

# Ceramic Surface Mount Frequency Mixer WIDE BAND

## SIM-153+

### Level 7 (LO Power +7 dBm) 3400 to 15000 MHz



Generic photo used for illustration purposes only

CASE STYLE: HV1195

#### 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

#### Features

- wide bandwidth, 3400 to 15000 MHz
- low conversion loss, 6.8 dB typ.
- high L-R isolation, 36 dB typ.
- excellent IF BW, DC to 4000 MHz
- 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

- satellite up and down converters
- defense radar and communications
- line of sight links
- federal fixed service
- WIFI
- blue tooth
- VSAT
- ISM

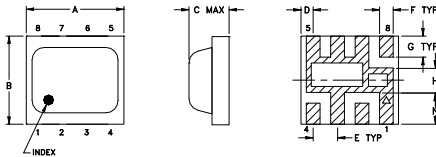
#### +RoHS Compliant

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

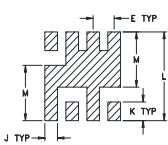
Available Tape and Reel at no extra cost

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

#### Outline Drawing



#### PCB Metal Land Pattern

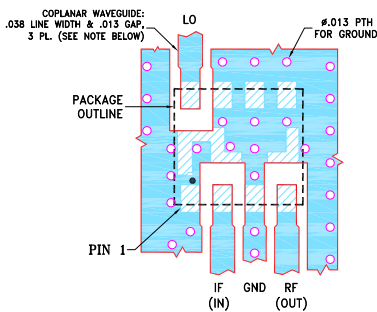


Suggested Layout, Tolerance to be within ±0.02

#### Outline Dimensions (inch/mm)

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-458+ Suggested PCB Layout (PL-517)



- NOTES:
1. TRACE WIDTH AND GAP ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .0028(.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.
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#### 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/WCLStore/terms.jsp](http://www.minicircuits.com/WCLStore/terms.jsp)

#### Electrical Specifications

FREQUENCY (MHz)	CONVERSION LOSS* (dB)	LO-RF ISOLATION (dB)		LO-IF ISOLATION (dB)		IP3 at center band (dBm)			
		Typ.	Min.	Typ.	Min.				
LO/RF $f_L-f_U$	IF	Typ.	$\sigma$	Max.	Typ.	Min.	Typ.		
3400-15000	DC-4000								
3400-10000		6.5	0.3	9.5	36	25	15	12	10
10000-13500		10.0	0.7	13.2	36	27	30	15	—
13500-15000		8.0	0.4	10.4	31	20	27	20	—

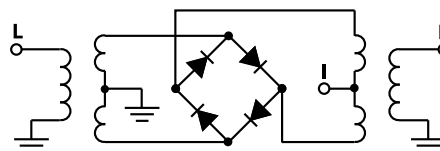
1 dB Compression: +1 dBm typ.

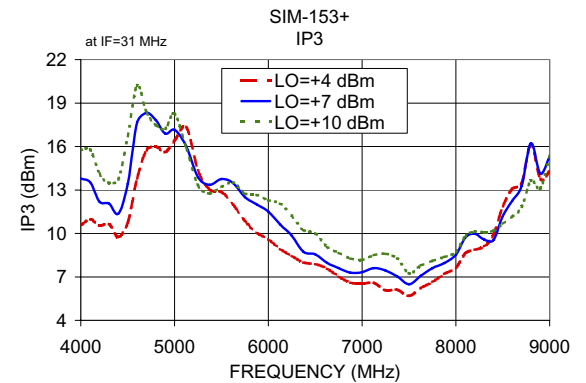
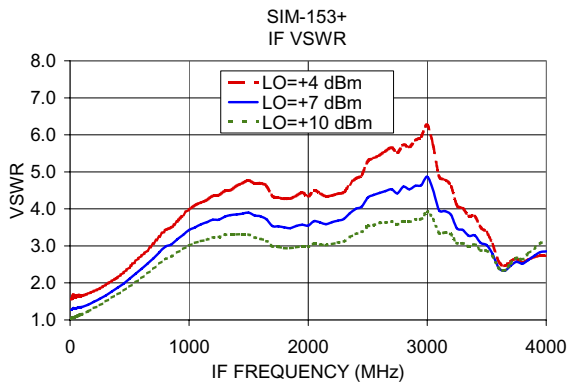
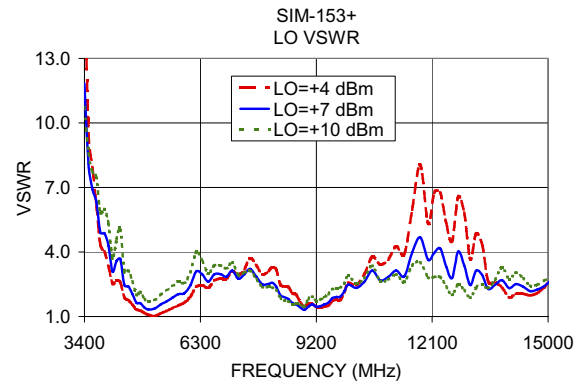
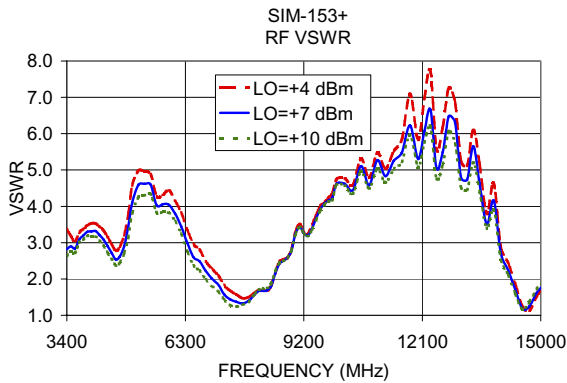
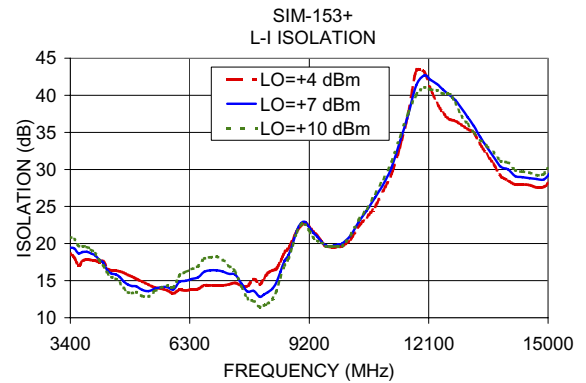
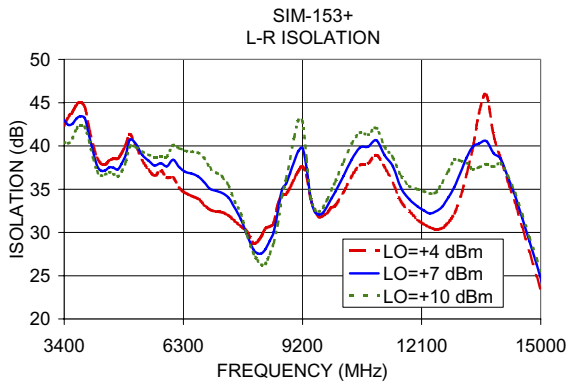
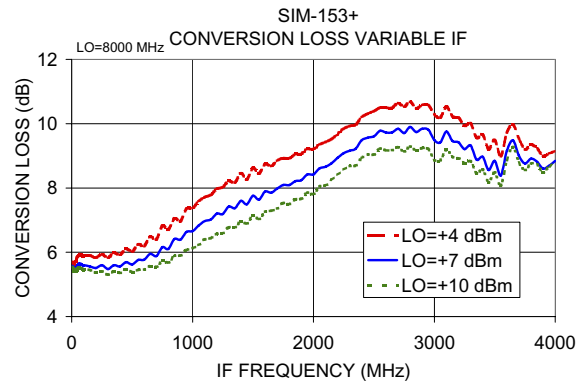
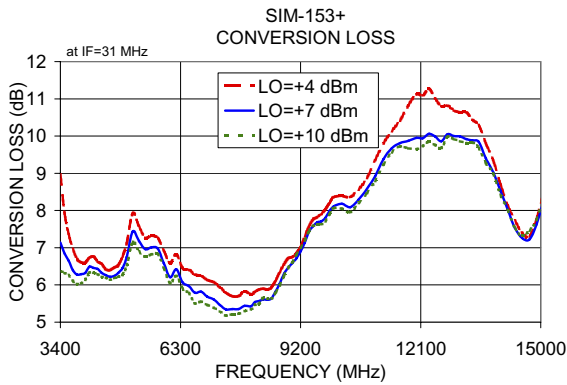
\* Conversion loss at 30 MHz IF  $\sigma$  is a measure of repeatability from unit to unit.

#### Typical Performance Data

Frequency (MHz)	Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)	
						LO +7dBm
RF	LO	LO +7dBm	LO +7dBm	LO +7dBm	LO +7dBm	
3400.00	3431.00	7.14	42.99	19.46	2.82	11.83
4000.00	4031.00	6.32	41.32	18.41	3.31	4.30
4500.00	4531.00	6.26	37.54	15.84	2.71	2.40
5000.00	5031.00	6.75	40.73	14.23	4.10	1.33
5600.00	5631.00	7.01	37.75	14.10	4.02	1.87
6500.00	6531.00	5.97	36.81	15.44	2.60	2.62
7400.00	7431.00	5.34	34.01	15.81	1.44	2.97
8000.00	8031.00	5.43	28.07	12.83	1.58	2.51
8500.00	8531.00	5.64	30.06	16.20	2.15	1.82
9000.00	9031.00	6.59	38.23	22.75	3.25	1.45
9500.00	9531.00	7.58	32.38	20.23	3.67	1.64
10000.00	10031.00	8.11	34.68	20.01	4.62	2.48
11000.00	11031.00	8.92	40.65	27.99	5.27	2.84
12000.00	12031.00	9.95	33.01	42.68	5.30	3.63
13050.00	13081.00	9.99	36.98	37.00	4.78	2.46
13500.00	13531.00	9.85	40.28	33.11	4.65	2.28
14025.00	14056.00	8.53	38.51	30.02	2.71	2.32
14550.00	14581.00	7.26	31.68	28.81	1.18	2.18
15075.00	15106.00	8.28	23.38	29.68	1.84	2.69

#### Electrical Schematic





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## Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)		
		@LO (dBm)		
		+4	+7	+10
2800.0	2830.0	19.80	14.17	9.60
3125.0	3155.0	14.46	9.05	6.89
3450.0	3480.0	9.44	7.14	6.31
3775.0	3805.0	6.93	6.46	6.18
4100.0	4130.0	7.04	6.77	6.62
4425.0	4455.0	7.10	6.86	6.73
4750.0	4780.0	6.73	6.50	6.39
5075.0	5105.0	7.51	7.13	6.90
5400.0	5430.0	8.09	7.65	7.35
5725.0	5755.0	7.44	7.03	6.81
6050.0	6080.0	7.15	6.75	6.57
6375.0	6405.0	7.03	6.54	6.34
6700.0	6730.0	6.91	6.42	6.14
7025.0	7055.0	6.73	6.23	5.96
7375.0	7405.0	6.08	5.72	5.60
7700.0	7730.0	6.48	5.98	5.76
8050.0	8080.0	6.54	6.19	6.06
8375.0	8405.0	6.91	6.62	6.51
8725.0	8755.0	7.23	6.93	6.87
9050.0	9080.0	7.89	7.56	7.44
9400.0	9430.0	7.73	7.43	7.37
9725.0	9755.0	8.48	8.21	8.12
10075.0	10105.0	8.81	8.52	8.46
10400.0	10430.0	9.50	9.17	9.06
10750.0	10780.0	9.72	9.31	9.16
11075.0	11105.0	10.14	9.55	9.34
11425.0	11455.0	11.51	10.33	10.06
11750.0	11780.0	12.72	10.85	10.42
12100.0	12130.0	12.20	10.28	9.97
12425.0	12455.0	13.24	10.96	10.52
12775.0	12805.0	13.18	10.91	10.50
13100.0	13130.0	13.10	10.48	10.07
13450.0	13480.0	10.37	9.15	8.94
13775.0	13805.0	8.87	8.40	8.35
14125.0	14155.0	8.08	7.77	7.78
14450.0	14480.0	7.94	7.74	7.77
14800.0	14830.0	8.61	8.42	8.53
15125.0	15155.0	9.56	9.10	9.16
15475.0	15505.0	12.00	10.90	10.80
15800.0	15830.0	18.78	13.70	12.10

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+4	+7	+10
2800.0	2830.0	-8.78	-4.99	1.57
3125.0	3155.0	-5.40	3.23	11.17
3450.0	3480.0	1.46	5.60	11.20
3775.0	3805.0	6.39	9.23	12.00
4100.0	4130.0	9.00	10.68	12.49
4425.0	4455.0	9.70	11.17	12.61
4750.0	4780.0	14.52	17.10	18.14
5075.0	5105.0	17.42	19.28	19.76
5400.0	5430.0	15.82	16.09	14.79
5725.0	5755.0	12.03	14.39	15.32
6050.0	6080.0	10.54	12.78	14.44
6375.0	6405.0	9.71	10.31	12.05
6700.0	6730.0	8.64	8.83	9.77
7025.0	7055.0	6.49	7.50	8.57
7375.0	7405.0	6.44	7.75	9.24
7700.0	7730.0	7.47	8.81	9.02
8050.0	8080.0	10.19	11.17	10.45
8375.0	8405.0	13.97	14.37	12.56
8725.0	8755.0	12.98	15.33	13.21
9050.0	9080.0	15.74	14.62	16.47
9400.0	9430.0	15.18	15.55	16.11
9725.0	9755.0	15.89	16.88	17.45
10075.0	10105.0	14.82	16.62	16.65
10400.0	10430.0	15.20	17.64	18.03
10750.0	10780.0	13.62	17.49	18.12
11075.0	11105.0	12.75	16.06	17.84
11425.0	11455.0	13.80	15.04	18.11
11750.0	11780.0	14.92	14.79	17.56
12100.0	12130.0	15.03	14.18	16.25
12425.0	12455.0	13.54	15.41	16.67
12775.0	12805.0	13.82	15.35	15.97
13100.0	13130.0	12.24	14.88	14.53
13450.0	13480.0	15.61	13.64	12.38
13775.0	13805.0	16.12	10.17	8.79
14125.0	14155.0	9.08	8.91	8.11
14450.0	14480.0	8.93	9.59	9.29
14800.0	14830.0	11.08	12.28	11.89
15125.0	15155.0	10.99	13.52	13.32
15475.0	15505.0	11.42	13.74	15.77
15800.0	15830.0	3.57	12.96	15.21

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+1dBm (dB)		
		@LO (dBm)		
		+4	+7	+10
2800.0	2830.0	-4.34	-1.54	0.93
3125.0	3155.0	-2.21	1.03	1.96
3450.0	3480.0	0.99	1.69	1.36
3775.0	3805.0	1.84	1.28	0.96
4100.0	4130.0	1.04	0.72	0.56
4425.0	4455.0	0.69	0.46	0.34
4750.0	4780.0	0.50	0.31	0.23
5075.0	5105.0	0.39	0.27	0.19
5400.0	5430.0	0.28	0.20	0.19
5725.0	5755.0	0.49	0.41	0.36
6050.0	6080.0	0.47	0.42	0.40
6375.0	6405.0	0.55	0.49	0.46
6700.0	6730.0	0.70	0.58	0.51
7025.0	7055.0	0.88	0.67	0.58
7375.0	7405.0	1.15	0.80	0.63
7700.0	7730.0	1.02	0.69	0.58
8050.0	8080.0	1.05	0.78	0.63
8375.0	8405.0	0.68	0.53	0.50
8725.0	8755.0	0.53	0.38	0.31
9050.0	9080.0	0.36	0.34	0.40
9400.0	9430.0	0.43	0.41	0.50
9725.0	9755.0	0.28	0.31	0.38
10075.0	10105.0	0.28	0.28	0.32
10400.0	10430.0	0.19	0.19	0.21
10750.0	10780.0	0.11	0.13	0.17
11075.0	11105.0	0.10	0.11	0.15
11425.0	11455.0	0.03	0.05	0.11
11750.0	11780.0	-0.32	-0.03	0.09
12100.0	12130.0	-0.20	0.06	0.13
12425.0	12455.0	-0.49	0.02	0.11
12775.0	12805.0	-0.36	0.04	0.15
13100.0	13130.0	-0.52	0.12	0.25
13450.0	13480.0	0.29	0.33	0.57
13775.0	13805.0	0.55	0.60	0.91
14125.0	14155.0	0.80	0.82	1.04
14450.0	14480.0	0.80	0.63	0.85
14800.0	14830.0	0.76	0.48	0.63
15125.0	15155.0	0.57	0.29	0.42
15475.0	15505.0	0.49	0.30	0.26
15800.0	15830.0	-2.49	-0.21	0.16

## Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=9200MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=3390MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=15010MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+7			+7			+7
4100.0	5100.0	9.43	10.1	3400.1	7.71	4310.0	10700.0	11.44
3892.0	5308.0	8.85	130.1	3520.1	6.56	4190.0	10820.0	11.24
3684.1	5515.9	8.27	250.1	3640.1	6.29	4070.0	10940.0	11.10
3476.1	5723.9	8.10	370.1	3760.1	6.01	3970.0	11040.0	10.90
3268.1	5931.9	8.47	490.1	3880.1	5.89	3850.0	11160.0	10.70
3060.2	6139.8	8.57	610.1	4000.1	5.86	3750.0	11260.0	10.73
2852.2	6347.8	8.90	730.1	4120.1	5.89	3630.0	11380.0	10.85
2644.2	6555.8	9.16	850.1	4240.1	5.98	3530.0	11480.0	11.04
2436.3	6763.7	9.66	970.1	4360.1	6.05	3410.0	11600.0	11.09
2228.3	6971.7	9.66	1090.1	4480.1	6.10	3310.0	11700.0	11.13
2020.3	7179.7	9.12	1210.1	4600.1	6.18	3190.0	11820.0	11.04
1812.4	7387.6	8.61	1330.1	4720.1	6.43	3090.0	11920.0	10.99
1604.4	7595.6	8.53	1450.1	4840.1	6.82	2970.0	12040.0	11.08
1396.4	7803.6	8.43	1570.1	4960.1	7.28	2870.0	12140.0	11.06
1188.5	8011.5	8.48	1690.1	5080.1	7.66	2750.0	12260.0	11.19
980.5	8219.5	8.57	1810.1	5200.1	8.06	2650.0	12360.0	11.15
772.5	8427.5	8.46	1930.1	5320.1	8.17	2530.0	12480.0	11.10
564.6	8635.4	7.94	2050.1	5440.1	8.18	2430.0	12580.0	11.00
356.6	8843.4	7.69	2170.1	5560.1	8.07	2310.0	12700.0	10.91
148.6	9051.4	7.35	2290.1	5680.1	7.89	2210.0	12800.0	10.74
43.8	9243.8	7.28	2410.1	5800.1	7.93	2090.0	12920.0	10.70
195.8	9395.8	7.22	2530.1	5920.1	7.88	1990.0	13020.0	10.43
347.9	9547.9	7.34	2650.1	6040.1	7.68	1870.0	13140.0	10.32
499.9	9699.9	7.52	2770.1	6160.1	7.70	1770.0	13240.0	10.13
651.9	9851.9	7.71	2890.1	6280.1	7.60	1650.0	13360.0	9.86
804.0	10004.0	7.89	3010.1	6400.1	7.66	1550.0	13460.0	9.72
956.0	10156.0	8.07	3130.1	6520.1	7.78	1430.0	13580.0	9.46
1108.0	10308.0	8.10	3250.1	6640.1	7.85	1330.0	13680.0	9.33
1260.1	10460.1	8.24	3370.1	6760.1	7.72	1210.0	13800.0	9.17
1412.1	10612.1	8.26	3490.1	6880.1	7.79	1110.0	13900.0	9.09
1564.1	10764.1	8.40	3610.1	7000.1	7.57	990.0	14020.0	9.08
1716.2	10916.2	8.38	3730.1	7120.1	7.42	890.0	14120.0	9.11
1885.1	11085.1	8.61	3850.1	7240.1	7.57	770.0	14240.0	9.20
2037.1	11237.1	8.75	3950.1	7340.1	7.52	670.0	14340.0	9.18
2206.0	11406.0	9.03	4070.1	7460.1	7.75	550.0	14460.0	9.28
2358.1	11558.1	9.48	4170.1	7560.1	7.99	450.0	14560.0	9.49
2527.0	11727.0	10.21	4290.1	7680.1	8.31	330.0	14680.0	9.53
2679.0	11879.0	10.59	4390.1	7780.1	8.77	230.0	14780.0	9.40
2848.0	12048.0	10.25	4510.1	7900.1	9.45	110.0	14900.0	9.10
3000.0	12200.0	9.81	4610.1	8000.1	10.21	10.0	15000.0	9.17

## Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+4	+7	+10	+4	+7	+10
2830.0	39.65	40.27	40.21	21.06	21.10	21.50
3155.0	38.81	39.52	37.02	19.74	20.07	21.25
3480.0	39.83	41.55	39.83	18.48	19.46	20.96
3805.0	46.98	46.37	44.35	18.56	19.97	20.86
4130.0	40.15	38.54	37.37	18.70	19.32	19.44
4455.0	38.67	38.03	37.77	17.66	17.11	16.78
4780.0	41.88	40.47	39.58	17.28	16.06	15.39
5105.0	42.99	43.00	42.64	16.14	14.75	13.94
5430.0	39.00	39.91	40.98	15.03	14.33	13.54
5755.0	37.77	38.22	38.99	14.49	14.39	14.12
6080.0	38.40	39.55	40.52	14.10	14.69	15.10
6405.0	36.33	37.64	38.95	13.98	15.06	16.10
6730.0	34.66	36.30	37.40	14.26	15.77	17.14
7055.0	33.67	34.95	35.79	14.68	16.41	18.26
7405.0	34.90	35.24	33.92	14.99	16.48	17.50
7730.0	35.62	34.35	32.30	15.20	15.53	15.55
8080.0	34.33	31.54	29.69	15.65	14.40	13.10
8405.0	40.17	36.26	33.15	17.31	15.73	14.48
8755.0	37.71	36.79	36.00	21.29	20.22	19.29
9080.0	31.46	30.13	29.38	23.27	22.83	22.57
9430.0	28.24	27.74	27.00	23.32	23.47	22.96
9755.0	26.95	26.94	26.54	21.37	21.33	20.73
10105.0	28.59	28.75	29.10	19.83	19.99	19.89
10430.0	30.89	31.37	31.51	21.36	22.15	22.12
10780.0	35.04	35.39	35.56	24.06	24.82	25.27
11105.0	37.40	37.75	37.83	26.08	26.87	27.11
11455.0	42.85	41.94	40.65	27.74	28.18	28.47
11780.0	45.32	51.33	45.87	28.00	28.53	28.76
12130.0	44.48	54.88	45.94	28.58	29.43	30.12
12455.0	45.13	50.27	40.48	30.93	32.19	32.93
12805.0	35.91	44.07	42.79	34.65	37.59	40.14
13130.0	37.41	51.17	39.57	35.83	40.40	53.03
13480.0	31.68	40.66	42.02	34.28	39.59	50.84
13805.0	26.08	29.29	31.47	35.98	36.77	35.79
14155.0	24.57	26.60	27.94	30.86	31.83	31.96
14480.0	24.49	27.81	30.14	37.28	37.06	36.69
14830.0	24.19	27.84	30.84	28.61	30.01	31.14
15155.0	22.44	24.99	26.34	25.30	24.38	24.34
15505.0	18.99	20.13	20.72	18.95	18.50	18.02
15830.0	21.19	21.08	21.22	13.33	13.62	13.59

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+4	+7	+10
2800.0	2830.0	15.63	15.85	15.42
3125.0	3155.0	17.40	19.16	15.85
3450.0	3480.0	20.02	19.78	19.28
3775.0	3805.0	24.41	24.70	24.40
4100.0	4130.0	21.46	20.68	19.70
4425.0	4455.0	18.15	17.54	17.08
4750.0	4780.0	18.81	18.28	17.85
5075.0	5105.0	22.49	21.91	21.41
5400.0	5430.0	25.17	24.77	24.45
5725.0	5755.0	23.18	22.92	22.63
6050.0	6080.0	22.91	22.50	22.20
6375.0	6405.0	23.55	23.18	22.95
6700.0	6730.0	26.03	25.92	25.76
7025.0	7055.0	31.59	31.43	31.19
7375.0	7405.0	31.39	31.27	31.18
7700.0	7730.0	23.51	23.46	23.40
8050.0	8080.0	17.96	17.81	17.70
8375.0	8405.0	16.81	16.53	16.26
8725.0	8755.0	22.76	21.64	20.61
9050.0	9080.0	61.60	47.81	40.99
9400.0	9430.0	25.56	25.79	26.55
9725.0	9755.0	20.96	20.92	21.20
10075.0	10105.0	19.96	20.39	20.87
10400.0	10430.0	20.21	20.82	21.39
10750.0	10780.0	21.51	21.95	22.31
11075.0	11105.0	22.45	22.80	22.94
11425.0	11455.0	22.70	23.07	23.14
11750.0	11780.0	24.12	24.75	24.72
12100.0	12130.0	23.45	24.04	24.00
12425.0	12455.0	20.57	21.14	21.14
12775.0	12805.0	17.94	18.48	18.61
13100.0	13130.0	16.55	17.01	17.11
13450.0	13480.0	17.56	17.93	18.07
13775.0	13805.0	17.93	18.21	18.45
14125.0	14155.0	19.39	19.84	20.05
14450.0	14480.0	22.49	22.91	23.15
14800.0	14830.0	25.50	25.22	24.77
15125.0	15155.0	21.96	21.85	21.81
15475.0	15505.0	17.23	17.53	17.68
15800.0	15830.0	15.45	15.93	16.20

# Frequency Mixer

# SIM-153+

## Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=15000MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+4	+7	+10		+4	+7	+10		+4	+7	+10
2800.0	2830.0	4.95	3.41	2.18	2830.0	22.29	22.00	20.45	10.0	1.47	1.25	1.06
3125.0	3155.0	3.96	2.39	1.79	3155.0	20.70	18.70	14.74	110.0	1.51	1.30	1.16
3450.0	3480.0	2.74	2.25	2.12	3480.0	15.00	11.09	10.19	210.0	1.64	1.43	1.31
3775.0	3805.0	3.05	2.93	2.86	3805.0	6.01	6.49	7.47	310.0	1.78	1.59	1.48
4100.0	4130.0	3.34	3.20	3.10	4130.0	3.83	4.88	5.99	410.0	2.03	1.83	1.70
4425.0	4455.0	3.29	3.10	2.98	4455.0	2.63	3.38	4.24	510.0	2.24	2.06	1.93
4750.0	4780.0	3.14	2.89	2.72	4780.0	1.92	2.35	2.88	610.0	2.41	2.24	2.12
5075.0	5105.0	4.37	4.01	3.74	5105.0	1.54	1.64	1.98	710.0	2.52	2.36	2.26
5400.0	5430.0	5.85	5.44	5.07	5430.0	1.20	1.36	1.74	810.0	2.53	2.38	2.30
5725.0	5755.0	4.63	4.34	4.13	5755.0	1.22	1.64	2.12	910.0	2.48	2.32	2.23
6050.0	6080.0	3.81	3.51	3.31	6080.0	1.57	2.05	2.61	1030.0	2.42	2.20	2.09
6375.0	6405.0	3.52	3.12	2.89	6405.0	2.00	2.42	2.98	1130.0	2.40	2.13	1.99
6700.0	6730.0	3.08	2.71	2.41	6730.0	2.41	2.78	3.27	1250.0	2.52	2.18	2.00
7025.0	7055.0	2.26	1.97	1.75	7055.0	2.75	2.84	3.21	1350.0	2.58	2.22	2.01
7375.0	7405.0	1.45	1.25	1.11	7405.0	3.07	2.80	2.91	1470.0	2.62	2.23	2.00
7700.0	7730.0	1.47	1.36	1.34	7730.0	3.26	2.77	2.68	1570.0	2.66	2.24	2.00
8050.0	8080.0	1.49	1.49	1.54	8080.0	3.10	2.50	2.31	1690.0	2.65	2.22	1.97
8375.0	8405.0	2.07	2.13	2.23	8405.0	2.73	2.20	2.02	1790.0	2.65	2.20	1.95
8725.0	8755.0	3.27	3.25	3.29	8755.0	2.24	1.76	1.61	1910.0	2.60	2.16	1.91
9050.0	9080.0	3.72	3.61	3.54	9080.0	1.84	1.53	1.57	2010.0	2.58	2.12	1.88
9400.0	9430.0	3.45	3.37	3.31	9430.0	1.79	1.51	1.63	2130.0	2.54	2.09	1.85
9725.0	9755.0	5.00	4.88	4.79	9755.0	1.61	1.44	1.63	2230.0	2.56	2.11	1.88
10075.0	10105.0	4.55	4.42	4.32	10105.0	1.70	1.68	1.97	2350.0	2.61	2.17	1.96
10400.0	10430.0	4.11	4.01	3.95	10430.0	2.13	2.11	2.40	2450.0	2.73	2.32	2.11
10750.0	10780.0	6.58	6.37	6.19	10780.0	2.87	2.58	2.72	2570.0	2.95	2.57	2.36
11075.0	11105.0	7.53	6.91	6.56	11105.0	3.73	3.02	2.93	2670.0	3.02	2.65	2.44
11425.0	11455.0	5.02	4.56	4.36	11455.0	5.03	3.69	3.25	2790.0	2.85	2.52	2.35
11750.0	11780.0	5.00	4.53	4.33	11780.0	6.44	4.39	3.49	2890.0	2.68	2.39	2.25
12100.0	12130.0	7.02	6.01	5.65	12130.0	6.76	4.51	3.37	3010.0	2.55	2.28	2.16
12425.0	12455.0	5.30	4.59	4.25	12455.0	7.11	4.67	3.22	3110.0	2.48	2.25	2.15
12775.0	12805.0	4.74	4.19	3.89	12805.0	7.02	4.50	2.95	3230.0	2.45	2.25	2.18
13100.0	13130.0	4.69	4.02	3.70	13130.0	6.51	4.25	2.87	3330.0	2.44	2.28	2.22
13450.0	13480.0	3.56	3.11	2.87	13480.0	4.28	3.19	2.69	3450.0	2.48	2.34	2.29
13775.0	13805.0	2.77	2.48	2.25	13805.0	2.67	2.57	2.77	3550.0	2.50	2.39	2.36
14125.0	14155.0	2.17	1.97	1.81	14155.0	1.95	2.37	2.88	3670.0	2.56	2.49	2.48
14450.0	14480.0	1.27	1.39	1.52	14480.0	2.08	2.50	2.95	3770.0	2.59	2.56	2.57
14800.0	14830.0	2.27	2.40	2.54	14830.0	2.48	2.68	2.97	3890.0	2.72	2.73	2.77
15125.0	15155.0	2.83	2.79	2.83	15155.0	2.46	2.42	2.54	3990.0	2.80	2.86	2.93
15475.0	15505.0	2.29	2.22	2.20	15505.0	2.00	1.95	1.99	4110.0	2.89	3.03	3.14
15800.0	15830.0	3.27	2.95	2.74	15830.0	2.92	2.80	2.73	4210.0	3.05	3.25	3.40



## Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+11	33	14	---	---	---	---	---	---	---
1	-	17	+0	37	28	42	---	---	---	---	---	---
2	>90	57	44	52	45	57	54	---	---	---	---	---
3	>90	>70	68	>70	59	65	>70	>70	---	---	---	---
4	---	---	>70	>70	>70	>70	>70	>70	>70	---	---	---
5	---	---	---	>70	>70	>70	>70	>70	>70	>70	---	---
6	---	---	---	---	>70	>70	>70	>70	>70	>70	>70	---
7	---	---	---	---	---	>70	>70	>70	>70	>70	>70	>70
8	---	---	---	---	---	---	>70	>70	>70	>70	>70	>70
9	---	---	---	---	---	---	---	>70	>70	>70	>70	>70
10	---	---	---	---	---	---	---	---	>70	>70	>70	>70
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

Test conditions: RF IN: 7700 MHz; -14.00 dBm.  
 LO IN: 7730 MHz; +7.00 dBm  
 IF OUT: 30 MHz; -20.1 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+1	41	26	---	---	---	---	---	---	---
1	-	17	+0	41	28	46	---	---	---	---	---	---
2	79	46	34	43	38	51	48	---	---	---	---	---
3	74	54	48	58	39	50	62	61	---	---	---	---
4	---	---	77	73	59	59	55	62	66	---	---	---
5	---	---	---	79	75	>80	58	63	77	72	---	---
6	---	---	---	---	>80	>80	75	73	70	75	>80	---
7	---	---	---	---	---	>80	>80	>80	72	76	>80	>80
8	---	---	---	---	---	---	>80	>80	>80	>80	>80	>80
9	---	---	---	---	---	---	---	>80	>80	>80	>80	>80
10	---	---	---	---	---	---	---	---	>80	>80	>80	>80
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

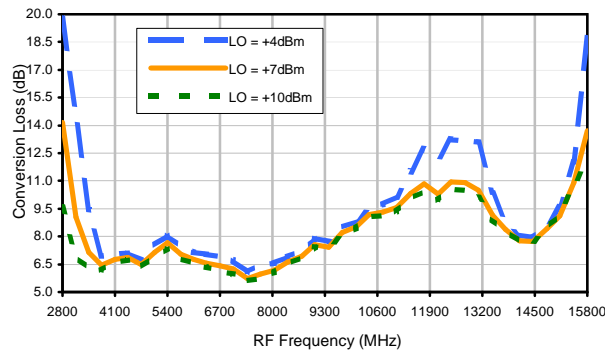
### LO HARMONICS ORDER

Test conditions: RF IN: 7700 MHz; -4.00 dBm.  
 LO IN: 7730 MHz; +7.00 dBm  
 IF OUT: 30 MHz; -10.07 dBm

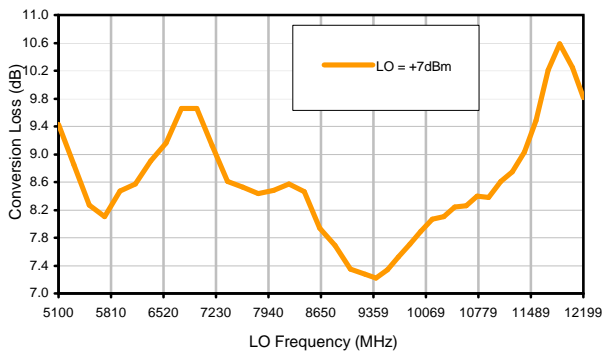
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.  
 2. + entry denotes harmonics are in (dBc) above IF OUTPUT.  
 3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

## Typical Performance Curves

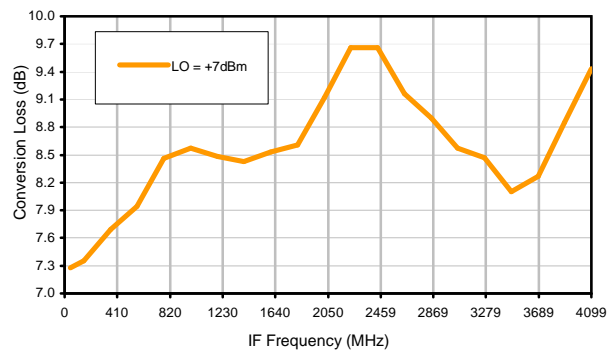
Conversion Loss @ IF=30MHz



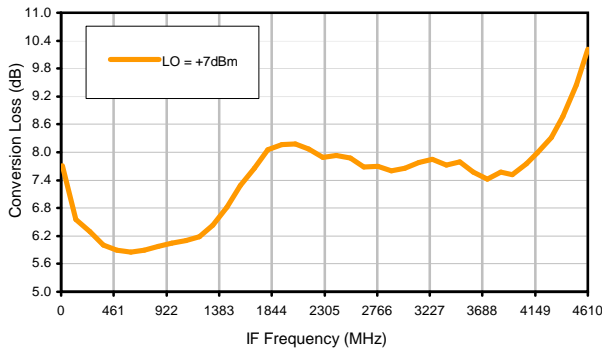
Conversion Loss vs. LO @ RF=9200MHz



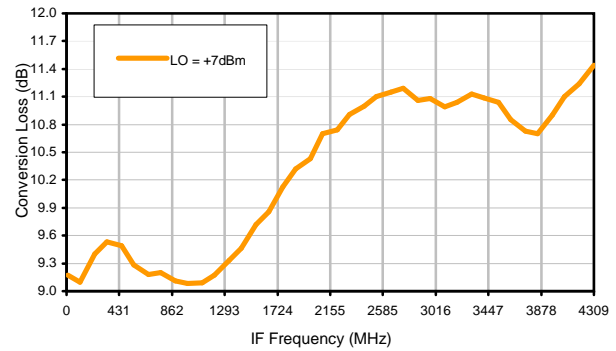
Conversion Loss vs. IF @ RF=9200MHz



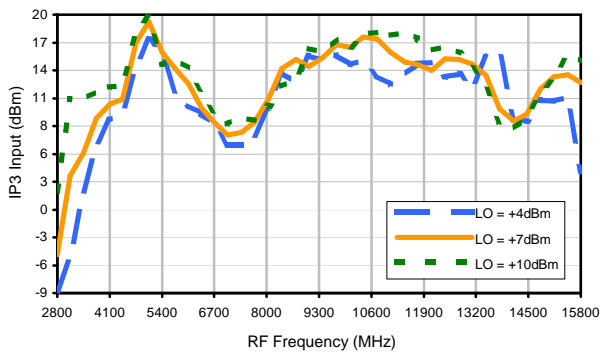
Conversion Loss vs. IF @ RF=3390MHz



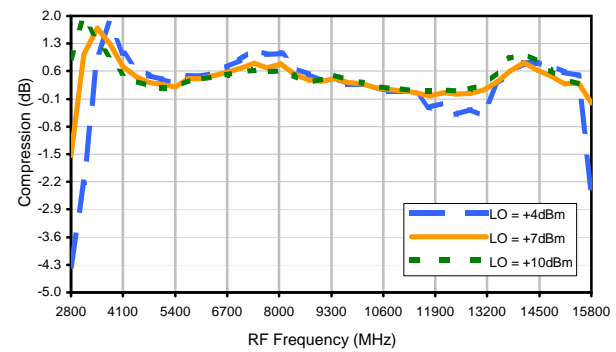
Conversion Loss vs. IF @ RF=15010MHz



IP3 Input



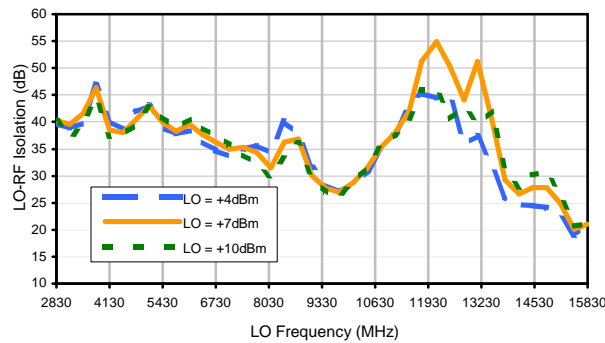
Compression @ RF IN=+1dBm



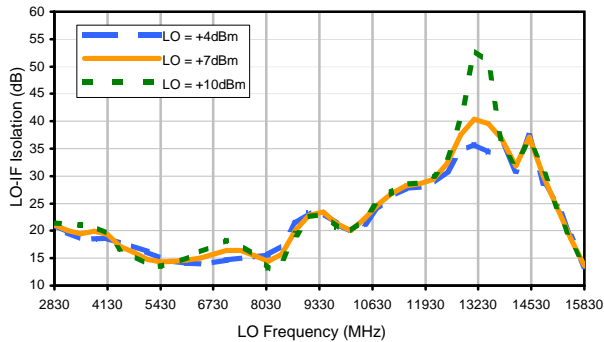


## Typical Performance Curves

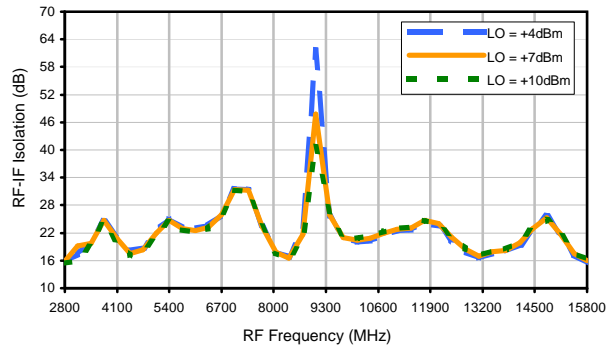
LO-RF Isolation



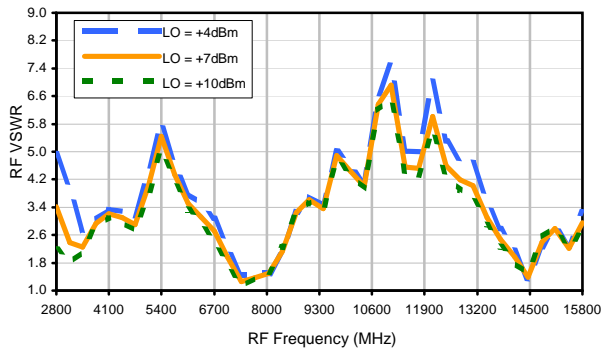
LO-IF Isolation



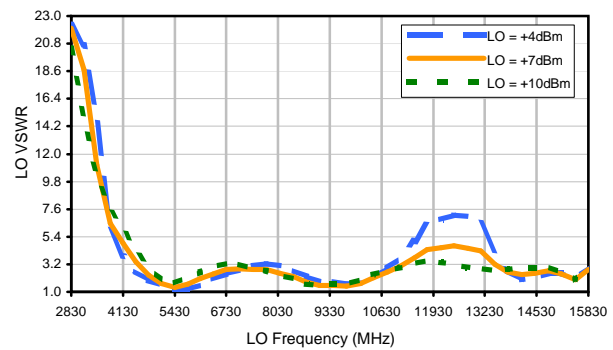
RF-IF Isolation



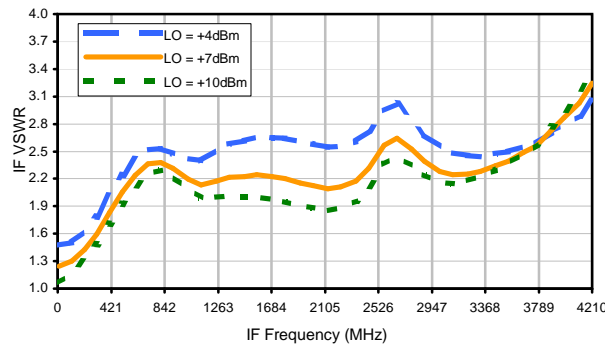
RF VSWR



LO VSWR



IF VSWR



## Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+11	33	14	---	---	---	---	---	---	---
1	-	17	+0	37	28	42	---	---	---	---	---	---
2	>90	57	44	52	45	57	54	---	---	---	---	---
3	>90	>70	68	>70	59	65	>70	>70	---	---	---	---
4	---	---	>70	>70	>70	>70	>70	>70	>70	---	---	---
5	---	---	---	>70	>70	>70	>70	>70	>70	>70	---	---
6	---	---	---	---	>70	>70	>70	>70	>70	>70	>70	---
7	---	---	---	---	---	>70	>70	>70	>70	>70	>70	>70
8	---	---	---	---	---	---	>70	>70	>70	>70	>70	>70
9	---	---	---	---	---	---	---	>70	>70	>70	>70	>70
10	---	---	---	---	---	---	---	---	>70	>70	>70	>70
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

Test conditions: RF IN: 7700 MHz; -14.00 dBm.  
 LO IN: 7730 MHz; +7.00 dBm  
 IF OUT: 30 MHz; -20.1 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+1	41	26	---	---	---	---	---	---	---
1	-	17	+0	41	28	46	---	---	---	---	---	---
2	79	46	34	43	38	51	48	---	---	---	---	---
3	74	54	48	58	39	50	62	61	---	---	---	---
4	---	---	77	73	59	59	55	62	66	---	---	---
5	---	---	---	79	75	>80	58	63	77	72	---	---
6	---	---	---	---	>80	>80	75	73	70	75	>80	---
7	---	---	---	---	---	>80	>80	>80	72	76	>80	>80
8	---	---	---	---	---	---	>80	>80	>80	>80	>80	>80
9	---	---	---	---	---	---	---	>80	>80	>80	>80	>80
10	---	---	---	---	---	---	---	---	>80	>80	>80	>80
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

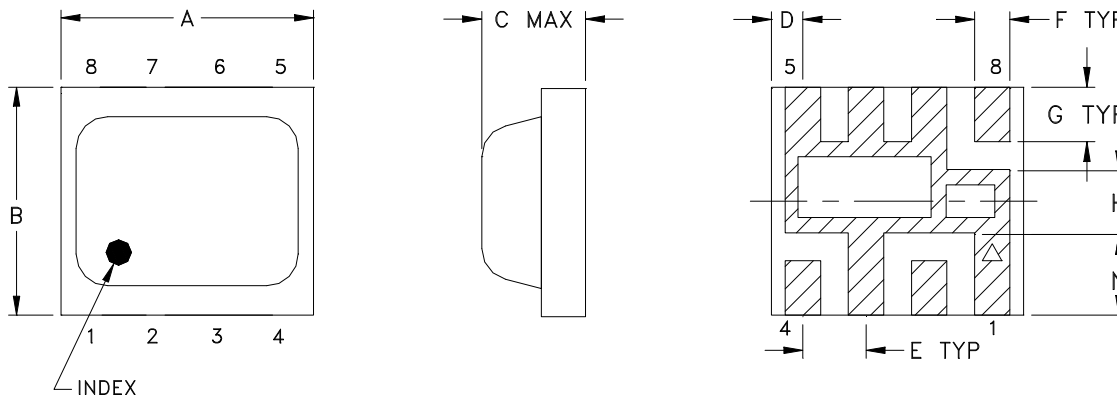
### LO HARMONICS ORDER

Test conditions: RF IN: 7700 MHz; -4.00 dBm.  
 LO IN: 7730 MHz; +7.00 dBm  
 IF OUT: 30 MHz; -10.07 dBm

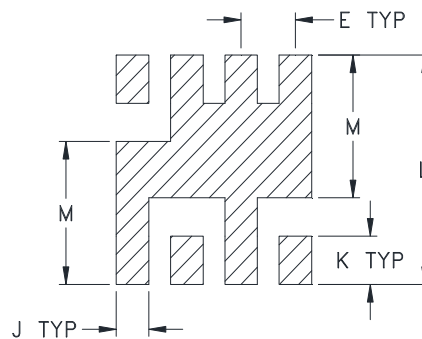
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.  
 2. + entry denotes harmonics are in (dBc) above IF OUTPUT.  
 3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

## Outline Dimensions

HV1195



## PCB Metal Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm 0.002$

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.



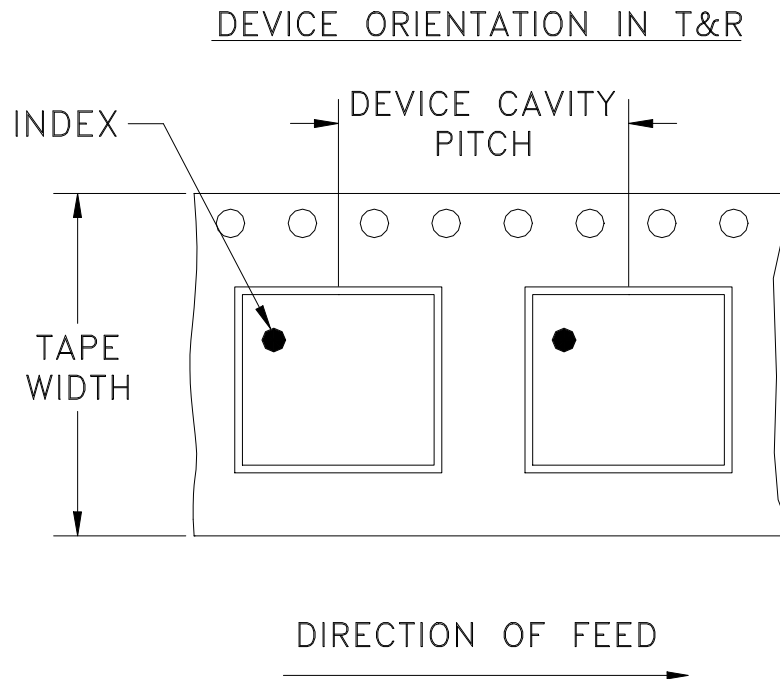
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://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](http://www.minicircuits.com/pages/pdfs/tape.pdf)



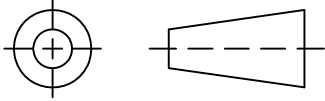
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THIRD ANGLE PROJECTION

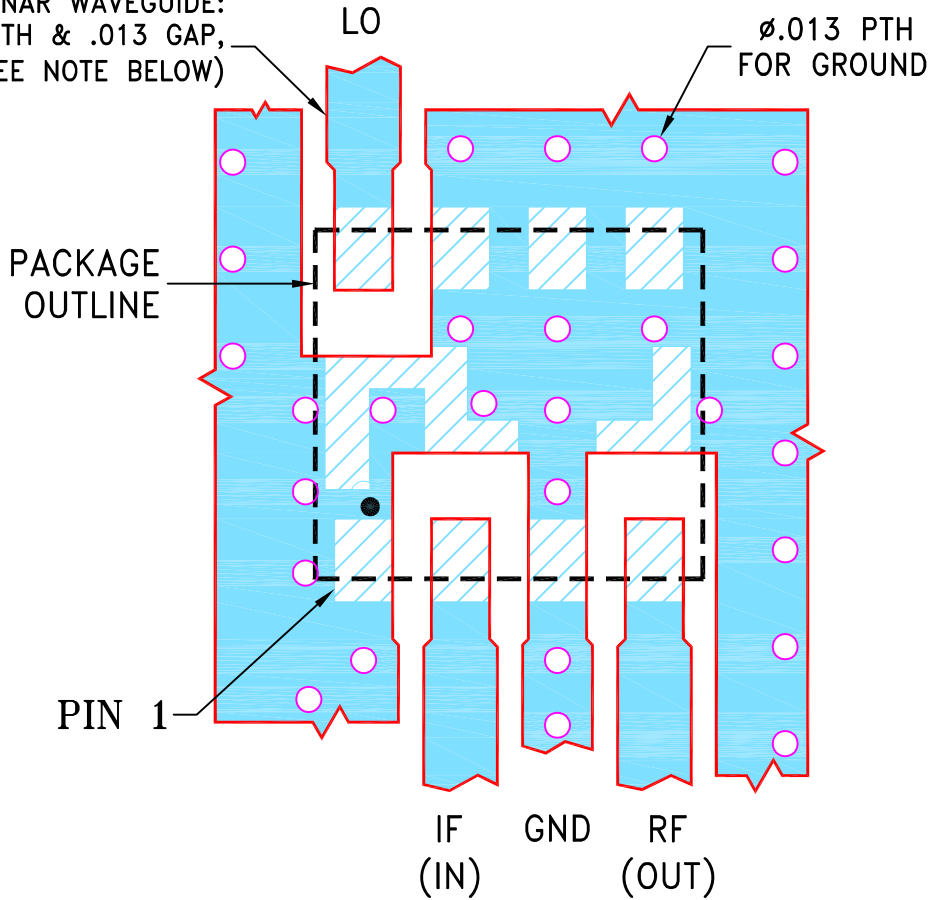


REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M161975	NEW RELEASE	05/30/17	CA	WL
A	ECO-000060	MODIFIED CASE STYLE	10/16/19	ITG	RB

SUGGESTED MOUNTING CONFIGURATION FOR HV1195 CASE STYLE, "08MX05" PIN CONNECTION

COPLANAR WAVEGUIDE:  
.038 LINE WIDTH & .013 GAP,  
3 PL. (SEE NOTE BELOW)



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 CA	05/30/17
TOLERANCES ON:	CHECKED GF	05/30/17
2 PL DECIMALS ±	APPROVED WL	05/30/17
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		

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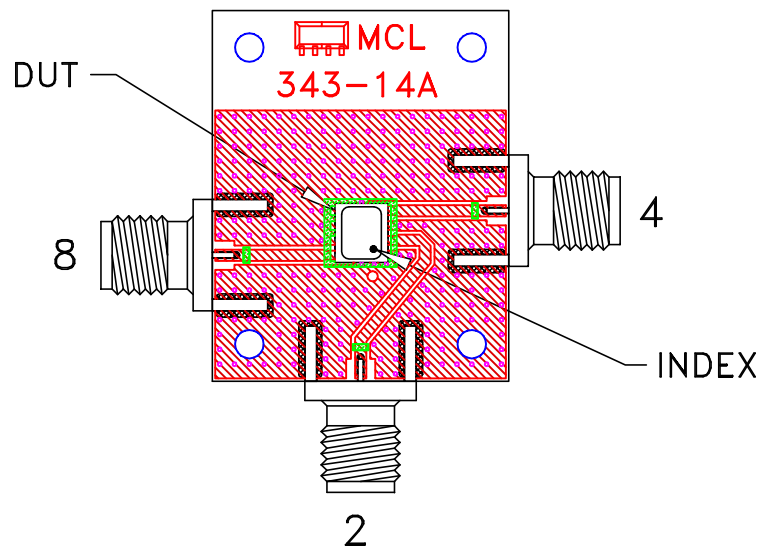
PL, 08MX05, HV1195, TB-458+

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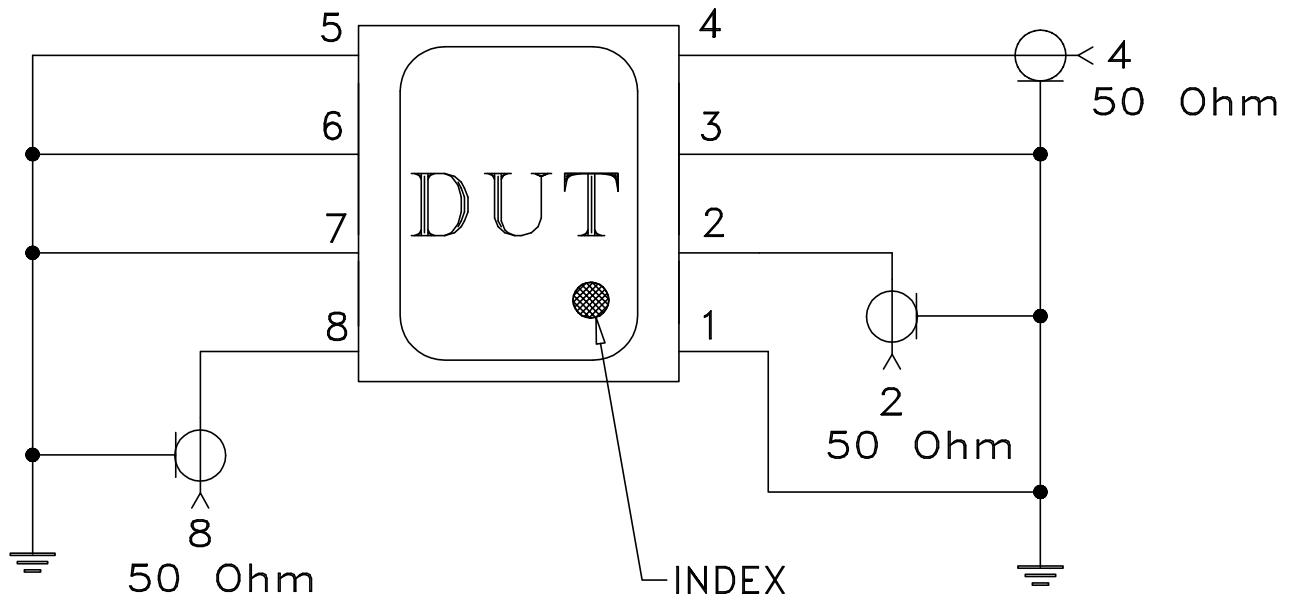
SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-517	REV: A
FILE: 98PL517	SCALE: 10:1	SHEET: 1 OF 1	

# Evaluation Board and Circuit

For Pin Connections refer to Data Sheet of the DUT




TB-458+



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