

Frequency Mixer WIDE BAND

SIM-63LH+

Level 10 (LO Power +10 dBm) 750 to 6000 MHz

Maximum Ratings

Operating Temperature -40°C to 85°C

Storage Temperature -55°C to 100°C

RF Power 50mW

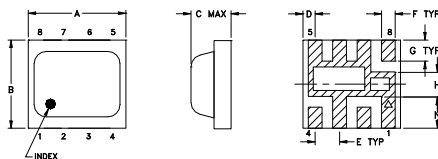
For extended temperature range, consult factory.

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

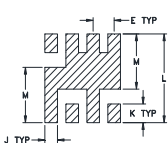
Pin Connections

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

Outline Drawing



PCB Metal Land Pattern



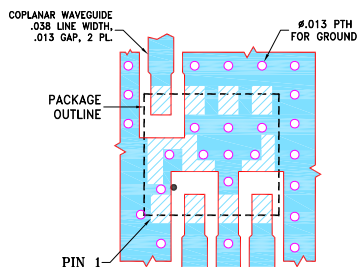
Suggested Layout, Tolerance to be within ±0.002

Outline Dimensions (inch)

A	B	C	D	E	F	G
.200	.180	.087	.025	.050	.028	.043
5.08	4.57	2.2098	0.64	1.27	0.71	1.09

H	J	K	L	M	N	wt
.050	.030	.043	.204	.127	0.065	grams
1.27	0.76	1.09	5.18	3.23	1.65	0.08

Demo Board MCL P/N: TB-382 Suggested PCB Layout (PL-239)



NOTES:

- TRACE WIDTH AND GAP ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020" ±.0015". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
- 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.

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-Circuit's 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-Circuit's website at www.minicircuits.com/MCLStore/terms.jsp

Features

- wide bandwidth, 750 to 6000 MHz
- low conversion loss, 6.2 dB typ.
- excellent L-R isolation, 34 dB typ.
- LTCC double balanced mixer
- tiny size, low profile, 0.08"
- useable as up and down converter
- aqueous washable
- protected by US patent 7,027,795

Applications

- cellular
- defense & weather radar
- defense communications
- PCN
- WCDMA
- WIFI
- blue tooth
- VSAT
- ISM

Electrical Specifications

FREQUENCY (MHz)	CONVERSION LOSS* (dB)			LO-RF ISOLATION (dB)		LO-IF ISOLATION (dB)		IP3 at center band (dBm)
	Typ.	σ	Max.	Typ.	Min.	Typ.	Min.	
LO/RF f _L -f _U	IF							Typ.
750-6000	DC-1500							
750-1700	6.3	0.1	7.3	37	31	30	20	12
1700-2000	6.6	0.1	7.5	37	32	20	12	18
2000-3100	5.8	0.1	7.2	32	25	22	12	12
3100-3800	5.7	0.1	7.0	30	25	25	15	15
3800-6000	8.0	0.2	9.3	30	22	20	13	15

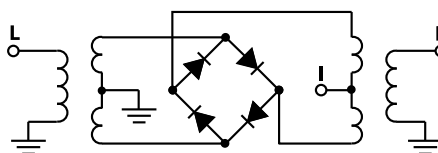
1 dB Compression: +3 dBm typ.

* Conversion loss at 30 MHz IF. σ is a measure of repeatability from unit to unit.

Typical Performance Data

Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)
RF	LO	LO +10dBm	LO +10dBm	LO +10dBm	LO +10dBm	LO +10dBm
740.00	771.00	6.12	39.29	26.22	1.99	7.05
850.00	881.00	5.79	36.91	27.35	1.51	4.55
1000.00	1031.00	6.24	40.47	28.20	2.63	2.78
1200.00	1231.00	6.27	42.51	30.04	3.21	1.54
1500.00	1531.00	6.05	36.17	42.37	2.94	2.15
1800.00	1831.00	6.53	37.46	21.72	3.22	2.96
2100.00	2131.00	6.29	36.76	17.14	3.00	2.64
2400.00	2431.00	5.47	35.23	21.65	2.01	2.45
2700.00	2731.00	5.11	31.43	23.85	1.75	1.87
3000.00	3031.00	5.05	30.30	26.15	1.34	1.30
3400.00	3431.00	5.53	30.24	23.55	1.44	1.45
3800.00	3831.00	6.01	28.84	20.37	2.40	2.23
4200.00	4231.00	7.01	30.59	18.41	3.57	3.00
4500.00	4531.00	8.08	32.32	17.66	4.84	3.45
4800.00	4831.00	8.28	31.53	21.57	5.04	3.96
5100.00	5131.00	7.96	28.60	26.68	3.55	3.05
5400.00	5431.00	7.36	28.72	23.26	3.65	3.13
5700.00	5731.00	7.43	28.75	20.86	2.99	3.26
5850.00	5881.00	7.75	27.90	20.28	2.82	2.87
6000.00	6031.00	7.66	27.87	21.39	2.48	2.13

Electrical Schematic



Generic photo used for illustration purposes only

CASE STYLE: HV1195

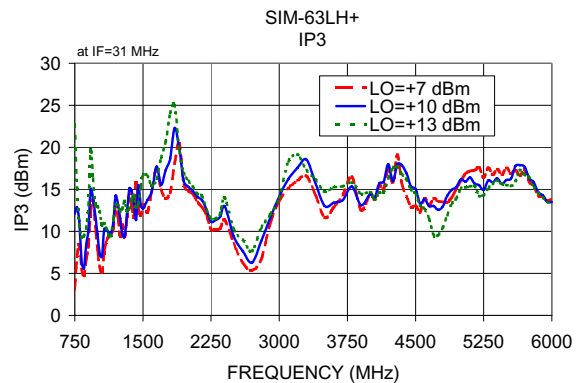
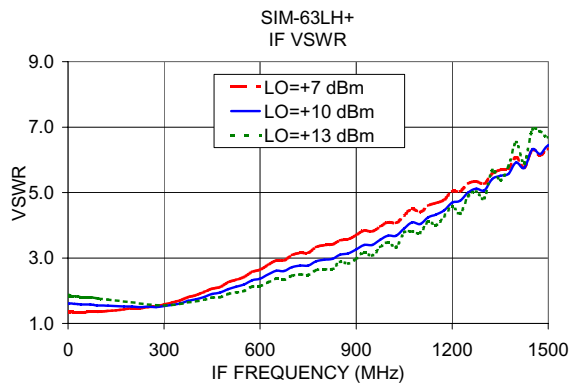
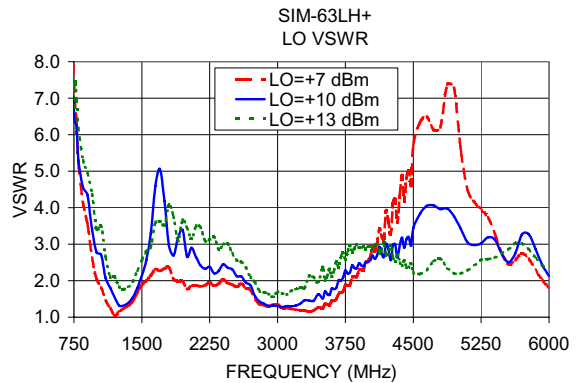
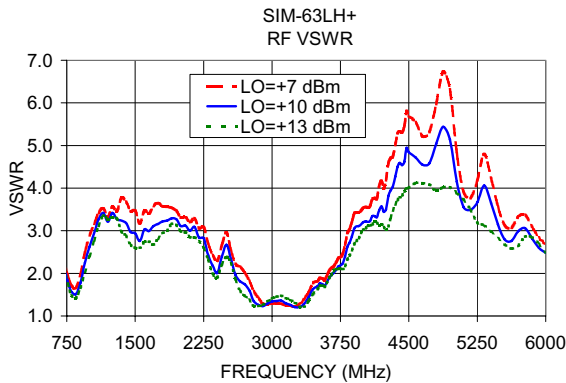
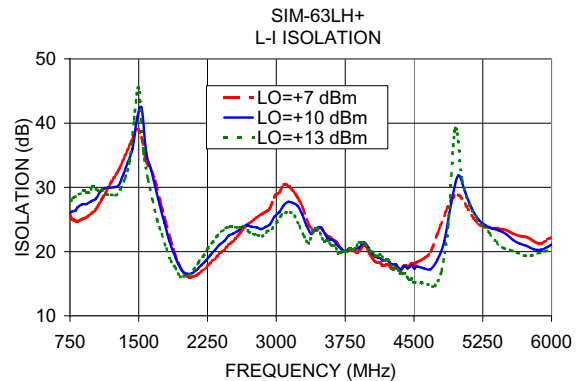
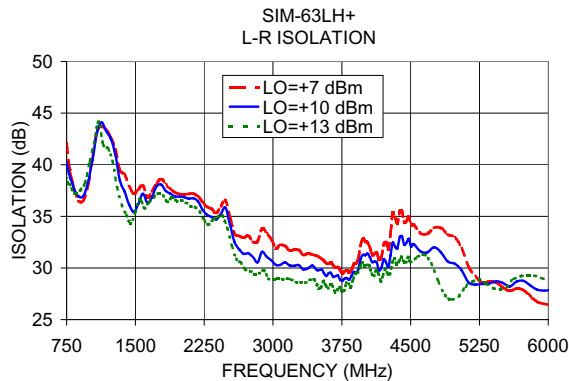
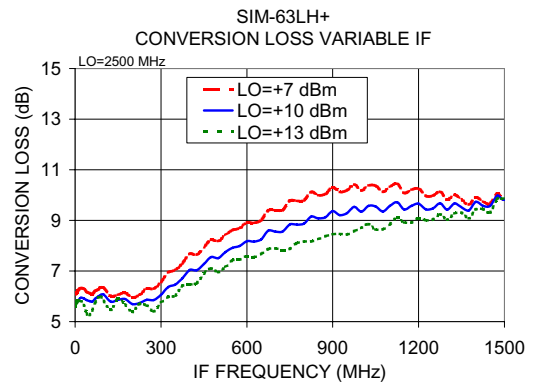
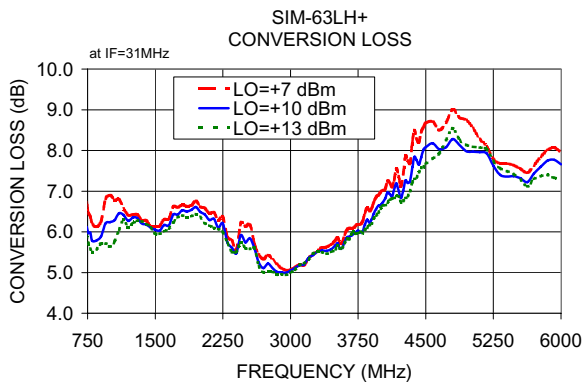
+RoHS Compliant

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



Available Tape and Reel at no extra cost

Reel Size	Devices/Reel
7"	10, 20, 50, 100, 200, 500



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

SIM-63LH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)		
		@LO (dBm)		
		+7	+10	+13
550.0	580.0	19.19	12.50	8.87
750.0	780.0	7.31	6.60	6.29
950.0	980.0	6.81	6.27	5.85
1150.0	1180.0	6.41	6.28	6.18
1350.0	1380.0	6.26	6.21	6.25
1550.0	1580.0	6.17	6.02	5.98
1750.0	1780.0	6.45	6.27	6.21
1950.0	1980.0	6.62	6.49	6.43
2150.0	2180.0	6.51	6.36	6.29
2350.0	2380.0	6.11	5.93	5.85
2550.0	2580.0	6.51	6.08	5.82
2750.0	2780.0	5.56	5.32	5.21
2950.0	2980.0	5.09	5.00	5.02
3150.0	3180.0	5.27	5.30	5.38
3350.0	3380.0	5.53	5.53	5.59
3550.0	3580.0	6.07	5.94	5.91
3730.0	3760.0	6.61	6.42	6.38
3910.0	3940.0	7.45	7.11	6.91
4010.0	4040.0	7.50	7.22	7.10
4090.0	4120.0	7.72	7.36	7.25
4190.0	4220.0	8.11	7.63	7.46
4270.0	4300.0	8.05	7.56	7.42
4370.0	4400.0	8.73	7.83	7.59
4520.0	4550.0	7.82	6.95	6.79
4640.0	4670.0	8.10	7.16	6.98
4780.0	4810.0	8.00	7.25	7.33
4900.0	4930.0	7.97	7.30	7.29
5040.0	5070.0	8.29	7.63	7.57
5160.0	5190.0	8.54	7.96	7.89
5300.0	5330.0	8.28	8.02	8.08
5420.0	5450.0	8.36	8.04	8.00
5560.0	5590.0	8.55	8.26	8.15
5680.0	5710.0	8.14	7.94	7.90
5820.0	5850.0	7.83	7.65	7.62
5940.0	5970.0	8.61	8.22	8.05
6080.0	6110.0	8.20	7.81	7.62
6200.0	6230.0	7.89	7.55	7.32
6340.0	6370.0	8.16	7.87	7.64
6460.0	6490.0	9.40	9.02	8.78
6600.0	6630.0	14.98	12.80	12.11

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+7	+10	+13
550.0	580.0	-4.69	1.33	11.39
750.0	780.0	5.24	13.31	14.53
950.0	980.0	6.35	7.94	9.60
1150.0	1180.0	8.94	9.04	9.42
1350.0	1380.0	11.85	11.61	13.01
1550.0	1580.0	14.71	13.50	16.22
1750.0	1780.0	14.26	15.40	19.95
1950.0	1980.0	18.69	18.52	18.78
2150.0	2180.0	14.48	14.86	15.31
2350.0	2380.0	10.21	11.61	12.54
2550.0	2580.0	7.65	8.63	9.91
2750.0	2780.0	5.21	6.07	7.31
2950.0	2980.0	11.89	12.65	12.76
3150.0	3180.0	14.24	15.51	16.19
3350.0	3380.0	17.19	18.84	18.91
3550.0	3580.0	14.90	14.82	15.88
3730.0	3760.0	16.81	15.55	15.21
3910.0	3940.0	14.29	15.12	15.86
4010.0	4040.0	15.23	16.31	16.17
4090.0	4120.0	16.13	18.63	17.08
4190.0	4220.0	15.09	17.38	17.41
4270.0	4300.0	15.46	18.76	19.11
4370.0	4400.0	19.68	20.22	19.84
4520.0	4550.0	11.58	11.89	11.46
4640.0	4670.0	12.83	11.34	11.19
4780.0	4810.0	14.48	12.21	10.30
4900.0	4930.0	13.87	13.33	12.63
5040.0	5070.0	18.34	14.27	14.78
5160.0	5190.0	17.21	15.09	15.72
5300.0	5330.0	13.13	15.48	14.43
5420.0	5450.0	16.26	16.37	16.22
5560.0	5590.0	17.00	16.92	15.17
5680.0	5710.0	15.06	17.73	17.29
5820.0	5850.0	16.58	15.48	16.10
5940.0	5970.0	15.08	14.11	14.34
6080.0	6110.0	12.03	11.55	11.78
6200.0	6230.0	11.57	10.93	11.17
6340.0	6370.0	13.18	12.82	12.12
6460.0	6490.0	12.69	14.75	14.71
6600.0	6630.0	9.76	11.60	13.95

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+3dBm (dB)		
		@LO (dBm)		
		+7	+10	+13
550.0	580.0	-4.17	-0.23	1.02
750.0	780.0	3.42	2.71	2.23
950.0	980.0	2.75	2.65	2.58
1150.0	1180.0	2.04	1.69	1.39
1350.0	1380.0	1.13	0.87	0.73
1550.0	1580.0	0.90	0.70	0.56
1750.0	1780.0	0.98	0.70	0.50
1950.0	1980.0	0.90	0.69	0.52
2150.0	2180.0	1.09	0.85	0.66
2350.0	2380.0	1.38	1.14	0.94
2550.0	2580.0	1.76	1.58	1.38
2750.0	2780.0	2.26	1.97	1.77
2950.0	2980.0	1.78	1.46	1.31
3150.0	3180.0	1.09	0.77	0.65
3350.0	3380.0	1.48	1.09	0.84
3550.0	3580.0	1.51	1.15	0.91
3730.0	3760.0	1.16	0.89	0.71
3910.0	3940.0	1.06	0.87	0.77
4010.0	4040.0	0.93	0.76	0.70
4090.0	4120.0	0.79	0.60	0.50
4190.0	4220.0	0.81	0.60	0.47
4270.0	4300.0	0.84	0.61	0.46
4370.0	4400.0	0.93	0.70	0.56
4520.0	4550.0	1.48	1.14	1.03
4640.0	4670.0	1.57	1.19	1.01
4780.0	4810.0	1.38	1.15	1.07
4900.0	4930.0	1.07	0.81	0.73
5040.0	5070.0	0.86	0.62	0.55
5160.0	5190.0	0.70	0.49	0.44
5300.0	5330.0	0.78	0.49	0.43
5420.0	5450.0	0.58	0.43	0.42
5560.0	5590.0	0.46	0.35	0.31
5680.0	5710.0	0.57	0.40	0.35
5820.0	5850.0	0.59	0.44	0.37
5940.0	5970.0	0.73	0.66	0.60
6080.0	6110.0	1.00	0.91	0.88
6200.0	6230.0	1.17	1.04	1.00
6340.0	6370.0	1.25	1.03	0.96
6460.0	6490.0	1.20	0.83	0.75
6600.0	6630.0	0.73	0.84	0.58

REV. X2

SIM-63LH+

101028

Page 1 of 5



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

P.O. Box 350186, Brooklyn, New York 11235-0036 (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

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=3010.1MHz (dB)			IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=739.9MHz (dB)			IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=6010.1MHz (dB)		
		@LO (dBm)					@LO (dBm)					@LO (dBm)		
		+10					+10					+10		
1550.1	1460.0		10.80		10.1	750.0		7.15		1510.1	4500.0		12.60	
1510.1	1500.0		9.60		50.1	790.0		6.61		1470.1	4540.0		12.09	
1470.1	1540.0		8.86		90.1	830.0		6.52		1430.1	4580.0		11.81	
1430.1	1580.0		8.52		130.1	870.0		6.48		1390.1	4620.0		11.43	
1390.1	1620.0		8.25		170.1	910.0		6.49		1350.1	4660.0		11.16	
1350.1	1660.0		8.09		210.1	950.0		6.61		1310.1	4700.0		11.12	
1310.1	1700.0		7.72		250.1	990.0		6.57		1270.1	4740.0		10.77	
1270.1	1740.0		7.42		290.1	1030.0		6.44		1230.1	4780.0		10.57	
1230.1	1780.0		7.56		330.1	1070.0		6.28		1190.1	4820.0		10.21	
1190.1	1820.0		8.01		370.1	1110.0		6.27		1150.1	4860.0		9.78	
1150.1	1860.0		8.15		410.1	1150.0		6.31		1110.1	4900.0		9.45	
1110.1	1900.0		8.11		450.1	1190.0		6.25		1070.1	4940.0		9.00	
1070.1	1940.0		8.05		490.1	1230.0		6.17		1030.1	4980.0		8.63	
1030.1	1980.0		8.02		530.1	1270.0		6.15		990.1	5020.0		8.33	
990.1	2020.0		7.96		570.1	1310.0		6.19		950.1	5060.0		7.96	
950.1	2060.0		7.63		610.1	1350.0		6.15		910.1	5100.0		7.94	
910.1	2100.0		7.42		650.1	1390.0		6.20		870.1	5140.0		7.68	
870.1	2140.0		7.12		690.1	1430.0		6.19		830.1	5180.0		7.62	
830.1	2180.0		6.75		730.1	1470.0		6.31		790.1	5220.0		7.52	
790.1	2220.0		6.59		770.1	1510.0		6.45		750.1	5260.0		7.34	
750.1	2260.0		6.44		810.1	1550.0		6.47		710.1	5300.0		7.35	
710.1	2300.0		6.52		850.1	1590.0		6.50		670.1	5340.0		7.14	
670.1	2340.0		6.53		890.1	1630.0		6.74		630.1	5380.0		7.04	
630.1	2380.0		6.54		930.1	1670.0		6.95		590.1	5420.0		6.93	
590.1	2420.0		6.09		970.1	1710.0		7.08		550.1	5460.0		6.91	
550.1	2460.0		5.82		1010.1	1750.0		7.09		510.1	5500.0		6.98	
510.1	2500.0		5.55		1050.1	1790.0		6.97		470.1	5540.0		6.86	
470.1	2540.0		5.35		1090.1	1830.0		7.24		430.1	5580.0		6.78	
430.1	2580.0		5.25		1130.1	1870.0		7.40		390.1	5620.0		6.89	
390.1	2620.0		5.30		1170.1	1910.0		7.56		350.1	5660.0		6.92	
350.1	2660.0		5.22		1210.1	1950.0		7.62		310.1	5700.0		7.04	
310.1	2700.0		5.19		1250.1	1990.0		7.82		270.1	5740.0		7.25	
270.1	2740.0		5.13		1290.1	2030.0		7.98		230.1	5780.0		7.51	
230.1	2780.0		5.19		1330.1	2070.0		8.09		190.1	5820.0		7.81	
190.1	2820.0		5.28		1370.1	2110.0		8.24		150.1	5860.0		8.00	
150.1	2860.0		5.28		1410.1	2150.0		8.47		130.1	5880.0		8.10	
110.1	2900.0		5.19		1450.1	2190.0		8.64		90.1	5920.0		8.11	
70.1	2940.0		5.15		1490.1	2230.0		9.04		70.1	5940.0		8.04	
30.1	2980.0		5.07		1530.1	2270.0		9.49		30.1	5980.0		8.00	
10.1	3000.0		5.50		1590.1	2330.0		10.59		10.1	6000.0		8.36	

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+7	+10	+13	+7	+10	+13
580.0	63.45	61.39	57.89	28.88	29.02	29.15
780.0	41.56	40.63	40.44	24.70	26.74	28.99
980.0	40.40	41.01	41.50	26.69	29.00	31.11
1180.0	41.05	40.43	39.67	30.66	32.25	32.44
1380.0	35.15	33.80	32.71	34.02	35.24	35.38
1580.0	33.73	32.61	31.73	29.06	30.36	31.29
1780.0	35.56	34.34	33.22	21.21	21.45	21.31
1980.0	34.56	33.58	32.83	13.04	13.91	14.39
2180.0	34.91	33.62	32.74	11.63	13.04	14.15
2380.0	32.27	30.75	29.52	14.31	16.03	17.69
2580.0	31.12	29.87	29.25	17.19	18.76	20.20
2780.0	29.16	27.24	25.56	19.24	19.71	19.79
2980.0	29.15	26.63	25.11	21.25	20.40	19.94
3180.0	26.71	25.38	24.20	24.41	23.57	22.91
3380.0	27.34	26.20	25.58	22.76	22.56	22.42
3580.0	26.33	25.60	25.13	22.35	22.66	23.06
3760.0	26.10	25.39	24.62	18.77	19.30	19.74
3940.0	26.79	26.15	25.21	19.36	20.00	20.67
4040.0	27.32	26.37	25.27	18.35	19.41	20.46
4120.0	27.12	26.29	25.18	16.71	17.76	18.88
4220.0	26.99	25.98	24.63	15.77	16.77	17.92
4300.0	27.83	26.32	24.62	15.51	16.49	17.61
4400.0	29.46	27.18	25.08	15.03	15.82	16.76
4550.0	28.75	26.19	23.87	15.37	15.61	15.63
4670.0	28.87	26.27	23.15	17.25	16.86	15.46
4810.0	29.10	26.50	22.98	23.17	20.55	17.38
4930.0	28.98	26.37	23.38	38.13	31.88	27.43
5070.0	28.02	25.78	23.52	30.61	31.97	32.72
5190.0	27.04	25.32	23.76	26.74	27.04	26.72
5330.0	25.81	24.93	24.14	24.70	24.32	23.79
5450.0	24.79	24.49	24.12	23.32	22.66	22.00
5590.0	24.27	24.36	24.22	21.96	21.12	20.48
5710.0	24.14	24.54	24.72	21.17	20.19	19.74
5850.0	23.40	24.23	24.50	19.71	19.17	18.62
5970.0	22.69	23.76	24.70	18.72	18.20	18.07
6110.0	21.45	22.59	23.67	18.27	18.02	18.10
6230.0	21.12	22.47	23.50	18.04	18.30	18.37
6370.0	22.28	23.88	25.14	18.39	19.09	19.52
6490.0	24.64	26.57	28.27	18.50	19.69	20.47
6630.0	29.01	29.94	31.33	17.62	18.74	19.14

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+7	+10	+13
550.0	580.0	28.19	24.87	20.29
750.0	780.0	15.77	14.32	13.73
950.0	980.0	13.04	12.49	12.14
1150.0	1180.0	19.12	18.82	18.59
1350.0	1380.0	25.03	25.52	25.81
1550.0	1580.0	27.10	27.10	26.93
1750.0	1780.0	26.91	26.76	26.66
1950.0	1980.0	34.07	33.90	33.78
2150.0	2180.0	38.73	38.67	38.80
2350.0	2380.0	39.43	39.65	39.88
2550.0	2580.0	35.36	35.39	35.77
2750.0	2780.0	28.79	28.56	28.48
2950.0	2980.0	26.35	26.47	26.85
3150.0	3180.0	23.48	23.15	23.13
3350.0	3380.0	28.25	27.43	26.63
3550.0	3580.0	20.01	19.82	19.70
3730.0	3760.0	22.13	21.38	21.07
3910.0	3940.0	30.07	29.81	30.35
4010.0	4040.0	39.05	37.74	35.98
4090.0	4120.0	28.93	27.45	26.62
4190.0	4220.0	24.96	23.27	22.25
4270.0	4300.0	23.66	21.67	20.76
4370.0	4400.0	27.85	26.80	26.85
4520.0	4550.0	28.12	27.53	26.68
4640.0	4670.0	27.25	25.93	24.68
4780.0	4810.0	27.86	25.14	23.31
4900.0	4930.0	24.46	23.14	22.15
5040.0	5070.0	23.06	23.60	23.76
5160.0	5190.0	24.58	25.25	25.68
5300.0	5330.0	27.45	28.29	28.93
5420.0	5450.0	30.17	30.94	31.60
5560.0	5590.0	32.40	33.31	34.02
5680.0	5710.0	34.31	35.22	35.52
5820.0	5850.0	33.90	34.52	34.77
5940.0	5970.0	29.66	29.74	29.64
6080.0	6110.0	25.98	25.61	25.13
6200.0	6230.0	24.19	23.69	22.91
6340.0	6370.0	22.52	22.03	21.33
6460.0	6490.0	21.60	21.29	20.97
6600.0	6630.0	21.78	21.32	21.62

Frequency Mixer

SIM-63LH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=6000MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+7	+10	+13		+7	+10	+13		+7	+10	+13
550.0	580.0	10.89	6.81	4.82	580.0	36.97	34.75	28.03	10.0	1.57	1.95	2.29
750.0	780.0	2.37	2.25	2.19	780.0	10.19	8.35	8.64	50.0	1.60	1.98	2.33
950.0	980.0	2.13	1.96	1.82	980.0	3.07	3.85	4.80	90.0	1.57	1.92	2.24
1150.0	1180.0	3.15	3.12	3.07	1180.0	1.46	2.01	2.62	130.0	1.60	1.92	2.22
1350.0	1380.0	3.19	3.08	3.05	1380.0	1.08	1.40	1.86	170.0	1.60	1.87	2.13
1550.0	1580.0	2.95	2.71	2.48	1580.0	1.67	2.01	2.53	210.0	1.61	1.83	2.05
1750.0	1780.0	3.05	2.74	2.55	1780.0	2.07	2.62	3.31	250.0	1.62	1.80	2.00
1950.0	1980.0	3.18	3.01	2.89	1980.0	1.92	2.61	3.39	290.0	1.63	1.75	1.91
2150.0	2180.0	3.08	2.89	2.75	2180.0	1.90	2.48	3.17	330.0	1.67	1.75	1.89
2350.0	2380.0	2.59	2.39	2.24	2380.0	2.08	2.40	2.90	370.0	1.66	1.69	1.80
2550.0	2580.0	2.82	2.60	2.44	2580.0	1.98	2.03	2.35	410.0	1.72	1.71	1.78
2750.0	2780.0	1.90	1.70	1.52	2780.0	1.64	1.52	1.76	450.0	1.70	1.65	1.69
2950.0	2980.0	1.34	1.34	1.35	2980.0	1.43	1.15	1.45	490.0	1.74	1.64	1.64
3150.0	3180.0	1.60	1.67	1.73	3180.0	1.18	1.24	1.65	530.0	1.70	1.57	1.54
3350.0	3380.0	1.54	1.51	1.51	3380.0	1.17	1.56	2.05	570.0	1.69	1.49	1.42
3550.0	3580.0	2.26	2.13	2.06	3580.0	1.63	1.98	2.48	610.0	1.67	1.43	1.31
3730.0	3760.0	3.09	2.88	2.74	3760.0	2.12	2.37	2.82	650.0	1.68	1.40	1.22
3910.0	3940.0	3.85	3.56	3.33	3940.0	2.77	2.73	3.03	690.0	1.88	1.60	1.43
4010.0	4040.0	4.03	3.74	3.53	4040.0	3.26	2.95	3.11	730.0	2.32	2.04	1.88
4090.0	4120.0	4.10	3.74	3.46	4120.0	3.72	3.13	3.11	770.0	3.12	2.77	2.54
4190.0	4220.0	4.42	3.98	3.67	4220.0	4.20	3.26	3.04	810.0	3.81	3.34	3.02
4270.0	4300.0	4.16	3.69	3.37	4300.0	4.68	3.29	2.86	850.0	4.19	3.65	3.29
4370.0	4400.0	4.66	4.01	3.69	4400.0	5.72	3.67	2.86	890.0	4.30	3.75	3.36
4520.0	4550.0	3.05	2.67	2.47	4550.0	6.28	3.95	2.78	930.0	4.18	3.66	3.30
4640.0	4670.0	2.98	2.60	2.36	4670.0	6.73	4.29	2.88	970.0	4.15	3.65	3.31
4780.0	4810.0	3.13	2.73	2.51	4810.0	6.91	4.27	2.87	1010.0	4.03	3.57	3.24
4900.0	4930.0	3.24	2.86	2.67	4930.0	6.76	4.00	2.72	1050.0	3.98	3.55	3.26
5040.0	5070.0	3.62	3.25	3.08	5070.0	5.95	3.73	2.90	1090.0	3.95	3.55	3.29
5160.0	5190.0	4.04	3.67	3.52	5190.0	5.19	3.56	3.16	1130.0	3.97	3.63	3.42
5300.0	5330.0	4.36	3.96	3.84	5330.0	4.17	3.40	3.43	1170.0	4.10	3.81	3.64
5420.0	5450.0	4.47	4.05	3.78	5450.0	3.43	3.25	3.56	1210.0	4.20	3.96	3.84
5560.0	5590.0	4.45	4.09	3.74	5590.0	2.94	3.06	3.44	1250.0	4.41	4.27	4.22
5680.0	5710.0	4.19	3.84	3.56	5710.0	2.63	2.90	3.30	1290.0	4.67	4.61	4.64
5820.0	5850.0	3.45	3.14	2.88	5850.0	2.15	2.52	2.93	1330.0	5.10	5.16	5.28
5940.0	5970.0	3.79	3.52	3.28	5970.0	1.94	2.27	2.62	1370.0	5.68	5.87	6.11
6080.0	6110.0	2.92	2.73	2.55	6110.0	1.90	2.19	2.48	1390.0	6.01	6.28	6.56
6200.0	6230.0	2.10	1.99	1.84	6230.0	2.11	2.39	2.66	1430.0	6.86	7.31	7.70
6340.0	6370.0	1.74	1.68	1.61	6370.0	2.71	3.03	3.31	1450.0	7.34	7.87	8.31
6460.0	6490.0	2.28	2.24	2.19	6490.0	3.37	3.71	3.99	1490.0	8.39	9.04	9.58
6600.0	6630.0	4.02	3.83	3.76	6630.0	3.02	3.17	3.28	1510.0	8.90	9.63	10.13

REV. X2

SIM-63LH+

101028

Page 4 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



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	4	4	12	36	19	36	32	---	---	---
1	-	18	+0	22	12	31	41	57	46	46	---	---
2	90	63	52	60	69	64	64	>72	64	67	65	---
3	>90	>72	66	>72	67	>72	66	>72	>72	>72	>72	>72
4	>90	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72
5	>90	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72
6	>90	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72
7	>90	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72
8	---	---	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72
9	---	---	---	>72	>72	>72	>72	>72	>72	>72	>72	>72
10	---	---	---	---	>72	>72	>72	>72	>72	>72	>72	>72
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

Test conditions:

RF IN: 3375 MHz; -12.00 dBm.

LO IN: 3405 MHz; +10.00 dBm

IF OUT: 30 MHz; -17.76 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	6	15	22	48	30	49	45	---	---	---
1	-	17	+0	22	12	32	41	56	48	47	---	---
2	70	51	40	49	64	53	56	70	55	58	56	---
3	>90	62	45	55	44	52	44	60	70	70	65	70
4	>90	>82	71	66	70	61	65	65	77	>82	77	75
5	>90	75	>82	>82	70	75	68	>82	72	82	>82	>82
6	>90	>82	>82	>82	>82	>82	>82	77	82	>82	>82	>82
7	>90	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
8	---	---	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
9	---	---	---	>82	>82	>82	>82	>82	>82	>82	>82	>82
10	---	---	---	---	>82	>82	>82	>82	>82	>82	>82	>82
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions:

RF IN: 3375 MHz; -2.00 dBm.

LO IN: 3405 MHz; +10.00 dBm

IF OUT: 30 MHz; -7.85 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

SIM-63LH+

101028

Page 5 of 5



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

P.O. Box 350186, Brooklyn, New York 11235-0008 (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

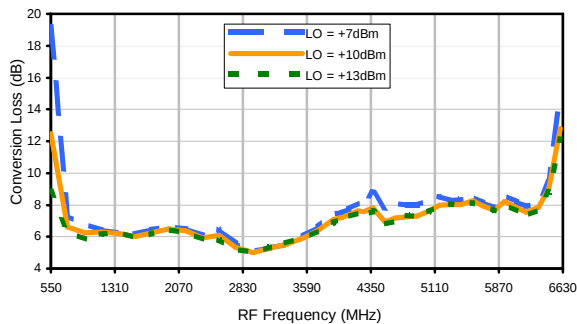


Frequency Mixer

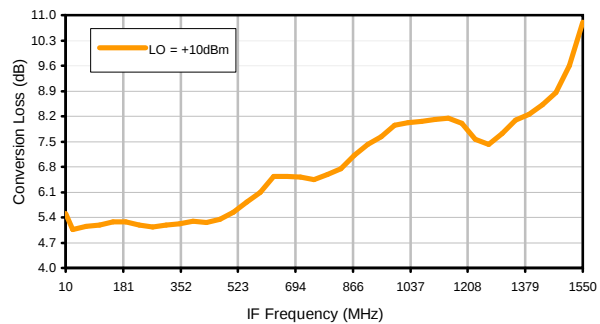
SIM-63LH+

Typical Performance Curves

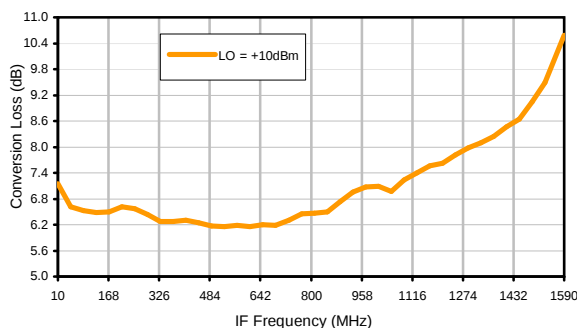
Conversion Loss @ IF=30MHz



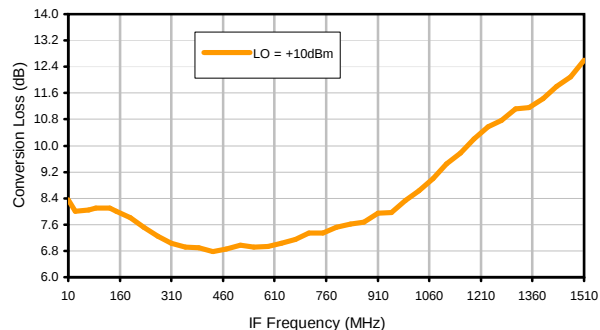
Conversion Loss vs. IF @ RF=3010.1MHz



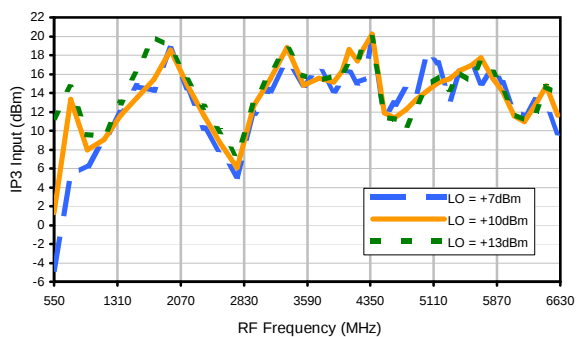
Conversion Loss vs. IF @ RF=739.9MHz



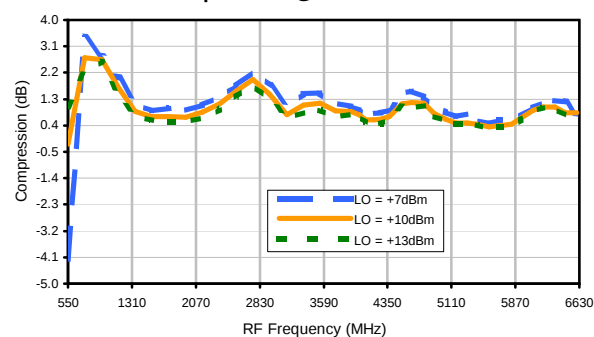
Conversion Loss vs. IF @ RF=6010.1MHz



IP3 Input



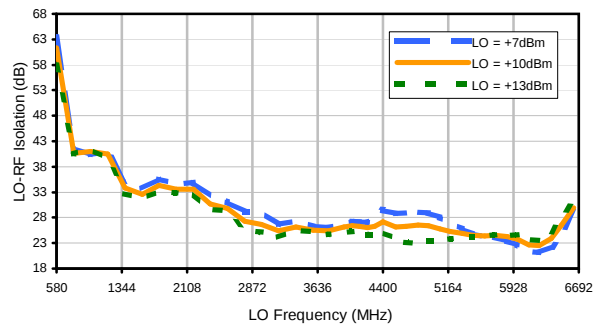
Compression @ RF IN=+3dBm



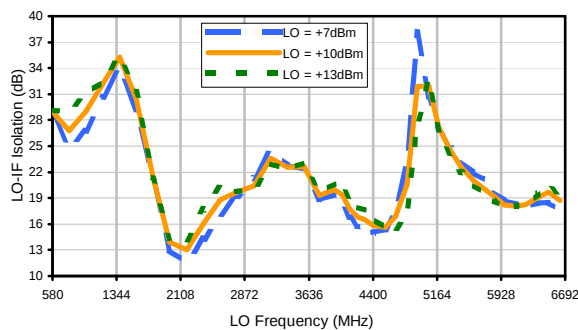
REV. X2
SIM-63LH+
101028
Page 1 of 3

Typical Performance Curves

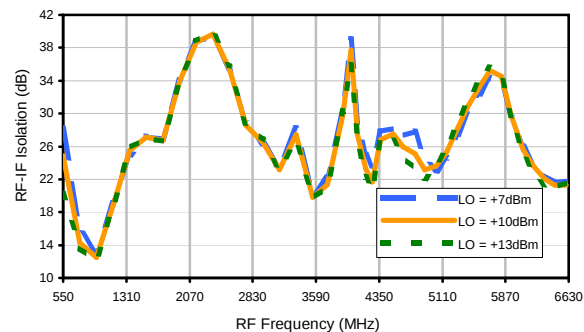
LO-RF Isolation



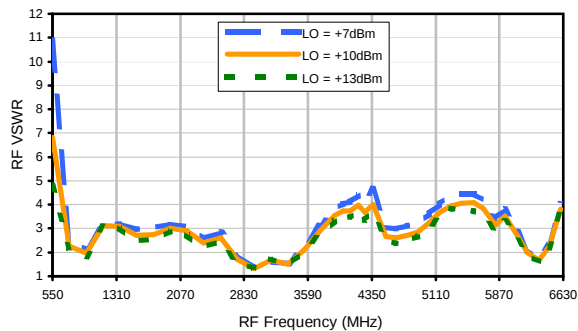
LO-IF Isolation



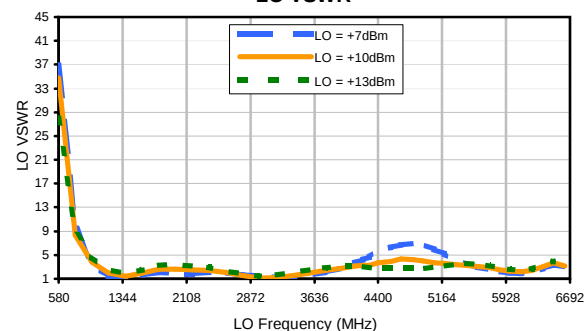
RF-IF Isolation



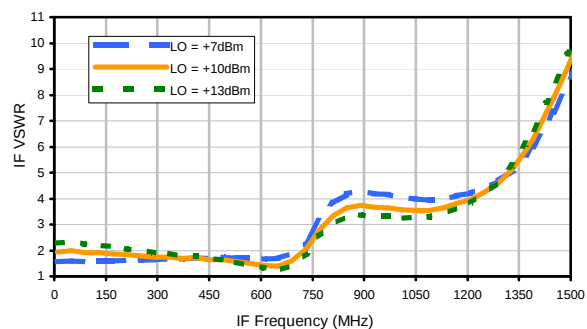
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	4	4	12	36	19	36	32	---	---	---
1	-	18	+0	22	12	31	41	57	46	46	---	---
2	90	63	52	60	69	64	64	>72	64	67	65	---
3	>90	>72	66	>72	67	>72	66	>72	>72	>72	>72	>72
4	>90	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72
5	>90	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72
6	>90	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72
7	>90	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72
8	---	---	>72	>72	>72	>72	>72	>72	>72	>72	>72	>72
9	---	---	---	>72	>72	>72	>72	>72	>72	>72	>72	>72
10	---	---	---	---	>72	>72	>72	>72	>72	>72	>72	>72
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

Test conditions:

RF IN: 3375 MHz; -12.00 dBm.

LO IN: 3405 MHz; +10.00 dBm

IF OUT: 30 MHz; -17.76 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	6	15	22	48	30	49	45	---	---	---
1	-	17	+0	22	12	32	41	56	48	47	---	---
2	70	51	40	49	64	53	56	70	55	58	56	---
3	>90	62	45	55	44	52	44	60	70	70	65	70
4	>90	>82	71	66	70	61	65	65	77	>82	77	75
5	>90	75	>82	>82	70	75	68	>82	72	82	>82	>82
6	>90	>82	>82	>82	>82	>82	>82	77	82	>82	>82	>82
7	>90	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
8	---	---	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
9	---	---	---	>82	>82	>82	>82	>82	>82	>82	>82	>82
10	---	---	---	---	>82	>82	>82	>82	>82	>82	>82	>82
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 3375 MHz; -2.00 dBm.

LO IN: 3405 MHz; +10.00 dBm

IF OUT: 30 MHz; -7.85 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

SIM-63LH+

101028

Page 3 of 3



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

P.O. Box 350186, Brooklyn, New York 11235-0008 (718) 934-4500 Fax (718) 332-4661

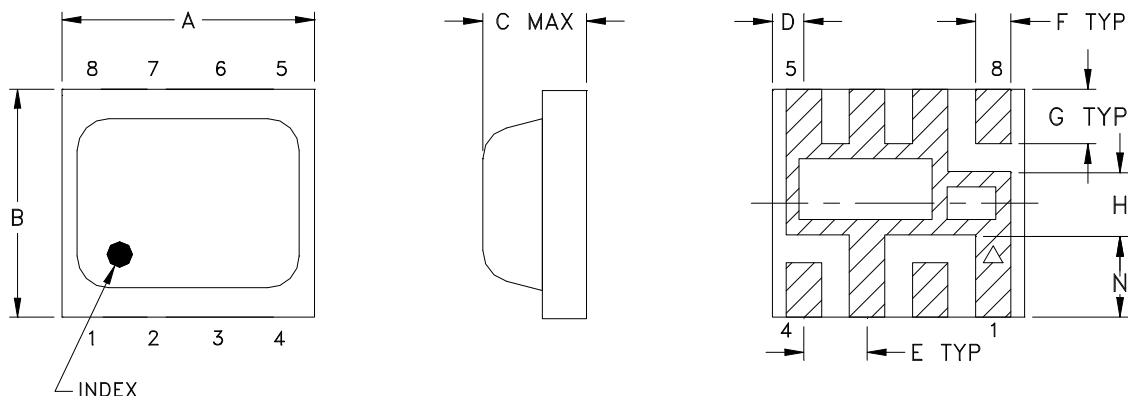


The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see

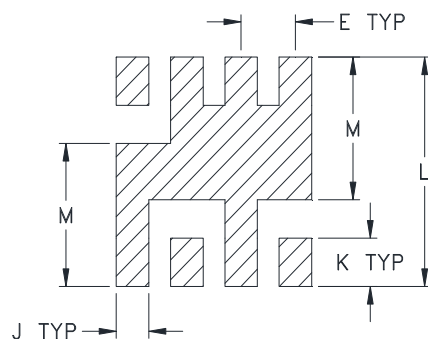


Outline Dimensions

HV1195



PCB Metal Land Pattern



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

CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
HV1195	0.200 (5.08)	0.180 (4.57)	0.087 (2.21)	0.025 (0.64)	0.050 (1.27)	0.028 (0.71)	0.043 (1.09)	0.050 (1.27)	0.030 (0.76)	0.043 (1.09)	0.204 (5.18)	0.127 (3.23)	0.065 (1.65)

CASE#	WT, GRAM
HV1195	.08

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

Notes:

1. Case material: Plastic encapsulation on Ceramic base.
2. Termination finish: Palladium Silver.



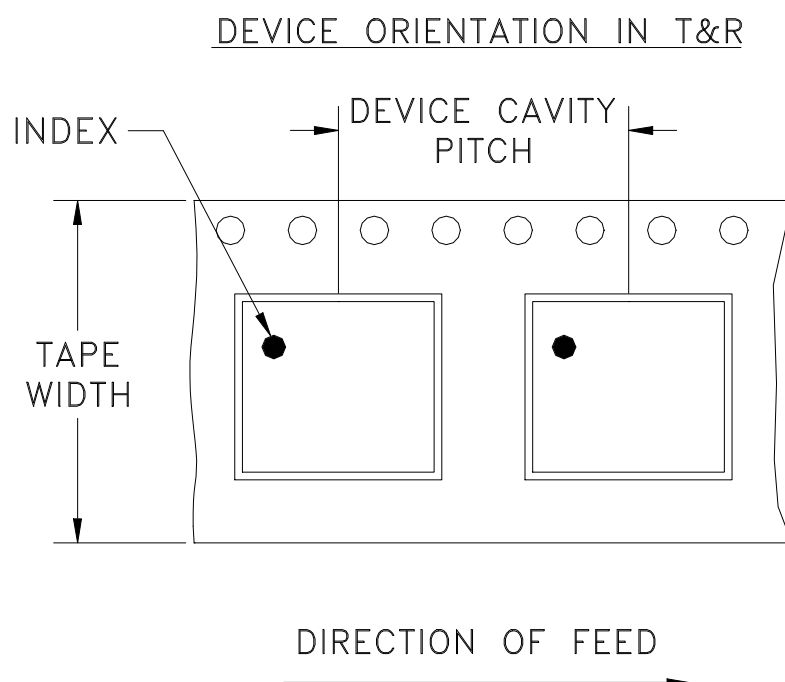
P.O. Box 350186, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F82



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
12	8	7	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



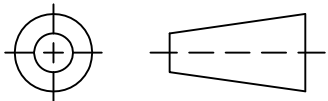
INTERNET <http://www.minicircuits.com>

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
OR	M104559	NEW RELEASE	04/11/06	MMG	DJ
A	M109513	MODIFIED SMOBC AREA, REMOVED NOTE 3	01/31/07	PW	DJ
B	M176274	MODIFIED CASE STYLE	09/23/19	ITG	RB

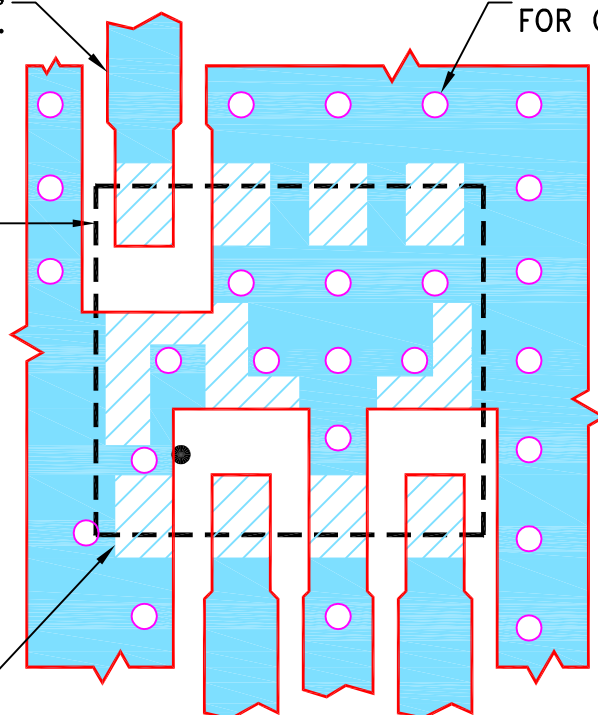
SUGGESTED MOUNTING CONFIGURATION FOR HV1195 CASE STYLE, "rh" PIN CONNECTION

COPLANAR WAVEGUIDE
.038 LINE WIDTH,
.013 GAP, 2 PL.

Ø.013 PTH
FOR GROUND

PACKAGE
OUTLINE

PIN 1

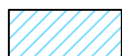


NOTES:

1. TRACE WIDTH AND GAP ARE SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .020"±.0015"; COPPER: 1/2 OZ. EACH SIDE.
FOR OTHER MATERIALS TRACE WIDTH AND GAP 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

04/10/06

TOLERANCES ON:

CHECKED

IL

04/11/06

2 PL DECIMALS ± .005

APPROVED

DJ

04/11/06

ANGLES ±
FRACTIONS ±

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



Mini-Circuits®

13 Neptune Avenue
Brooklyn NY 11235

PL, rh, HV1195, SIM, TB-382

SIZE

CODE IDENT

DRAWING NO:

REV:

A

15542

98-PL-239

B

FILE:

98PL239

SCALE:

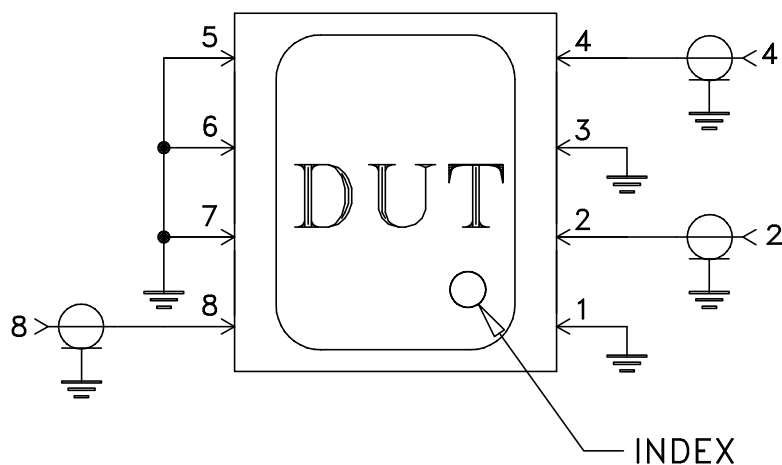
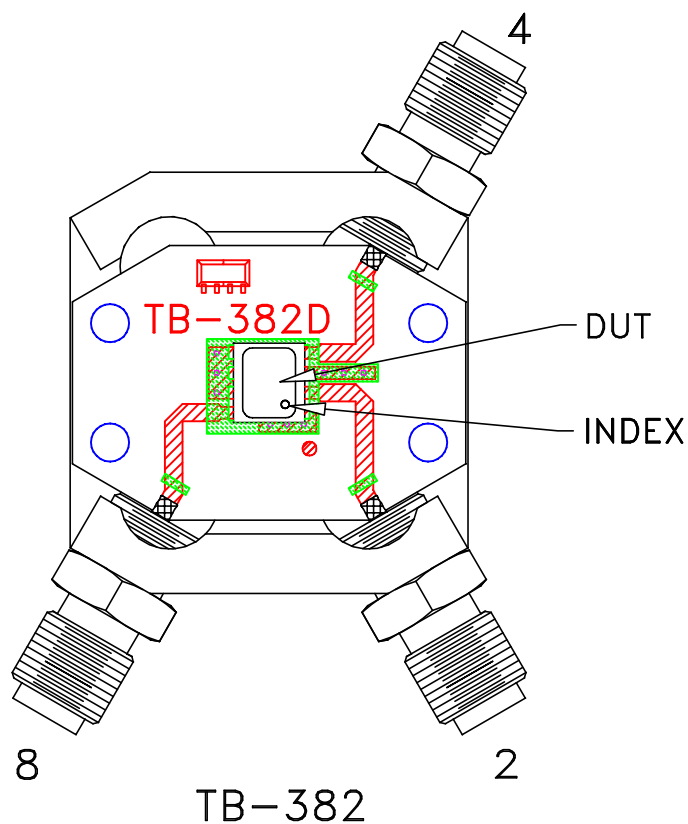
10:1

SHEET:

1 OF 1

Evaluation Board and Circuit

For Pin Connections refer to Data Sheet of the DUT



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.020 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 Case Temperature	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JESD22-A102-C, Condition C
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutectic Process: 225°C peak Pb-Free Process: 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 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