

Surface Mount Frequency Mixer

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

Maximum Ratings

Operating Temperature -40°C to 85°C

Storage Temperature -55°C to 100°C

RF Power 50mW

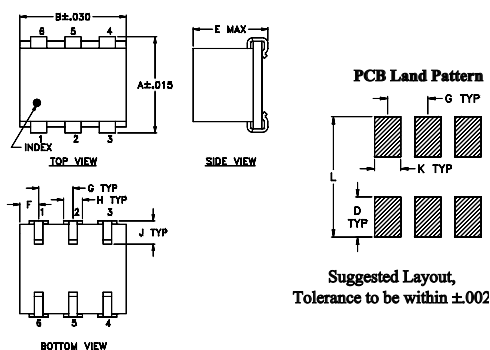
IF Current 40mA

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

Pin Connections

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

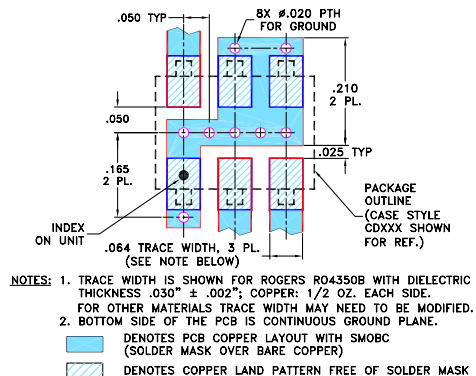
Outline Drawing



Outline Dimensions (inch)

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

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp

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



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

Electrical Specifications

FREQUENCY (MHz)		CONVERSION LOSS (dB)				LO-RF ISOLATION (dB)						LO-IF ISOLATION (dB)						IP3 at center band (dBm)
LO/RF f _L -f _U	IF	Mid-Band m			Total Range Max.	L	M		U		L	M		U				
		$\overline{X}$	σ	Max.			Typ.	Min.	Typ.	Min.		Typ.	Min.	Typ.	Min.	Typ.	Min.	
		Typ.	Min.	Typ.			Min.	Typ.	Min.	Typ.		Min.	Typ.	Min.	Typ.	Min.		
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 band [$2 f_L$ to $f_U/2$]

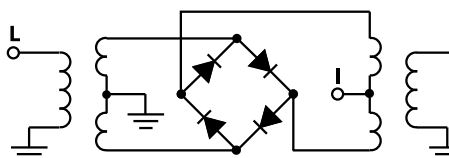
M = mid range [$10 f_L$ to $f_U/2$]

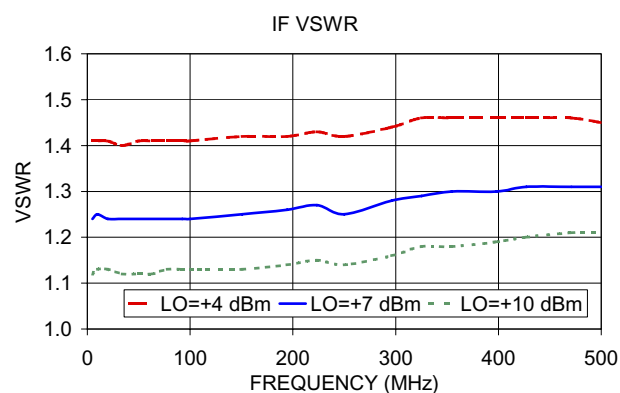
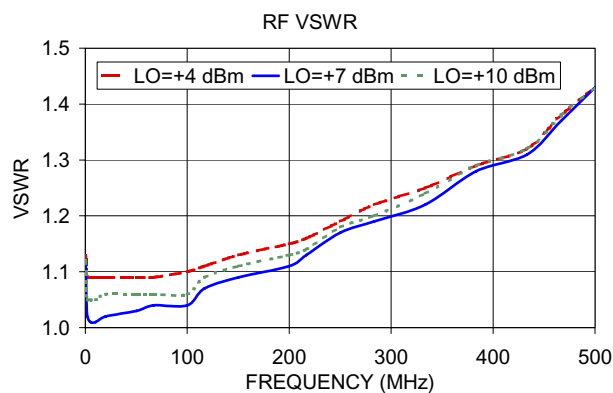
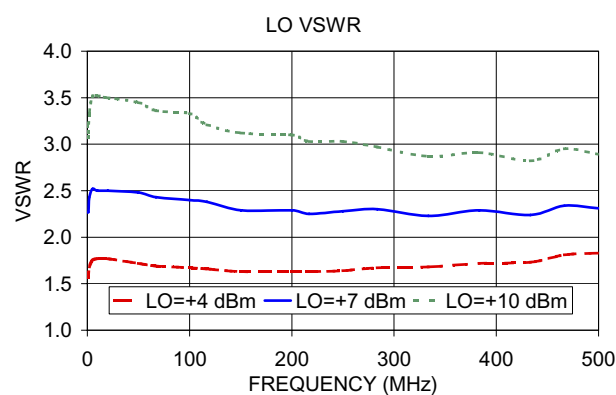
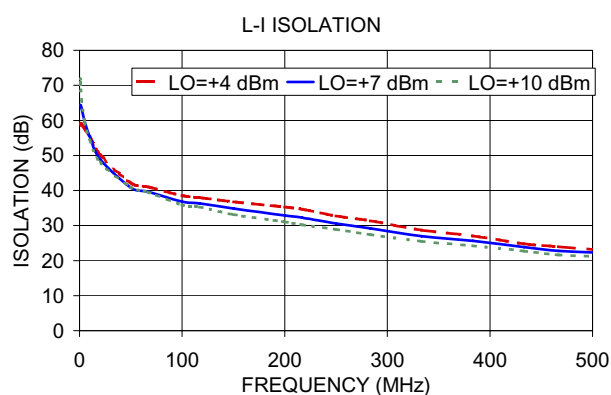
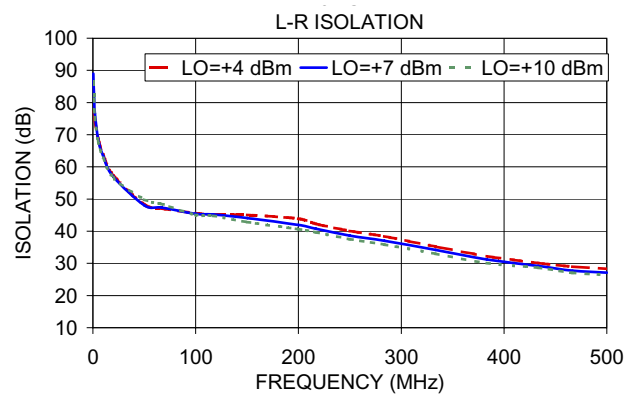
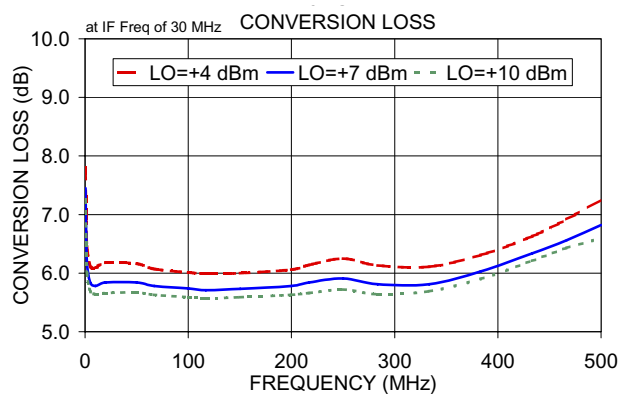
U = upper range [$f_U/2$ to f_U]

Typical Performance Data

Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)
RF	LO	LO +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

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp



Frequency Mixer

JMS-1+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)			RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)			RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+1dBm (dB)		
		@LO (dBm)					@LO (dBm)					@LO (dBm)		
		+4	+7	+10			+4	+7	+10			+4	+7	+10
0.5	30.5	7.81	7.45	7.25	10.1	40.1	20.53	22.15	21.19	10.1	40.1	1.05	0.73	0.55
1.0	31.0	7.02	6.68	6.52	50.8	80.8	18.60	20.22	19.60	50.8	80.8	0.94	0.73	0.54
2.0	32.0	6.45	6.15	6.00	91.4	121.4	15.39	16.73	20.57	91.4	121.4	0.93	0.67	0.46
5.0	35.0	6.12	5.84	5.69	132.1	162.1	14.65	17.24	21.57	132.1	162.1	0.92	0.65	0.48
10.0	40.0	6.09	5.78	5.64	172.7	202.7	15.14	20.38	21.90	172.7	202.7	0.82	0.60	0.47
50.8	80.8	6.10	5.70	5.51	213.4	243.4	15.58	19.16	23.23	213.4	243.4	0.87	0.61	0.44
132.1	162.1	6.00	5.72	5.57	254.0	284.0	16.60	21.97	24.24	254.0	284.0	0.86	0.61	0.46
172.7	202.7	6.04	5.76	5.61	274.4	304.4	16.26	19.62	26.17	274.4	304.4	0.83	0.61	0.48
213.4	243.4	6.00	5.76	5.60	315.0	345.0	16.61	20.63	23.81	315.0	345.0	0.89	0.61	0.45
254.0	284.0	6.08	5.81	5.65	335.3	365.3	22.63	22.12	21.24	335.3	365.3	0.90	0.64	0.49
274.4	304.4	6.11	5.83	5.67	376.0	406.0	16.04	17.02	20.87	376.0	406.0	0.82	0.60	0.47
315.0	345.0	6.10	5.83	5.69	396.3	426.3	16.75	17.80	21.87	396.3	426.3	0.80	0.60	0.45
376.0	406.0	6.12	5.85	5.68	437.0	467.0	18.87	19.96	21.68	437.0	467.0	0.78	0.57	0.46
396.3	426.3	6.12	5.84	5.68	457.3	487.3	17.50	18.82	19.05	457.3	487.3	0.78	0.57	0.44
437.0	467.0	6.19	5.92	5.73	498.0	528.0	13.46	15.75	16.21	498.0	528.0	0.84	0.59	0.44
457.3	487.3	6.25	5.98	5.77	518.3	548.3	15.52	15.55	16.22	518.3	548.3	0.88	0.64	0.48
498.0	528.0	6.21	5.93	5.76	559.0	589.0	18.31	20.00	19.04	559.0	589.0	0.93	0.63	0.47
518.3	548.3	6.25	5.96	5.79	579.3	609.3	24.25	22.27	21.04	579.3	609.3	0.93	0.64	0.46
559.0	589.0	6.29	6.00	5.83	619.9	649.9	14.40	15.27	22.49	619.9	649.9	0.99	0.67	0.48
579.3	609.3	6.35	6.05	5.88	640.3	670.3	12.87	14.65	19.80	640.3	670.3	0.97	0.70	0.51
619.9	649.9	6.47	6.20	6.01	680.9	710.9	9.74	12.16	17.80	680.9	710.9	1.03	0.75	0.57
640.3	670.3	6.58	6.29	6.09	701.2	731.2	8.82	11.07	14.20	701.2	731.2	1.06	0.79	0.60
680.9	710.9	6.69	6.43	6.23	741.9	771.9	7.72	9.95	12.73	741.9	771.9	1.14	0.87	0.69
741.9	771.9	6.93	6.64	6.44	762.2	792.2	8.17	10.83	13.63	762.2	792.2	1.20	0.91	0.72
762.2	792.2	6.94	6.65	6.45	802.9	832.9	8.32	11.41	15.31	802.9	832.9	1.26	0.96	0.79
802.9	832.9	7.08	6.75	6.53	823.2	853.2	9.19	13.64	18.25	823.2	853.2	1.26	1.01	0.83
823.2	853.2	7.11	6.76	6.55	863.9	893.9	10.13	15.48	25.70	863.9	893.9	1.36	1.10	0.92
863.9	893.9	7.24	6.84	6.61	884.2	914.2	10.54	16.86	20.08	884.2	914.2	1.41	1.13	0.94
884.2	914.2	7.27	6.88	6.63	924.9	954.9	12.02	16.76	19.35	924.9	954.9	1.37	1.13	0.93
924.9	954.9	7.52	7.06	6.79	945.2	975.2	11.44	18.79	19.93	945.2	975.2	1.39	1.12	0.94
945.2	975.2	7.62	7.14	6.86	985.8	1015.8	14.46	14.59	16.58	985.8	1015.8	1.30	1.05	0.89
985.8	1015.8	7.95	7.45	7.11	1006.2	1036.2	13.16	13.44	14.04	1006.2	1036.2	1.29	1.07	0.90
1006.2	1036.2	8.11	7.59	7.24	1046.8	1076.8	10.12	11.20	12.42	1046.8	1076.8	1.18	0.99	0.81
1046.8	1076.8	8.48	7.92	7.57	1067.1	1097.1	9.58	10.53	11.80	1067.1	1097.1	1.12	0.94	0.80
1067.1	1097.1	8.72	8.16	7.77	1107.8	1137.8	8.15	9.27	10.44	1107.8	1137.8	0.99	0.85	0.73
1128.1	1158.1	9.45	8.86	8.44	1128.1	1158.1	8.03	8.56	10.01	1128.1	1158.1	0.92	0.79	0.68
1168.8	1198.8	9.94	9.34	8.92	1168.8	1198.8	7.24	8.26	9.29	1168.8	1198.8	0.88	0.76	0.66
1189.1	1219.1	10.15	9.57	9.14	1189.1	1219.1	7.59	8.59	9.21	1189.1	1219.1	0.86	0.75	0.65
1229.8	1259.8	10.54	9.99	9.58	1229.8	1259.8	8.11	9.04	10.53	1229.8	1259.8	0.82	0.73	0.66
1250.1	1280.1	10.74	10.19	9.81	1250.1	1280.1	9.10	9.74	11.99	1250.1	1280.1	0.84	0.74	0.67

REV. X2

JMS-1+

100817

Page 1 of 5



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

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



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



Frequency Mixer

JMS-1+

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=250.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=10.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=500.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+7			+7			+7
240.0	10.1	5.97	10.0	20.1	5.51	490.0	10.1	6.21
234.1	16.0	5.95	22.3	32.4	5.48	477.7	22.4	6.14
228.2	21.9	5.89	34.6	44.7	5.50	465.4	34.7	6.09
222.3	27.8	5.88	46.9	57.0	5.56	453.1	47.0	6.08
216.4	33.7	5.87	59.2	69.3	5.53	440.8	59.3	6.11
210.5	39.6	5.84	71.5	81.6	5.63	428.5	71.6	6.09
204.6	45.5	5.86	83.8	93.9	5.61	416.2	83.9	6.04
198.7	51.4	5.85	96.2	106.3	5.61	403.8	96.3	6.00
192.8	57.3	5.86	108.5	118.6	5.62	391.5	108.6	5.95
186.9	63.2	5.83	120.8	130.9	5.61	379.2	120.9	5.94
181.0	69.1	5.85	133.1	143.2	5.62	366.9	133.2	5.93
175.1	75.0	5.87	145.4	155.5	5.68	354.6	145.5	5.91
169.2	80.9	5.81	157.7	167.8	5.71	342.3	157.8	5.92
163.3	86.8	5.84	170.0	180.1	5.74	330.0	170.1	5.93
157.4	92.7	5.84	182.3	192.4	5.74	317.7	182.4	5.93
151.5	98.6	5.80	194.6	204.7	5.72	305.4	194.7	5.93
145.6	104.5	5.80	206.9	217.0	5.75	293.1	207.0	5.90
139.7	110.4	5.79	219.2	229.3	5.79	280.8	219.3	5.89
133.8	116.3	5.77	231.5	241.6	5.77	268.5	231.6	5.91
127.9	122.2	5.75	243.8	253.9	5.80	256.2	243.9	5.92
122.1	128.0	5.74	256.2	266.3	5.85	243.8	256.3	5.94
116.2	133.9	5.73	268.5	278.6	5.85	231.5	268.6	5.95
110.3	139.8	5.77	280.8	290.9	5.86	219.2	280.9	5.93
104.4	145.7	5.73	293.1	303.2	5.88	206.9	293.2	5.93
98.5	151.6	5.75	305.4	315.5	5.88	194.6	305.5	5.90
92.6	157.5	5.73	317.7	327.8	5.91	182.3	317.8	5.88
86.7	163.4	5.74	330.0	340.1	5.92	170.0	330.1	5.88
80.8	169.3	5.76	342.3	352.4	5.93	157.7	342.4	5.88
74.9	175.2	5.75	354.6	364.7	5.96	145.4	354.7	5.90
69.0	181.1	5.73	366.9	377.0	5.95	133.1	367.0	5.92
63.1	187.0	5.73	379.2	389.3	5.96	120.8	379.3	5.90
57.2	192.9	5.72	391.5	401.6	5.95	108.5	391.6	5.90
51.3	198.8	5.72	403.8	413.9	5.91	96.2	403.9	5.91
45.4	204.7	5.73	416.2	426.3	5.94	83.8	416.3	5.90
39.5	210.6	5.74	428.5	438.6	5.98	71.5	428.6	5.93
33.6	216.5	5.73	440.8	450.9	6.01	59.2	440.9	5.94
27.7	222.4	5.73	453.1	463.2	6.01	46.9	453.2	5.92
21.8	228.3	5.74	465.4	475.5	6.02	34.6	465.5	5.95
15.9	234.2	5.71	477.7	487.8	6.01	22.3	477.8	5.93
10.0	240.1	5.81	490.0	500.1	6.02	10.0	490.1	5.96

REV. X2

JMS-1+

100817

Page 2 of 5



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS 9100 CERTIFIED • RoHS compliant

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



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



Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@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

Frequency Mixer

JMS-1+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=500.1MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+4	+7	+10		+4	+7	+10		+4	+7	+10
0.5	30.5	1.13	1.11	1.12	0.5	1.58	2.27	3.21	5.0	1.41	1.24	1.12
1.0	31.0	1.10	1.05	1.07	1.0	1.57	2.27	3.08	10.0	1.41	1.25	1.13
2.0	32.0	1.09	1.02	1.05	2.0	1.68	2.43	3.34	22.6	1.58	1.36	1.28
5.0	35.0	1.09	1.01	1.05	5.0	1.75	2.52	3.51	35.1	1.54	1.38	1.28
10.0	40.0	1.09	1.01	1.05	10.0	1.77	2.50	3.52	47.7	1.63	1.45	1.28
50.8	80.8	1.03	1.04	1.09	50.8	1.87	2.75	3.88	60.3	1.65	1.46	1.30
132.1	162.1	1.02	1.07	1.13	132.1	1.85	2.68	3.76	72.8	1.67	1.46	1.31
172.7	202.7	1.02	1.09	1.15	172.7	1.77	2.52	3.48	85.4	1.63	1.45	1.30
213.4	243.4	1.04	1.11	1.18	213.4	1.83	2.61	3.60	97.9	1.59	1.42	1.29
254.0	284.0	1.06	1.13	1.19	254.0	1.84	2.60	3.58	110.5	1.58	1.40	1.28
274.4	304.4	1.06	1.14	1.20	274.4	1.82	2.55	3.48	123.1	1.59	1.42	1.30
315.0	345.0	1.11	1.19	1.25	315.0	1.87	2.64	3.60	135.6	1.64	1.45	1.31
335.3	365.3	1.12	1.20	1.27	335.3	1.90	2.67	3.65	148.2	1.63	1.46	1.31
376.0	406.0	1.15	1.24	1.30	376.0	1.87	2.59	3.50	160.8	1.64	1.46	1.31
396.3	426.3	1.17	1.25	1.31	396.3	1.90	2.62	3.54	173.3	1.62	1.45	1.31
437.0	467.0	1.22	1.28	1.34	437.0	1.96	2.70	3.63	185.9	1.60	1.42	1.30
457.3	487.3	1.24	1.31	1.37	457.3	1.95	2.66	3.57	198.5	1.60	1.43	1.31
498.0	528.0	1.33	1.41	1.48	498.0	1.97	2.68	3.58	211.0	1.59	1.43	1.32
518.3	548.3	1.35	1.44	1.51	518.3	2.00	2.72	3.62	223.6	1.61	1.44	1.33
559.0	589.0	1.43	1.53	1.61	559.0	2.03	2.71	3.58	236.2	1.62	1.46	1.34
579.3	609.3	1.46	1.56	1.64	579.3	2.05	2.73	3.59	248.7	1.66	1.48	1.36
619.9	649.9	1.51	1.61	1.70	619.9	2.12	2.82	3.69	261.3	1.67	1.49	1.37
640.3	670.3	1.52	1.62	1.70	640.3	2.14	2.82	3.68	273.8	1.66	1.49	1.37
680.9	710.9	1.54	1.64	1.72	680.9	2.15	2.83	3.68	286.4	1.63	1.47	1.36
741.9	771.9	1.55	1.62	1.69	741.9	2.20	2.86	3.70	299.0	1.61	1.44	1.34
762.2	792.2	1.57	1.63	1.70	762.2	2.20	2.85	3.67	311.5	1.59	1.44	1.34
802.9	832.9	1.60	1.66	1.71	802.9	2.22	2.87	3.70	324.1	1.61	1.45	1.35
823.2	853.2	1.64	1.69	1.74	823.2	2.22	2.87	3.69	336.7	1.64	1.48	1.38
863.9	893.9	1.72	1.77	1.82	863.9	2.22	2.85	3.66	349.2	1.67	1.51	1.40
884.2	914.2	1.80	1.84	1.89	884.2	2.26	2.88	3.69	361.8	1.67	1.53	1.41
924.9	954.9	1.98	2.01	2.05	924.9	2.30	2.90	3.70	374.4	1.68	1.52	1.41
945.2	975.2	2.10	2.13	2.16	945.2	2.33	2.92	3.70	386.9	1.68	1.52	1.42
985.8	1015.8	2.39	2.40	2.42	985.8	2.40	2.97	3.74	399.5	1.68	1.52	1.42
1006.2	1036.2	2.54	2.54	2.55	1006.2	2.44	3.00	3.76	412.1	1.70	1.54	1.44
1046.8	1076.8	2.88	2.87	2.87	1046.8	2.49	3.02	3.76	424.6	1.69	1.54	1.45
1067.1	1097.1	3.06	3.04	3.02	1067.1	2.54	3.06	3.79	437.2	1.69	1.54	1.45
1128.1	1158.1	3.56	3.51	3.45	1128.1	2.64	3.11	3.79	449.7	1.71	1.56	1.46
1168.8	1198.8	3.76	3.70	3.64	1168.8	2.71	3.15	3.83	462.3	1.73	1.59	1.50
1189.1	1219.1	3.82	3.76	3.69	1189.1	2.73	3.16	3.82	474.9	1.78	1.64	1.53
1229.8	1259.8	3.94	3.86	3.78	1229.8	2.78	3.16	3.79	487.4	1.81	1.66	1.57
1250.1	1280.1	3.95	3.89	3.79	1250.1	2.81	3.17	3.81	500.0	1.86	1.86	1.87

REV. X2
JMS-1+
100817
Page 4 of 5

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.

REV. X2

JMS-1+

100817

Page 5 of 5



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

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



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

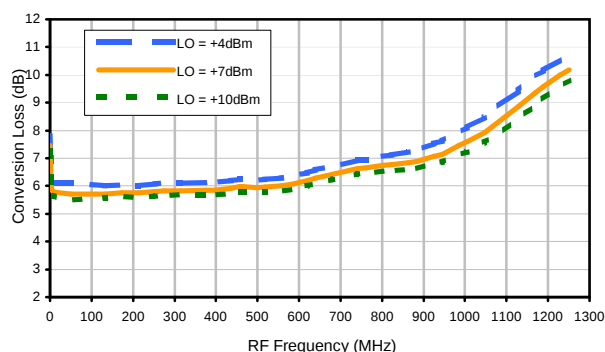


Frequency Mixer

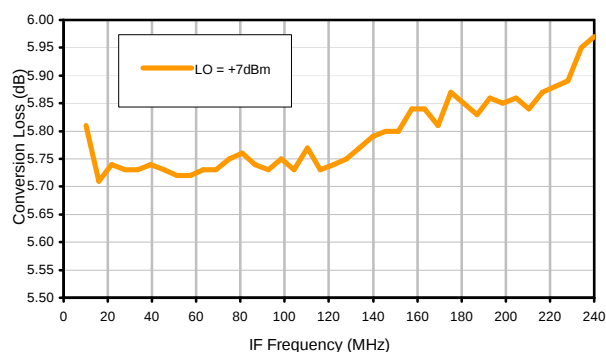
JMS-1+

Typical Performance Curves

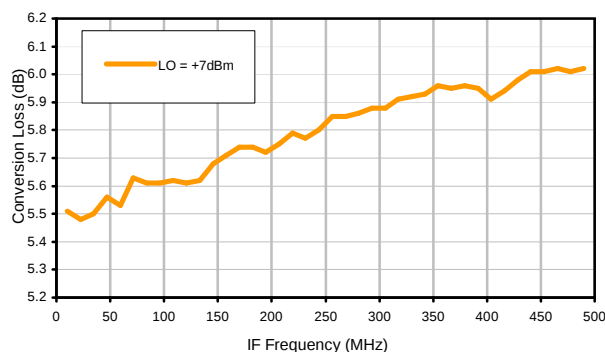
Conversion Loss @ IF=30MHz



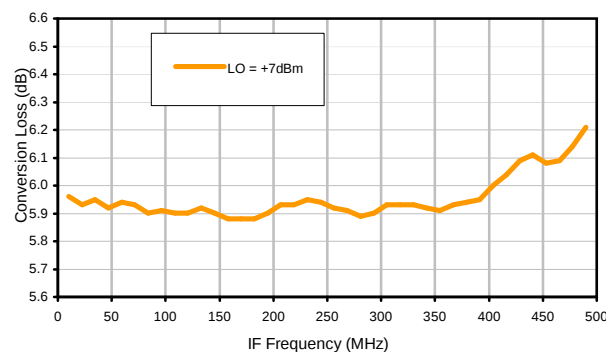
Conversion Loss vs. IF @ RF=250.1MHz



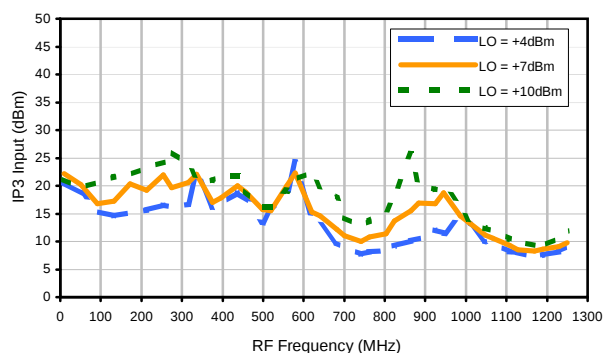
Conversion Loss vs. IF @ RF=10.1MHz



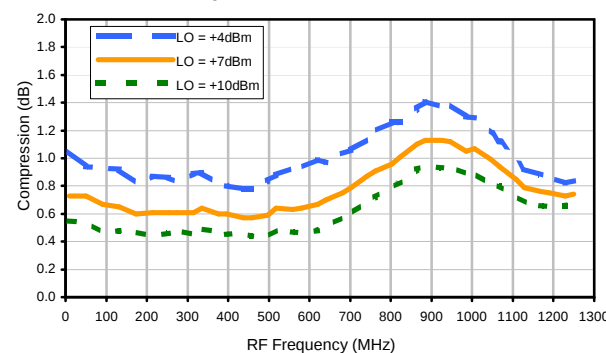
Conversion Loss vs. IF @ RF=500.1MHz



IP3 Input



Compression @ RF IN=+1dBm



REV. X2

JMS-1+

100817

Page 1 of 3



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS 9100 CERTIFIED • RoHS compliant

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

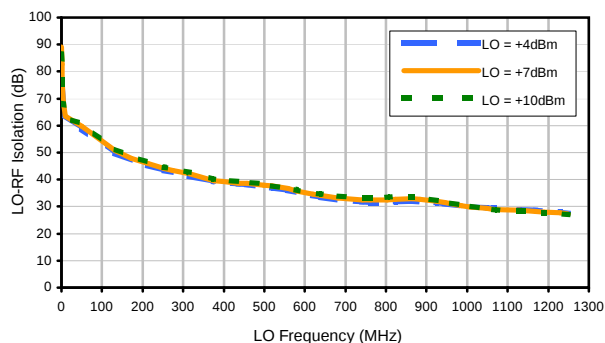


The Design Engineers Search Engine finds the model you need, instantly • For detailed performance specs & shopping online see

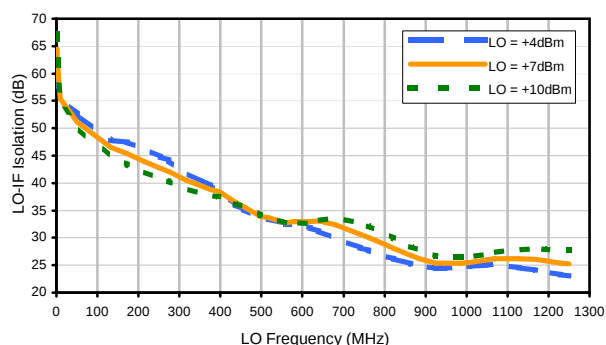


Typical Performance Curves

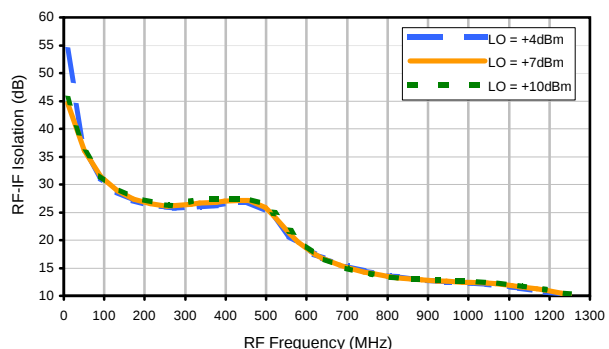
LO-RF Isolation



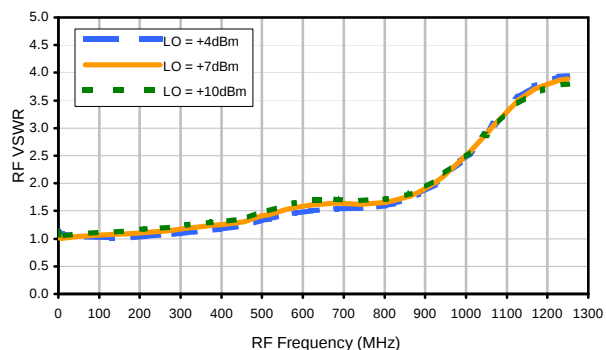
LO-IF Isolation



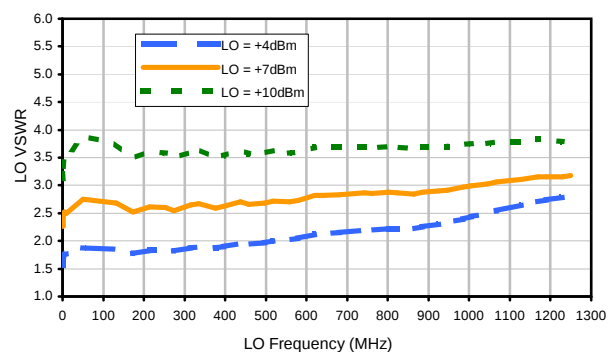
RF-IF Isolation



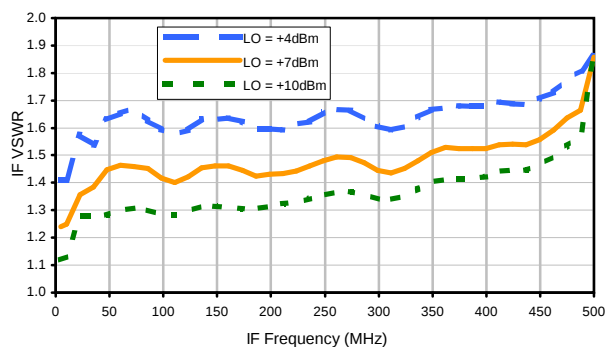
RF VSWR



LO VSWR



IF VSWR



REV. X2

JMS-1+

100817

Page 2 of 3



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS 9100 CERTIFIED • RoHS compliant

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



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



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	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.

REV. X2
JMS-1+
100817
Page 3 of 3



Mini-Circuits®

IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED • RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

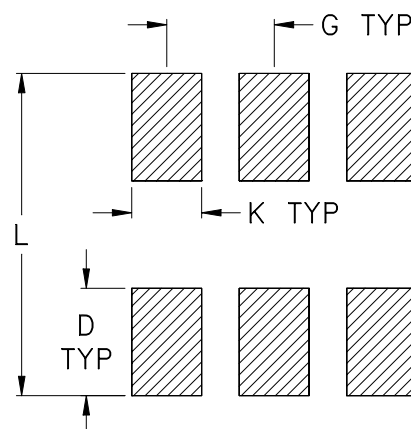
The Design Engineers Search Engine finds the model you need, instantly • For detailed performance specs & shopping online see



Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within $\pm .002$

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. $\pm .01$; 3Pl. $\pm .005$

Notes:

- Case material: Ceramic.
- 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.

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



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

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

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

Mini-Circuits ISO 9001 & ISO 14001 Certified

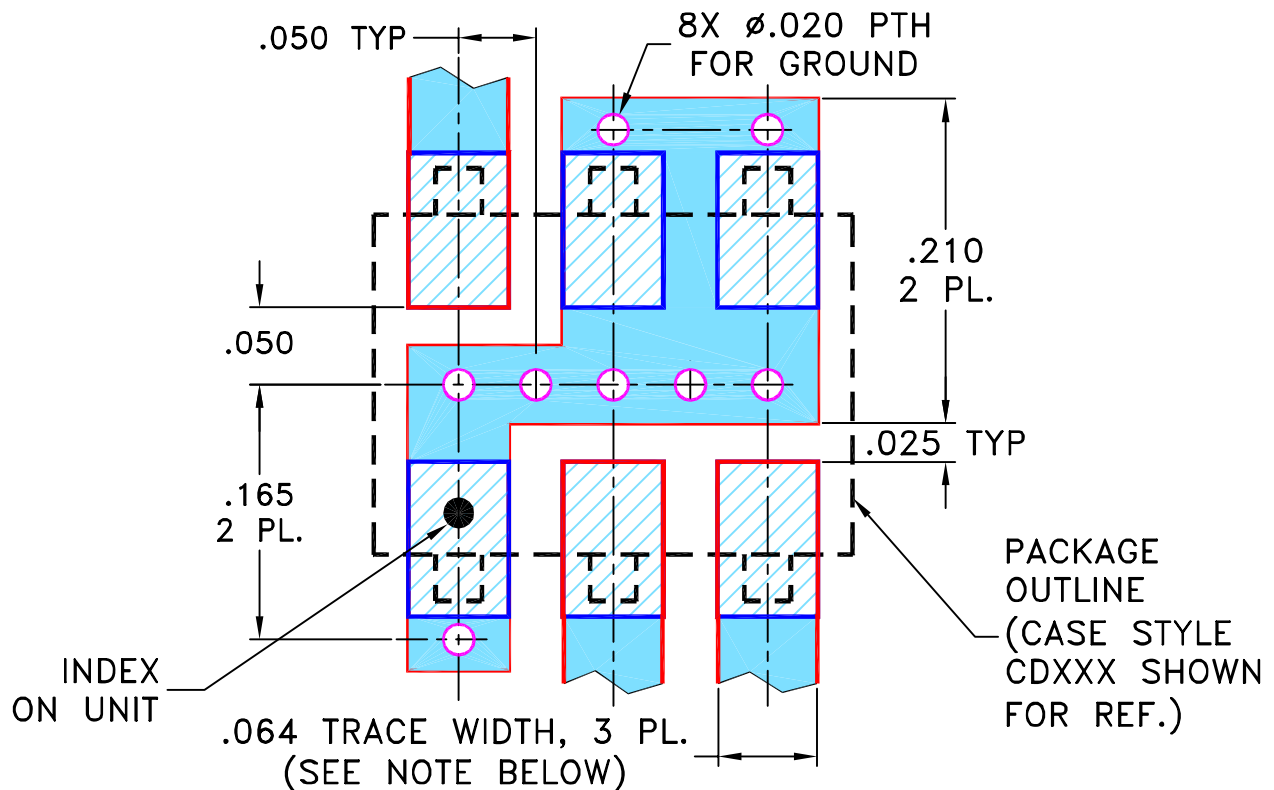
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
A	M101143	ADDED "gk" PIN CONNECTION, 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 R04350B WITH DIELECTRIC THICKNESS .030" $\pm$.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

TOLERANCES ON:

2 PL DECIMALS $\pm$ 3 PL DECIMALS $\pm$.005ANGLES $\pm$ FRACTIONS $\pm$

DRAWN

MMG

07/17/02

CHECKED

WL

08/02/02

APPROVED

DJ

08/05/02



Mini-Circuits®

13 Neptune Avenue
 Brooklyn NY 11235

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

SIZE

A

CODE IDENT

15542

DRAWING NO:

98-PL-052

REV:

C

FILE:

98PL052

SCALE:

8:1

SHEET:

1 OF 1

Mini-Circuits®

THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE, MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.

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

Evaluation Board and Circuit

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



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.030 inch.

 **Mini-Circuits®**



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