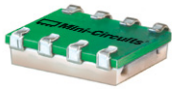
Surface Mount

Frequency Mixer

SKY-53MHR+

Level 13 (LO Power +13 dBm) 2800 to 5300 MHz



CASE STYLE: BJ398

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	5
RF	1
IF	7
GROUND	2,3,4,6,8

Features

- wide bandwidth, 2800 to 5300 MHz.
- low conversion loss, 5.7 dB typ.
- good L-R isolation, 28 dB typ.
- J-leads for strain relief

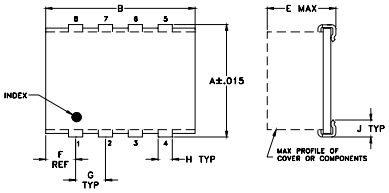
+RoHS Compliant

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

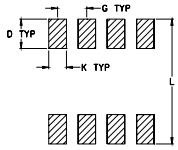
Applications

- line of sight links
- fixed satellite

Outline Drawing



PCB Land Pattern



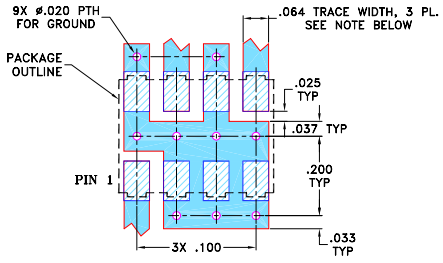
Suggested Layout,
Tolerance to be within ±.002

Outline Dimensions (inch / mm)

A	B	C	D	E	F	G
.305	.390	--	.100	.105	.045	.100
7.75	9.91	--	2.54	2.67	1.14	2.54

H	J	K	L	wt
.047	.065	.065	.325	grams
1.19	1.65	1.65	8.26	0.20

Demo Board MCL P/N: TB-11
Suggested PCB Layout (PL-056)



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

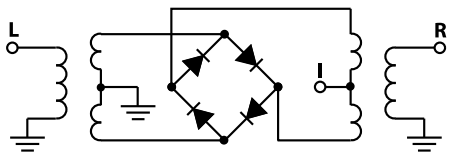
FREQUENCY (MHz)		CONVERSION LOSS (dB)			LO-RF ISOLATION (dB)		LO-IF ISOLATION (dB)		IP3 at center band (dBm)
LO/RF	IF	Mid-Band		Total Range					
f_L-f_U		$\overline{X}$	σ	Max.	Typ.	Min.	Typ.	Min.	Typ.
2800-5300	DC-500	5.7	.20	9.5	28	15	12	8	19

1 dB COMP.: +9 dBm typ.

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 +13dBm	LO +13dBm	LO +13dBm	LO +13dBm	LO +13dBm
2800.00	2830.00	6.81	24.05	13.89	3.76	1.21
3000.00	3030.00	6.76	22.21	12.43	2.95	1.15
3224.53	3254.53	5.99	22.25	11.65	2.41	1.09
3413.21	3443.21	5.67	23.17	11.34	2.25	1.09
3601.89	3631.89	5.66	24.09	10.82	2.32	1.06
3649.06	3679.06	5.84	24.22	10.73	2.36	1.06
3837.74	3867.74	6.03	25.15	11.25	2.60	1.07
4000.00	4030.00	6.59	27.60	12.14	2.72	1.22
4120.75	4090.75	6.76	27.24	12.80	2.84	1.30
4215.09	4185.09	6.79	27.81	13.43	2.89	1.33
4356.60	4326.60	6.89	35.40	13.95	3.01	1.31
4498.11	4468.11	6.59	52.00	14.21	3.25	1.44
4639.62	4609.62	6.51	40.26	15.15	3.53	1.62
4781.13	4751.13	6.64	35.74	16.72	4.06	1.92
4828.30	4798.30	6.67	34.61	17.36	4.06	1.88
5000.00	4970.00	7.29	32.18	19.27	4.73	1.98
5111.32	5081.32	7.58	31.21	20.41	5.52	1.81
5158.49	5128.49	7.66	30.74	21.01	5.56	1.81
5252.83	5222.83	7.92	29.76	21.69	6.50	1.70
5300.00	5270.00	8.09	29.09	21.97	6.45	1.63

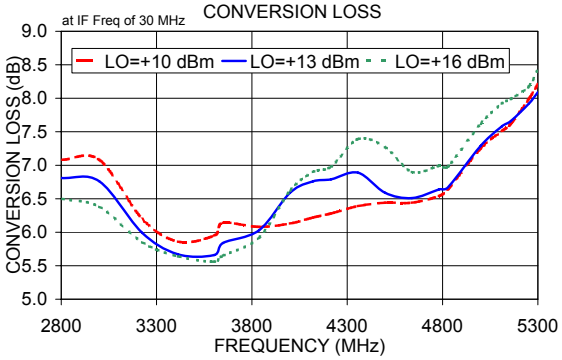
Electrical Schematic



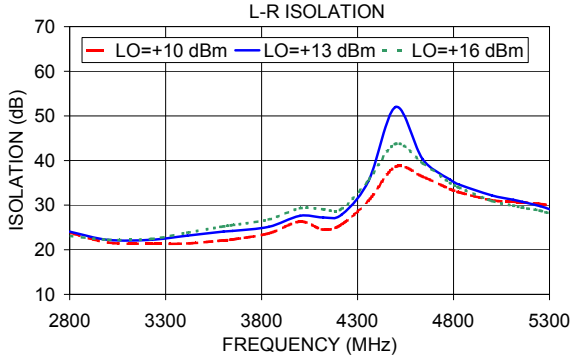
Notes
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's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

Performance Charts

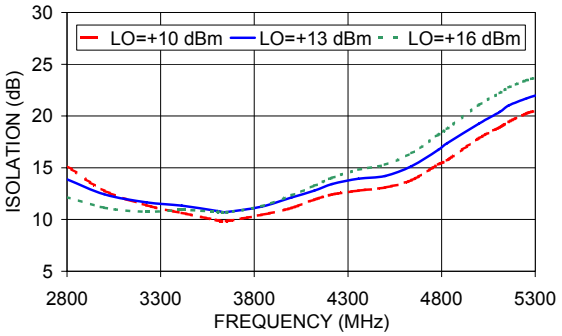
SKY-53MHR
CONVERSION LOSS
at IF Freq of 30 MHz



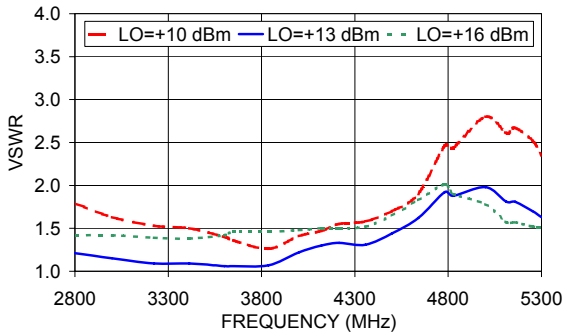
SKY-53MHR
L-R ISOLATION



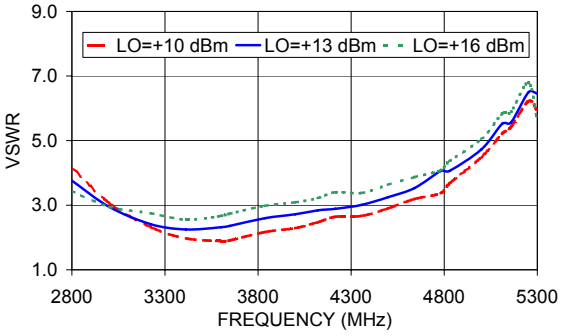
SKY-53MHR
L-I ISOLATION



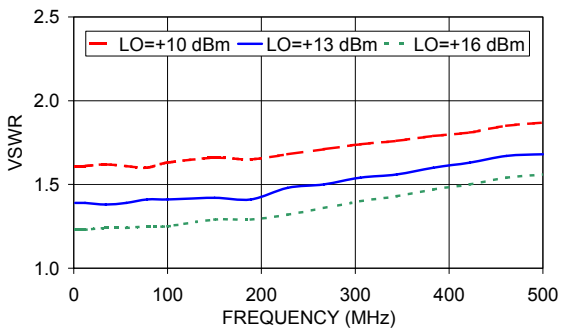
SKY-53MHR
LO VSWR



SKY-53MHR
RF VSWR



SKY-53MHR
IF VSWR



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

Frequency Mixer SKY-53MHR+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB) @LO (dBm)		
		+10	+13	+16
1860.1	1890.1	10.91	10.60	10.40
1960.1	1990.1	9.93	9.65	9.40
2060.1	2090.1	8.98	8.73	8.32
2160.1	2190.1	8.29	8.03	7.52
2260.1	2290.1	7.66	7.32	6.69
2360.1	2390.1	7.27	6.84	6.17
2460.1	2490.1	6.80	6.38	5.81
2560.1	2590.1	6.49	6.12	5.77
2660.1	2690.1	6.22	5.94	5.65
2760.1	2790.1	5.99	5.67	5.45
2860.1	2890.1	5.82	5.55	5.37
2960.1	2990.1	5.69	5.47	5.32
3060.1	3090.1	5.56	5.35	5.22
3160.1	3190.1	5.58	5.33	5.28
3260.1	3290.1	5.65	5.44	5.42
3360.1	3390.1	5.78	5.57	5.57
3460.1	3490.1	6.04	5.90	5.84
3560.1	3590.1	5.75	5.97	6.01
3660.1	3690.1	5.67	5.94	6.09
3760.1	3790.1	5.69	5.92	6.13
3860.1	3890.1	5.68	5.89	6.17
3960.1	3990.1	5.65	5.79	6.10
4060.1	4090.1	5.64	5.67	5.90
4160.1	4190.1	5.76	5.80	6.04
4260.1	4290.1	5.88	5.91	6.11
4360.1	4390.1	6.09	6.10	6.28
4460.1	4490.1	6.36	6.36	6.54
4560.1	4590.1	6.66	6.62	6.78
4660.1	4690.1	7.01	6.92	7.06
4760.1	4790.1	7.32	7.28	7.43
4860.1	4890.1	7.40	7.39	7.57
4960.1	4990.1	7.54	7.45	7.59
5060.1	5090.1	7.61	7.55	7.67
5160.1	5190.1	7.26	7.27	7.40
5260.1	5290.1	7.40	7.12	7.15
5360.1	5390.1	9.35	8.60	8.12
5480.1	5510.1	10.28	9.61	9.06
5580.1	5610.1	10.37	9.89	9.42
5700.1	5730.1	10.55	10.22	9.89
5800.1	5830.1	10.46	10.23	10.04

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm) @LO (dBm)		
		+10	+13	+16
1860.1	1890.1	19.95	19.20	14.67
1960.1	1990.1	19.90	18.57	13.81
2060.1	2090.1	20.61	19.69	18.38
2160.1	2190.1	20.34	19.04	16.44
2260.1	2290.1	17.21	17.47	13.19
2360.1	2390.1	14.80	17.00	11.94
2460.1	2490.1	14.62	17.20	12.15
2560.1	2590.1	15.07	17.29	13.65
2660.1	2690.1	13.10	14.32	15.27
2760.1	2790.1	13.87	14.64	15.68
2860.1	2890.1	15.76	16.19	16.90
2960.1	2990.1	16.65	17.28	17.58
3060.1	3090.1	16.84	18.59	19.13
3160.1	3190.1	18.05	18.82	19.30
3260.1	3290.1	17.55	18.11	18.78
3360.1	3390.1	18.40	18.58	18.92
3460.1	3490.1	18.17	20.49	20.11
3560.1	3590.1	15.02	22.12	21.94
3660.1	3690.1	12.95	19.89	21.28
3760.1	3790.1	13.07	20.37	21.69
3860.1	3890.1	13.38	19.87	21.33
3960.1	3990.1	13.46	18.75	20.70
4060.1	4090.1	13.49	18.05	20.52
4160.1	4190.1	14.51	17.92	22.04
4260.1	4290.1	16.51	19.04	23.16
4360.1	4390.1	18.58	20.35	23.11
4460.1	4490.1	18.90	21.16	23.36
4560.1	4590.1	18.99	21.24	23.26
4660.1	4690.1	21.74	23.16	24.04
4760.1	4790.1	20.68	24.04	24.59
4860.1	4890.1	19.59	22.86	24.62
4960.1	4990.1	17.07	21.77	24.40
5060.1	5090.1	15.96	20.69	24.66
5160.1	5190.1	13.59	17.60	23.11
5260.1	5290.1	12.27	15.15	19.98
5360.1	5390.1	15.80	17.20	20.04
5480.1	5510.1	20.35	22.23	22.14
5580.1	5610.1	22.33	25.44	22.78
5700.1	5730.1	23.42	26.87	23.15
5800.1	5830.1	22.34	24.94	21.79

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+9dBm (dB) @LO (dBm)		
		+10	+13	+16
1860.1	1890.1	0.55	0.56	0.70
1960.1	1990.1	0.65	0.53	0.67
2060.1	2090.1	0.75	0.63	1.07
2160.1	2190.1	0.84	0.80	1.50
2260.1	2290.1	1.04	1.19	2.10
2360.1	2390.1	1.22	1.53	2.59
2460.1	2490.1	1.52	1.88	2.87
2560.1	2590.1	1.69	2.04	2.76
2660.1	2690.1	1.70	1.82	2.39
2760.1	2790.1	1.90	1.96	2.36
2860.1	2890.1	1.97	1.87	2.06
2960.1	2990.1	2.09	1.78	1.74
3060.1	3090.1	2.06	1.67	1.59
3160.1	3190.1	1.93	1.57	1.44
3260.1	3290.1	1.85	1.43	1.30
3360.1	3390.1	1.77	1.34	1.31
3460.1	3490.1	1.56	0.97	0.99
3560.1	3590.1	1.74	0.82	0.70
3660.1	3690.1	1.83	0.91	0.70
3760.1	3790.1	1.83	0.95	0.73
3860.1	3890.1	1.82	1.08	0.79
3960.1	3990.1	1.95	1.26	0.93
4060.1	4090.1	1.92	1.28	0.91
4160.1	4190.1	1.94	1.28	0.88
4260.1	4290.1	1.83	1.13	0.77
4360.1	4390.1	1.71	0.99	0.74
4460.1	4490.1	1.55	0.89	0.60
4560.1	4590.1	1.36	0.79	0.49
4660.1	4690.1	1.07	0.54	0.40
4760.1	4790.1	0.95	0.43	0.33
4860.1	4890.1	0.97	0.45	0.29
4960.1	4990.1	0.96	0.50	0.28
5060.1	5090.1	1.12	0.59	0.28
5160.1	5190.1	1.84	1.01	0.49
5260.1	5290.1	2.94	2.02	1.25
5360.1	5390.1	1.31	1.24	0.91
5480.1	5510.1	0.38	0.47	0.53
5580.1	5610.1	0.27	0.27	0.43
5700.1	5730.1	0.21	0.18	0.29
5800.1	5830.1	0.26	0.17	0.24

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=4050MHz (dB) @LO (dBm) +13
2650.0	1400.0	9.06
2518.9	1531.1	6.79
2387.9	1662.1	6.28
2256.8	1793.2	5.98
2125.7	1924.3	5.88
1994.7	2055.3	5.95
1863.6	2186.4	6.05
1732.6	2317.4	6.23
1601.5	2448.5	6.47
1470.4	2579.6	6.50
1339.4	2710.6	6.72
1208.3	2841.7	6.94
1077.2	2972.8	7.37
946.2	3103.8	8.11
815.1	3234.9	7.76
684.0	3366.0	7.42
553.0	3497.0	7.42
421.9	3628.1	6.69
290.9	3759.1	6.33
159.8	3890.2	6.02
10.0	4040.0	6.10
137.7	4187.7	5.69
307.9	4357.9	5.67
456.8	4506.8	5.76
627.0	4677.0	6.03
776.0	4826.0	6.38
946.2	4996.2	5.72
1095.1	5145.1	6.03
1265.3	5315.3	6.20
1414.3	5464.3	6.41
1584.5	5634.5	6.77
1733.4	5783.4	6.66
1903.6	5953.6	6.78
2052.6	6102.6	6.42
2222.8	6272.8	6.32
2371.7	6421.7	6.01
2541.9	6591.9	6.51
2690.9	6740.9	7.65
2861.1	6911.1	8.77
3010.0	7060.0	10.35

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=2789.89MHz (dB) @LO (dBm) +13
10.1	2800.0	5.97
90.1	2880.0	5.28
170.1	2960.0	5.12
250.1	3040.0	4.97
330.1	3120.0	4.85
410.1	3200.0	5.00
490.1	3280.0	5.16
570.1	3360.0	5.34
650.1	3440.0	5.52
730.1	3520.0	5.77
810.1	3600.0	5.85
890.1	3680.0	5.96
970.1	3760.0	6.04
1050.1	3840.0	5.97
1130.1	3920.0	5.95
1190.1	3980.0	5.98
1270.1	4060.0	5.94
1330.1	4120.0	6.19
1410.1	4200.0	6.17
1470.1	4260.0	6.43
1550.1	4340.0	6.58
1610.1	4400.0	6.15
1690.1	4480.0	5.77
1750.1	4540.0	6.05
1830.1	4620.0	6.10
1890.1	4680.0	5.92
1970.1	4760.0	6.10
2030.1	4820.0	6.43
2110.1	4900.0	6.63
2170.1	4960.0	6.49
2250.1	5040.0	6.72
2310.1	5100.0	7.13
2390.1	5180.0	7.16
2450.1	5240.0	7.15
2530.1	5320.0	7.60
2590.1	5380.0	8.13
2670.1	5460.0	8.53
2730.1	5520.0	9.08
2810.1	5600.0	9.91
2870.1	5660.0	10.23

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=5310.1MHz (dB) @LO (dBm) +13
1110.1	4200.0	10.65
1090.1	4220.0	10.42
1070.1	4240.0	10.42
1050.1	4260.0	10.11
1030.1	4280.0	10.10
1010.1	4300.0	9.81
990.1	4320.0	9.90
970.1	4340.0	9.68
930.1	4380.0	9.36
910.1	4400.0	9.40
870.1	4440.0	9.28
850.1	4460.0	9.08
810.1	4500.0	9.05
790.1	4520.0	9.01
750.1	4560.0	8.83
730.1	4580.0	8.76
690.1	4620.0	8.75
670.1	4640.0	8.66
630.1	4680.0	8.44
610.1	4700.0	8.41
570.1	4740.0	8.23
550.1	4760.0	8.07
510.1	4800.0	8.00
490.1	4820.0	8.03
450.1	4860.0	7.85
430.1	4880.0	7.71
390.1	4920.0	7.64
370.1	4940.0	7.65
330.1	4980.0	7.51
310.1	5000.0	7.45
270.1	5040.0	7.30
250.1	5060.0	7.25
210.1	5100.0	7.24
190.1	5120.0	7.20
150.1	5160.0	7.33
130.1	5180.0	7.46
90.1	5220.0	7.76
70.1	5240.0	7.90
30.1	5280.0	7.95
10.1	5300.0	8.25

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm)			LO-IF ISOLATION (dB) @LO (dBm)		
	+10	+13	+16	+10	+13	+16
1890.1	30.11	30.25	29.85	16.23	15.72	15.12
1990.1	30.25	29.86	29.18	17.01	16.25	15.10
2090.1	31.03	29.68	28.48	18.23	16.54	14.90
2190.1	31.20	29.51	27.86	18.71	16.26	14.53
2290.1	30.17	28.36	26.95	18.21	15.63	13.93
2390.1	28.25	27.05	26.21	16.99	15.00	13.52
2490.1	26.55	26.06	25.24	15.69	14.34	12.77
2590.1	25.02	25.34	24.71	14.35	13.54	12.13
2690.1	24.30	24.69	24.34	13.36	12.90	11.66
2790.1	24.51	24.67	24.49	13.01	12.30	11.56
2890.1	24.53	24.97	24.87	12.75	12.34	11.58
2990.1	24.77	25.58	25.29	12.75	12.57	11.70
3090.1	25.26	26.06	25.29	12.76	12.64	11.88
3190.1	24.99	25.48	25.44	12.80	12.85	12.25
3290.1	25.20	25.58	25.80	12.82	12.99	12.62
3390.1	25.24	26.01	26.14	13.00	13.28	12.85
3490.1	25.82	27.07	27.29	13.33	13.72	13.52
3590.1	27.30	29.22	29.35	13.16	13.88	13.86
3690.1	27.68	29.65	30.20	13.35	14.14	14.31
3790.1	28.13	30.88	31.36	13.59	14.40	14.78
3890.1	29.85	32.63	31.91	13.68	14.71	15.14
3990.1	34.55	37.39	32.71	13.84	14.92	15.52
4090.1	40.47	38.71	31.72	14.08	15.09	15.83
4190.1	52.04	36.08	30.20	14.46	15.45	16.15
4290.1	41.95	38.60	32.09	14.93	15.87	16.73
4390.1	43.59	36.47	30.41	15.29	16.39	17.31
4490.1	43.53	33.24	28.09	15.75	16.86	17.85
4590.1	43.97	32.36	27.62	16.31	17.46	18.57
4690.1	41.81	31.15	27.01	17.02	18.15	19.41
4790.1	39.36	30.14	26.36	17.57	18.81	20.20
4890.1	37.27	28.85	25.59	18.34	19.59	21.14
4990.1	35.09	28.34	24.84	19.20	20.60	22.17
5090.1	31.32	26.52	23.78	20.10	21.58	23.18
5190.1	28.11	24.84	22.80	21.00	22.55	24.15
5290.1	26.88	23.23	21.46	21.98	23.44	24.72
5390.1	27.04	23.26	20.85	23.11	24.50	25.09
5510.1	25.97	22.23	20.19	24.82	25.57	25.39
5610.1	24.31	21.33	19.20	26.19	26.19	24.95
5730.1	22.33	20.21	18.43	27.44	26.37	24.35
5830.1	21.50	19.27	18.03	28.27	25.92	24.04

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB) @LO (dBm)		
		+10	+13	+16
1860.1	1890.1	14.17	15.31	16.46
1960.1	1990.1	14.62	15.92	17.36
2060.1	2090.1	15.32	16.70	18.32
2160.1	2190.1	16.33	17.34	19.07
2260.1	2290.1	17.28	17.81	18.82
2360.1	2390.1	17.82	17.64	17.80
2460.1	2490.1	17.27	16.94	17.06
2560.1	2590.1	15.77	15.58	15.65
2660.1	2690.1	15.21	14.86	14.69
2760.1	2790.1	14.29	14.22	14.24
2860.1	2890.1	13.44	13.49	13.51
2960.1	2990.1	12.92	12.83	12.83
3060.1	3090.1	12.65	12.58	12.49
3160.1	3190.1	12.49	12.18	11.92
3260.1	3290.1	12.55	12.10	11.90
3360.1	3390.1	12.57	12.07	11.83
3460.1	3490.1	12.28	11.75	11.67
3560.1	3590.1	12.97	12.04	11.91
3660.1	3690.1	13.44	12.37	12.14
3760.1	3790.1	13.68	12.45	12.19
3860.1	3890.1	13.90	12.77	12.45
3960.1	3990.1	14.27	13.28	12.86
4060.1	4090.1	14.69	13.74	13.32
4160.1	4190.1	15.24	14.48	14.06
4260.1	4290.1	15.91	15.15	14.76
4360.1	4390.1	16.64	15.99	15.56
4460.1	4490.1	17.48	16.76	16.34
4560.1	4590.1	18.31	17.60	17.15
4660.1	4690.1	18.99	18.31	17.90
4760.1	4790.1	19.86	18.95	18.56
4860.1	4890.1	20.61	19.69	19.24
4960.1	4990.1	21.60	20.63	20.01
5060.1	5090.1	22.49	21.33	20.71
5160.1	5190.1	23.49	22.61	21.86
5260.1	5290.1	25.44	24.62	23.94
5360.1	5390.1	26.86	25.86	25.23
5480.1	5510.1	27.44	26.25	25.60
5580.1	5610.1	27.79	26.64	25.96
5700.1	5730.1	28.15	27.09	26.33
5800.1	5830.1	28.60	27.35	26.56

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1) @LO (dBm)		
		+10	+13	+16
1860.1	1890.1	10.62	9.79	8.86
1960.1	1990.1	8.51	7.76	6.73
2060.1	2090.1	7.00	6.24	5.27
2160.1	2190.1	5.68	5.06	4.32
2260.1	2290.1	4.74	4.15	3.59
2360.1	2390.1	3.96	3.48	3.09
2460.1	2490.1	3.31	3.00	2.77
2560.1	2590.1	2.86	2.71	2.65
2660.1	2690.1	2.43	2.40	2.42
2760.1	2790.1	2.09	2.16	2.25
2860.1	2890.1	1.88	2.01	2.14
2960.1	2990.1	1.77	1.96	2.13
3060.1	3090.1	1.77	2.04	2.28
3160.1	3190.1	1.88	2.19	2.39
3260.1	3290.1	1.99	2.30	2.44
3360.1	3390.1	2.13	2.44	2.59
3460.1	3490.1	2.36	2.68	2.78
3560.1	3590.1	2.29	2.77	2.91
3660.1	3690.1	2.32	2.78	2.96
3760.1	3790.1	2.41	2.85	3.06
3860.1	3890.1	2.52	2.88	3.13
3960.1	3990.1	2.54	2.82	3.07
4060.1	4090.1	2.58	2.77	2.96
4160.1	4190.1	2.67	2.82	2.99
4260.1	4290.1	2.72	2.85	2.99
4360.1	4390.1	2.91	3.01	3.14
4460.1	4490.1	3.19	3.26	3.37
4560.1	4590.1	3.48	3.49	3.57
4660.1	4690.1	3.82	3.82	3.89
4760.1	4790.1	4.17	4.16	4.23
4860.1	4890.1	4.40	4.36	4.45
4960.1	4990.1	4.73	4.56	4.60
5060.1	5090.1	4.83	4.61	4.56
5160.1	5190.1	4.36	4.06	3.92
5260.1	5290.1	4.33	3.86	3.62
5360.1	5390.1	6.01	5.36	4.84
5480.1	5510.1	7.34	6.61	6.01
5580.1	5610.1	7.66	7.00	6.44
5700.1	5730.1	8.05	7.47	6.86
5800.1	5830.1	8.05	7.44	6.91

LO (MHz)	LO VSWR (:1) @LO (dBm)		
	+10	+13	+16
1890.1	2.28	2.13	2.61
1990.1	1.99	1.98	2.52
2090.1	1.73	1.84	2.40
2190.1	1.52	1.74	2.34
2290.1	1.36	1.66	2.27
2390.1	1.22	1.59	2.22
2490.1	1.12	1.56	2.19
2590.1	1.02	1.53	2.16
2690.1	1.06	1.51	2.15
2790.1	1.14	1.50	2.09
2890.1	1.18	1.54	2.11
2990.1	1.22	1.51	2.05
3090.1	1.26	1.46	1.99
3190.1	1.34	1.45	2.00
3290.1	1.50	1.53	2.04
3390.1	1.64	1.61	2.08
3490.1	1.75	1.70	2.18
3590.1	1.90	1.82	2.20
3690.1	1.95	1.85	2.22
3790.1	2.03	1.89	2.24
3890.1	2.09	1.92	2.21
3990.1	2.14	1.94	2.20
4090.1	2.18	1.96	2.21
4190.1	2.22	1.95	2.17
4290.1	2.32	1.95	2.13
4390.1	2.43	1.99	2.11
4490.1	2.51	2.02	2.09
4590.1	2.53	1.98	2.04
4690.1	2.58	1.96	1.97
4790.1	2.63	2.01	1.96
4890.1	2.62	1.97	1.92
4990.1	2.59	1.92	1.86
5090.1	2.49	1.85	1.80
5190.1	2.40	1.76	1.73
5290.1	2.30	1.69	1.67
5390.1	2.21	1.65	1.67
5510.1	2.18	1.61	1.62
5610.1	2.04	1.56	1.63
5730.1	1.92	1.51	1.64
5830.1	1.80	1.46	1.65

IF (OUT) (MHz)	IF VSWR @LO=5300MHz (:1) @LO (dBm)		
	+10	+13	+16
10.0	1.07	1.12	1.26
90.6	1.10	1.12	1.22
171.2	1.17	1.08	1.18
251.7	1.21	1.03	1.15
332.3	1.26	1.05	1.16
412.9	1.32	1.12	1.19
493.5	1.38	1.18	1.22
553.9	1.39	1.19	1.24
634.5	1.45	1.24	1.27
694.9	1.52	1.33	1.34
775.5	1.59	1.39	1.39
835.9	1.68	1.42	1.39
916.5	1.75	1.48	1.43
976.9	1.77	1.54	1.52
1057.5	1.85	1.61	1.57
1117.9	1.99	1.69	1.62
1198.5	2.03	1.71	1.63
1258.9	2.06	1.73	1.65
1339.5	2.11	1.75	1.65
1399.9	2.18	1.75	1.59
1480.5	2.20	1.76	1.60
1540.9	2.11	1.66	1.51
1621.5	2.10	1.65	1.48
1681.9	2.16	1.69	1.50
1762.5	2.11	1.64	1.44
1822.9	1.98	1.54	1.36
1903.5	1.97	1.53	1.35
1964.0	2.02	1.55	1.35
2044.5	1.91	1.45	1.26
2105.0	1.78	1.37	1.22
2185.5	1.76	1.36	1.23
2246.0	1.80	1.38	1.22
2326.5	1.68	1.32	1.22
2387.0	1.71	1.42	1.37
2467.6	1.87	1.60	1.53
2528.0	1.99	1.69	1.59
2608.6	2.23	1.94	1.82
2669.0	2.66	2.36	2.20
2749.6	3.10	2.75	2.54
2810.0	3.33	2.95	2.73

Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	+10	11	15	17	49	---	---	---	---	---
1	-	8	+0	30	36	50	36	53	---	---	---	---
2	76	58	51	50	64	58	55	59	59	---	---	---
3	>90	76	>78	>78	54	75	77	>78	67	>78	---	---
4	>90	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78	---
5	>90	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78
6	---	---	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78
7	---	---	---	>78	>78	>78	>78	>78	>78	>78	>78	>78
8	---	---	---	---	>78	>78	>78	>78	>78	>78	>78	>78
9	---	---	---	---	---	>78	>78	>78	>78	>78	>78	>78
10	---	---	---	---	---	---	>78	>78	>78	>78	>78	>78
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

Test conditions: RF IN: 4050 MHz; -6.00 dBm.
LO IN: 4080 MHz; +13.00 dBm
IF OUT: 30 MHz; -11.87 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	+0	21	24	28	45	---	---	---	---	---
1	-	8	+0	31	37	45	41	56	---	---	---	---
2	57	48	41	40	54	50	49	52	55	---	---	---
3	84	54	64	78	35	56	63	60	53	73	---	---
4	>90	78	77	78	81	59	72	68	65	75	66	---
5	>90	85	78	79	88	76	53	80	76	77	68	85
6	---	---	>88	>88	>88	>88	>88	74	85	80	76	87
7	---	---	---	87	>88	87	>88	83	67	>88	>88	>88
8	---	---	---	---	>88	>88	>88	>88	>88	87	>88	>88
9	---	---	---	---	---	>88	>88	>88	>88	>88	79	>88
10	---	---	---	---	---	---	>88	>88	>88	>88	>88	>88
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

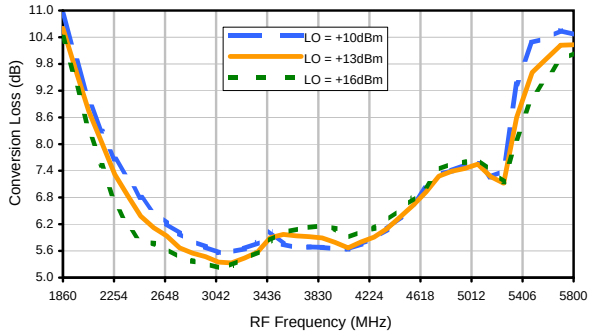
Test conditions: RF IN: 4050 MHz; 4.00 dBm.
LO IN: 4080 MHz; +13.00 dBm
IF OUT: 30 MHz; -2.15 dBm

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.

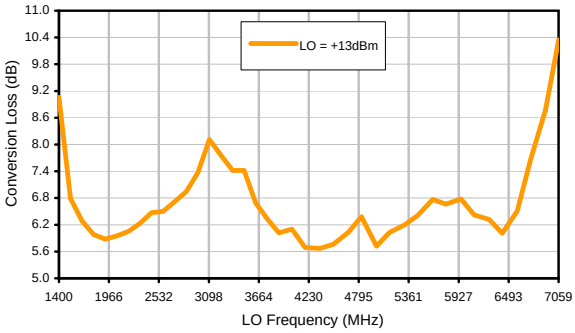
Frequency Mixer SKY-53MHR+

Typical Performance Curves

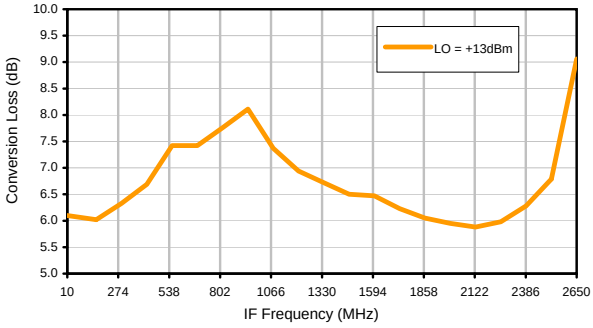
Conversion Loss @ IF=30MHz



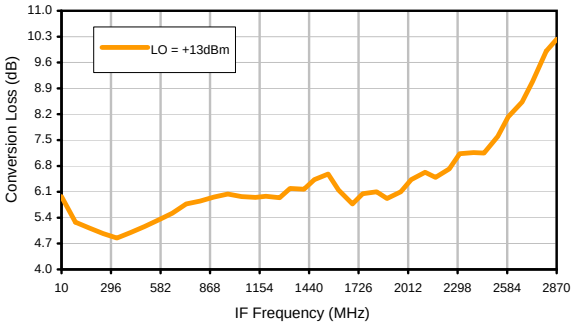
Conversion Loss vs. LO @ RF=4050MHz



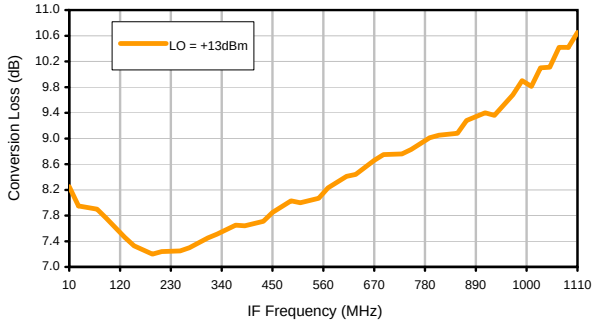
Conversion Loss vs. IF @ RF=4050MHz



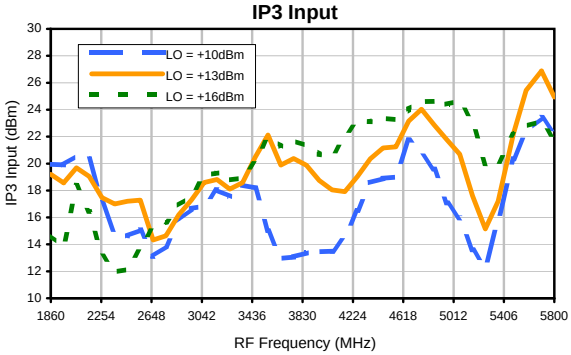
Conversion Loss vs. IF @ RF=2789.89MHz



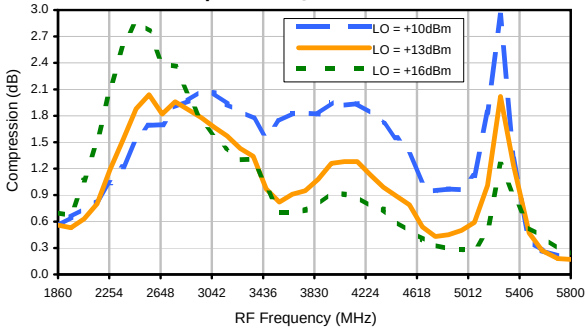
Conversion Loss vs. IF @ RF=5310.1MHz



IP3 Input

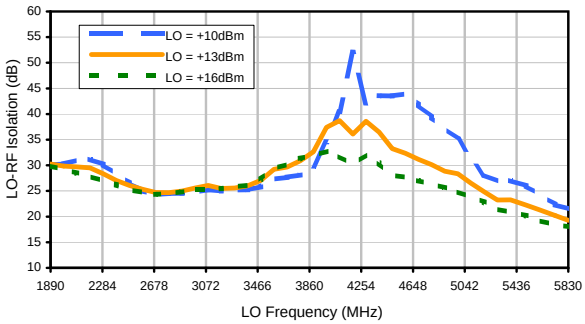


Compression @ RF IN=+9dBm

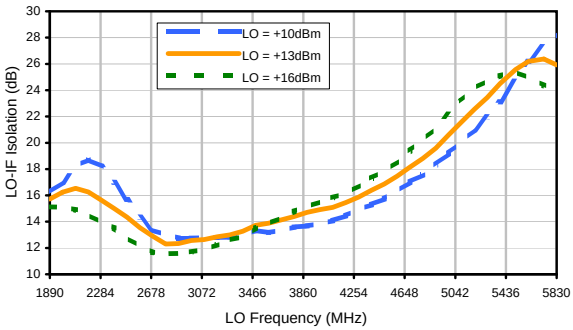


Typical Performance Curves

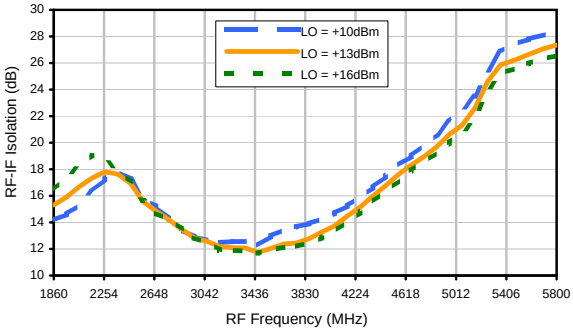
LO-RF Isolation



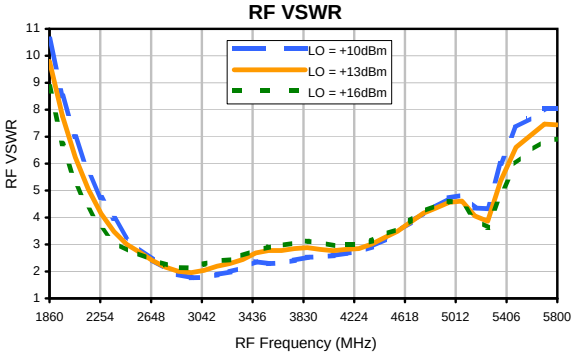
LO-IF Isolation



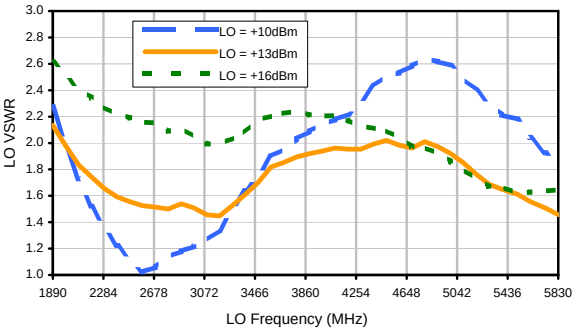
RF-IF Isolation



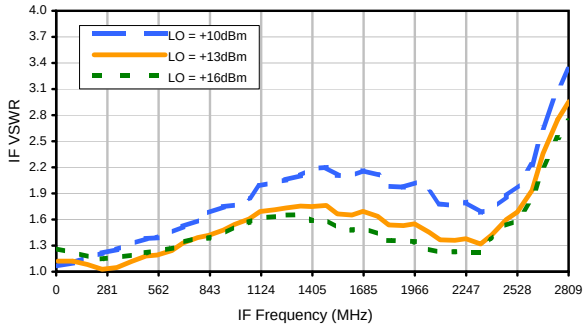
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+10	11	15	17	49	---	---	---	---	---
1	-	8	+0	30	36	50	36	53	---	---	---	---
2	76	58	51	50	64	58	55	59	59	---	---	---
3	>90	76	>78	>78	54	75	77	>78	67	>78	---	---
4	>90	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78	---
5	>90	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78
6	---	---	>78	>78	>78	>78	>78	>78	>78	>78	>78	>78
7	---	---	---	>78	>78	>78	>78	>78	>78	>78	>78	>78
8	---	---	---	---	>78	>78	>78	>78	>78	>78	>78	>78
9	---	---	---	---	---	>78	>78	>78	>78	>78	>78	>78
10	---	---	---	---	---	---	>78	>78	>78	>78	>78	>78
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

Test conditions: RF IN: 4050 MHz; -6.00 dBm.
LO IN: 4080 MHz; +13.00 dBm
IF OUT: 30 MHz; -11.87 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+0	21	24	28	45	---	---	---	---	---
1	-	8	+0	31	37	45	41	56	---	---	---	---
2	57	48	41	40	54	50	49	52	55	---	---	---
3	84	54	64	78	35	56	63	60	53	73	---	---
4	>90	78	77	78	81	59	72	68	65	75	66	---
5	>90	85	78	79	88	76	53	80	76	77	68	85
6	---	---	>88	>88	>88	>88	>88	74	85	80	76	87
7	---	---	---	87	>88	87	>88	83	67	>88	>88	>88
8	---	---	---	---	>88	>88	>88	>88	>88	87	>88	>88
9	---	---	---	---	---	>88	>88	>88	>88	>88	79	>88
10	---	---	---	---	---	---	>88	>88	>88	>88	>88	>88
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

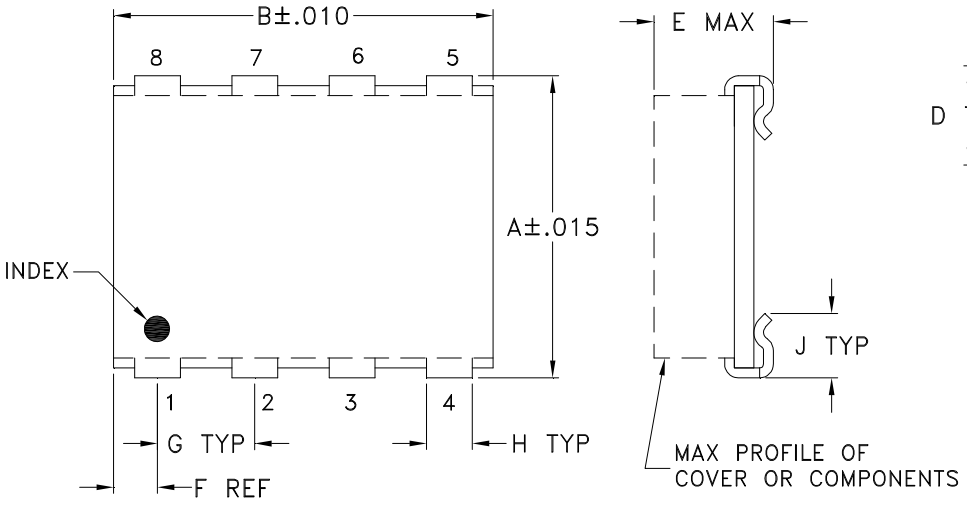
Test conditions: RF IN: 4050 MHz; 4.00 dBm.
LO IN: 4080 MHz; +13.00 dBm
IF OUT: 30 MHz; -2.15 dBm

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.

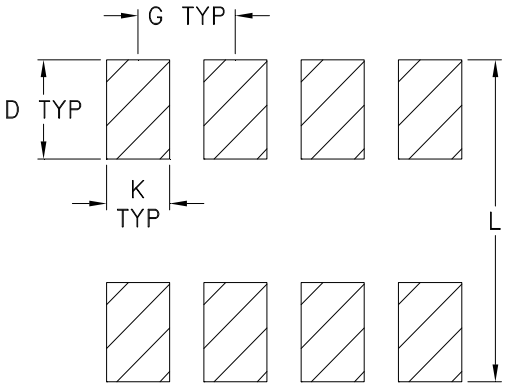
Case Style BJ

BJ293
BJ398

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

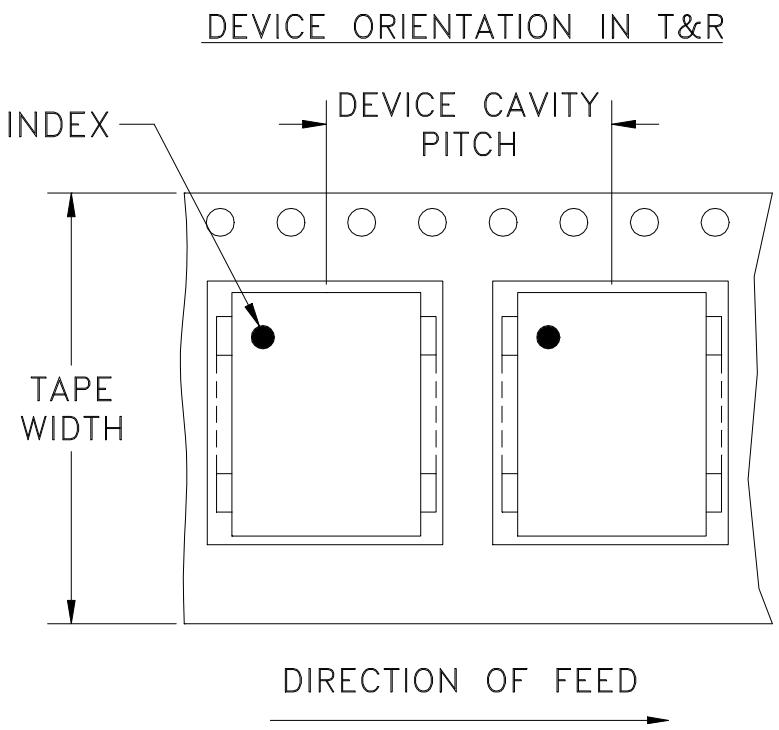
CASE#	A	B	C	D	E	F	G	H	J	K	L	WT. GRAMS
BJ293	.395 (10.03)	.500 (12.70)	-- --	.100 (2.54)	.230 (5.84)	.100 (2.54)	.100 (2.54)	.047 (1.19)	.065 (1.65)	.065 (1.65)	.425 (10.80)	.80
BJ398	.305 (7.75)	.390 (9.91)	-- --	.100 (2.54)	.105 (2.67)	.045 (1.14)	.100 (2.54)	.047 (1.19)	.065 (1.65)	.065 (1.65)	.325 (8.26)	.20

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

Notes:
1. Case material: Plastic.
2. Base material: Printed wiring laminate.
3. Termination finish:
   For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
   For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

Tape & Reel Packaging TR-F29



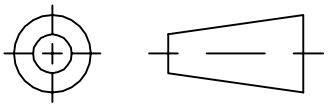
Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
24	12	13	500

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

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

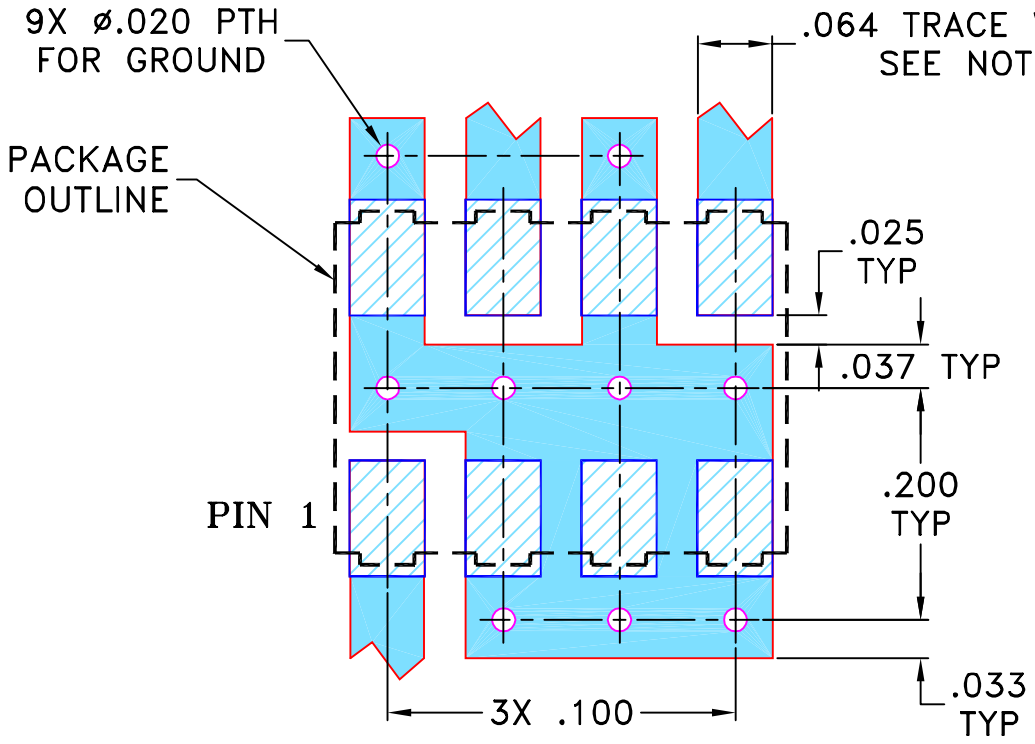
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

THIRD ANGLE PROJECTION



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M88233	NEW RELEASE	08/06/03	AV	WL
A	M102713	UPDATED NOTES, ADDED "...WITH SMOBC"	01/16/06	GT	IL

SUGGESTED MOUNTING CONFIGURATION
FOR BJ398 CASE STYLE, "je/hp" 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	AV	07/28/03
TOLERANCES ON:	CHECKED	IL	08/06/03
2 PL DECIMALS ±	APPROVED	WL	08/06/03
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

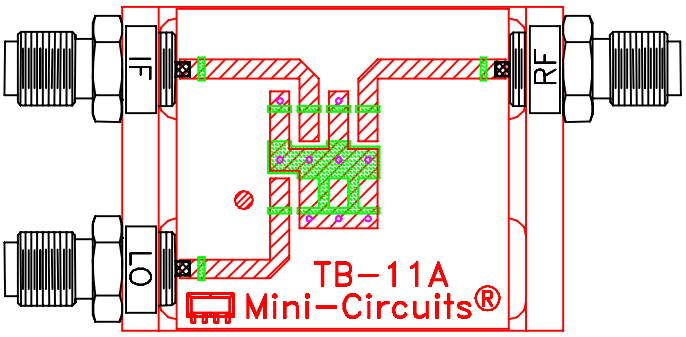
ASHEETA1.DWG REV:A DATE:01/12/95

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

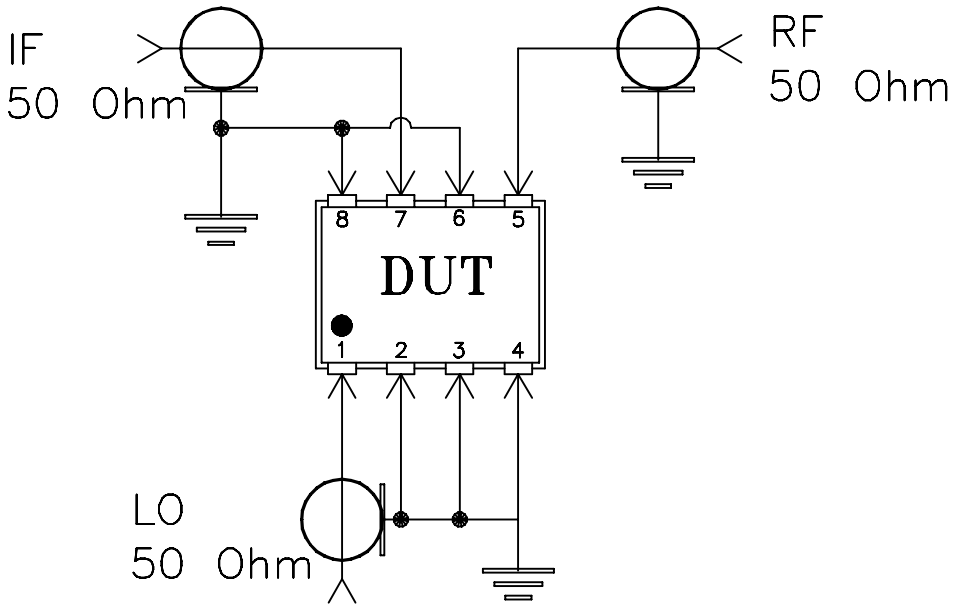
PL, je/hp, BJ398, SKY, TB-11

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-056	A
FILE: 98PL056		SCALE: 6:1	SHEET: 1 OF 1

Evaluation Board and Circuit



TB-11



Schematic Diagram

Notes:

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

Mini-Circuits®

Mini-Circuits

Environmental Specifications ENV02T1

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, 95% Coverage
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215