

Frequency Mixer WIDE BAND

Level 13 (LO Power +13 dBm) 3200 to 15000 MHz

SIM-153MH+



Generic photo used for illustration purposes only

CASE STYLE: HV1195

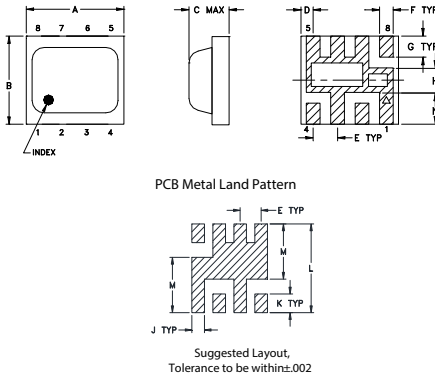
Maximum Ratings

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

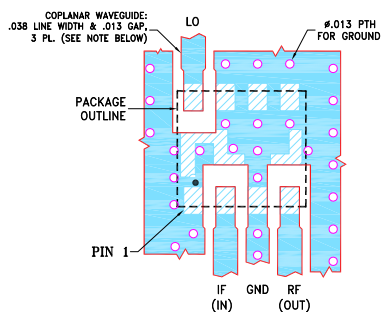
Outline Drawing



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.
- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).

 DENOTES PCB LAND PATTERN FREE OF SOLDER MASK.

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

Features

- wide bandwidth, 3200 to 15000 MHz
- low conversion loss, 6.5 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 under U.S. 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

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.
3200-15000	DC-4000							
3200-4500	6.4	0.2	8.9	38	31	19	15	17
4500-5100	6.5	0.2	8.0	38	32	15	11	22
5100-14000	7.5	0.4	11.5	35	22	15	9	17
14000-15000	7.8	0.3	9.6	30	18	28	17	14

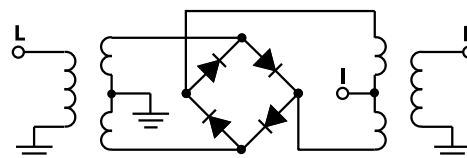
1 dB Compression: +7 dBm typ.

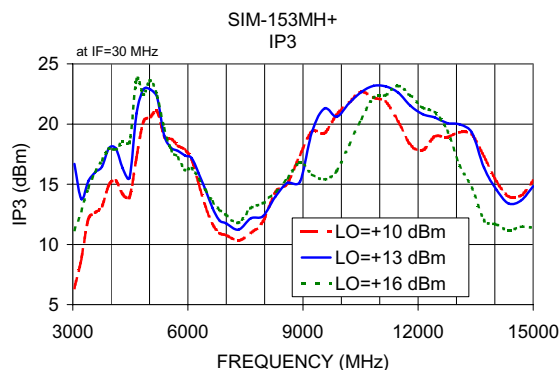
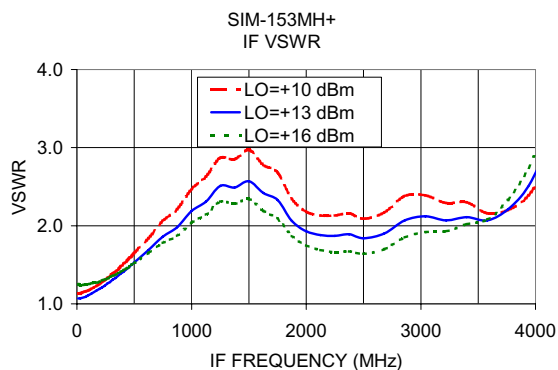
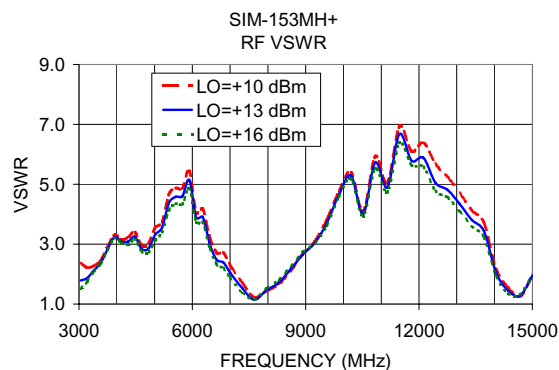
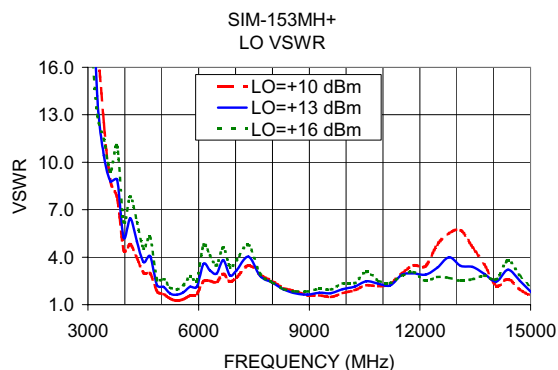
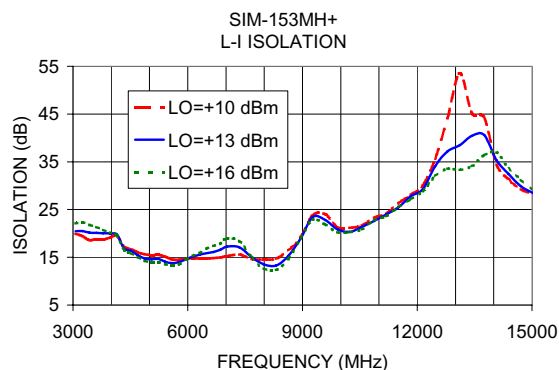
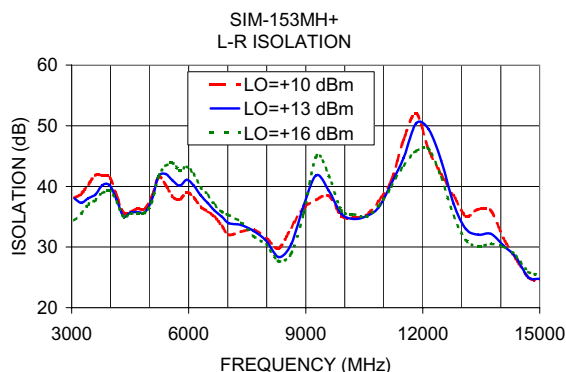
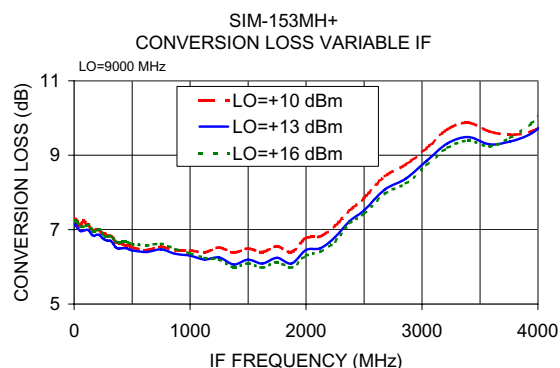
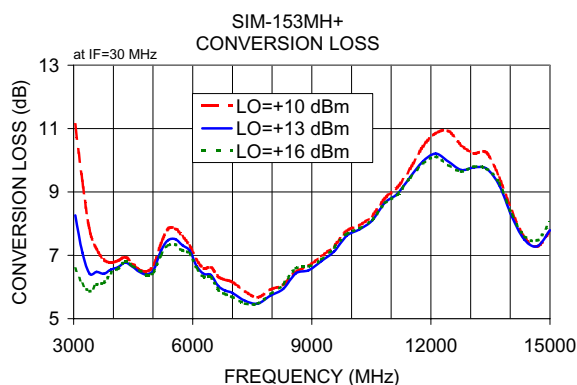
* Conversion loss at 30 MHz IF. σ is a measure of repeatability from unit to unit.

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 +13dBm	LO +13dBm	LO +13dBm	LO +13dBm	LO +13dBm
3040.10	3070.00	8.26	38.01	20.45	1.79	25.34
3220.10	3250.00	7.09	37.30	20.51	1.87	14.19
3580.10	3610.00	6.48	38.65	20.11	2.39	8.79
4120.10	4150.00	6.63	37.90	19.72	3.08	6.45
4660.10	4690.00	6.48	35.77	15.49	2.84	4.04
5200.10	5230.00	7.15	41.71	14.68	3.55	1.70
5740.10	5770.00	7.32	40.10	14.00	4.60	2.13
6280.10	6310.00	6.41	38.52	15.57	3.91	3.17
7000.10	7030.00	5.81	33.94	17.23	2.05	3.17
7960.10	7990.00	5.73	31.00	13.54	1.46	2.40
8920.10	8950.00	6.53	36.88	18.96	2.65	1.64
9880.10	9910.00	7.62	35.50	20.89	4.65	1.98
10840.10	10870.00	8.66	36.53	22.63	5.72	2.33
11480.10	11510.00	9.47	44.69	25.50	6.68	2.89
12120.10	12150.00	10.21	49.42	29.27	5.88	2.90
12760.10	12790.00	9.69	37.13	37.19	4.81	3.99
13400.10	13430.00	9.74	32.02	40.42	3.81	3.38
14040.10	14070.00	8.22	30.24	35.32	2.06	2.47
14680.10	14710.00	7.29	25.00	29.88	1.28	2.50
15000.10	15030.00	7.79	24.75	28.45	1.94	1.76

Electrical Schematic





Notes

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Frequency Mixer

SIM-153MH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)		
		@LO (dBm)		
		+10	+13	+16
2500.1	2530.1	22.84	17.96	12.20
2815.1	2845.1	15.31	10.24	7.40
3130.1	3160.1	11.29	7.47	6.18
3445.1	3475.1	8.05	6.62	6.06
3760.1	3790.1	6.64	6.24	6.05
4075.1	4105.1	6.72	6.55	6.51
4390.1	4420.1	6.95	6.82	6.82
4705.1	4735.1	6.66	6.56	6.54
5020.1	5050.1	7.30	7.07	6.95
5335.1	5365.1	7.72	7.42	7.26
5650.1	5680.1	7.78	7.55	7.41
5965.1	5995.1	7.48	7.29	7.21
6280.1	6310.1	6.89	6.65	6.58
6595.1	6625.1	6.45	6.09	5.99
6910.1	6940.1	6.03	5.69	5.58
7225.1	7255.1	5.93	5.64	5.55
7540.1	7570.1	5.99	5.84	5.94
7855.1	7885.1	6.33	6.18	6.31
8170.1	8200.1	6.26	6.13	6.27
8485.1	8515.1	6.41	6.34	6.51
8800.1	8830.1	6.68	6.56	6.66
9146.6	9176.6	7.67	7.67	7.89
9461.6	9491.6	8.16	8.12	8.30
9808.1	9838.1	8.75	8.67	8.74
10123.1	10153.1	8.55	8.42	8.41
10469.6	10499.6	8.73	8.62	8.65
10784.6	10814.6	8.91	8.77	8.79
11131.1	11161.1	9.51	9.29	9.27
11446.1	11476.1	9.96	9.75	9.75
11792.6	11822.6	9.67	9.36	9.36
12107.6	12137.6	9.78	9.11	9.07
12454.1	12484.1	10.22	9.64	9.75
12769.1	12799.1	10.65	9.99	10.11
13115.6	13145.6	10.51	10.03	10.17
13430.6	13460.6	9.31	9.11	9.30
13777.1	13807.1	8.04	7.98	8.19
14092.1	14122.1	7.46	7.47	7.73
14438.6	14468.6	7.78	7.83	8.06
14753.6	14783.6	8.21	8.27	8.64
15100.1	15130.1	8.80	8.87	9.11

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+10	+13	+16
2500.1	2530.1	-0.44	1.00	5.41
2815.1	2845.1	-1.75	3.42	9.43
3130.1	3160.1	1.90	20.82	13.54
3445.1	3475.1	7.02	12.40	15.57
3760.1	3790.1	11.11	14.85	17.57
4075.1	4105.1	12.37	15.27	17.89
4390.1	4420.1	12.00	13.27	15.97
4705.1	4735.1	20.55	22.92	23.19
5020.1	5050.1	20.37	21.09	21.71
5335.1	5365.1	19.24	17.46	17.23
5650.1	5680.1	20.00	19.97	18.34
5965.1	5995.1	17.10	19.11	18.55
6280.1	6310.1	13.04	15.32	16.14
6595.1	6625.1	11.21	12.17	13.62
6910.1	6940.1	9.65	10.63	12.18
7225.1	7255.1	9.50	10.83	12.11
7540.1	7570.1	11.00	11.99	13.06
7855.1	7885.1	12.46	12.69	13.74
8170.1	8200.1	14.35	14.03	14.18
8485.1	8515.1	14.95	14.29	15.68
8800.1	8830.1	19.00	16.82	15.52
9146.6	9176.6	17.11	20.25	14.82
9461.6	9491.6	18.19	19.94	14.95
9808.1	9838.1	19.77	21.21	18.27
10123.1	10153.1	20.44	21.04	20.50
10469.6	10499.6	21.91	22.15	21.27
10784.6	10814.6	20.34	22.27	21.73
11131.1	11161.1	19.51	22.42	22.19
11446.1	11476.1	18.74	22.08	22.16
11792.6	11822.6	17.05	20.60	20.62
12107.6	12137.6	16.63	18.83	19.65
12454.1	12484.1	18.24	19.55	18.28
12769.1	12799.1	20.40	19.71	15.94
13115.6	13145.6	20.75	19.97	13.53
13430.6	13460.6	18.97	18.09	12.39
13777.1	13807.1	15.79	14.96	11.73
14092.1	14122.1	14.39	14.20	11.16
14438.6	14468.6	15.47	15.72	13.31
14753.6	14783.6	16.74	17.28	12.83
15100.1	15130.1	16.65	17.56	14.11

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+7dBm (dB)		
		@LO (dBm)		
		+10	+13	+16
2500.1	2530.1	-3.10	-1.21	1.90
2815.1	2845.1	0.07	2.41	3.61
3130.1	3160.1	1.16	3.29	3.30
3445.1	3475.1	3.04	3.02	2.63
3760.1	3790.1	2.57	2.08	1.74
4075.1	4105.1	1.84	1.43	1.16
4390.1	4420.1	1.39	1.03	0.77
4705.1	4735.1	1.11	0.86	0.68
5020.1	5050.1	1.41	1.16	0.93
5335.1	5365.1	1.24	1.08	0.93
5650.1	5680.1	1.05	0.91	0.81
5965.1	5995.1	1.04	0.98	0.92
6280.1	6310.1	1.45	1.35	1.28
6595.1	6625.1	1.82	1.67	1.55
6910.1	6940.1	2.15	1.92	1.74
7225.1	7255.1	2.24	1.95	1.70
7540.1	7570.1	2.07	1.64	1.41
7855.1	7885.1	1.87	1.47	1.24
8170.1	8200.1	1.79	1.48	1.33
8485.1	8515.1	1.42	1.27	1.34
8800.1	8830.1	1.44	1.41	1.62
9146.6	9176.6	1.00	1.14	1.48
9461.6	9491.6	0.89	0.91	1.05
9808.1	9838.1	0.67	0.69	0.78
10123.1	10153.1	0.68	0.70	0.81
10469.6	10499.6	0.48	0.58	0.74
10784.6	10814.6	0.39	0.48	0.62
11131.1	11161.1	0.26	0.38	0.51
11446.1	11476.1	0.18	0.31	0.49
11792.6	11822.6	0.16	0.35	0.67
12107.6	12137.6	0.23	0.41	0.77
12454.1	12484.1	0.15	0.40	0.97
12769.1	12799.1	0.16	0.41	1.09
13115.6	13145.6	0.30	0.55	1.24
13430.6	13460.6	0.72	1.03	1.66
13777.1	13807.1	1.38	1.66	2.03
14092.1	14122.1	1.40	1.68	2.09
14438.6	14468.6	1.08	1.39	1.75
14753.6	14783.6	0.54	0.94	1.43
15100.1	15130.1	0.50	0.83	1.16

REV. X3

SIM-153MH+

101028

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Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=9100MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=3190MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=15010.09MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+13			+13			+13
4599.9	4500.1	11.54	10.1	3200.1	7.82	3510.0	11500.1	10.06
4369.3	4730.7	10.20	130.1	3320.1	6.32	3430.0	11580.1	10.16
4138.6	4961.4	9.37	250.1	3440.1	6.26	3350.0	11660.1	10.16
3908.0	5192.0	9.12	370.1	3560.1	6.09	3250.0	11760.1	10.28
3677.3	5422.7	8.21	490.1	3680.1	5.87	3170.0	11840.1	10.24
3446.7	5653.3	7.89	610.1	3800.1	5.85	3070.0	11940.1	10.31
3216.0	5884.0	8.50	730.1	3920.1	5.70	2990.0	12020.1	10.19
2985.4	6114.6	8.62	850.1	4040.1	5.78	2890.0	12120.1	10.33
2754.7	6345.3	8.73	970.1	4160.1	5.77	2810.0	12200.1	10.19
2524.1	6575.9	9.21	1090.1	4280.1	5.79	2710.0	12300.1	10.09
2293.4	6806.6	9.28	1210.1	4400.1	5.78	2630.0	12380.1	10.08
2062.8	7037.2	8.96	1330.1	4520.1	5.87	2530.0	12480.1	10.02
1832.1	7267.9	8.26	1450.1	4640.1	6.26	2450.0	12560.1	9.90
1601.5	7498.5	8.06	1570.1	4760.1	6.69	2350.0	12660.1	9.60
1370.8	7729.2	8.01	1690.1	4880.1	7.07	2270.0	12740.1	9.80
1140.2	7959.8	8.30	1810.1	5000.1	7.44	2170.0	12840.1	9.62
909.5	8190.5	8.29	1930.1	5120.1	7.73	2090.0	12920.1	9.45
678.9	8421.1	7.86	2050.1	5240.1	8.09	1990.0	13020.1	9.28
448.2	8651.8	7.48	2170.1	5360.1	7.96	1910.0	13100.1	9.11
217.6	8882.4	7.20	2290.1	5480.1	7.56	1810.0	13200.1	8.98
10.0	9110.0	7.92	2410.1	5600.1	7.56	1730.0	13280.1	8.93
240.5	9340.5	7.40	2530.1	5720.1	7.59	1630.0	13380.1	8.79
450.0	9550.0	7.44	2650.1	5840.1	7.49	1550.0	13460.1	8.80
680.4	9780.4	7.57	2750.1	5940.1	7.37	1450.0	13560.1	8.83
889.9	9989.9	7.77	2870.1	6060.1	7.26	1370.0	13640.1	8.62
1120.4	10220.4	8.01	2970.1	6160.1	7.25	1270.0	13740.1	8.57
1329.9	10429.9	7.96	3090.1	6280.1	7.18	1190.0	13820.1	8.44
1560.3	10660.3	8.29	3190.1	6380.1	7.09	1090.0	13920.1	8.39
1769.8	10869.8	8.43	3310.1	6500.1	7.28	1010.0	14000.1	8.40
2000.3	11100.3	8.41	3410.1	6600.1	7.32	910.0	14100.1	8.42
2209.8	11309.8	8.64	3530.1	6720.1	7.43	830.0	14180.1	8.53
2440.3	11540.3	9.61	3630.1	6820.1	7.36	730.0	14280.1	8.63
2649.8	11749.8	9.97	3750.1	6940.1	7.38	650.0	14360.1	8.86
2880.2	11980.2	9.54	3850.1	7040.1	7.36	550.0	14460.1	9.04
3089.7	12189.7	9.54	3970.1	7160.1	7.44	470.0	14540.1	9.04
3320.2	12420.2	9.46	4070.1	7260.1	7.82	370.0	14640.1	8.92
3529.7	12629.7	9.50	4190.1	7380.1	8.15	290.0	14720.1	8.77
3760.1	12860.1	9.52	4290.1	7480.1	8.66	190.0	14820.1	8.57
3969.6	13069.6	9.54	4410.1	7600.1	9.24	110.0	14900.1	8.60
4200.1	13300.1	10.66	4510.1	7700.1	9.96	10.0	15000.1	9.13

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+10	+13	+16	+10	+13	+16
2530.1	44.24	44.24	45.72	22.55	22.53	22.67
2845.1	39.72	41.39	37.55	21.10	21.16	22.04
3160.1	38.96	38.92	35.91	19.81	20.38	21.98
3475.1	42.06	40.84	38.28	18.29	19.60	20.90
3790.1	43.53	40.99	39.44	18.40	19.51	20.03
4105.1	36.62	35.97	35.33	18.43	18.58	18.34
4420.1	35.63	35.74	35.72	16.18	15.72	15.33
4735.1	36.57	36.09	35.61	15.55	14.64	14.00
5050.1	38.96	39.44	39.43	14.74	13.67	12.96
5365.1	36.98	39.10	41.07	15.02	14.28	13.77
5680.1	36.46	38.50	40.67	14.95	14.75	14.54
5995.1	36.99	39.39	42.04	14.70	15.14	15.37
6310.1	36.20	39.48	43.45	14.88	15.92	16.71
6625.1	35.77	39.34	43.02	15.36	16.78	18.08
6940.1	35.77	39.12	40.34	15.46	17.26	18.96
7255.1	34.78	34.61	33.59	15.63	17.42	18.91
7570.1	31.93	31.32	30.62	15.81	16.05	15.76
7885.1	29.79	30.21	30.46	14.87	13.70	12.60
8200.1	30.08	29.17	28.67	15.56	13.93	12.88
8515.1	35.74	34.04	32.52	19.20	17.97	17.26
8830.1	34.95	37.33	37.49	24.00	22.79	21.92
9176.6	32.07	32.52	32.92	24.01	22.81	21.38
9491.6	29.89	29.95	30.20	19.78	19.59	19.00
9838.1	31.10	31.60	32.16	19.10	19.44	19.29
10153.1	31.09	31.63	32.25	20.66	21.29	21.32
10499.6	33.18	33.44	33.73	22.22	22.83	22.93
10814.6	36.06	36.02	36.09	25.47	26.17	26.32
11161.1	39.15	38.63	38.21	28.78	29.55	29.83
11476.1	42.37	41.27	40.37	30.24	30.78	30.80
11822.6	42.17	42.44	40.22	29.90	30.35	30.00
12137.6	39.26	39.92	37.20	31.26	32.37	31.64
12484.1	38.04	37.62	33.62	34.90	34.55	31.93
12799.1	39.26	43.00	35.25	36.89	33.82	30.64
13145.6	33.76	34.33	32.24	33.78	30.46	28.42
13460.6	27.49	27.33	26.89	28.75	26.93	25.78
13807.1	24.02	24.45	24.66	25.74	25.14	24.75
14122.1	22.23	22.97	23.49	25.95	25.86	25.72
14468.6	21.89	22.64	23.11	28.27	28.97	29.30
14783.6	21.10	22.04	22.66	28.46	30.01	31.06
15130.1	20.71	21.99	22.63	23.62	24.94	25.71

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+10	+13	+16
2500.1	2530.1	15.70	15.48	14.53
2815.1	2845.1	15.58	15.88	12.30
3130.1	3160.1	18.54	17.66	15.34
3445.1	3475.1	19.54	19.30	19.78
3760.1	3790.1	24.17	24.47	24.19
4075.1	4105.1	21.93	21.08	20.10
4390.1	4420.1	18.89	18.53	18.23
4705.1	4735.1	19.12	18.80	18.50
5020.1	5050.1	24.19	23.71	23.26
5335.1	5365.1	28.54	27.78	26.99
5650.1	5680.1	26.68	26.30	25.86
5965.1	5995.1	25.37	24.87	24.50
6280.1	6310.1	25.89	25.33	24.96
6595.1	6625.1	28.38	27.94	27.53
6910.1	6940.1	34.52	34.39	34.16
7225.1	7255.1	35.26	35.29	35.32
7540.1	7570.1	24.28	23.86	23.55
7855.1	7885.1	20.96	20.72	20.51
8170.1	8200.1	18.37	18.23	18.25
8485.1	8515.1	20.16	19.59	19.52
8800.1	8830.1	47.75	38.05	31.93
9146.6	9176.6	26.60	26.82	25.80
9461.6	9491.6	21.25	21.52	21.89
9808.1	9838.1	19.02	19.26	19.58
10123.1	10153.1	18.89	19.20	19.57
10469.6	10499.6	19.15	19.42	19.76
10784.6	10814.6	21.49	21.77	22.03
11131.1	11161.1	24.67	25.01	25.32
11446.1	11476.1	24.52	24.69	24.82
11792.6	11822.6	21.67	21.72	21.75
12107.6	12137.6	19.47	19.48	19.42
12454.1	12484.1	16.82	16.95	16.94
12769.1	12799.1	16.75	16.94	17.07
13115.6	13145.6	17.42	17.60	17.74
13430.6	13460.6	17.33	17.47	17.61
13777.1	13807.1	16.06	16.21	16.46
14092.1	14122.1	16.15	16.39	16.75
14438.6	14468.6	19.56	19.70	19.84
14753.6	14783.6	22.40	22.17	22.10
15100.1	15130.1	25.75	25.34	25.14

Frequency Mixer

SIM-153MH+

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)			
		+10	+13	+16		+10	+13	+16	+10		+13	+16		
2500.1	2530.1	5.13	3.97	2.60	2530.1	31.03	29.96	27.59	10.0	1.14	1.05	1.18		
2815.1	2845.1	3.16	2.09	1.38	2845.1	25.56	24.83	19.98	110.2	1.23	1.12	1.21		
3130.1	3160.1	2.65	1.83	1.65	3160.1	21.46	17.57	14.03	210.5	1.35	1.25	1.29		
3445.1	3475.1	2.45	2.25	2.22	3475.1	13.29	10.19	10.31	310.7	1.52	1.40	1.39		
3760.1	3790.1	2.89	2.80	2.78	3790.1	6.05	6.76	7.70	411.0	1.70	1.56	1.53		
4075.1	4105.1	3.07	2.97	2.91	4105.1	4.22	5.22	6.17	511.2	1.90	1.75	1.69		
4390.1	4420.1	3.11	2.97	2.88	4420.1	3.11	3.95	4.79	611.4	2.12	1.95	1.87		
4705.1	4735.1	3.05	2.86	2.70	4735.1	2.17	2.73	3.31	711.7	2.32	2.13	2.04		
5020.1	5050.1	4.25	3.95	3.72	5050.1	1.45	1.81	2.20	811.9	2.46	2.27	2.17		
5335.1	5365.1	5.31	4.95	4.64	5365.1	1.38	1.82	2.27	912.2	2.54	2.35	2.24		
5650.1	5680.1	4.96	4.70	4.45	5680.1	1.86	2.47	3.10	1012.4	2.53	2.33	2.23		
5965.1	5995.1	4.23	4.00	3.78	5995.1	2.25	2.93	3.66	1112.6	2.52	2.29	2.17		
6280.1	6310.1	3.65	3.35	3.16	6310.1	2.66	3.33	4.07	1232.9	2.43	2.18	2.06		
6595.1	6625.1	3.02	2.64	2.41	6625.1	3.06	3.67	4.34	1333.2	2.36	2.09	1.97		
6910.1	6940.1	2.30	1.99	1.78	6940.1	3.14	3.66	4.24	1453.4	2.31	2.01	1.86		
7225.1	7255.1	1.57	1.38	1.25	7255.1	3.24	3.62	4.15	1553.7	2.31	1.99	1.82		
7540.1	7570.1	1.09	1.07	1.18	7570.1	3.47	3.54	3.81	1674.0	2.26	1.93	1.74		
7855.1	7885.1	1.17	1.27	1.40	7885.1	3.17	2.97	3.00	1774.2	2.24	1.90	1.71		
8170.1	8200.1	1.63	1.73	1.87	8200.1	2.49	2.23	2.23	1894.5	2.22	1.89	1.69		
8485.1	8515.1	2.18	2.29	2.41	8515.1	1.93	1.73	1.77	1994.7	2.21	1.89	1.69		
8800.1	8830.1	2.66	2.71	2.79	8830.1	1.54	1.49	1.64	2115.0	2.22	1.90	1.71		
9146.6	9176.6	3.52	3.54	3.71	9176.6	1.24	1.48	1.78	2215.3	2.24	1.94	1.75		
9461.6	9491.6	3.80	3.75	3.75	9491.6	1.36	1.72	2.10	2335.6	2.32	2.02	1.85		
9808.1	9838.1	4.60	4.54	4.39	9838.1	1.80	2.24	2.69	2435.8	2.46	2.18	2.01		
10123.1	10153.1	5.06	4.95	4.86	10153.1	2.22	2.58	3.06	2556.1	2.71	2.42	2.25		
10469.6	10499.6	5.09	4.93	4.80	10499.6	2.64	2.93	3.40	2656.3	2.88	2.58	2.39		
10784.6	10814.6	4.98	4.83	4.57	10814.6	2.89	2.92	3.26	2776.6	2.87	2.59	2.41		
11131.1	11161.1	5.03	4.82	4.69	11161.1	3.36	3.09	3.27	2876.8	2.75	2.51	2.36		
11446.1	11476.1	5.83	5.46	5.39	11476.1	3.95	3.45	3.52	2997.1	2.61	2.41	2.30		
11792.6	11822.6	5.93	5.52	5.16	11822.6	4.52	3.51	3.27	3097.4	2.56	2.39	2.31		
12107.6	12137.6	5.89	5.33	4.91	12137.6	5.56	3.70	3.06	3217.7	2.53	2.40	2.37		
12454.1	12484.1	5.95	5.22	4.84	12484.1	4.46	2.99	2.30	3317.9	2.56	2.46	2.45		
12769.1	12799.1	5.20	4.56	4.12	12799.1	3.43	2.34	1.76	3438.2	2.64	2.58	2.60		
13115.6	13145.6	3.79	3.48	3.10	13145.6	2.95	2.20	1.96	3538.4	2.71	2.67	2.71		
13430.6	13460.6	3.30	3.03	2.73	13460.6	2.51	2.42	2.58	3658.7	2.82	2.82	2.89		
13777.1	13807.1	2.38	2.18	2.00	13807.1	2.49	2.95	3.37	3758.9	2.92	2.94	3.04		
14092.1	14122.1	1.36	1.28	1.19	14122.1	2.71	3.30	3.82	3879.2	3.07	3.15	3.29		
14438.6	14468.6	1.31	1.39	1.47	14468.6	2.98	3.43	3.79	3979.5	3.22	3.35	3.52		
14753.6	14783.6	1.97	2.09	2.15	14783.6	2.92	3.14	3.40	4099.8	3.40	3.58	3.78		
15100.1	15130.1	2.87	2.90	3.00	15130.1	2.12	2.19	2.26	4200.0	3.65	3.89	4.13		

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+14	17	10	---	---	---	---	---	---	---
1	-	16	+0	36	27	44	---	---	---	---	---	---
2	83	55	43	52	42	56	52	---	---	---	---	---
3	89	>70	67	>70	63	68	>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; -8.00 dBm.
LO IN: 7730 MHz; +13.00 dBm
IF OUT: 30 MHz; -19.75 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+4	26	21	---	---	---	---	---	---	---
1	-	16	+0	38	26	48	---	---	---	---	---	---
2	64	46	35	42	35	49	46	---	---	---	---	---
3	61	63	50	58	43	53	61	68	---	---	---	---
4	---	---	73	69	59	78	55	66	65	---	---	---
5	---	---	---	>80	78	>80	67	68	72	>80	---	---
6	---	---	---	---	>80	>80	77	>80	73	>80	79	---
7	---	---	---	---	---	>80	>80	>80	>80	79	>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

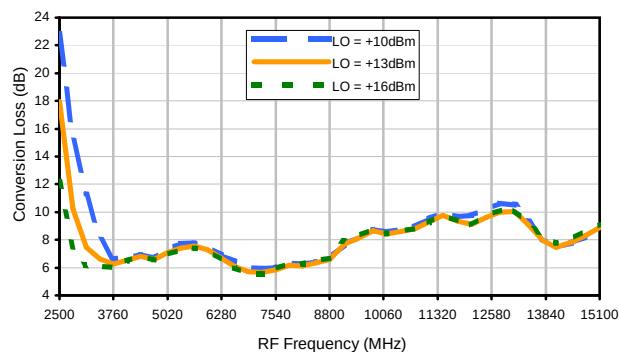
Test conditions:

RF IN: 7700 MHz; 2.00 dBm.
LO IN: 7730 MHz; +13.00 dBm
IF OUT: 30 MHz; -10.15 dBm

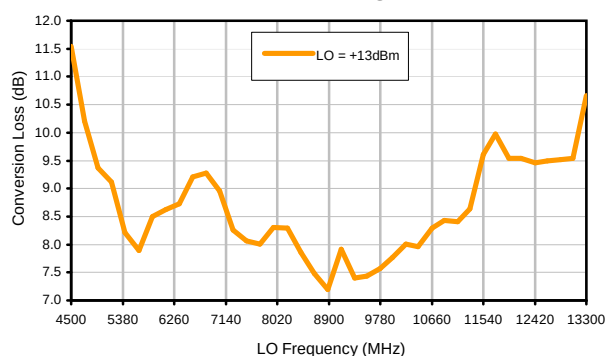
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

Typical Performance Curves

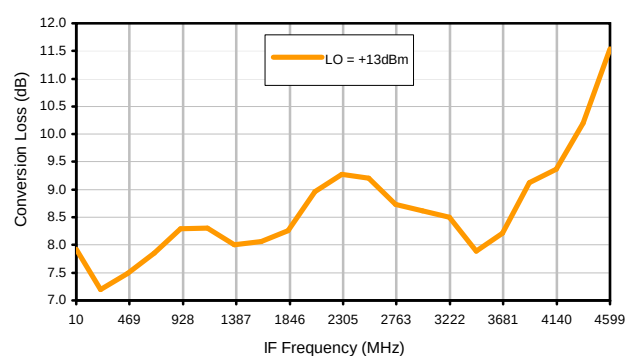
Conversion Loss @ IF=30MHz



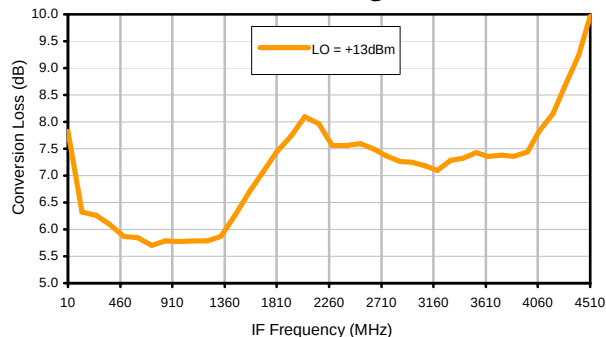
Conversion Loss vs. LO @ RF=9100MHz



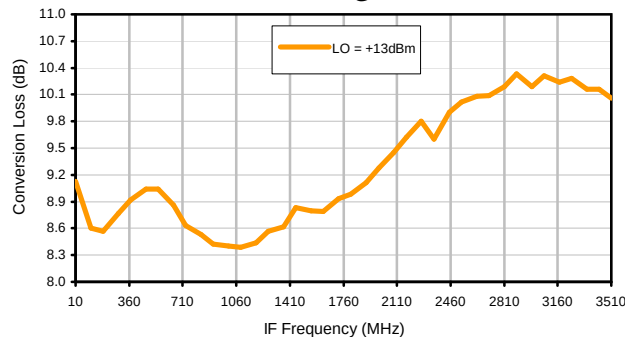
Conversion Loss vs. IF @ RF=9100MHz



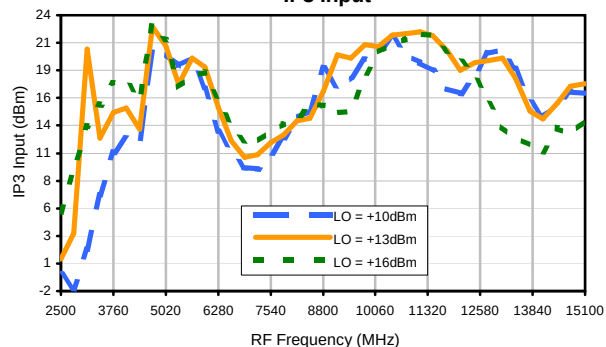
Conversion Loss vs. IF @ RF=3190MHz



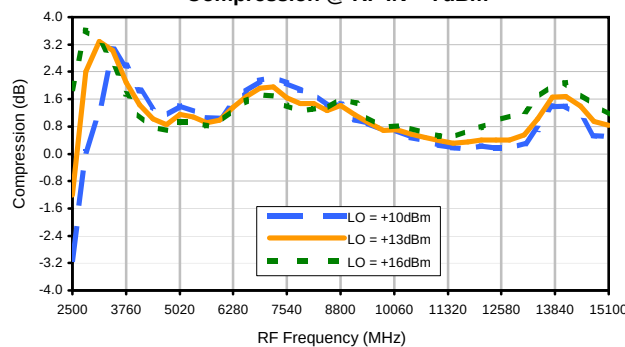
Conversion Loss vs. IF @ RF=15010.09MHz



IP3 Input

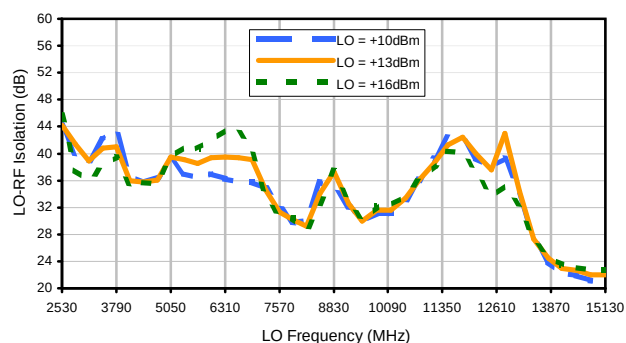


Compression @ RF IN=+7dBm

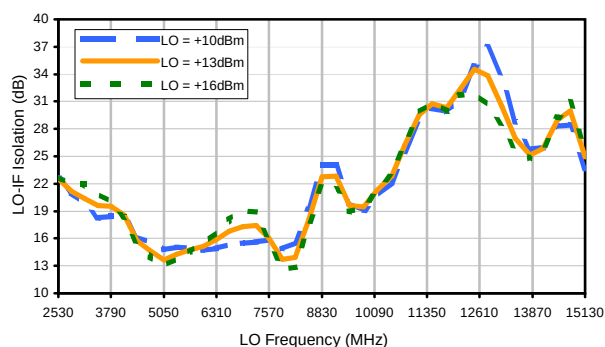


Typical Performance Curves

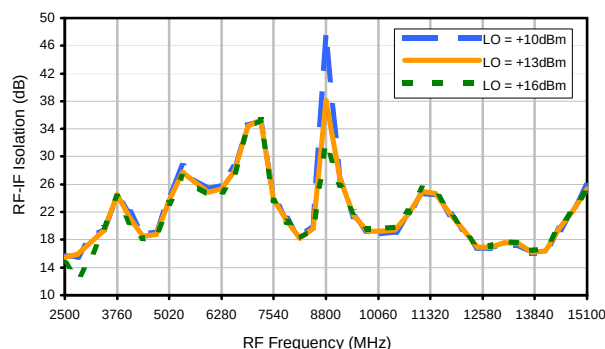
LO-RF Isolation



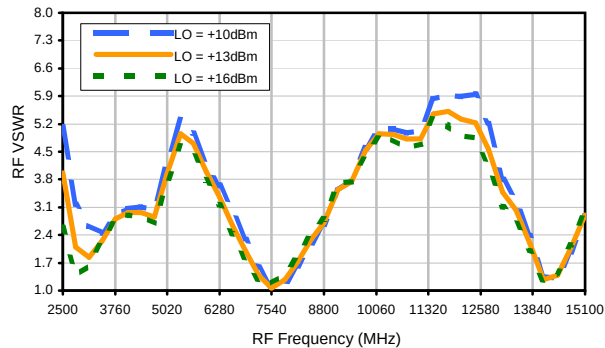
LO-IF Isolation



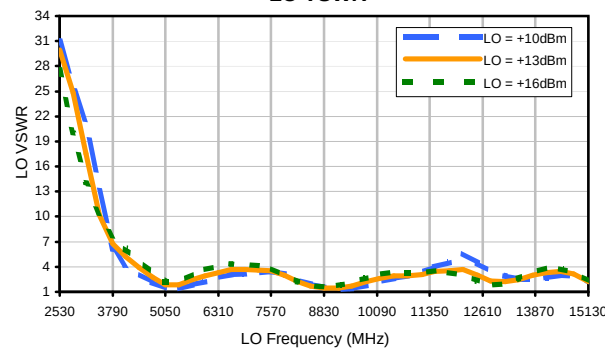
RF-IF Isolation



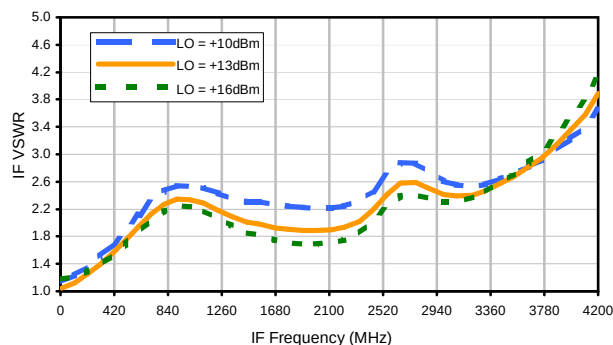
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+14	17	10	---	---	---	---	---	---	---
1	-	16	+0	36	27	44	---	---	---	---	---	---
2	83	55	43	52	42	56	52	---	---	---	---	---
3	89	>70	67	>70	63	68	>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; -8.00 dBm.
LO IN: 7730 MHz; +13.00 dBm
IF OUT: 30 MHz; -19.75 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+4	26	21	---	---	---	---	---	---	---
1	-	16	+0	38	26	48	---	---	---	---	---	---
2	64	46	35	42	35	49	46	---	---	---	---	---
3	61	63	50	58	43	53	61	68	---	---	---	---
4	---	---	73	69	59	78	55	66	65	---	---	---
5	---	---	---	>80	78	>80	67	68	72	>80	---	---
6	---	---	---	---	>80	>80	77	>80	73	>80	79	---
7	---	---	---	---	---	>80	>80	>80	>80	79	>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

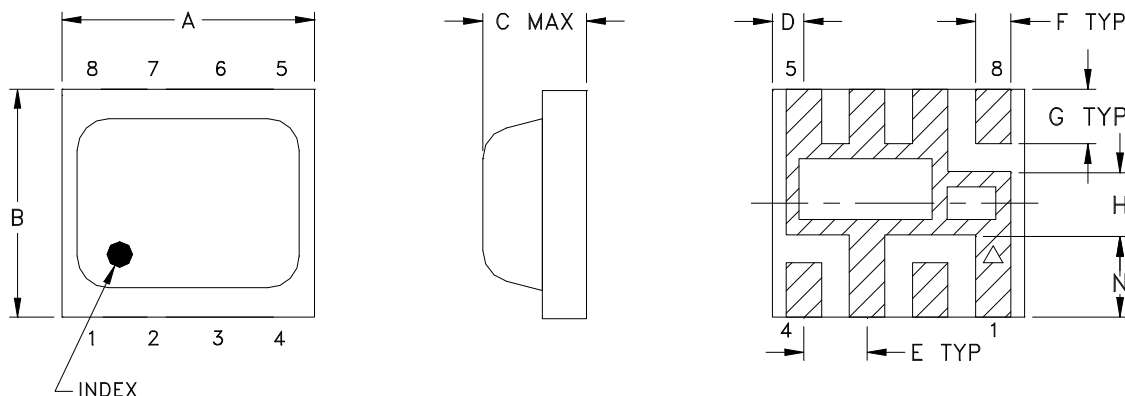
Test conditions:

RF IN: 7700 MHz; 2.00 dBm.
LO IN: 7730 MHz; +13.00 dBm
IF OUT: 30 MHz; -10.15 dBm

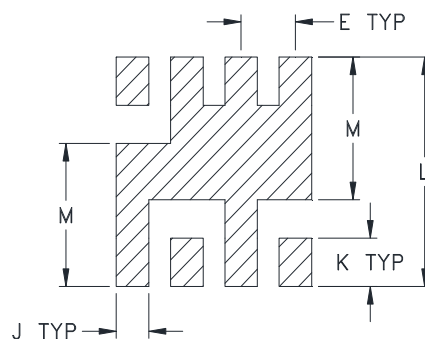
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

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.



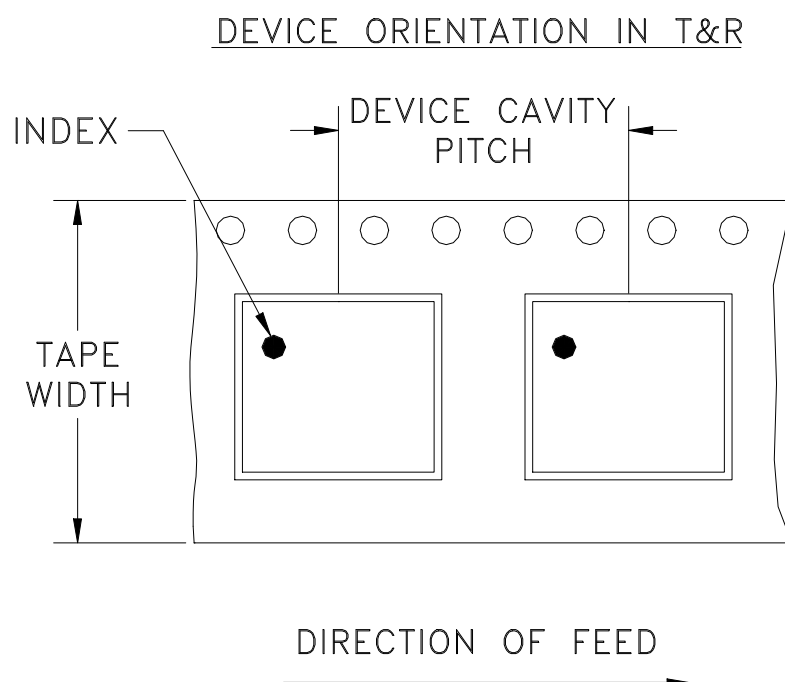
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Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
12	8	7	500

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REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M161975	NEW RELEASE	05/30/17	CA	WL
A	EC0-000060	MODIFIED CASE STYLE	10/16/19	ITG	RB

1. 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.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

 DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).

 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

UNLESS OTHERWISE SPECIFIED		INITIALS		DATE	
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ±		DRAWN	CA	05/30/17	
		CHECKED	GF	05/30/17	
		APPROVED	WL	05/30/17	

Mini-Circuits®

13 Neptune Avenue
Brooklyn NY 11235

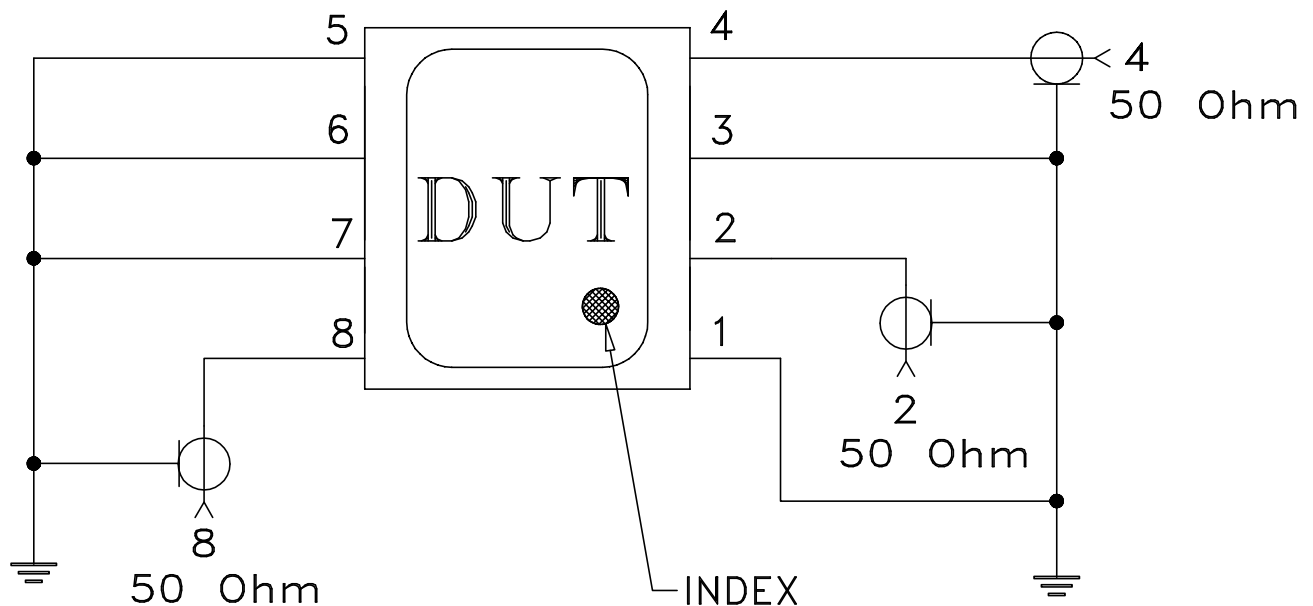
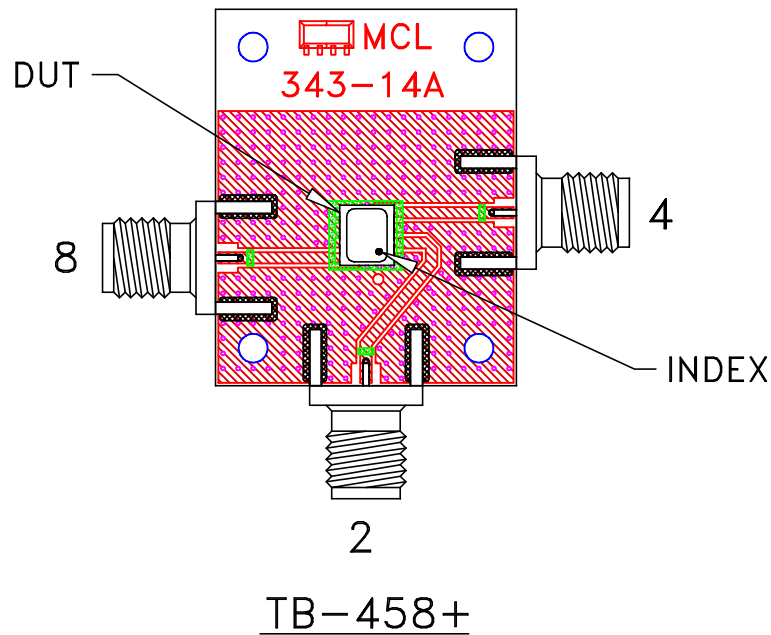
PL, 08MX05, HV1195, TB-458+

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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



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