	1.01	2.50
20.00	50.00	5.84	56.92	48.99	1.02	2.50
50.00	80.00	5.84	48.06	40.83	1.03	2.48
67.10	97.10	5.78	47.33	39.62	1.04	2.43
100.00	70.00	5.74	45.42	36.85	1.04	2.40
117.05	87.05	5.71	45.23	36.32	1.07	2.38
150.35	120.35	5.73	44.09	34.84	1.09	2.29
200.00	170.00	5.78	41.97	32.90	1.11	2.29
216.95	186.95	5.84	40.74	32.23	1.13	2.25
250.00	220.00	5.91	38.62	30.58	1.17	2.28
283.55	253.55	5.81	36.99	29.19	1.19	2.30
333.50	303.50	5.81	34.17	26.96	1.22	2.23
383.45	353.45	6.03	31.17	25.64	1.28	2.29
433.40	403.40	6.34	29.18	23.85	1.31	2.24
466.70	436.70	6.56	27.71	22.78	1.37	2.34
500.00	470.00	6.82	27.09	22.32	1.43	2.31

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.
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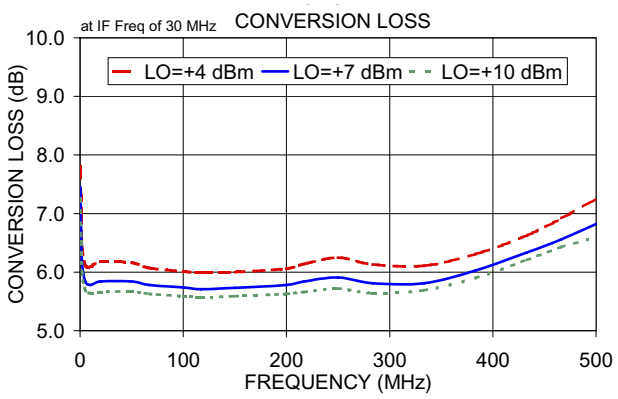
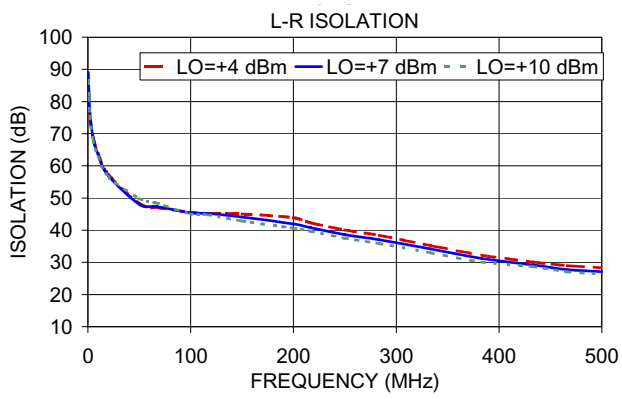
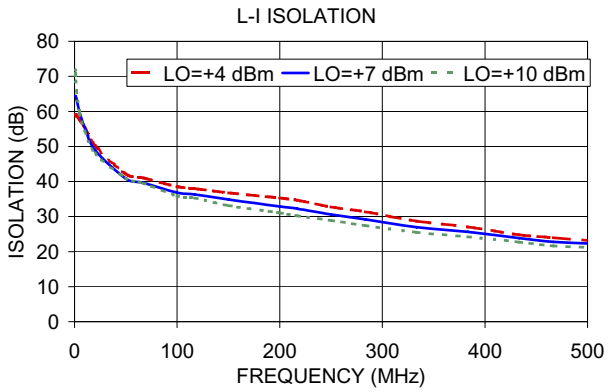
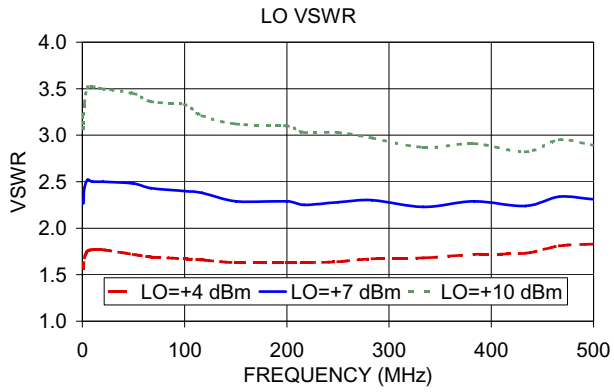
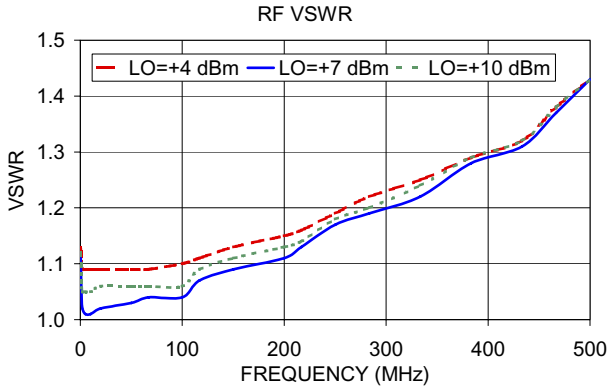
at IF Freq of 30 MHz

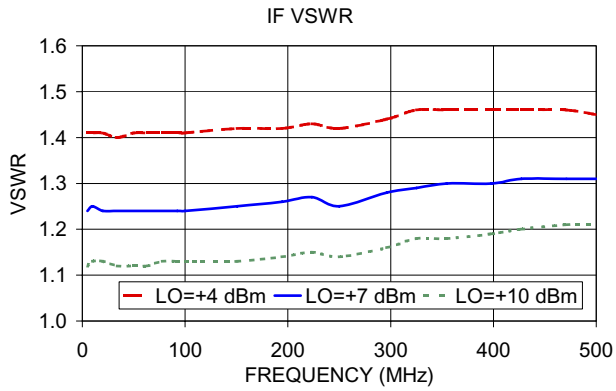












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Frequency Mixer JMS-1+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB) @LO (dBm)		
		+4	+7	+10
0.5	30.5	7.81	7.45	7.25
1.0	31.0	7.02	6.68	6.52
2.0	32.0	6.45	6.15	6.00
5.0	35.0	6.12	5.84	5.69
10.0	40.0	6.09	5.78	5.64
50.8	80.8	6.10	5.70	5.51
132.1	162.1	6.00	5.72	5.57
172.7	202.7	6.04	5.76	5.61
213.4	243.4	6.00	5.76	5.60
254.0	284.0	6.08	5.81	5.65
274.4	304.4	6.11	5.83	5.67
315.0	345.0	6.10	5.83	5.69
376.0	406.0	6.12	5.85	5.68
396.3	426.3	6.12	5.84	5.68
437.0	467.0	6.19	5.92	5.73
457.3	487.3	6.25	5.98	5.77
498.0	528.0	6.21	5.93	5.76
518.3	548.3	6.25	5.96	5.79
559.0	589.0	6.29	6.00	5.83
579.3	609.3	6.35	6.05	5.88
619.9	649.9	6.47	6.20	6.01
640.3	670.3	6.58	6.29	6.09
680.9	710.9	6.69	6.43	6.23
741.9	771.9	6.93	6.64	6.44
762.2	792.2	6.94	6.65	6.45
802.9	832.9	7.08	6.75	6.53
823.2	853.2	7.11	6.76	6.55
863.9	893.9	7.24	6.84	6.61
884.2	914.2	7.27	6.88	6.63
924.9	954.9	7.52	7.06	6.79
945.2	975.2	7.62	7.14	6.86
985.8	1015.8	7.95	7.45	7.11
1006.2	1036.2	8.11	7.59	7.24
1046.8	1076.8	8.48	7.92	7.57
1067.1	1097.1	8.72	8.16	7.77
1128.1	1158.1	9.45	8.86	8.44
1168.8	1198.8	9.94	9.34	8.92
1189.1	1219.1	10.15	9.57	9.14
1229.8	1259.8	10.54	9.99	9.58
1250.1	1280.1	10.74	10.19	9.81

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm) @LO (dBm)		
		+4	+7	+10
10.1	40.1	20.53	22.15	21.19
50.8	80.8	18.60	20.22	19.60
91.4	121.4	15.39	16.73	20.57
132.1	162.1	14.65	17.24	21.57
172.7	202.7	15.14	20.38	21.90
213.4	243.4	15.58	19.16	23.23
254.0	284.0	16.60	21.97	24.24
274.4	304.4	16.26	19.62	26.17
315.0	345.0	16.61	20.63	23.81
335.3	365.3	22.63	22.12	21.24
376.0	406.0	16.04	17.02	20.87
396.3	426.3	16.75	17.80	21.87
437.0	467.0	18.87	19.96	21.68
457.3	487.3	17.50	18.82	19.05
498.0	528.0	13.46	15.75	16.21
518.3	548.3	15.52	15.55	16.22
559.0	589.0	18.31	20.00	19.04
579.3	609.3	24.25	22.27	21.04
619.9	649.9	14.40	15.27	22.49
640.3	670.3	12.87	14.65	19.80
680.9	710.9	9.74	12.16	17.80
701.2	731.2	8.82	11.07	14.20
741.9	771.9	7.72	9.95	12.73
762.2	792.2	8.17	10.83	13.63
802.9	832.9	8.32	11.41	15.31
823.2	853.2	9.19	13.64	18.25
863.9	893.9	10.13	15.48	25.70
884.2	914.2	10.54	16.86	20.08
924.9	954.9	12.02	16.76	19.35
945.2	975.2	11.44	18.79	19.93
985.8	1015.8	14.46	14.59	16.58
1006.2	1036.2	13.16	13.44	14.04
1046.8	1076.8	10.12	11.20	12.42
1067.1	1097.1	9.58	10.53	11.80
1107.8	1137.8	8.15	9.27	10.44
1128.1	1158.1	8.03	8.56	10.01
1168.8	1198.8	7.24	8.26	9.29
1189.1	1219.1	7.59	8.59	9.21
1229.8	1259.8	8.11	9.04	10.53
1250.1	1280.1	9.10	9.74	11.99

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+1dBm (dB) @LO (dBm)		
		+4	+7	+10
10.1	40.1	1.05	0.73	0.55
50.8	80.8	0.94	0.73	0.54
91.4	121.4	0.93	0.67	0.46
132.1	162.1	0.92	0.65	0.48
172.7	202.7	0.82	0.60	0.47
213.4	243.4	0.87	0.61	0.44
254.0	284.0	0.86	0.61	0.46
274.4	304.4	0.83	0.61	0.48
315.0	345.0	0.89	0.61	0.45
335.3	365.3	0.90	0.64	0.49
376.0	406.0	0.82	0.60	0.47
396.3	426.3	0.80	0.60	0.45
437.0	467.0	0.78	0.57	0.46
457.3	487.3	0.78	0.57	0.44
498.0	528.0	0.84	0.59	0.44
518.3	548.3	0.88	0.64	0.48
559.0	589.0	0.93	0.63	0.47
579.3	609.3	0.93	0.64	0.46
619.9	649.9	0.99	0.67	0.48
640.3	670.3	0.97	0.70	0.51
680.9	710.9	1.03	0.75	0.57
701.2	731.2	1.06	0.79	0.60
741.9	771.9	1.14	0.87	0.69
762.2	792.2	1.20	0.91	0.72
802.9	832.9	1.26	0.96	0.79
823.2	853.2	1.26	1.01	0.83
863.9	893.9	1.36	1.10	0.92
884.2	914.2	1.41	1.13	0.94
924.9	954.9	1.37	1.13	0.93
945.2	975.2	1.39	1.12	0.94
985.8	1015.8	1.30	1.05	0.89
1006.2	1036.2	1.29	1.07	0.90
1046.8	1076.8	1.18	0.99	0.81
1067.1	1097.1	1.12	0.94	0.80
1107.8	1137.8	0.99	0.85	0.73
1128.1	1158.1	0.92	0.79	0.68
1168.8	1198.8	0.88	0.76	0.66
1189.1	1219.1	0.86	0.75	0.65
1229.8	1259.8	0.82	0.73	0.66
1250.1	1280.1	0.84	0.74	0.67

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Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=250.1MHz (dB) @LO (dBm) +7
240.0	10.1	5.97
234.1	16.0	5.95
228.2	21.9	5.89
222.3	27.8	5.88
216.4	33.7	5.87
210.5	39.6	5.84
204.6	45.5	5.86
198.7	51.4	5.85
192.8	57.3	5.86
186.9	63.2	5.83
181.0	69.1	5.85
175.1	75.0	5.87
169.2	80.9	5.81
163.3	86.8	5.84
157.4	92.7	5.84
151.5	98.6	5.80
145.6	104.5	5.80
139.7	110.4	5.79
133.8	116.3	5.77
127.9	122.2	5.75
122.1	128.0	5.74
116.2	133.9	5.73
110.3	139.8	5.77
104.4	145.7	5.73
98.5	151.6	5.75
92.6	157.5	5.73
86.7	163.4	5.74
80.8	169.3	5.76
74.9	175.2	5.75
69.0	181.1	5.73
63.1	187.0	5.73
57.2	192.9	5.72
51.3	198.8	5.72
45.4	204.7	5.73
39.5	210.6	5.74
33.6	216.5	5.73
27.7	222.4	5.73
21.8	228.3	5.74
15.9	234.2	5.71
10.0	240.1	5.81

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=10.1MHz (dB) @LO (dBm) +7
10.0	20.1	5.51
22.3	32.4	5.48
34.6	44.7	5.50
46.9	57.0	5.56
59.2	69.3	5.53
71.5	81.6	5.63
83.8	93.9	5.61
96.2	106.3	5.61
108.5	118.6	5.62
120.8	130.9	5.61
133.1	143.2	5.62
145.4	155.5	5.68
157.7	167.8	5.71
170.0	180.1	5.74
182.3	192.4	5.74
194.6	204.7	5.72
206.9	217.0	5.75
219.2	229.3	5.79
231.5	241.6	5.77
243.8	253.9	5.80
256.2	266.3	5.85
268.5	278.6	5.85
280.8	290.9	5.86
293.1	303.2	5.88
305.4	315.5	5.88
317.7	327.8	5.91
330.0	340.1	5.92
342.3	352.4	5.93
354.6	364.7	5.96
366.9	377.0	5.95
379.2	389.3	5.96
391.5	401.6	5.95
403.8	413.9	5.91
416.2	426.3	5.94
428.5	438.6	5.98
440.8	450.9	6.01
453.1	463.2	6.01
465.4	475.5	6.02
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) +7
490.0	10.1	6.21
477.7	22.4	6.14
465.4	34.7	6.09
453.1	47.0	6.08
440.8	59.3	6.11
428.5	71.6	6.09
416.2	83.9	6.04
403.8	96.3	6.00
391.5	108.6	5.95
379.2	120.9	5.94
366.9	133.2	5.93
354.6	145.5	5.91
342.3	157.8	5.92
330.0	170.1	5.93
317.7	182.4	5.93
305.4	194.7	5.93
293.1	207.0	5.90
280.8	219.3	5.89
268.5	231.6	5.91
256.2	243.9	5.92
243.8	256.3	5.94
231.5	268.6	5.95
219.2	280.9	5.93
206.9	293.2	5.93
194.6	305.5	5.90
182.3	317.8	5.88
170.0	330.1	5.88
157.7	342.4	5.88
145.4	354.7	5.90
133.1	367.0	5.92
120.8	379.3	5.90
108.5	391.6	5.90
96.2	403.9	5.91
83.8	416.3	5.90
71.5	428.6	5.93
59.2	440.9	5.94
46.9	453.2	5.92
34.6	465.5	5.95
22.3	477.8	5.93
10.0	490.1	5.96

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Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm)			LO-IF ISOLATION (dB) @LO (dBm)		
	+4	+7	+10	+4	+7	+10
0.5	77.47	89.00	86.40	58.57	64.40	71.90
1.0	76.77	82.65	81.16	59.07	64.35	70.66
2.0	74.40	76.59	75.41	58.90	63.49	66.01
5.0	68.98	68.78	67.98	57.58	59.68	59.61
10.0	63.87	63.45	62.82	55.47	55.38	54.46
50.8	59.00	59.82	60.61	52.56	51.08	50.21
132.1	49.81	50.75	51.33	47.86	46.48	44.78
172.7	47.13	47.89	48.53	47.46	45.40	43.33
213.4	45.21	46.03	46.52	46.24	43.93	42.05
254.0	43.37	44.09	44.57	44.75	42.70	40.70
274.4	42.66	43.25	43.76	44.24	42.05	40.29
315.0	41.34	42.15	42.68	42.01	40.51	39.08
376.0	39.26	39.64	40.11	39.51	38.77	37.63
396.3	38.81	39.24	39.75	38.57	38.40	37.55
437.0	38.32	38.69	39.22	35.96	36.45	36.18
457.3	38.11	38.62	39.00	35.19	35.69	35.72
498.0	37.40	37.98	38.32	33.58	33.96	34.17
518.3	36.95	37.57	37.79	33.39	33.61	33.63
559.0	35.99	36.62	36.92	32.62	32.75	32.77
579.3	35.25	35.87	36.30	32.60	32.97	32.84
619.9	34.15	34.71	35.17	31.79	32.94	32.66
640.3	33.40	34.07	34.63	31.22	33.10	33.19
680.9	32.52	33.24	33.91	29.98	32.44	33.70
741.9	31.70	32.55	33.27	28.19	30.59	32.76
762.2	31.60	32.46	33.24	27.72	30.03	32.20
802.9	31.57	32.57	33.36	26.71	28.79	30.81
823.2	31.76	32.77	33.58	26.19	28.03	29.88
863.9	31.89	32.86	33.61	25.30	26.74	28.40
884.2	31.86	32.67	33.19	24.92	26.19	27.69
924.9	31.41	32.01	32.33	24.42	25.42	26.70
945.2	31.05	31.42	31.69	24.43	25.33	26.51
985.8	30.18	30.36	30.46	24.69	25.41	26.51
1006.2	29.95	29.97	30.18	24.84	25.54	26.58
1046.8	29.56	29.37	29.48	24.99	25.96	27.05
1067.1	29.29	29.00	28.98	25.10	26.20	27.36
1128.1	29.01	28.59	28.31	24.54	26.23	27.77
1168.8	28.71	28.22	27.99	24.13	26.12	28.11
1189.1	28.47	28.02	27.75	23.82	25.81	27.93
1229.8	28.02	27.64	27.42	23.30	25.39	27.76
1250.1	27.60	27.32	27.10	23.08	25.20	27.68

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB) @LO (dBm)		
		+4	+7	+10
10.1	40.1	54.11	44.61	45.41
50.8	80.8	35.59	36.10	35.85
91.4	121.4	31.21	31.33	31.61
132.1	162.1	28.67	28.81	29.26
172.7	202.7	27.07	27.30	27.53
213.4	243.4	26.21	26.60	26.87
254.0	284.0	25.98	26.06	26.35
274.4	304.4	25.80	26.17	26.21
315.0	345.0	26.00	26.44	26.97
335.3	365.3	25.95	26.63	27.37
376.0	406.0	26.25	26.79	27.34
396.3	426.3	26.54	27.03	27.40
437.0	467.0	26.83	27.09	27.30
457.3	487.3	26.81	27.13	27.38
498.0	528.0	25.12	25.82	26.38
518.3	548.3	23.65	24.33	24.87
559.0	589.0	20.73	21.16	21.61
579.3	609.3	19.47	19.68	20.00
619.9	649.9	17.50	17.52	17.62
640.3	670.3	16.77	16.67	16.68
680.9	710.9	15.65	15.47	15.46
701.2	731.2	15.24	15.06	15.00
741.9	771.9	14.52	14.28	14.15
762.2	792.2	14.16	14.02	13.89
802.9	832.9	13.61	13.44	13.37
823.2	853.2	13.40	13.26	13.20
863.9	893.9	13.02	13.02	13.01
884.2	914.2	12.91	12.91	12.95
924.9	954.9	12.65	12.66	12.82
945.2	975.2	12.55	12.60	12.71
985.8	1015.8	12.40	12.47	12.59
1006.2	1036.2	12.32	12.38	12.59
1046.8	1076.8	12.09	12.25	12.38
1067.1	1097.1	12.00	12.19	12.28
1107.8	1137.8	11.59	11.82	12.01
1128.1	1158.1	11.43	11.63	11.79
1168.8	1198.8	10.97	11.21	11.41
1189.1	1219.1	10.73	10.98	11.11
1229.8	1259.8	10.32	10.46	10.62
1250.1	1280.1	10.13	10.25	10.31

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Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1) @LO (dBm)		
		+4	+7	+10
0.5	30.5	1.13	1.11	1.12
1.0	31.0	1.10	1.05	1.07
2.0	32.0	1.09	1.02	1.05
5.0	35.0	1.09	1.01	1.05
10.0	40.0	1.09	1.01	1.05
50.8	80.8	1.03	1.04	1.09
132.1	162.1	1.02	1.07	1.13
172.7	202.7	1.02	1.09	1.15
213.4	243.4	1.04	1.11	1.18
254.0	284.0	1.06	1.13	1.19
274.4	304.4	1.06	1.14	1.20
315.0	345.0	1.11	1.19	1.25
335.3	365.3	1.12	1.20	1.27
376.0	406.0	1.15	1.24	1.30
396.3	426.3	1.17	1.25	1.31
437.0	467.0	1.22	1.28	1.34
457.3	487.3	1.24	1.31	1.37
498.0	528.0	1.33	1.41	1.48
518.3	548.3	1.35	1.44	1.51
559.0	589.0	1.43	1.53	1.61
579.3	609.3	1.46	1.56	1.64
619.9	649.9	1.51	1.61	1.70
640.3	670.3	1.52	1.62	1.70
680.9	710.9	1.54	1.64	1.72
741.9	771.9	1.55	1.62	1.69
762.2	792.2	1.57	1.63	1.70
802.9	832.9	1.60	1.66	1.71
823.2	853.2	1.64	1.69	1.74
863.9	893.9	1.72	1.77	1.82
884.2	914.2	1.80	1.84	1.89
924.9	954.9	1.98	2.01	2.05
945.2	975.2	2.10	2.13	2.16
985.8	1015.8	2.39	2.40	2.42
1006.2	1036.2	2.54	2.54	2.55
1046.8	1076.8	2.88	2.87	2.87
1067.1	1097.1	3.06	3.04	3.02
1128.1	1158.1	3.56	3.51	3.45
1168.8	1198.8	3.76	3.70	3.64
1189.1	1219.1	3.82	3.76	3.69
1229.8	1259.8	3.94	3.86	3.78
1250.1	1280.1	3.95	3.89	3.79

LO (MHz)	LO VSWR (:1) @LO (dBm)		
	+4	+7	+10
0.5	1.58	2.27	3.21
1.0	1.57	2.27	3.08
2.0	1.68	2.43	3.34
5.0	1.75	2.52	3.51
10.0	1.77	2.50	3.52
50.8	1.87	2.75	3.88
132.1	1.85	2.68	3.76
172.7	1.77	2.52	3.48
213.4	1.83	2.61	3.60
254.0	1.84	2.60	3.58
274.4	1.82	2.55	3.48
315.0	1.87	2.64	3.60
335.3	1.90	2.67	3.65
376.0	1.87	2.59	3.50
396.3	1.90	2.62	3.54
437.0	1.96	2.70	3.63
457.3	1.95	2.66	3.57
498.0	1.97	2.68	3.58
518.3	2.00	2.72	3.62
559.0	2.03	2.71	3.58
579.3	2.05	2.73	3.59
619.9	2.12	2.82	3.69
640.3	2.14	2.82	3.68
680.9	2.15	2.83	3.68
741.9	2.20	2.86	3.70
762.2	2.20	2.85	3.67
802.9	2.22	2.87	3.70
823.2	2.22	2.87	3.69
863.9	2.22	2.85	3.66
884.2	2.26	2.88	3.69
924.9	2.30	2.90	3.70
945.2	2.33	2.92	3.70
985.8	2.40	2.97	3.74
1006.2	2.44	3.00	3.76
1046.8	2.49	3.02	3.76
1067.1	2.54	3.06	3.79
1128.1	2.64	3.11	3.79
1168.8	2.71	3.15	3.83
1189.1	2.73	3.16	3.82
1229.8	2.78	3.16	3.79
1250.1	2.81	3.17	3.81

IF (OUT) (MHz)	IF VSWR @LO=500.1MHz (:1) @LO (dBm)		
	+4	+7	+10
5.0	1.41	1.24	1.12
10.0	1.41	1.25	1.13
22.6	1.58	1.36	1.28
35.1	1.54	1.38	1.28
47.7	1.63	1.45	1.28
60.3	1.65	1.46	1.30
72.8	1.67	1.46	1.31
85.4	1.63	1.45	1.30
97.9	1.59	1.42	1.29
110.5	1.58	1.40	1.28
123.1	1.59	1.42	1.30
135.6	1.64	1.45	1.31
148.2	1.63	1.46	1.31
160.8	1.64	1.46	1.31
173.3	1.62	1.45	1.31
185.9	1.60	1.42	1.30
198.5	1.60	1.43	1.31
211.0	1.59	1.43	1.32
223.6	1.61	1.44	1.33
236.2	1.62	1.46	1.34
248.7	1.66	1.48	1.36
261.3	1.67	1.49	1.37
273.8	1.66	1.49	1.37
286.4	1.63	1.47	1.36
299.0	1.61	1.44	1.34
311.5	1.59	1.44	1.34
324.1	1.61	1.45	1.35
336.7	1.64	1.48	1.38
349.2	1.67	1.51	1.40
361.8	1.67	1.53	1.41
374.4	1.68	1.52	1.41
386.9	1.68	1.52	1.42
399.5	1.68	1.52	1.42
412.1	1.70	1.54	1.44
424.6	1.69	1.54	1.45
437.2	1.69	1.54	1.45
449.7	1.71	1.56	1.46
462.3	1.73	1.59	1.50
474.9	1.78	1.64	1.53
487.4	1.81	1.66	1.57
500.0	1.86	1.86	1.87

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Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	14	24	14	31	15	30	19	45	29	39
1	-	21	+0	30	12	33	18	32	23	49	41	48
2	>100	72	52	67	52	69	52	66	49	60	51	71
3	>100	70	77	75	72	>80	64	76	67	>80	67	>80
4	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
5	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
6	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
7	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
8	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
9	>100	>80	>80	>80	>80	>80	>80	>80	>80	66	>80	>80
10	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	70	>80
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: **RF IN: 250.1 MHz; -14.00 dBm.**
LO IN: 280.01 MHz; +7.00 dBm
IF OUT: 29.91 MHz; -19.92 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	23	34	26	44	27	45	32	63	45	55
1	-	21	+0	31	12	34	19	34	26	51	43	57
2	93	62	45	68	45	60	45	58	44	56	47	68
3	>100	49	51	55	48	56	48	53	45	56	46	63
4	>100	72	72	72	67	72	65	74	60	74	58	71
5	>100	67	70	71	60	76	57	73	56	83	58	70
6	>100	87	80	83	86	83	85	87	82	86	81	>90
7	>100	>90	80	>90	83	>90	>90	>90	88	84	72	81
8	>100	>90	>90	>90	>90	>90	>90	>90	>90	>90	>90	>90
9	>100	>90	>90	>90	84	89	83	>90	83	84	87	>90
10	>100	>90	>90	>90	>90	>90	>90	>90	>90	>90	76	>90
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: **RF IN: 250.1 MHz; -4.00 dBm.**
LO IN: 280.01 MHz; +7.00 dBm
IF OUT: 29.91 MHz; -9.93 dBm

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

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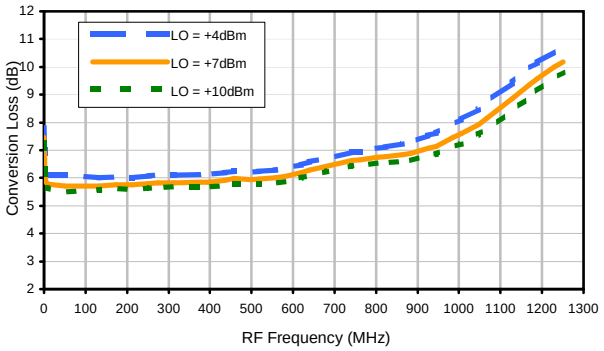
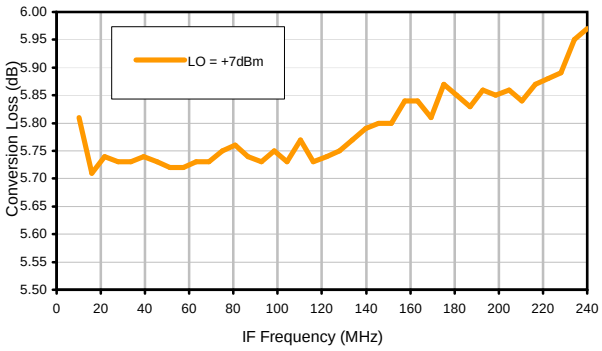
Typical Performance Curves

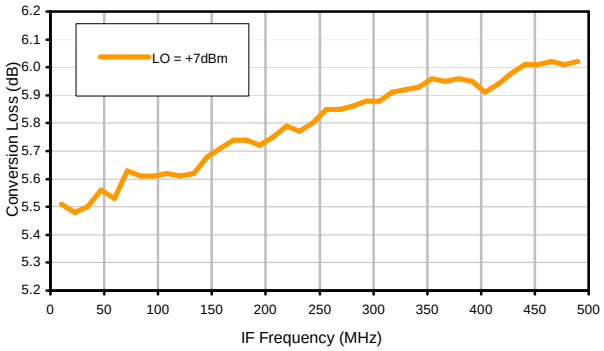
Conversion Loss @ IF=30MHz



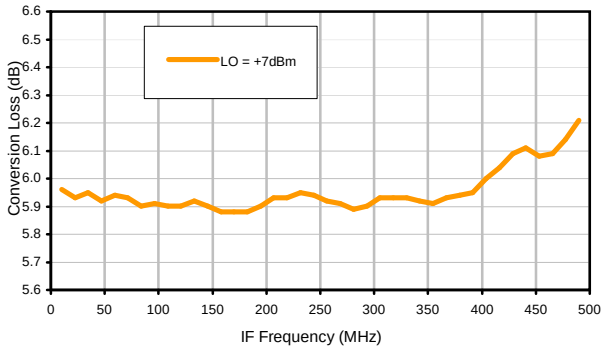
Conversion Loss vs. IF @ RF=250.1MHz



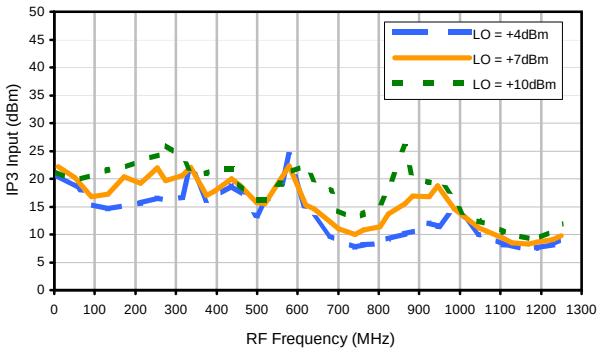
Conversion Loss vs. IF @ RF=10.1MHz



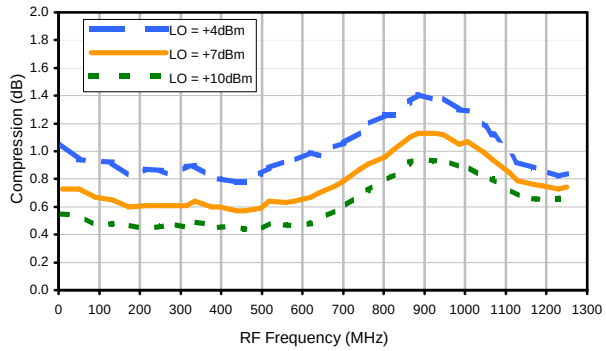
Conversion Loss vs. IF @ RF=500.1MHz



IP3 Input



Compression @ RF IN=+1dBm



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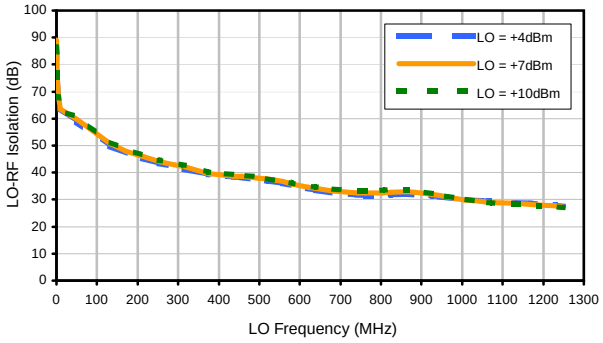
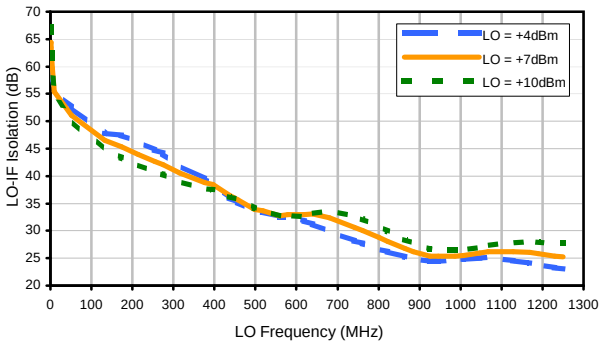
Typical Performance Curves

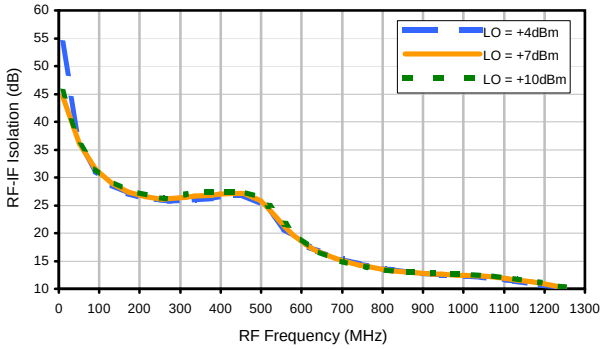
LO-RF Isolation



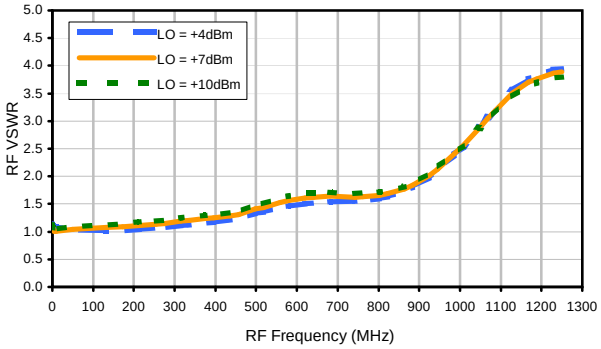
LO-IF Isolation



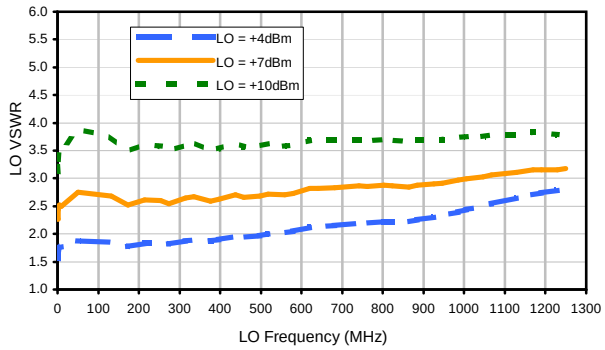
RF-IF Isolation



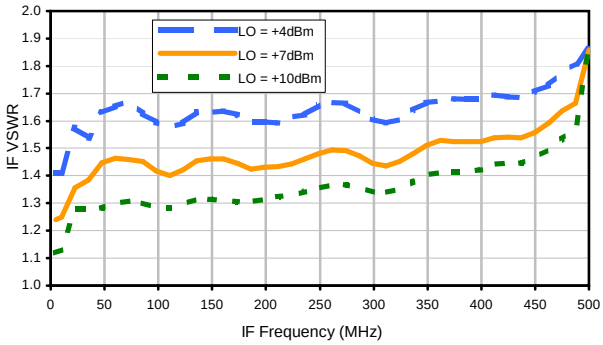
RF VSWR



LO VSWR



IF VSWR



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Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	14	24	14	31	15	30	19	45	29	39
1	-	21	+0	30	12	33	18	32	23	49	41	48
2	>100	72	52	67	52	69	52	66	49	60	51	71
3	>100	70	77	75	72	>80	64	76	67	>80	67	>80
4	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
5	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
6	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
7	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
8	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80	>80
9	>100	>80	>80	>80	>80	>80	>80	>80	>80	66	>80	>80
10	>100	>80	>80	>80	>80	>80	>80	>80	>80	>80	70	>80
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:
RF IN: 250.1 MHz; -14.00 dBm.
LO IN: 280.01 MHz; +7.00 dBm
IF OUT: 29.91 MHz; -19.92 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	23	34	26	44	27	45	32	63	45	55
1	-	21	+0	31	12	34	19	34	26	51	43	57
2	93	62	45	68	45	60	45	58	44	56	47	68
3	>100	49	51	55	48	56	48	53	45	56	46	63
4	>100	72	72	72	67	72	65	74	60	74	58	71
5	>100	67	70	71	60	76	57	73	56	83	58	70
6	>100	87	80	83	86	83	85	87	82	86	81	>90
7	>100	>90	80	>90	83	>90	>90	>90	88	84	72	81
8	>100	>90	>90	>90	>90	>90	>90	>90	>90	>90	>90	>90
9	>100	>90	>90	>90	84	89	83	>90	83	84	87	>90
10	>100	>90	>90	>90	>90	>90	>90	>90	>90	>90	76	>90
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:
RF IN: 250.1 MHz; -4.00 dBm.
LO IN: 280.01 MHz; +7.00 dBm
IF OUT: 29.91 MHz; -9.93 dBm

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

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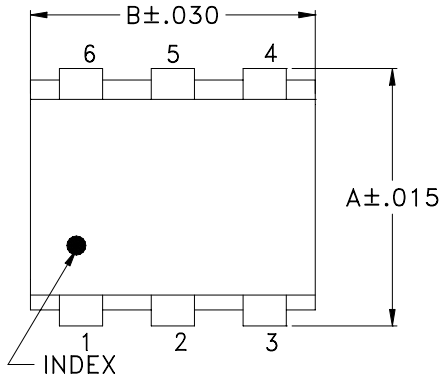
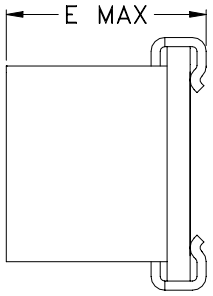
Case Style BH

BH292

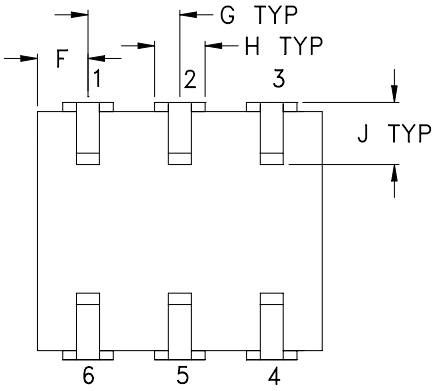
Outline Dimensions



TOP VIEW

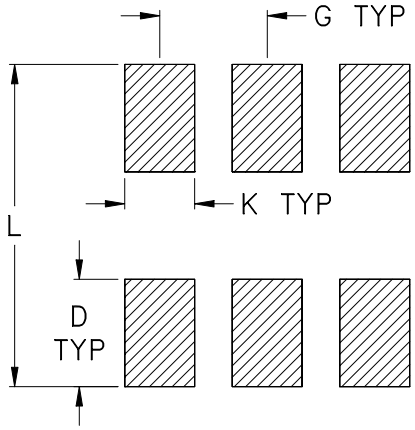


SIDE VIEW



BOTTOM VIEW

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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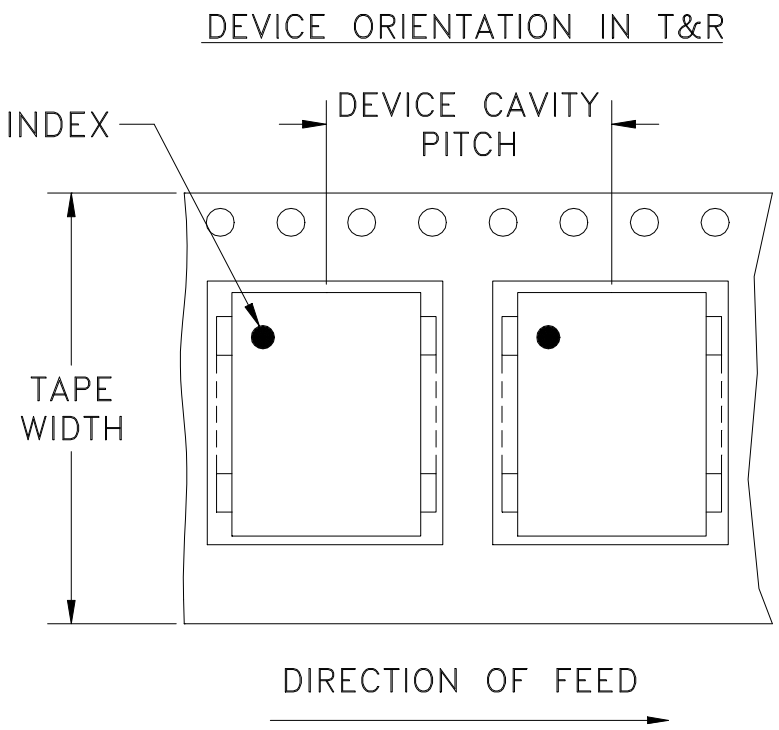
Tape & Reel Packaging TR-F24



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

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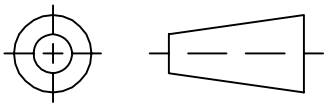
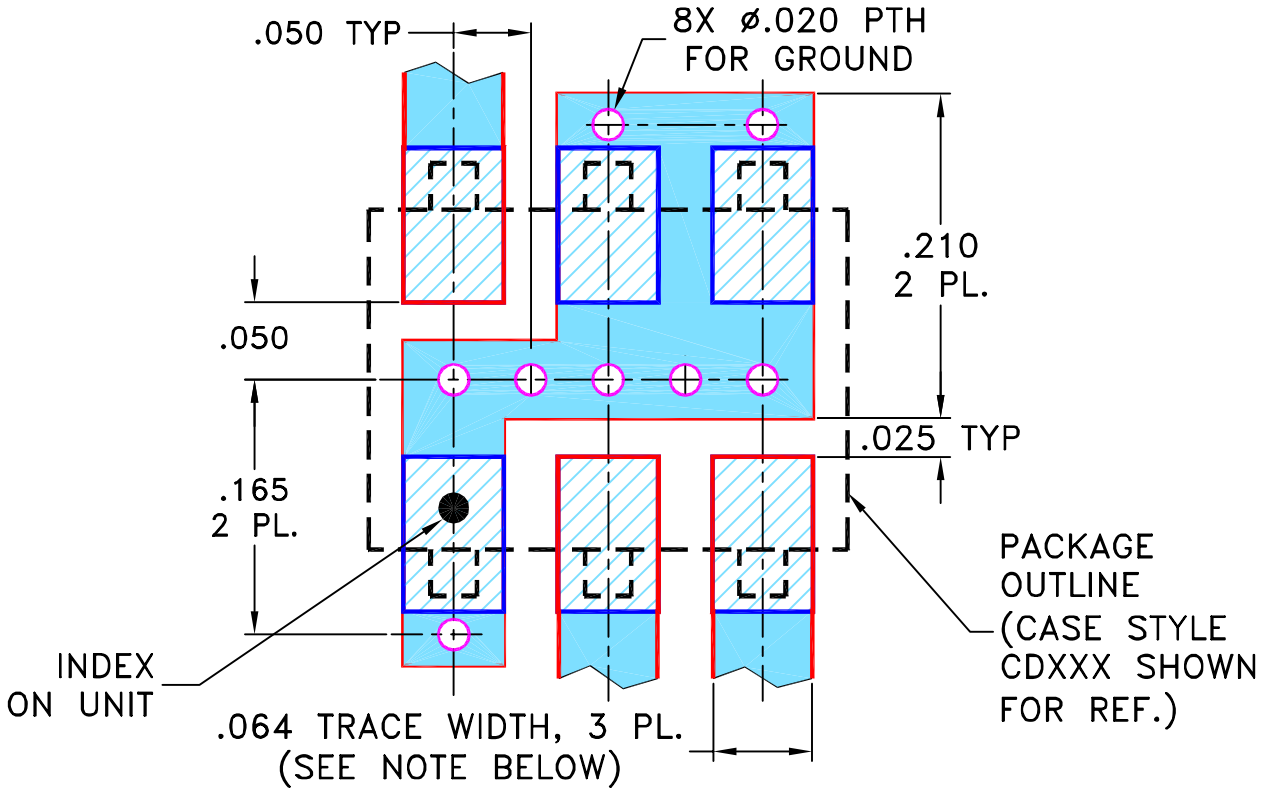
THIRD ANGLE PROJECTION



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
A	M101143	ADDED "gk" PIN CONNECTION, TT100 CASE STYLE & NOTE 2	10/10/05	MMG	DJ
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

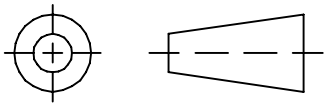
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

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

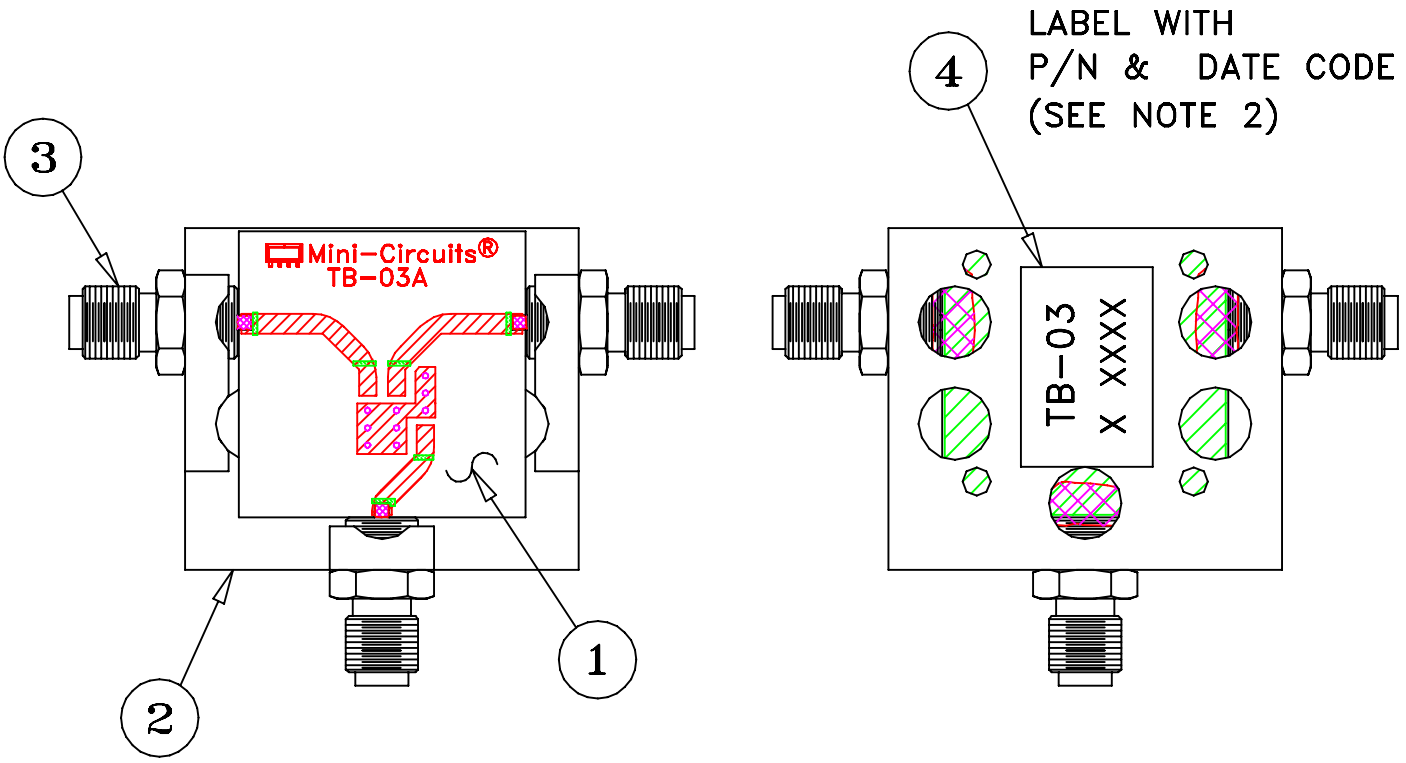
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-052	C

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

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 ±			

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

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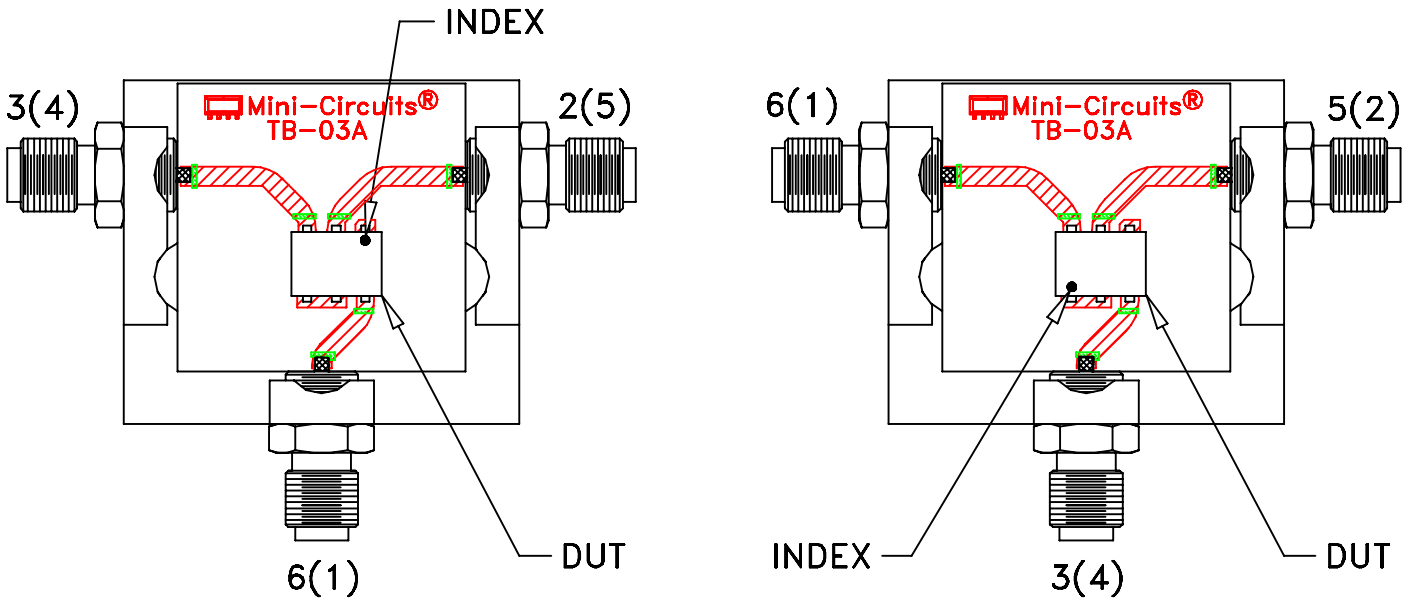
TB,ADE,CD542/636,06MX01,50

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

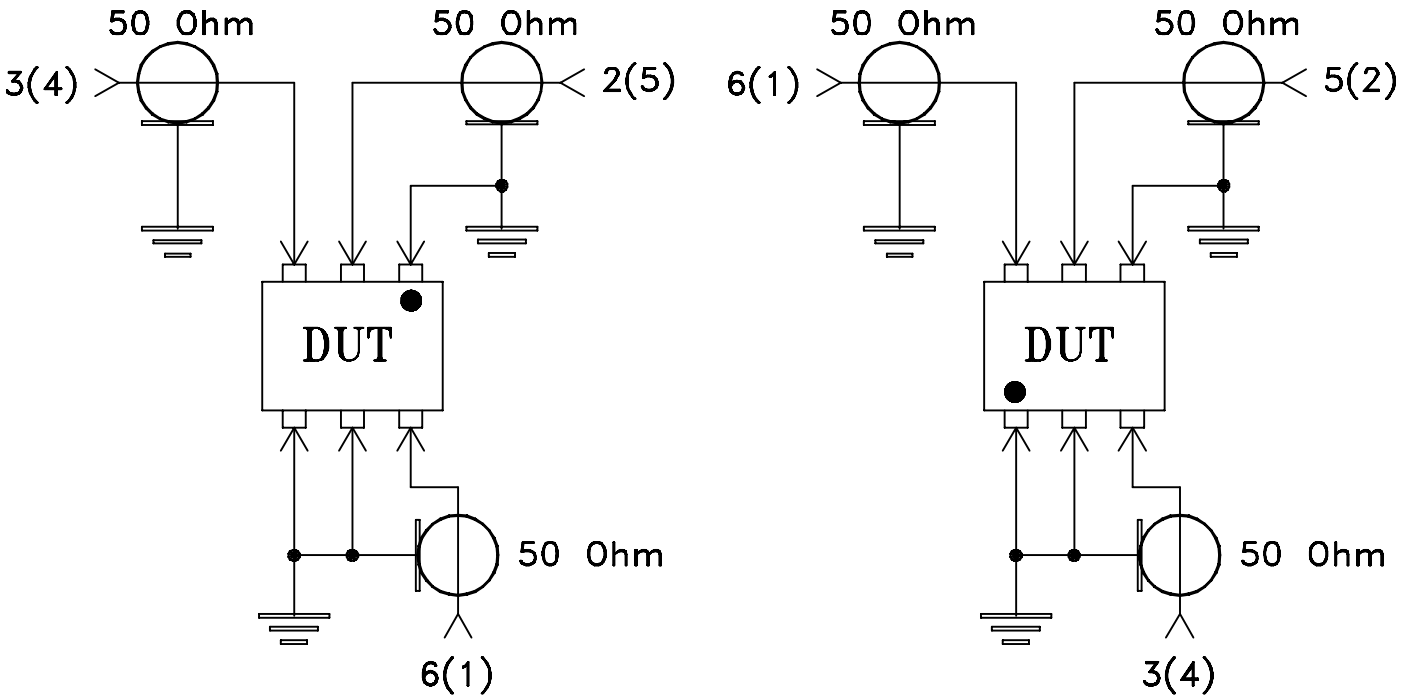
FILE:	SCALE:	SHEET:
WTB-03	1.5:1	1 OF 2

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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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

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