Surface Mount

Frequency Mixer

JMS-2H+

Level 17 (LO Power +17 dBm) 20 to 1000 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	200mW
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

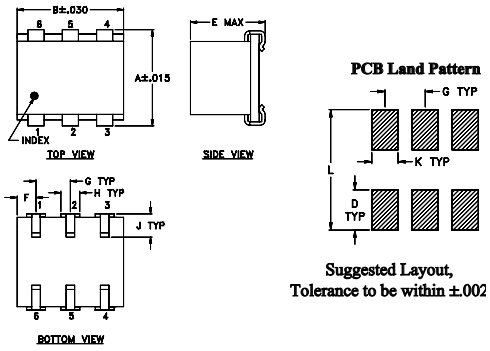
Features

- excellent L-R isolation, up to 63 dB typ.
- miniature surface mount
- J-leads for strain relief and excellent solderability

Applications

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

Outline Drawing

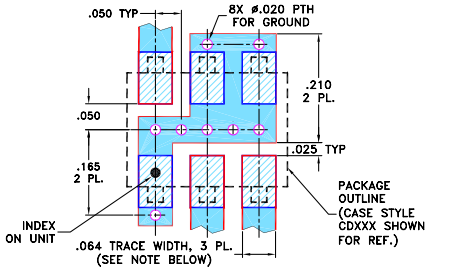


Outline Dimensions (inch / mm)

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	7.0	.15	8.4	9.5	63	40	50	28	35	20	56	30	47	22	37	20	24

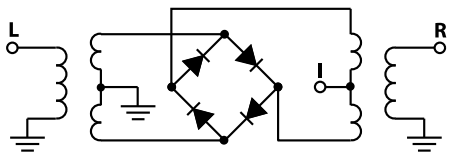
1 dB COMP.: +14 dBm typ.
Phase detection, positive polarity

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_L/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
5.00	35.00	7.85	66.33	72.89	1.54	1.95
10.00	40.00	7.64	63.63	68.70	1.49	1.85
20.00	50.00	7.69	58.93	63.79	1.47	1.79
50.00	80.00	7.55	52.00	56.89	1.45	1.91
95.45	65.45	7.54	46.41	50.84	1.44	1.79
100.00	70.00	7.53	46.04	50.67	1.43	1.79
185.91	155.91	7.51	40.70	46.79	1.43	1.69
200.00	170.00	7.37	40.02	46.99	1.42	1.68
276.36	246.36	7.35	37.35	44.46	1.40	1.56
366.82	336.82	7.22	35.28	42.69	1.34	1.47
457.27	427.27	7.11	33.66	39.45	1.25	1.36
487.42	457.42	7.17	33.17	37.61	1.24	1.34
500.00	470.00	7.07	33.04	37.36	1.21	1.34
547.73	517.73	7.11	32.95	35.68	1.11	1.28
638.18	608.18	7.46	32.78	31.60	1.06	1.29
728.64	698.64	7.45	31.90	30.61	1.27	1.46
819.09	789.09	7.76	30.74	28.78	1.54	1.81
909.55	879.55	8.24	29.67	27.10	1.90	2.21
969.85	939.85	8.54	29.46	25.48	2.06	2.34
1000.00	970.00	8.75	29.31	24.84	2.10	2.40

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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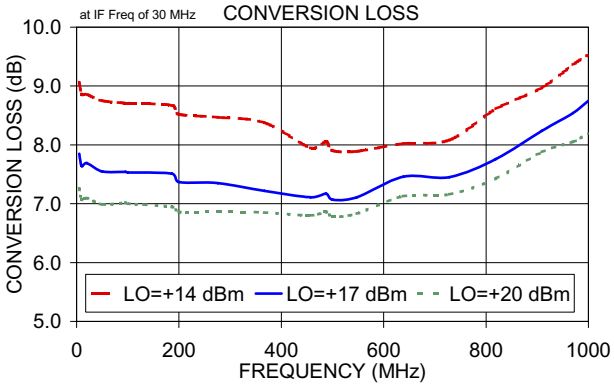
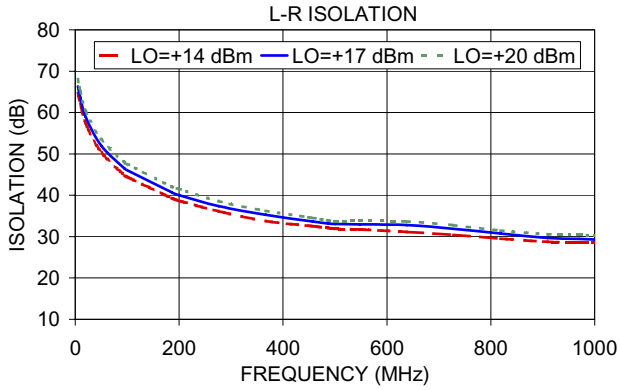
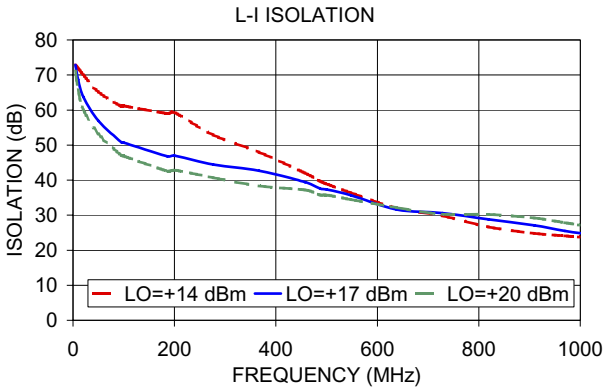
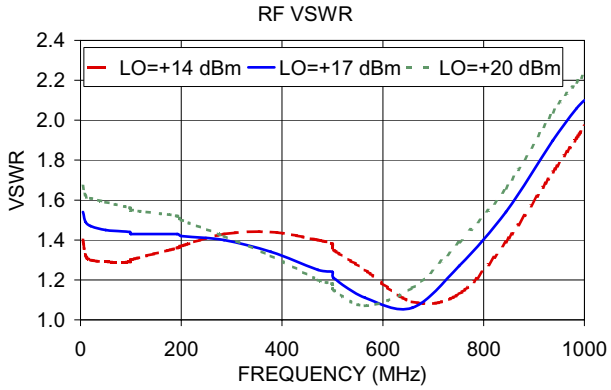
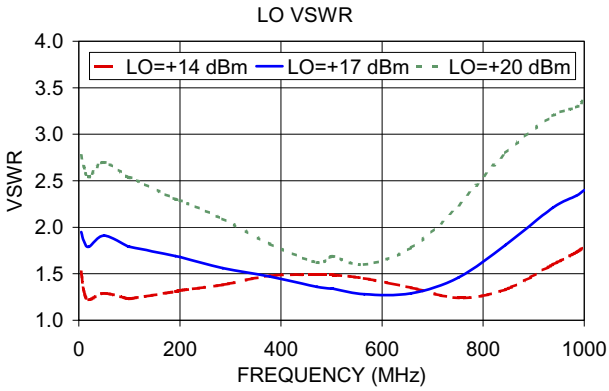
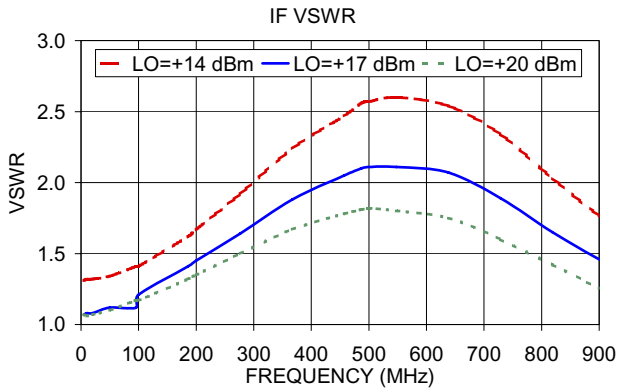












Frequency Mixer JMS-2H+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB) @LO (dBm)		
		+14	+17	+20
20.1	50.1	8.11	7.09	6.64
60.1	90.1	8.23	7.26	6.79
100.1	130.1	8.12	7.14	6.71
140.1	170.1	8.25	7.24	6.75
180.1	210.1	8.16	7.11	6.72
220.1	250.1	8.16	7.07	6.69
260.1	290.1	8.01	7.03	6.70
300.1	330.1	7.83	6.92	6.66
340.1	370.1	7.91	7.00	6.72
380.1	410.1	7.69	6.94	6.72
420.1	450.1	7.64	6.96	6.72
460.1	490.1	7.63	7.00	6.75
500.1	530.1	7.52	6.96	6.72
540.1	570.1	7.67	7.10	6.83
580.1	610.1	7.68	7.13	6.84
620.1	650.1	7.75	7.20	6.88
660.1	690.1	7.81	7.30	6.95
700.1	730.1	7.78	7.33	6.99
740.1	770.1	7.89	7.46	7.15
780.1	810.1	7.91	7.46	7.16
820.1	850.1	8.03	7.54	7.21
860.1	890.1	8.10	7.54	7.16
900.1	930.1	8.22	7.53	7.16
920.1	950.1	8.32	7.60	7.20
960.1	990.1	8.50	7.66	7.25
980.1	1010.1	8.63	7.75	7.29
1020.1	1050.1	8.85	7.93	7.40
1040.1	1070.1	8.95	8.07	7.44
1080.1	1110.1	9.19	8.31	7.60
1100.1	1130.1	9.27	8.47	7.73
1140.1	1170.1	9.48	8.68	7.93
1160.1	1190.1	9.60	8.82	8.03
1200.1	1230.1	9.80	9.06	8.25
1220.1	1250.1	9.94	9.17	8.35
1260.1	1290.1	10.15	9.35	8.56
1280.1	1310.1	10.36	9.50	8.70
1320.1	1350.1	10.57	9.61	8.74
1340.1	1370.1	10.74	9.69	8.77
1380.1	1410.1	11.03	9.86	8.81
1400.1	1430.1	11.08	9.82	8.70

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm) @LO (dBm)		
		+14	+17	+20
20.1	50.1	21.92	26.25	30.17
60.1	90.1	21.73	24.92	27.16
100.1	130.1	22.95	26.98	27.14
140.1	170.1	21.90	25.44	27.04
180.1	210.1	23.06	25.61	28.15
220.1	250.1	21.68	24.60	31.09
260.1	290.1	22.25	25.58	28.36
300.1	330.1	23.26	29.67	28.17
340.1	370.1	21.66	26.95	26.97
380.1	410.1	23.89	27.24	27.24
420.1	450.1	23.41	25.94	27.04
460.1	490.1	24.83	25.07	26.47
500.1	530.1	29.29	25.17	25.40
540.1	570.1	25.06	25.09	25.01
580.1	610.1	24.48	25.34	26.93
620.1	650.1	23.47	25.12	28.67
660.1	690.1	23.34	23.41	26.07
700.1	730.1	23.99	23.19	24.31
740.1	770.1	24.39	23.80	24.11
780.1	810.1	23.33	24.40	25.38
820.1	850.1	21.89	24.11	25.83
860.1	890.1	20.68	24.71	25.57
900.1	930.1	18.80	24.70	27.30
920.1	950.1	18.41	24.62	28.14
960.1	990.1	16.57	23.60	29.52
980.1	1010.1	15.88	20.91	27.86
1020.1	1050.1	15.36	18.79	25.07
1040.1	1070.1	15.12	16.93	23.23
1080.1	1110.1	15.39	16.63	21.55
1100.1	1130.1	15.36	16.19	19.70
1140.1	1170.1	15.55	16.49	18.99
1160.1	1190.1	15.55	16.21	18.56
1200.1	1230.1	16.05	16.61	18.77
1220.1	1250.1	16.05	16.78	18.94
1260.1	1290.1	16.63	17.69	19.24
1280.1	1310.1	16.84	18.42	20.00
1320.1	1350.1	16.91	18.68	21.27
1340.1	1370.1	17.04	18.82	21.46
1380.1	1410.1	16.61	18.18	21.28
1400.1	1430.1	16.66	18.33	22.53

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+14dBm (dB) @LO (dBm)		
		+14	+17	+20
20.1	50.1	0.25	0.07	0.07
60.1	90.1	0.31	0.04	0.03
100.1	130.1	0.23	0.05	0.04
140.1	170.1	0.21	0.05	0.07
180.1	210.1	0.18	0.06	0.05
220.1	250.1	0.17	0.13	0.09
260.1	290.1	0.29	0.15	0.07
300.1	330.1	0.41	0.20	0.08
340.1	370.1	0.38	0.16	0.08
380.1	410.1	0.54	0.15	0.06
420.1	450.1	0.58	0.19	0.08
460.1	490.1	0.59	0.14	0.07
500.1	530.1	0.71	0.20	0.10
540.1	570.1	0.59	0.15	0.07
580.1	610.1	0.61	0.14	0.08
620.1	650.1	0.68	0.17	0.14
660.1	690.1	0.67	0.14	0.14
700.1	730.1	0.72	0.20	0.16
740.1	770.1	0.72	0.19	0.13
780.1	810.1	0.77	0.28	0.19
820.1	850.1	0.85	0.36	0.26
860.1	890.1	0.85	0.47	0.35
900.1	930.1	0.94	0.60	0.42
920.1	950.1	0.81	0.59	0.45
960.1	990.1	0.78	0.68	0.53
980.1	1010.1	0.80	0.68	0.54
1020.1	1050.1	0.79	0.69	0.59
1040.1	1070.1	0.72	0.65	0.63
1080.1	1110.1	0.67	0.60	0.64
1100.1	1130.1	0.59	0.53	0.60
1140.1	1170.1	0.53	0.45	0.56
1160.1	1190.1	0.50	0.42	0.54
1200.1	1230.1	0.39	0.29	0.45
1220.1	1250.1	0.34	0.25	0.41
1260.1	1290.1	0.23	0.18	0.33
1280.1	1310.1	0.10	0.11	0.26
1320.1	1350.1	0.03	0.11	0.30
1340.1	1370.1	-0.08	0.06	0.29
1380.1	1410.1	-0.12	0.11	0.44
1400.1	1430.1	-0.10	0.19	0.55

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=500.1MHz (dB) @LO (dBm) +17
460.0	40.1	7.05
448.5	51.6	7.09
436.9	63.2	7.21
425.4	74.7	7.15
413.8	86.3	7.12
402.3	97.8	7.09
390.8	109.3	7.03
379.2	120.9	7.04
367.7	132.4	6.88
356.2	143.9	6.83
344.6	155.5	6.92
333.1	167.0	6.95
321.5	178.6	6.82
310.0	190.1	6.78
298.5	201.6	6.82
286.9	213.2	6.72
275.4	224.7	6.62
263.8	236.3	6.65
252.3	247.8	6.63
240.8	259.3	6.66
229.2	270.9	6.65
217.7	282.4	6.61
206.2	293.9	6.65
194.6	305.5	6.65
183.1	317.0	6.59
171.5	328.6	6.63
160.0	340.1	6.70
148.5	351.6	6.66
136.9	363.2	6.69
125.4	374.7	6.76
113.8	386.3	6.74
102.3	397.8	6.74
90.8	409.3	6.76
79.2	420.9	6.74
67.7	432.4	6.82
56.2	443.9	6.86
44.6	455.5	6.83
33.1	467.0	6.89
21.5	478.6	6.95
10.0	490.1	7.00

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=20.1MHz (dB) @LO (dBm) +17
10.0	30.1	7.15
29.8	49.9	7.07
49.6	69.7	7.10
69.4	89.5	7.22
89.2	109.3	7.18
109.0	129.1	7.12
128.8	148.9	7.14
148.6	168.7	7.34
168.4	188.5	7.31
188.2	208.3	7.24
208.0	228.1	7.25
227.8	247.9	7.35
247.6	267.7	7.40
267.3	287.4	7.38
287.1	307.2	7.50
306.9	327.0	7.38
326.7	346.8	7.37
346.5	366.6	7.46
366.3	386.4	7.58
386.1	406.2	7.47
425.7	445.8	7.57
445.5	465.6	7.59
485.1	505.2	7.53
504.9	525.0	7.56
544.5	564.6	7.57
564.3	584.4	7.64
603.9	624.0	7.54
623.7	643.8	7.67
663.3	683.4	7.74
683.1	703.2	7.69
722.7	742.8	7.84
742.4	762.5	7.81
782.0	802.1	7.74
801.8	821.9	7.73
841.4	861.5	7.70
861.2	881.3	7.60
900.8	920.9	7.52
920.6	940.7	7.45
960.2	980.3	7.41
980.0	1000.1	7.37

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1000.1MHz (dB) @LO (dBm) +17
980.0	20.1	7.91
960.2	39.9	7.79
940.4	59.7	7.85
920.6	79.5	7.79
900.8	99.3	7.65
881.0	119.1	7.51
861.2	138.9	7.51
841.4	158.7	7.45
821.6	178.5	7.37
801.8	198.3	7.30
782.0	218.1	7.20
762.2	237.9	7.16
742.4	257.7	7.13
722.7	277.4	7.16
702.9	297.2	7.04
683.1	317.0	7.01
663.3	336.8	7.02
643.5	356.6	7.04
623.7	376.4	7.07
603.9	396.2	7.03
564.3	435.8	7.09
544.5	455.6	7.14
504.9	495.2	7.13
485.1	515.0	7.19
445.5	554.6	7.29
425.7	574.4	7.27
386.1	614.0	7.31
366.3	633.8	7.32
326.7	673.4	7.36
306.9	693.2	7.39
267.3	732.8	7.46
247.6	752.5	7.51
208.0	792.1	7.56
188.2	811.9	7.57
148.6	851.5	7.70
128.8	871.3	7.68
89.2	910.9	7.66
69.4	930.7	7.64
29.8	970.3	7.75
10.0	990.1	7.64

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm)			LO-IF ISOLATION (dB) @LO (dBm)		
	+14	+17	+20	+14	+17	+20
20.1	66.92	67.13	67.30	66.94	63.20	63.52
60.1	57.91	58.61	59.40	56.86	55.91	55.21
100.1	53.77	55.06	55.73	52.30	51.66	51.45
140.1	51.22	52.42	53.52	49.38	49.06	48.70
180.1	49.50	50.91	52.78	47.83	47.75	47.48
220.1	47.88	50.16	52.35	46.49	46.50	46.59
260.1	47.13	49.75	51.63	45.51	45.78	45.56
300.1	46.82	49.86	51.15	44.86	45.15	44.70
340.1	46.29	49.10	50.21	44.19	44.48	43.82
380.1	46.71	48.95	49.68	43.70	43.59	43.11
420.1	46.33	48.33	48.79	43.03	42.87	42.33
460.1	45.95	47.29	47.89	42.68	42.32	42.38
500.1	45.56	46.33	46.78	42.24	41.30	41.53
540.1	44.84	45.48	45.85	42.43	41.65	40.59
580.1	44.05	44.71	45.27	41.94	42.03	41.17
620.1	43.07	43.72	44.39	41.63	41.74	42.21
660.1	42.10	42.75	43.52	42.24	40.92	42.07
700.1	40.78	41.61	42.54	42.54	40.39	40.30
740.1	39.72	40.64	41.69	42.06	40.71	39.53
780.1	38.50	39.53	40.72	40.84	40.58	39.23
820.1	37.55	38.69	39.95	39.59	40.35	39.05
860.1	36.90	38.02	39.33	38.27	40.97	41.28
900.1	36.12	37.28	38.54	36.79	40.00	41.67
920.1	35.98	37.03	38.24	35.85	39.18	41.36
960.1	35.44	36.57	37.79	34.98	37.13	39.31
980.1	35.34	36.52	37.68	34.69	36.37	38.77
1020.1	34.91	36.34	37.35	34.65	35.04	37.37
1040.1	34.67	36.14	37.17	34.99	34.82	36.99
1080.1	34.36	35.96	36.94	35.11	34.31	36.27
1100.1	33.93	35.56	36.60	35.69	34.88	36.24
1140.1	33.41	35.12	36.14	35.20	34.45	35.52
1160.1	33.05	34.79	35.97	36.28	35.49	35.85
1200.1	32.34	34.06	35.22	35.80	35.31	35.34
1220.1	31.96	33.68	34.84	36.76	36.23	35.48
1260.1	31.26	32.92	34.10	36.98	36.92	36.08
1280.1	30.82	32.39	33.44	38.19	38.01	36.44
1320.1	29.91	31.34	32.24	38.78	41.54	40.31
1340.1	29.47	30.89	31.80	39.28	44.55	42.72
1380.1	28.62	29.76	30.57	37.19	43.33	56.15
1400.1	28.17	29.29	30.08	36.23	40.59	46.14

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB) @LO (dBm)		
		+14	+17	+20
20.1	50.1	44.99	44.88	43.59
60.1	90.1	36.49	36.47	36.00
100.1	130.1	32.59	32.03	31.71
140.1	170.1	29.92	29.56	29.35
180.1	210.1	28.12	27.78	27.55
220.1	250.1	26.86	26.53	26.32
260.1	290.1	25.94	25.62	25.47
300.1	330.1	25.23	24.95	24.90
340.1	370.1	24.71	24.58	24.48
380.1	410.1	24.17	24.27	24.18
420.1	450.1	23.63	23.75	23.82
460.1	490.1	23.26	23.31	23.40
500.1	530.1	22.79	22.79	22.83
540.1	570.1	22.57	22.43	22.42
580.1	610.1	22.18	22.00	21.92
620.1	650.1	21.39	21.31	21.37
660.1	690.1	20.30	20.28	20.46
700.1	730.1	19.18	19.25	19.49
740.1	770.1	18.13	18.19	18.44
780.1	810.1	17.23	17.27	17.51
820.1	850.1	16.38	16.36	16.57
860.1	890.1	15.68	15.57	15.72
900.1	930.1	15.13	15.00	15.08
920.1	950.1	14.99	14.84	14.92
960.1	990.1	14.57	14.42	14.41
980.1	1010.1	14.32	14.21	14.18
1020.1	1050.1	13.92	13.91	13.94
1040.1	1070.1	13.67	13.75	13.74
1080.1	1110.1	13.42	13.56	13.65
1100.1	1130.1	13.28	13.46	13.68
1140.1	1170.1	12.94	13.19	13.46
1160.1	1190.1	12.77	12.98	13.27
1200.1	1230.1	12.45	12.68	13.02
1220.1	1250.1	12.30	12.52	12.84
1260.1	1290.1	11.98	12.22	12.49
1280.1	1310.1	11.85	12.09	12.34
1320.1	1350.1	11.56	11.87	12.10
1340.1	1370.1	11.38	11.72	12.00
1380.1	1410.1	11.16	11.56	11.93
1400.1	1430.1	11.07	11.57	12.00

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1) @LO (dBm)		
		+14	+17	+20
20.1	50.1	1.08	1.17	1.27
60.1	90.1	1.03	1.14	1.24
100.1	130.1	1.04	1.16	1.26
140.1	170.1	1.04	1.14	1.25
180.1	210.1	1.05	1.16	1.27
220.1	250.1	1.05	1.16	1.28
260.1	290.1	1.06	1.18	1.30
300.1	330.1	1.06	1.21	1.33
340.1	370.1	1.04	1.20	1.31
380.1	410.1	1.07	1.24	1.34
420.1	450.1	1.08	1.24	1.35
460.1	490.1	1.10	1.26	1.37
500.1	530.1	1.13	1.29	1.39
540.1	570.1	1.13	1.29	1.38
580.1	610.1	1.17	1.32	1.41
620.1	650.1	1.19	1.34	1.44
660.1	690.1	1.22	1.35	1.46
700.1	730.1	1.25	1.38	1.48
740.1	770.1	1.27	1.39	1.48
780.1	810.1	1.28	1.41	1.50
820.1	850.1	1.28	1.42	1.51
860.1	890.1	1.28	1.44	1.54
900.1	930.1	1.29	1.46	1.55
920.1	950.1	1.28	1.44	1.54
960.1	990.1	1.27	1.44	1.53
980.1	1010.1	1.28	1.41	1.52
1020.1	1050.1	1.28	1.39	1.49
1040.1	1070.1	1.30	1.37	1.49
1080.1	1110.1	1.33	1.38	1.48
1100.1	1130.1	1.35	1.38	1.47
1140.1	1170.1	1.40	1.42	1.48
1160.1	1190.1	1.43	1.44	1.50
1200.1	1230.1	1.51	1.51	1.54
1220.1	1250.1	1.56	1.55	1.58
1260.1	1290.1	1.66	1.64	1.66
1280.1	1310.1	1.73	1.70	1.72
1320.1	1350.1	1.85	1.83	1.83
1340.1	1370.1	1.93	1.90	1.91
1380.1	1410.1	2.09	2.05	2.05
1400.1	1430.1	2.18	2.14	2.14

LO (MHz)	LO VSWR (:1) @LO (dBm)		
	+14	+17	+20
20.1	1.15	1.72	2.60
60.1	1.08	1.68	2.54
100.1	1.08	1.62	2.41
140.1	1.10	1.70	2.57
180.1	1.10	1.62	2.39
220.1	1.14	1.68	2.51
260.1	1.12	1.65	2.45
300.1	1.14	1.65	2.45
340.1	1.15	1.70	2.52
380.1	1.14	1.66	2.44
420.1	1.16	1.72	2.55
460.1	1.13	1.70	2.50
500.1	1.14	1.72	2.53
540.1	1.15	1.75	2.56
580.1	1.15	1.75	2.55
620.1	1.17	1.79	2.61
660.1	1.18	1.79	2.58
700.1	1.19	1.83	2.64
740.1	1.22	1.85	2.65
780.1	1.24	1.87	2.67
820.1	1.26	1.90	2.70
860.1	1.29	1.91	2.69
900.1	1.33	1.94	2.72
920.1	1.34	1.95	2.73
960.1	1.38	1.97	2.75
980.1	1.40	2.00	2.78
1020.1	1.43	2.04	2.81
1040.1	1.45	2.07	2.84
1080.1	1.48	2.09	2.86
1100.1	1.50	2.12	2.89
1140.1	1.52	2.14	2.90
1160.1	1.55	2.17	2.94
1200.1	1.57	2.17	2.92
1220.1	1.59	2.18	2.93
1260.1	1.62	2.21	2.96
1280.1	1.64	2.21	2.95
1320.1	1.65	2.20	2.91
1340.1	1.67	2.21	2.93
1380.1	1.70	2.21	2.91
1400.1	1.69	2.18	2.87

IF (OUT) (MHz)	IF VSWR @LO=1000.1MHz (:1) @LO (dBm)		
	+14	+17	+20
10.1	3.19	2.24	1.86
30.1	3.20	2.33	1.87
50.1	3.19	2.28	1.81
70.1	3.36	2.40	1.89
90.1	3.25	2.34	1.87
110.1	3.17	2.30	1.83
130.1	3.31	2.40	1.91
150.1	3.29	2.36	1.88
170.1	3.16	2.28	1.82
190.1	3.17	2.30	1.85
210.1	3.21	2.33	1.89
230.1	3.04	2.22	1.81
250.1	3.06	2.22	1.81
270.1	3.12	2.28	1.85
290.1	3.07	2.26	1.85
310.1	2.96	2.19	1.81
330.1	3.03	2.23	1.84
350.1	3.05	2.25	1.87
370.1	2.94	2.20	1.83
390.1	2.91	2.17	1.81
430.1	2.87	2.17	1.84
450.1	2.77	2.09	1.78
490.1	2.80	2.13	1.82
510.1	2.76	2.09	1.80
550.1	2.72	2.07	1.79
570.1	2.70	2.07	1.80
610.1	2.66	2.02	1.75
630.1	2.62	2.01	1.76
670.1	2.55	1.94	1.71
690.1	2.60	1.98	1.74
730.1	2.51	1.88	1.67
750.1	2.51	1.89	1.67
790.1	2.46	1.85	1.64
810.1	2.44	1.81	1.60
850.1	2.38	1.77	1.58
870.1	2.35	1.74	1.54
910.1	2.39	1.75	1.54
930.1	2.34	1.70	1.50
970.1	2.32	1.69	1.48
990.1	2.32	1.70	1.50

Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	16	20	24	26	27	44	25	51	31	55
1	-	16	+0	31	14	37	25	38	31	44	32	58
2	96	60	61	63	57	73	56	59	53	63	56	85
3	>100	65	60	69	59	69	52	71	51	71	57	76
4	>100	79	>92	82	91	78	82	84	79	78	84	89
5	>100	>92	80	>92	81	>92	78	87	80	86	79	91
6	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
7	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
8	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
9	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
10	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
RF CAL		0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: **RF IN: 500.1 MHz; -1.00 dBm.**
LO IN: 530.01 MHz; +17.00 dBm
IF OUT: 29.91 MHz; -8.27 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	26	30	35	36	41	58	46	63	42	68
1	-	16	+0	31	14	41	23	40	38	51	40	60
2	78	52	55	58	53	54	53	59	52	64	48	73
3	>100	48	40	53	44	49	37	57	43	65	45	61
4	>100	73	67	84	69	70	64	68	62	64	64	69
5	>100	64	59	62	54	63	53	60	49	62	49	65
6	>100	82	80	93	76	86	84	79	71	80	69	73
7	>100	>102	78	82	74	74	69	73	64	68	62	68
8	>100	>102	89	88	92	81	87	82	84	79	79	80
9	>100	98	94	94	82	82	76	77	74	77	76	74
10	>100	>102	98	>102	98	97	90	89	87	89	86	90
RF CAL		0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

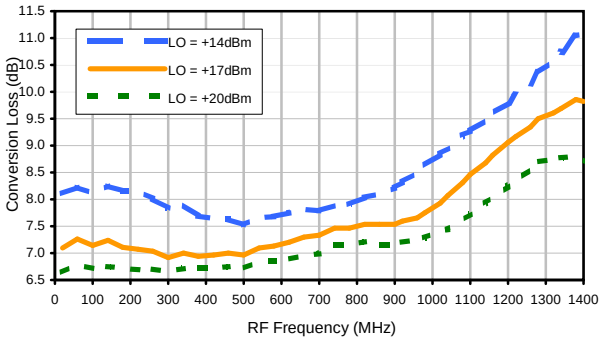
Test conditions: **RF IN: 500.1 MHz; 9.00 dBm.**
LO IN: 530.01 MHz; +17.00 dBm
IF OUT: 29.91 MHz; 1.8 dBm

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.

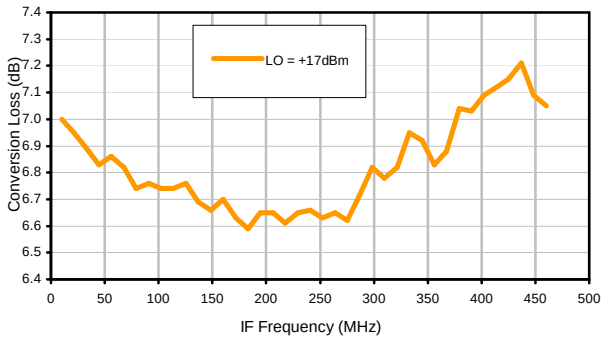
Frequency Mixer JMS-2H+

Typical Performance Curves

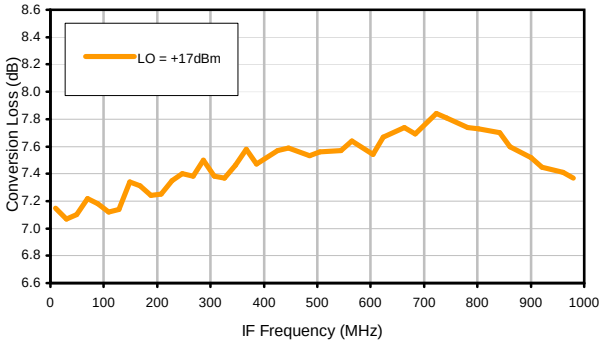
Conversion Loss @ IF=30MHz



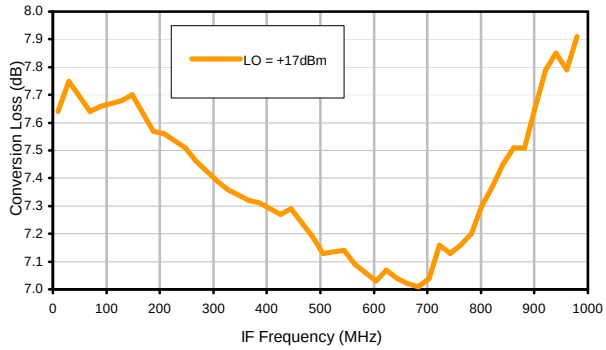
Conversion Loss vs. IF @ RF=500.1MHz



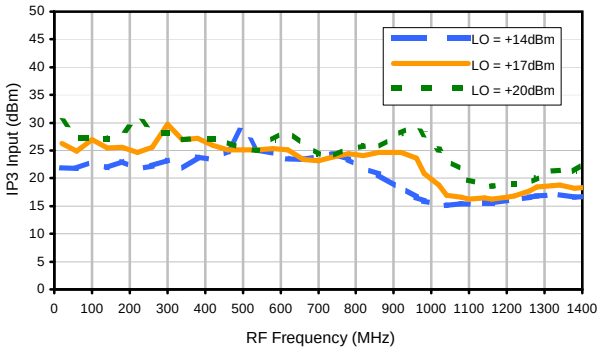
Conversion Loss vs. IF @ RF=20.1MHz



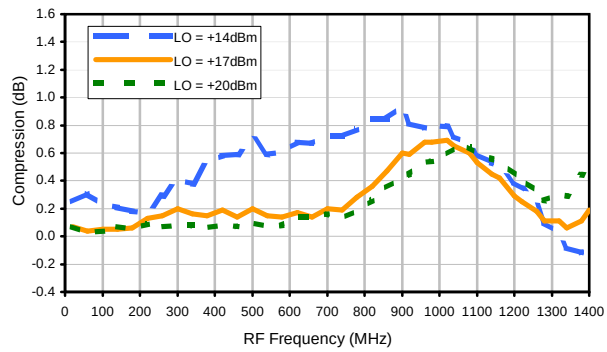
Conversion Loss vs. IF @ RF=1000.1MHz



IP3 Input

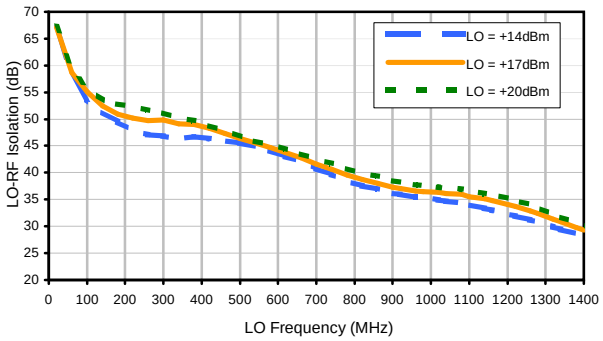


Compression @ RF IN=+14dBm

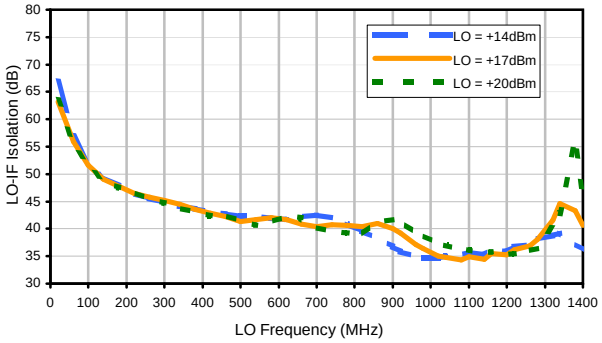


Typical Performance Curves

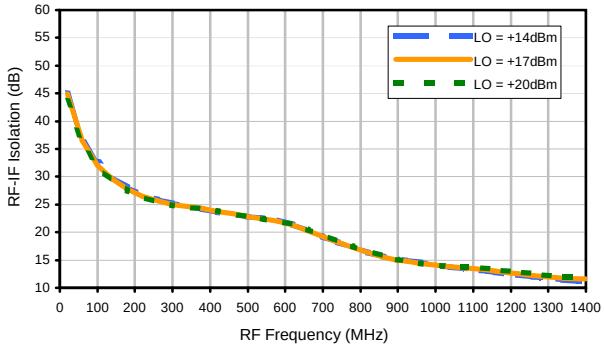
LO-RF Isolation



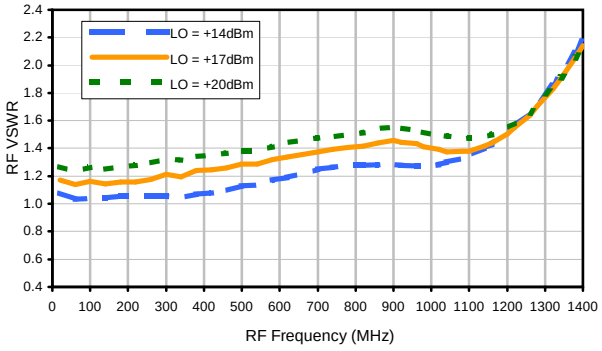
LO-IF Isolation



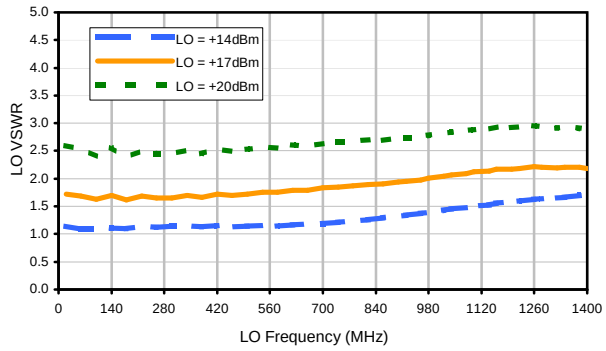
RF-IF Isolation



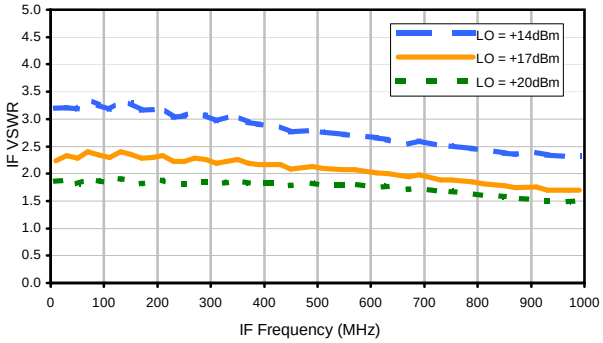
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	16	20	24	26	27	44	25	51	31	55
1	-	16	+0	31	14	37	25	38	31	44	32	58
2	96	60	61	63	57	73	56	59	53	63	56	85
3	>100	65	60	69	59	69	52	71	51	71	57	76
4	>100	79	>92	82	91	78	82	84	79	78	84	89
5	>100	>92	80	>92	81	>92	78	87	80	86	79	91
6	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
7	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
8	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
9	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
10	>100	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
RF CAL		0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: **RF IN: 500.1 MHz; -1.00 dBm.**
LO IN: 530.01 MHz; +17.00 dBm
IF OUT: 29.91 MHz; -8.27 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	26	30	35	36	41	58	46	63	42	68
1	-	16	+0	31	14	41	23	40	38	51	40	60
2	78	52	55	58	53	54	53	59	52	64	48	73
3	>100	48	40	53	44	49	37	57	43	65	45	61
4	>100	73	67	84	69	70	64	68	62	64	64	69
5	>100	64	59	62	54	63	53	60	49	62	49	65
6	>100	82	80	93	76	86	84	79	71	80	69	73
7	>100	>102	78	82	74	74	69	73	64	68	62	68
8	>100	>102	89	88	92	81	87	82	84	79	79	80
9	>100	98	94	94	82	82	76	77	74	77	76	74
10	>100	>102	98	>102	98	97	90	89	87	89	86	90
RF CAL		0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

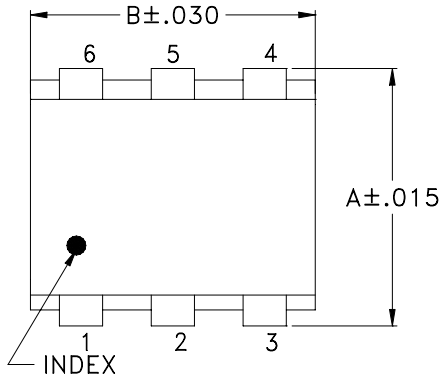
Test conditions: **RF IN: 500.1 MHz; 9.00 dBm.**
LO IN: 530.01 MHz; +17.00 dBm
IF OUT: 29.91 MHz; 1.8 dBm

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.

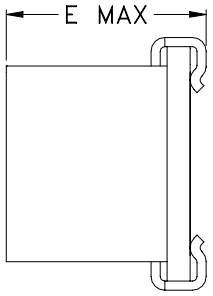
Case Style BH

BH292

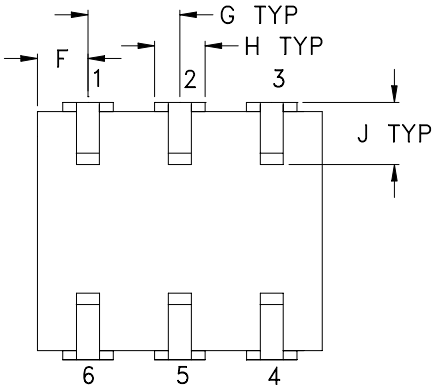
Outline Dimensions



TOP VIEW

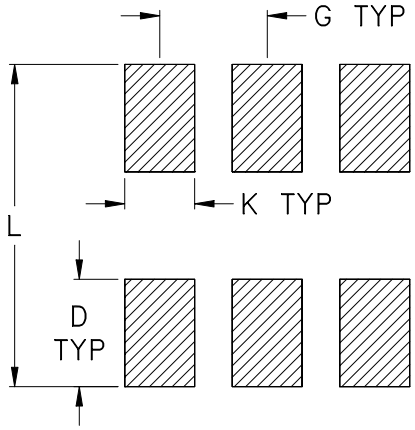


SIDE VIEW



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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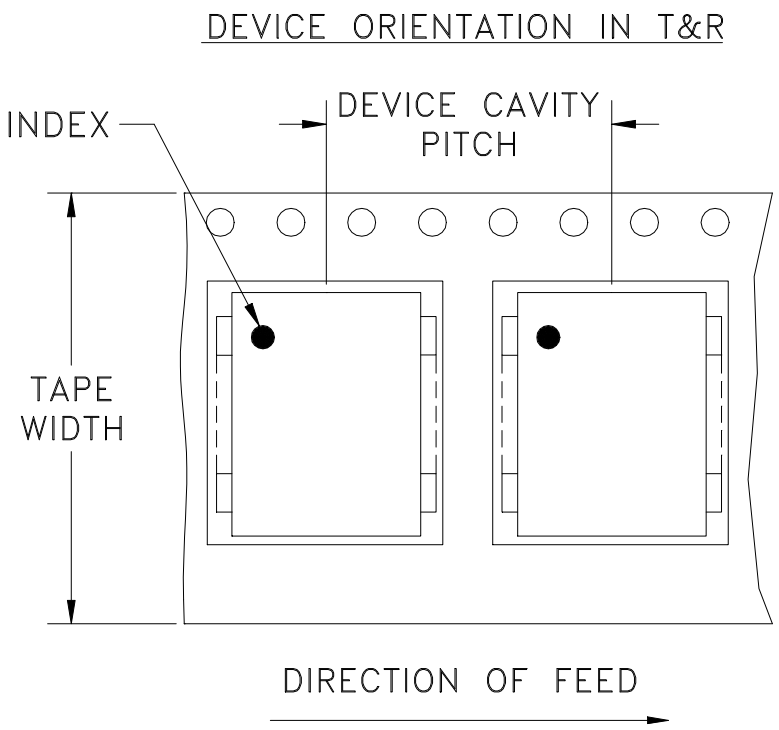
Tape & Reel Packaging TR-F24



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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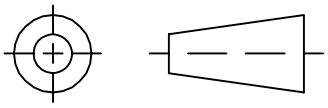
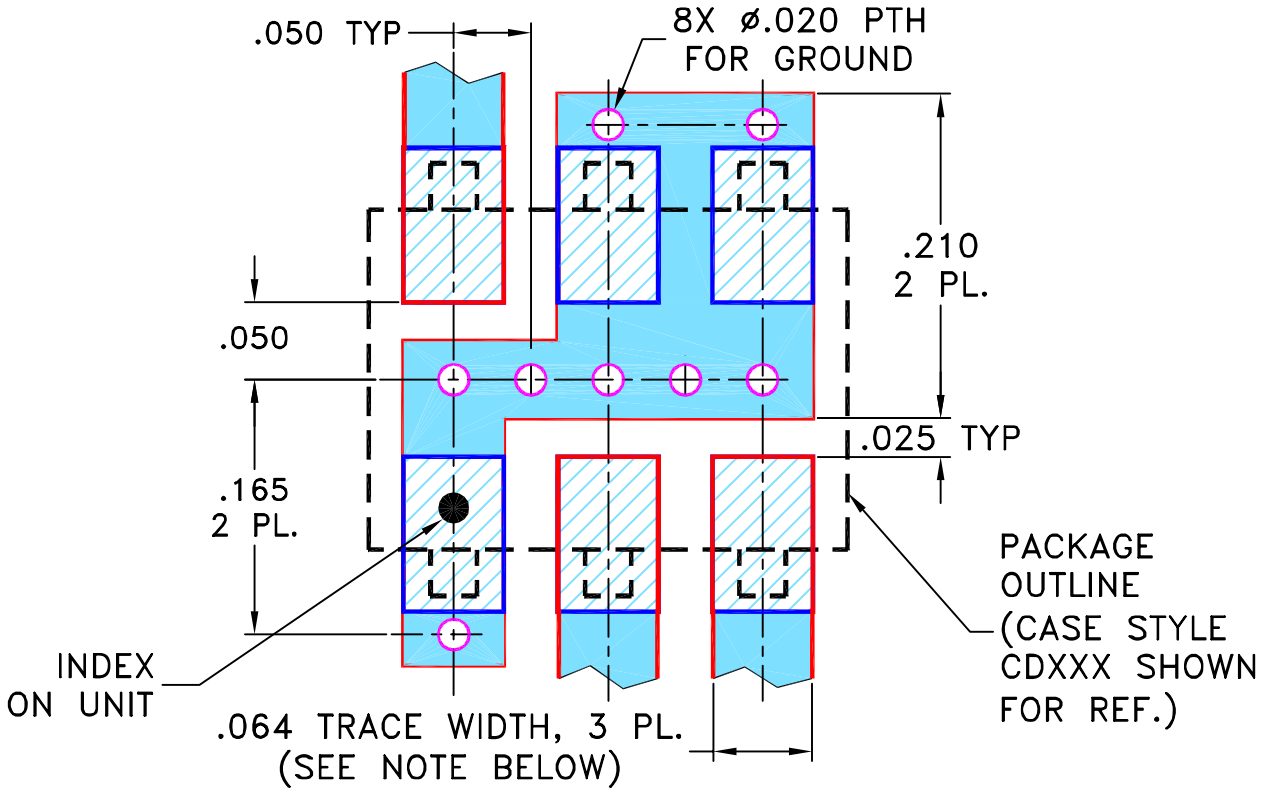
THIRD ANGLE PROJECTION



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 ±			

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

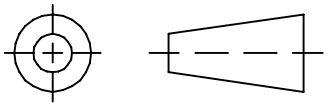
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

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

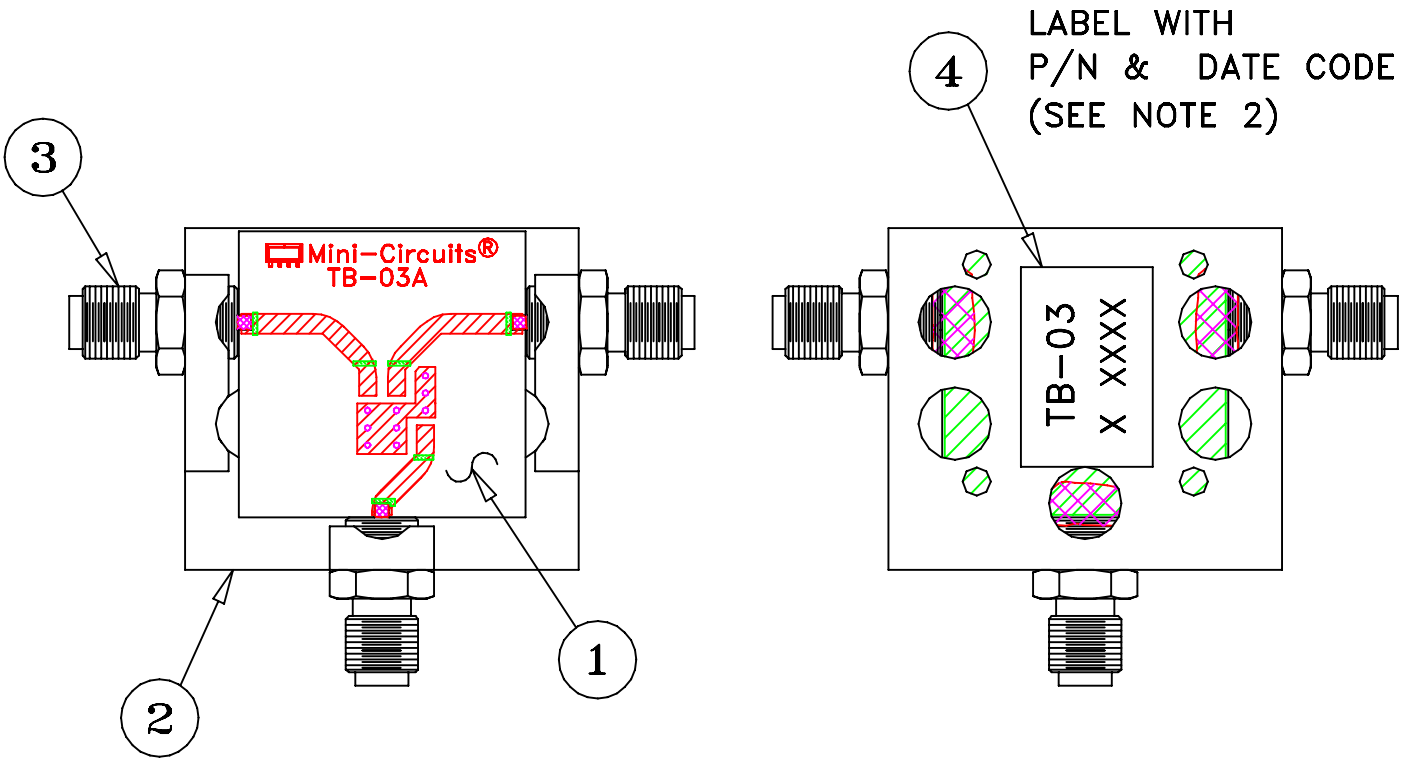
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-052	C

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 ±			

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

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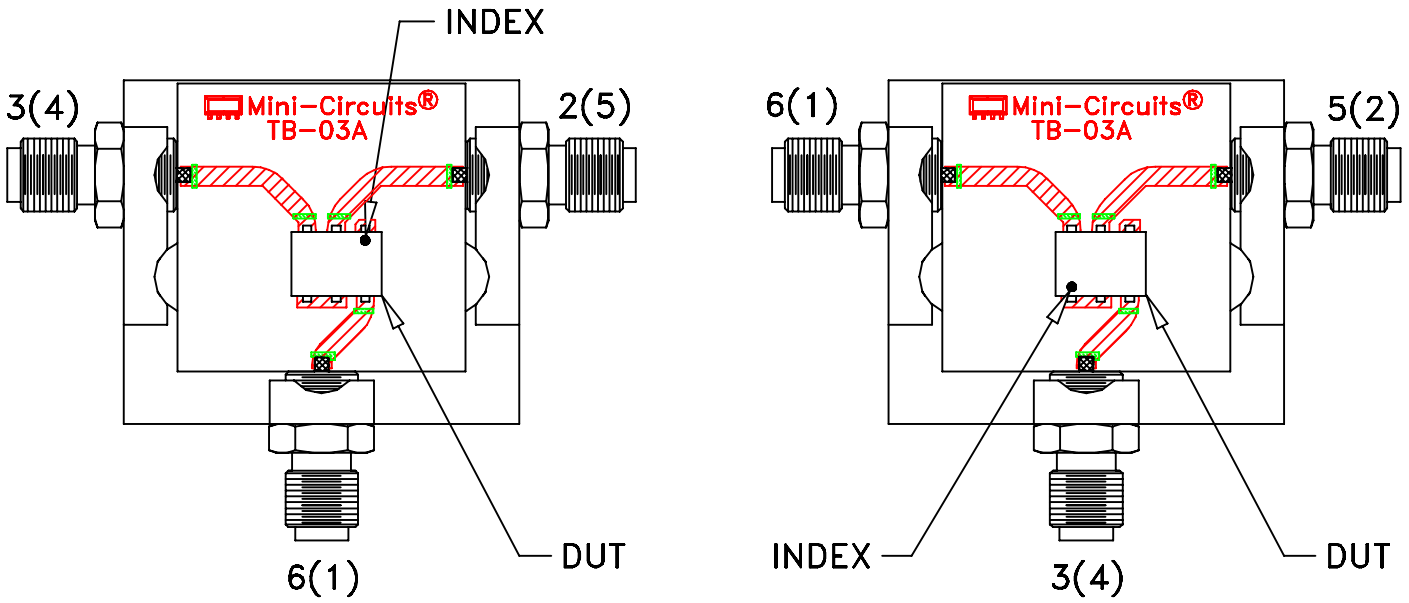
TB,ADE,CD542/636,06MX01,50

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

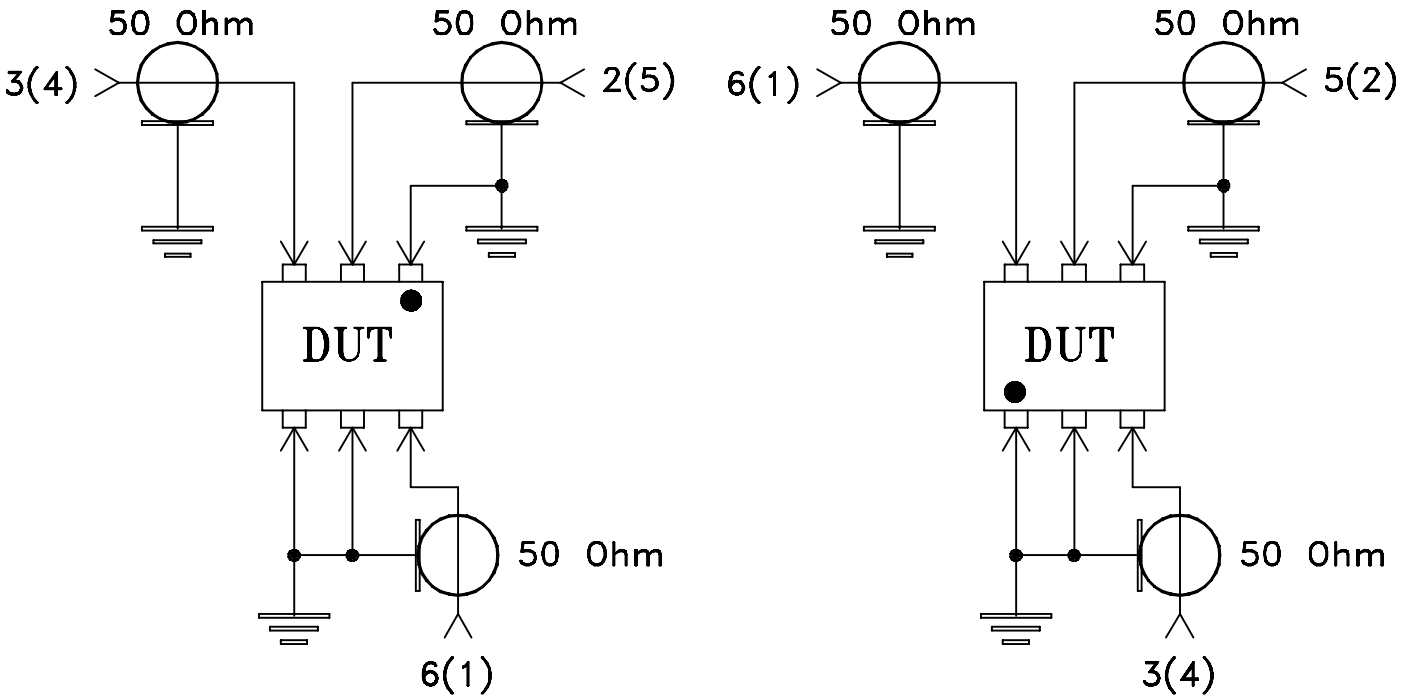
FILE:	SCALE:	SHEET:
WTB-03	1.5:1	1 OF 2

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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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