

Frequency Mixer WIDE BAND

Level 17 (LO Power +17 dBm) 7.3 to 19 GHz

SIM-193H+



Generic photo used for illustration purposes only

CASE STYLE: HV1195

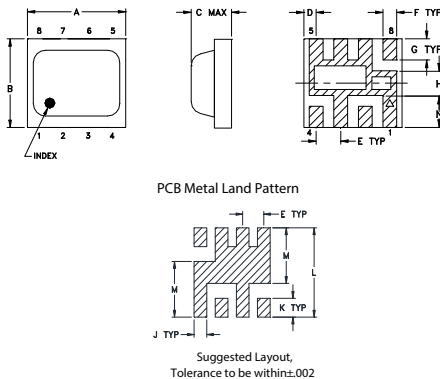
Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	120mW
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

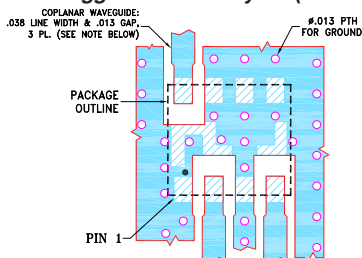


Outline Dimensions (inch mm)

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-284)



NOTES:

- TRACE WIDTH AND GAP ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .0028-.0013"; 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

- 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, 7.3 to 19 GHz
- low conversion loss, 6.2 dB typ.
- high L-R isolation, 33 dB typ.
- excellent IF BW, DC to 7.5 GHz
- 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

- fixed satellite
- mobile
- radio location

Electrical Specifications at 25°C

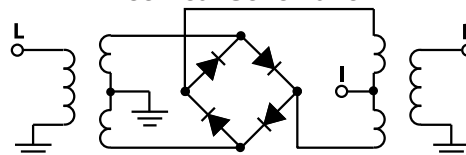
Parameter	Condition (GHz)	Min.	Typ.	Max.	Unit
Frequency Range, LO/RF		7.3	—	19	GHz
Frequency Range, IF		DC	—	7.5	GHz
Conversion Loss ¹	7.3-10	—	8.6	10.5	dB
	10-15	—	7.6	10.0	
	15-18	—	9.7	11.8	
	18-19	—	10.0	13.0	
LO to RF Isolation	7.3-10	24	32	—	dB
	10-15	20	28	—	
	15-18	16	21	—	
	18-19	20	26	—	
LO to IF Isolation	7.3-10	13	18	—	dB
	10-15	13	18	—	
	15-18	8	11	—	
	18-19	12	17	—	
IP3	7.3-10	—	17	—	dBm
	10-15	—	19	—	
	15-18	—	16	—	
	18-19	—	25	—	
RF Input Power at 1 dB Compression	7.3-19	—	+14	—	dBm

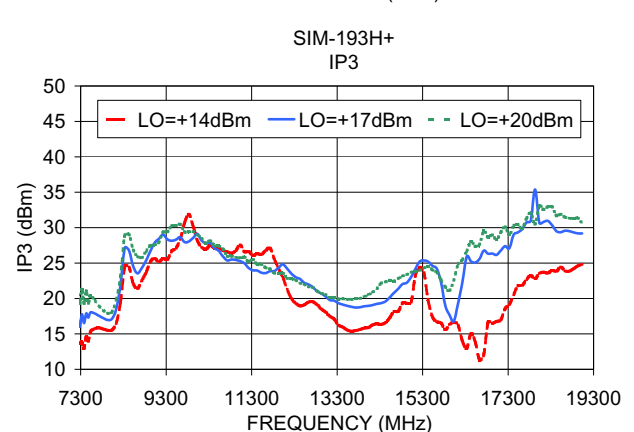
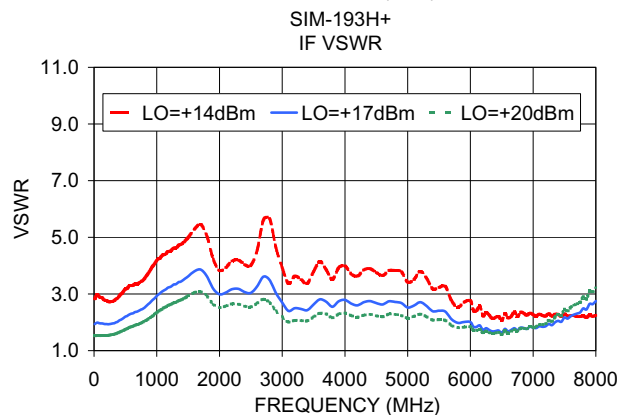
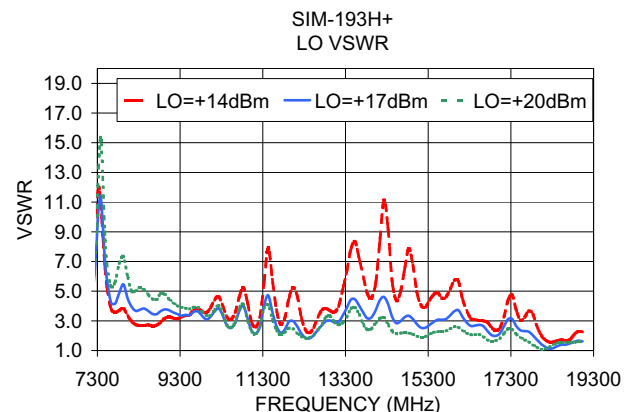
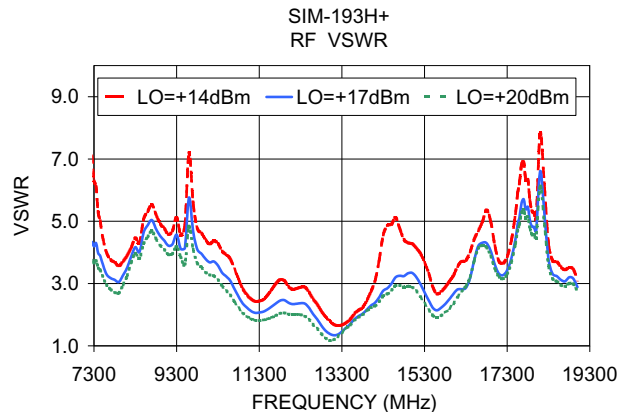
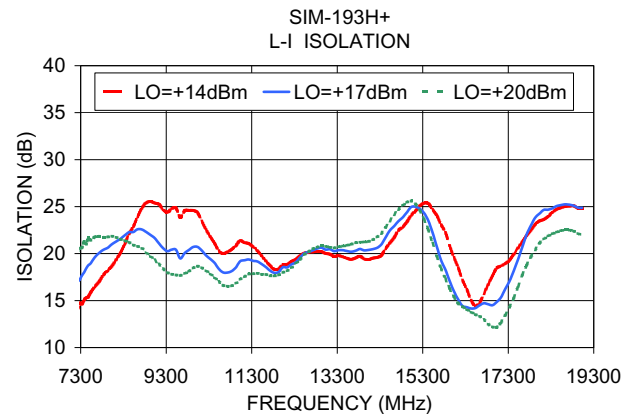
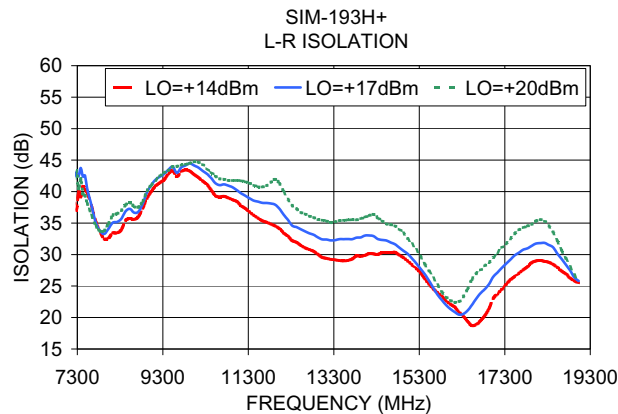
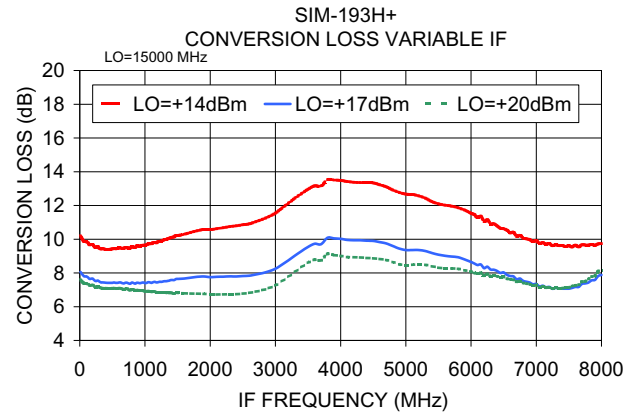
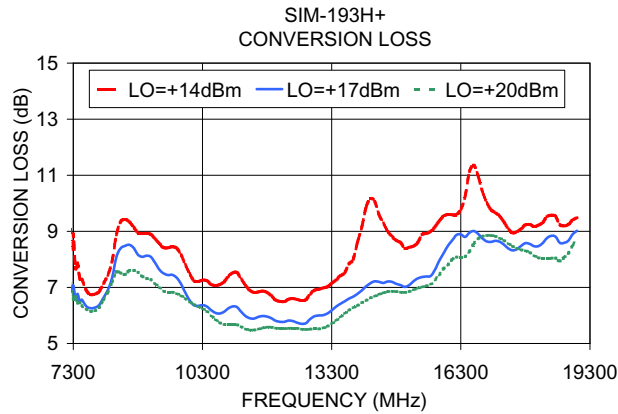
1. Conversion loss at 30 MHz IF.

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 +17dBm	LO +17dBm	LO +17dBm	LO +17dBm	LO +17dBm
7300.10	7330.00	7.07	42.48	17.69	4.20	10.62
8500.10	8530.00	8.48	37.26	22.30	4.64	3.67
9000.10	9030.00	8.13	41.03	21.66	4.38	3.72
9500.10	9530.00	7.44	43.94	20.41	4.15	3.39
10000.10	10030.00	6.54	44.16	20.71	3.79	3.26
11000.10	11030.00	6.32	40.24	19.18	2.23	2.34
11500.10	11530.00	5.89	38.41	18.90	2.17	3.62
12000.10	12030.00	5.81	37.27	18.55	2.39	2.98
12500.10	12530.00	5.74	34.00	20.03	2.23	2.03
13000.10	13030.00	6.00	32.41	20.42	1.39	2.90
14000.10	14030.00	6.89	33.02	20.39	2.29	3.72
14500.10	14530.00	7.16	32.23	22.45	3.00	2.84
15000.10	15030.00	7.02	30.11	24.95	3.34	2.77
15500.10	15530.00	7.39	25.82	22.24	2.22	3.08
16000.10	16030.00	8.48	21.35	16.00	2.27	3.72
16500.10	16530.00	8.95	21.99	14.20	3.74	2.73
17000.10	17030.00	8.62	26.46	14.84	3.61	2.14
17500.10	17530.00	8.32	29.85	19.38	4.43	2.36
18000.10	18030.00	8.47	31.75	24.25	4.67	1.44
19000.10	19030.00	9.02	25.80	24.87	2.89	1.62

Electrical Schematic





Notes

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



Frequency Mixer

SIM-193H+

Typical Performance Data

RF (IN) (GHz)	LO (GHz)	CONVERSION LOSS IF FIXED @IF(OUT)=0.030GHz (dB)			RF (IN) (GHz)	LO (GHz)	IP-3 INPUT (dBm)			RF (IN) (GHz)	LO (GHz)	COMPRESSION @RF IN=+14dBm (dB)		
		@LO (dBm)					@LO (dBm)					@LO (dBm)		
		+14	+17	+20			+14	+17	+20			+14	+17	+20
7.22	7.25	11.41	7.31	6.72	7.22	7.25	15.09	17.08	20.23	7.22	7.25	1.89	0.79	0.44
7.30	7.33	8.37	6.99	6.55	7.30	7.33	14.95	18.15	21.34	7.30	7.33	2.49	1.06	0.54
7.52	7.55	7.36	6.63	6.25	7.52	7.55	16.39	18.96	21.06	7.52	7.55	1.94	0.80	0.44
7.86	7.89	7.09	6.50	6.11	7.86	7.89	16.99	18.97	21.01	7.86	7.89	2.02	0.94	0.57
8.20	8.23	8.08	7.44	6.90	8.20	8.23	19.75	22.64	24.97	8.20	8.23	1.22	0.79	0.58
8.52	8.55	9.02	8.04	7.21	8.52	8.55	23.22	25.07	26.81	8.52	8.55	0.74	0.53	0.40
8.86	8.89	8.94	8.11	7.51	8.86	8.89	24.95	26.77	27.81	8.86	8.89	0.42	0.34	0.22
9.20	9.23	8.40	7.57	7.02	9.20	9.23	25.05	27.29	27.02	9.20	9.23	0.51	0.39	0.31
9.54	9.57	7.40	6.58	6.11	9.54	9.57	24.69	25.96	26.46	9.54	9.57	0.37	0.29	0.22
9.86	9.89	7.76	6.78	6.30	9.86	9.89	24.88	24.97	25.79	9.86	9.89	0.37	0.29	0.23
10.20	10.23	7.72	6.65	6.08	10.20	10.23	23.48	23.25	24.50	10.20	10.23	0.52	0.42	0.35
10.54	10.57	7.81	6.57	5.93	10.54	10.57	22.20	21.89	23.12	10.54	10.57	0.45	0.35	0.31
10.88	10.91	7.21	6.03	5.47	10.88	10.91	21.82	21.47	22.64	10.88	10.91	0.48	0.40	0.34
11.22	11.25	7.06	6.01	5.57	11.22	11.25	22.35	21.42	22.84	11.22	11.25	0.33	0.30	0.24
11.54	11.57	6.70	5.73	5.30	11.54	11.57	22.14	21.25	22.62	11.54	11.57	0.45	0.38	0.34
11.88	11.91	6.88	6.01	5.59	11.88	11.91	23.06	21.98	22.76	11.88	11.91	0.18	0.19	0.15
12.22	12.25	6.57	5.80	5.37	12.22	12.25	20.84	20.62	21.29	12.22	12.25	0.42	0.36	0.30
12.56	12.59	6.80	5.95	5.46	12.56	12.59	18.53	19.70	20.24	12.56	12.59	0.30	0.28	0.23
12.88	12.91	6.65	5.76	5.29	12.88	12.91	16.75	18.81	19.75	12.88	12.91	0.39	0.32	0.25
13.22	13.25	7.10	6.05	5.58	13.22	13.25	15.78	19.01	20.18	13.22	13.25	0.29	0.24	0.20
13.56	13.59	7.37	6.31	5.84	13.56	13.59	16.04	19.55	21.20	13.56	13.59	0.29	0.24	0.19
13.90	13.93	7.48	6.48	6.03	13.90	13.93	16.75	19.88	21.63	13.90	13.93	0.16	0.19	0.17
14.22	14.25	7.94	6.86	6.41	14.22	14.25	16.94	20.77	22.74	14.22	14.25	0.18	0.20	0.15
14.56	14.59	8.22	6.90	6.45	14.56	14.59	16.77	21.70	23.21	14.56	14.59	0.19	0.19	0.16
14.90	14.93	9.93	7.57	6.96	14.90	14.93	19.32	22.09	23.20	14.90	14.93	0.22	0.18	0.14
15.24	15.27	9.76	7.31	6.79	15.24	15.27	20.79	24.45	23.68	15.24	15.27	0.27	0.19	0.14
15.58	15.61	9.29	7.52	7.14	15.58	15.61	21.10	26.38	24.01	15.58	15.61	0.38	0.33	0.31
15.90	15.93	9.25	7.97	7.57	15.90	15.93	21.68	23.68	22.09	15.90	15.93	0.58	0.64	0.54
16.24	16.27	9.37	8.62	8.02	16.24	16.27	14.85	24.59	24.91	16.24	16.27	0.46	0.40	0.32
16.58	16.61	10.00	8.66	8.08	16.58	16.61	14.87	25.98	27.97	16.58	16.61	0.64	0.34	0.24
16.92	16.95	10.61	8.83	8.60	16.92	16.95	17.97	24.72	28.37	16.92	16.95	0.68	0.31	0.21
17.24	17.27	9.95	8.49	8.22	17.24	17.27	19.16	26.04	28.82	17.24	17.27	0.20	0.16	0.11
17.58	17.61	10.16	8.57	8.29	17.58	17.61	19.01	28.08	30.04	17.58	17.61	0.22	0.15	0.09
17.92	17.95	9.61	8.66	8.38	17.92	17.95	20.76	29.28	30.65	17.92	17.95	0.55	0.26	0.15
18.26	18.29	9.20	8.67	8.41	18.26	18.29	21.83	30.09	31.29	18.26	18.29	0.23	0.16	0.09
18.58	18.61	9.07	8.60	8.36	18.58	18.61	22.57	29.43	31.79	18.58	18.61	0.16	0.14	0.08
19.00	19.03	9.20	8.78	8.58	19.00	19.03	23.27	27.91	31.35	19.00	19.03	0.22	0.16	0.09
19.26	19.29	9.62	9.13	8.93	19.26	19.29	23.21	27.59	30.89	19.26	19.29	0.24	0.18	0.10
19.60	19.63	10.89	10.15	9.94	19.60	19.63	22.15	27.87	29.93	19.60	19.63	0.21	0.15	0.11
19.94	19.97	12.12	10.84	10.62	19.94	19.97	19.93	28.32	29.88	19.94	19.97	0.19	0.13	0.06

Frequency Mixer

SIM-193H+

Typical Performance Data

IF (OUT) (GHz)	LO (GHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=13.150GHz (dB)	IF (OUT) (GHz)	LO (GHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=7.300GHz (dB)	IF (OUT) (GHz)	LO (GHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=19GHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+17			+17			+17
6.050	7.100	6.17	0.050	7.350	6.58	9.3	9.7	15.30
5.750	7.400	6.19	0.270	7.570	6.32	9.1	9.9	14.89
5.450	7.700	6.56	0.510	7.810	6.01	8.8	10.2	14.28
5.130	8.020	6.51	0.730	8.030	5.73	8.6	10.4	13.74
4.830	8.320	6.55	0.970	8.270	5.67	8.3	10.7	13.13
4.510	8.640	7.08	1.190	8.490	5.85	8.1	10.9	12.30
4.210	8.940	7.59	1.430	8.730	6.40	7.9	11.1	11.22
3.890	9.260	7.81	1.650	8.950	7.34	7.6	11.4	10.28
3.590	9.560	7.60	1.890	9.190	8.57	7.4	11.6	9.74
3.270	9.880	6.88	2.110	9.410	9.35	7.2	11.8	9.86
2.970	10.180	6.62	2.350	9.650	9.50	6.9	12.1	9.87
2.650	10.500	6.49	2.570	9.870	10.35	6.7	12.3	9.95
2.350	10.800	6.31	2.810	10.110	10.77	6.4	12.6	10.01
2.030	11.120	6.03	3.050	10.350	10.80	6.2	12.8	10.00
1.730	11.420	5.79	3.270	10.570	10.59	6.0	13.0	10.05
1.410	11.740	5.73	3.510	10.810	10.45	5.7	13.3	10.37
1.110	12.040	5.63	3.730	11.030	10.35	5.5	13.5	10.78
0.790	12.360	5.39	3.970	11.270	10.43	5.3	13.7	11.09
0.490	12.660	5.33	4.190	11.490	10.40	5.0	14.0	11.36
0.170	12.980	5.56	4.430	11.730	10.15	4.8	14.2	11.66
0.010	13.160	5.96	4.650	11.950	10.19	4.6	14.4	11.63
0.350	13.500	5.85	4.890	12.190	9.83	4.3	14.7	11.34
0.690	13.840	5.81	5.110	12.410	9.76	4.1	14.9	11.03
1.050	14.200	6.13	5.350	12.650	9.96	3.8	15.2	11.03
1.390	14.540	6.42	5.570	12.870	9.63	3.6	15.4	10.79
1.750	14.900	6.31	5.810	13.110	9.34	3.4	15.6	10.93
2.090	15.240	6.35	6.050	13.350	8.89	3.1	15.9	11.62
2.450	15.600	6.48	6.270	13.570	8.62	2.9	16.1	11.94
2.790	15.940	6.82	6.510	13.810	8.63	2.7	16.3	11.26
3.130	16.280	7.41	6.730	14.030	8.36	2.4	16.6	11.20
3.490	16.640	7.07	6.970	14.270	8.23	2.2	16.8	11.05
3.830	16.980	6.86	7.190	14.490	8.55	1.9	17.1	10.94
4.190	17.340	6.79	7.430	14.730	8.98	1.7	17.3	10.81
4.530	17.680	6.78	7.650	14.950	9.55	1.5	17.5	10.57
4.890	18.040	6.85	7.890	15.190	10.25	1.2	17.8	10.29
5.230	18.380	6.95	8.110	15.410	10.76	1.0	18.0	9.96
5.570	18.720	7.19	8.350	15.650	11.56	0.8	18.2	9.72
5.930	19.080	7.03	8.570	15.870	12.32	0.5	18.5	9.64
6.270	19.420	7.40	8.810	16.110	13.53	0.3	18.7	9.47
6.630	19.780	7.27	9.050	16.350	15.18	0.0	19.0	9.41

Frequency Mixer

SIM-193H+

Typical Performance Data

LO (GHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+14	+17	+20	+14	+17	+20
7.25	39.93	40.01	40.26	14.58	17.39	19.15
7.33	39.90	41.80	41.76	14.16	17.13	19.08
7.55	37.28	38.55	38.73	15.57	17.90	18.81
7.89	29.65	30.72	32.02	16.95	18.26	18.44
8.23	32.40	34.36	36.16	17.84	18.01	17.51
8.55	39.39	43.09	41.45	19.32	17.89	16.89
8.89	36.92	38.18	38.18	20.18	17.74	16.33
9.23	37.38	38.18	38.66	17.57	15.11	13.76
9.57	38.44	39.52	40.41	17.50	15.36	14.17
9.89	39.78	40.93	41.08	17.75	15.43	14.23
10.23	39.27	40.85	40.72	16.80	14.77	13.77
10.57	38.89	41.72	43.29	16.16	14.49	13.63
10.91	36.36	38.67	39.57	16.19	14.65	13.78
11.25	35.25	37.89	38.61	15.94	14.57	13.80
11.57	33.17	34.04	34.30	16.35	15.47	14.94
11.91	34.78	37.07	36.34	15.38	14.69	14.32
12.25	32.34	35.36	37.83	16.42	16.11	15.85
12.59	31.46	34.31	37.00	16.40	16.13	15.88
12.91	29.34	31.73	34.04	16.71	16.70	16.63
13.25	29.06	31.34	33.44	17.05	17.28	17.35
13.59	29.03	31.35	33.22	17.30	17.68	17.84
13.93	29.56	31.75	33.39	17.47	17.97	18.22
14.25	29.68	32.17	33.91	17.93	18.62	19.04
14.59	28.91	31.35	33.37	18.83	19.83	20.47
14.93	27.70	29.60	31.17	21.23	21.80	22.15
15.27	25.07	26.29	27.31	21.25	20.84	20.49
15.61	22.15	22.88	23.50	18.06	17.30	16.84
15.93	18.33	18.97	19.62	14.14	13.38	13.15
16.27	16.21	17.53	18.91	10.87	10.92	11.03
16.61	18.78	20.71	22.38	11.02	10.44	9.85
16.95	20.96	22.59	23.98	11.81	10.25	9.09
17.27	24.92	26.50	27.78	12.30	10.90	9.97
17.61	25.94	27.43	28.41	17.05	15.71	14.87
17.95	27.03	28.83	29.81	20.70	19.90	19.09
18.29	31.21	33.98	36.28	21.30	19.27	17.83
18.61	30.22	30.76	30.75	20.46	18.92	18.04
19.03	25.17	24.89	24.66	20.49	19.81	19.31
19.29	22.95	21.97	21.41	20.04	19.03	18.27
19.63	19.55	18.62	18.14	19.06	18.52	18.08
19.97	16.25	15.48	15.06	17.79	17.69	17.47

RF (IN) (GHz)	LO (GHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+14	+17	+20
7.22	7.25	20.17	20.18	19.98
7.30	7.33	20.11	20.17	20.29
7.52	7.55	19.97	19.68	19.34
7.86	7.89	17.94	17.75	17.48
8.20	8.23	17.44	17.79	17.98
8.52	8.55	21.11	21.59	21.69
8.86	8.89	23.54	23.96	24.11
9.20	9.23	25.32	25.48	25.47
9.54	9.57	27.43	27.34	27.15
9.86	9.89	29.82	29.43	29.12
10.20	10.23	30.55	30.00	29.63
10.54	10.57	31.60	30.95	30.33
10.88	10.91	31.60	30.77	30.00
11.22	11.25	31.03	30.37	29.78
11.54	11.57	30.50	30.04	29.59
11.88	11.91	30.07	29.41	29.07
12.22	12.25	30.18	29.41	28.92
12.56	12.59	29.87	28.99	28.36
12.88	12.91	29.51	28.57	27.88
13.22	13.25	28.94	27.74	26.89
13.56	13.59	27.72	26.42	25.64
13.90	13.93	26.22	24.83	24.09
14.22	14.25	24.40	23.04	22.32
14.56	14.59	22.63	21.68	21.13
14.90	14.93	21.48	20.64	20.12
15.24	15.27	20.31	19.52	19.00
15.58	15.61	18.66	18.09	17.72
15.90	15.93	17.78	17.19	17.07
16.24	16.27	18.56	19.30	19.87
16.58	16.61	24.03	24.88	25.38
16.92	16.95	25.97	26.30	26.51
17.24	17.27	24.84	24.86	24.77
17.58	17.61	23.77	23.55	23.41
17.92	17.95	22.58	22.28	22.14
18.26	18.29	20.82	20.63	20.52
18.58	18.61	19.94	19.84	19.80
19.00	19.03	18.28	18.25	18.25
19.26	19.29	16.42	16.40	16.38
19.60	19.63	14.65	14.65	14.64
19.94	19.97	13.44	13.51	13.53

Frequency Mixer

SIM-193H+

Typical Performance Data

RF (IN) (GHz)	LO (GHz)	RF VSWR (:1)			LO (GHz)	LO VSWR (:1)			IF (OUT) (GHz)	IF VSWR @LO=19GHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+14	+17	+20		+14	+17	+20		+14	+17	+20
7.22	7.25	4.50	3.56	3.24	7.22	7.51	6.02	6.36	0.04	1.61	1.45	1.35
7.30	7.33	4.99	3.50	3.12	7.33	8.14	5.58	5.74	0.24	1.68	1.49	1.40
7.52	7.55	3.61	3.07	2.78	7.55	4.46	4.61	5.31	0.44	1.78	1.59	1.50
7.86	7.89	3.13	2.68	2.41	7.89	3.04	3.75	4.59	0.64	1.94	1.74	1.65
8.20	8.23	3.93	3.63	3.43	8.23	2.35	3.16	4.04	0.88	2.14	1.93	1.83
8.52	8.55	5.55	5.05	4.67	8.55	2.27	3.04	3.85	1.08	2.35	2.11	2.00
8.86	8.89	6.12	5.48	5.02	8.89	2.48	2.96	3.56	1.28	2.51	2.25	2.13
9.20	9.23	4.91	4.35	3.97	9.23	2.87	3.13	3.61	1.48	2.63	2.36	2.23
9.54	9.57	4.21	3.72	3.39	9.57	3.19	3.08	3.28	1.72	2.73	2.45	2.31
9.86	9.89	4.09	3.52	3.12	9.89	3.72	3.11	3.08	1.92	2.79	2.50	2.36
10.20	10.23	4.20	3.54	3.12	10.23	3.69	3.02	2.96	2.12	2.84	2.54	2.39
10.54	10.57	3.79	3.16	2.75	10.57	3.91	2.97	2.75	2.32	2.87	2.55	2.40
10.88	10.91	3.66	2.99	2.57	10.91	4.26	2.91	2.57	2.56	2.95	2.61	2.45
11.22	11.25	3.26	2.66	2.26	11.25	4.29	2.81	2.43	2.76	2.97	2.62	2.45
11.54	11.57	3.38	2.65	2.30	11.57	4.78	2.79	2.38	2.96	2.96	2.59	2.42
11.88	11.91	2.43	2.00	1.73	11.91	3.46	2.44	2.21	3.16	2.98	2.60	2.42
12.22	12.25	2.26	1.90	1.62	12.25	3.72	2.50	2.23	3.40	3.09	2.70	2.51
12.56	12.59	2.03	1.72	1.49	12.59	3.42	2.50	2.34	3.60	3.21	2.81	2.62
12.88	12.91	2.15	1.81	1.59	12.91	4.22	2.81	2.52	3.80	3.32	2.91	2.71
13.22	13.25	2.04	1.66	1.50	13.25	5.49	3.29	2.77	4.00	3.46	3.03	2.82
13.56	13.59	2.56	1.87	1.76	13.59	7.48	3.89	3.00	4.23	3.83	3.36	3.13
13.90	13.93	2.32	1.85	1.79	13.93	7.76	3.96	2.97	4.43	3.91	3.44	3.22
14.22	14.25	2.57	2.18	2.18	14.25	8.23	4.26	2.99	4.63	4.11	3.63	3.40
14.56	14.59	3.24	3.09	3.03	14.59	6.29	3.53	2.68	4.83	4.10	3.65	3.43
14.90	14.93	3.51	3.02	2.82	14.93	5.68	3.36	2.54	5.07	4.02	3.59	3.39
15.24	15.27	3.58	2.80	2.63	15.27	5.83	3.28	2.42	5.27	3.74	3.38	3.21
15.58	15.61	3.89	2.99	2.76	15.61	4.54	2.76	2.17	5.47	3.46	3.13	2.98
15.90	15.93	3.25	2.55	2.20	15.93	4.13	2.76	2.13	5.67	3.08	2.79	2.66
16.24	16.27	2.08	1.69	1.68	16.27	3.23	2.59	2.17	5.91	2.61	2.37	2.26
16.58	16.61	2.34	2.41	2.44	16.61	3.24	2.87	2.48	6.11	2.28	2.09	2.02
16.92	16.95	3.45	3.29	3.32	16.95	3.38	2.98	2.65	6.31	2.09	1.94	1.90
17.24	17.27	4.20	4.15	4.11	17.27	2.77	2.30	2.05	6.51	2.14	2.04	2.01
17.58	17.61	5.66	5.51	5.42	17.61	2.49	2.07	1.81	6.75	2.35	2.27	2.25
17.92	17.95	5.99	5.23	5.04	17.95	2.67	2.09	1.73	6.95	2.55	2.48	2.45
18.26	18.29	4.26	3.98	3.84	18.29	2.07	1.49	1.24	7.15	2.47	2.38	2.34
18.58	18.61	3.57	3.44	3.35	18.61	1.58	1.31	1.25	7.35	2.43	2.42	2.40
19.00	19.03	3.52	3.44	3.38	19.03	1.77	1.53	1.43	7.59	2.29	2.34	2.36
19.26	19.29	2.85	2.78	2.75	19.29	1.83	1.60	1.54	7.79	2.24	2.36	2.41
19.60	19.63	3.60	3.48	3.42	19.63	2.09	1.87	1.78	7.99	2.22	2.41	2.50
19.94	19.97	2.51	2.44	2.41	19.97	2.63	2.32	2.18	8.23	2.38	2.66	2.79

Frequency Mixer

SIM-193H+

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	---	---	-15.92	32.30	---	---	---	---	---	---	---	---
1	---	25.12	---	32.76	38.32	---	---	---	---	---	---	---
2	-104.18	77.79	69.93	59.81	70.54	76.72	---	---	---	---	---	---
3	-126.21	---	92.49	100.15	80.34	95.23	93.11	---	---	---	---	---
4	-124.18	---	---	92.05	101.08	105.11	101.18	92.86	---	---	---	---
5	-122.93	---	---	---	93.07	102.01	91.44	101.31	---	---	---	---
6	-123.50	---	---	---	---	91.84	89.03	95.06	89.54	---	---	---
7	-125.26	---	---	---	---	---	91.81	89.72	95.90	91.46	---	---
8	-125.01	---	---	---	---	---	---	92.89	99.03	96.14	97.00	---
9	-124.81	---	---	---	---	---	---	---	92.80	99.47	98.19	98.08
10	-126.17	---	---	---	---	---	---	---	---	90.62	100.82	103.18
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 13150 MHz; -15 dBm.
 LO IN: 13180 MHz; +17.00 dBm
 IF OUT: 30 MHz; -21.14 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	---	---	-5.99	43.11	---	---	---	---	---	---	---	---
1	---	25.69	---	32.80	38.06	---	---	---	---	---	---	---
2	-91.45	67.62	60.04	49.89	60.78	67.58	---	---	---	---	---	---
3	-113.83	---	82.64	81.07	60.37	78.67	89.18	---	---	---	---	---
4	-114.17	---	---	102.36	104.36	89.73	103.71	98.09	---	---	---	---
5	-111.38	---	---	---	102.59	111.69	93.95	111.21	---	---	---	---
6	-114.65	---	---	---	---	103.17	99.67	95.69	100.33	---	---	---
7	-114.09	---	---	---	---	---	102.30	99.78	95.63	101.48	---	---
8	-113.95	---	---	---	---	---	---	100.31	107.72	100.28	107.42	---
9	-112.34	---	---	---	---	---	---	---	100.85	110.44	99.48	109.14
10	-113.17	---	---	---	---	---	---	---	---	102.69	111.37	113.77
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

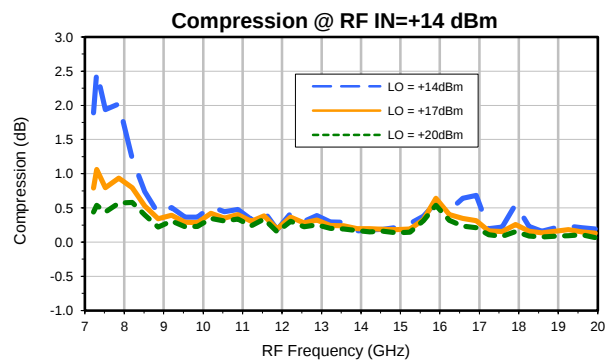
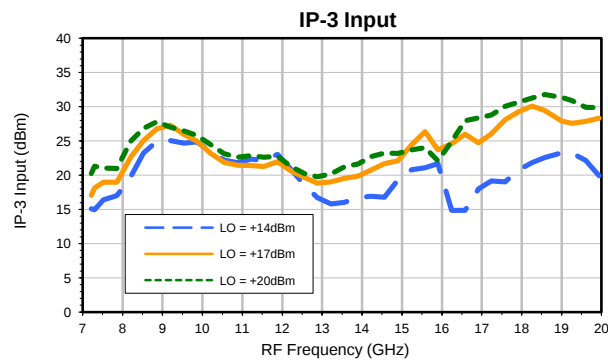
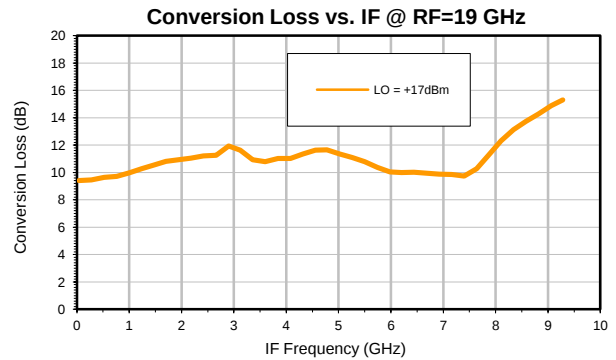
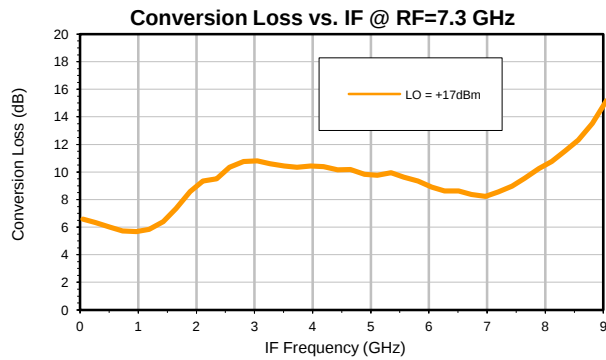
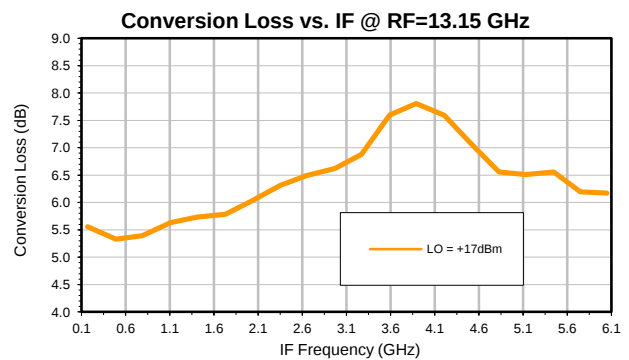
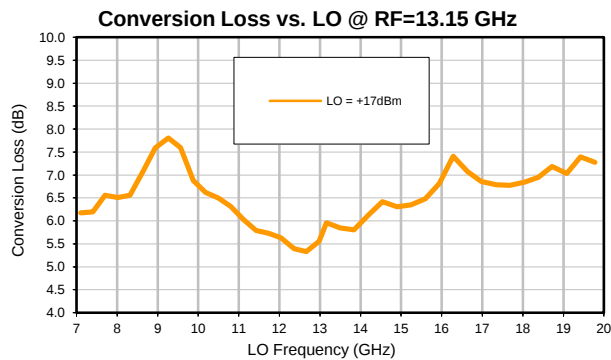
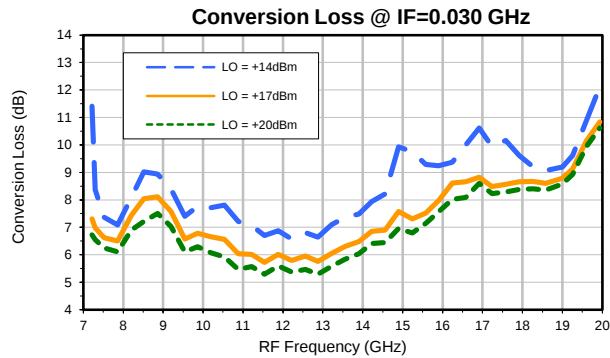
Test conditions: RF IN: 13150 MHz; -5 dBm.
 LO IN: 13180 MHz; +17.00 dBm
 IF OUT: 30 MHz; -10.99 dBm

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

Frequency Mixer

Typical Performance Curves

SIM-193H+



Mini-Circuits®
ISO 9001 ISO 14001 AS 9100 CERTIFIED

minicircuits.com

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



IF/RF MICROWAVE COMPONENTS

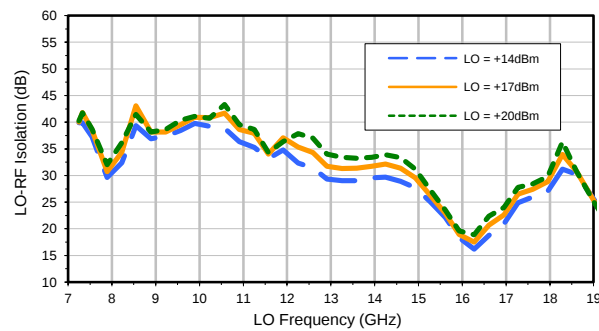
REV. A
SIM-193H+
4/25/2013
Page 1 of 3

Frequency Mixer

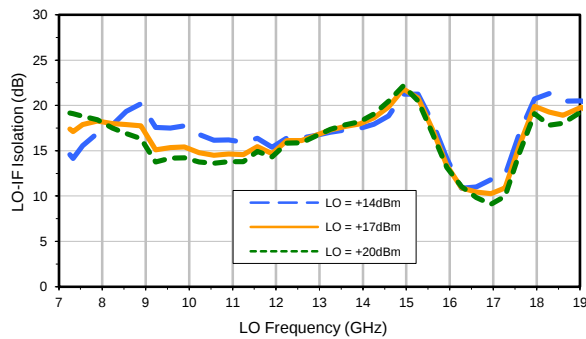
Typical Performance Curves

SIM-193H+

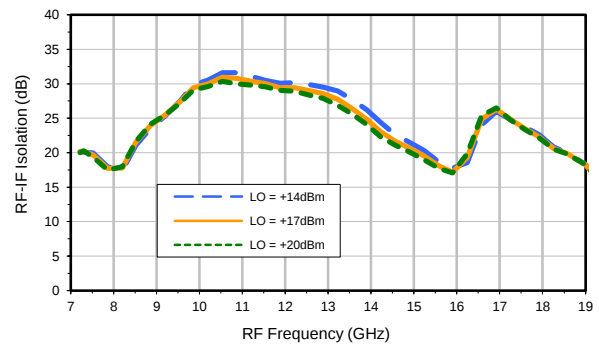
LO-RF Isolation



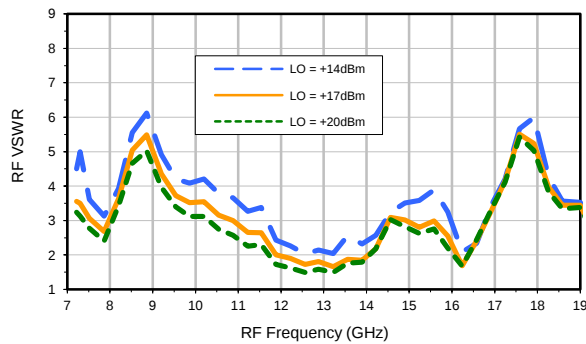
LO-IF Isolation



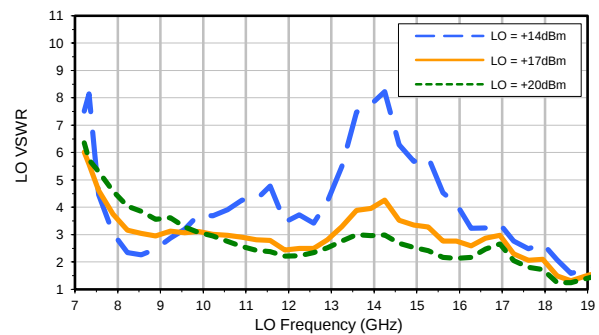
RF-IF Isolation



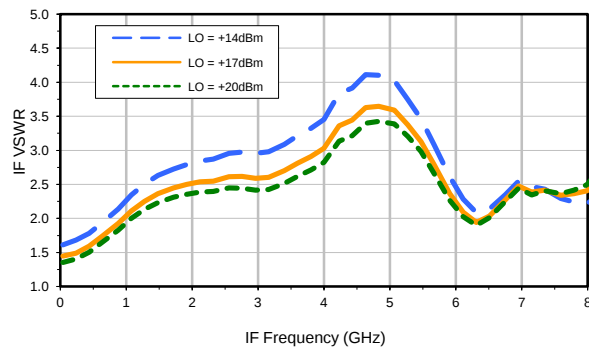
RF VSWR



LO VSWR



IF VSWR



Mini-Circuits®
ISO 9001 ISO 14001 AS 9100 CERTIFIED

minicircuits.com

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



IF/RF MICROWAVE COMPONENTS

REV. A
SIM-193H+
4/25/2013
Page 2 of 3

Frequency Mixer

SIM-193H+

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	---	---	-15.92	32.30	---	---	---	---	---	---	---	---
1	---	25.12	---	32.76	38.32	---	---	---	---	---	---	---
2	-104.18	77.79	69.93	59.81	70.54	76.72	---	---	---	---	---	---
3	-126.21	---	92.49	100.15	80.34	95.23	93.11	---	---	---	---	---
4	-124.18	---	---	92.05	101.08	105.11	101.18	92.86	---	---	---	---
5	-122.93	---	---	---	93.07	102.01	91.44	101.31	---	---	---	---
6	-123.50	---	---	---	---	91.84	89.03	95.06	89.54	---	---	---
7	-125.26	---	---	---	---	---	91.81	89.72	95.90	91.46	---	---
8	-125.01	---	---	---	---	---	---	92.89	99.03	96.14	97.00	---
9	-124.81	---	---	---	---	---	---	---	92.80	99.47	98.19	98.08
10	-126.17	---	---	---	---	---	---	---	---	90.62	100.82	103.18
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 13150 MHz; -15 dBm.
 LO IN: 13180 MHz; +17.00 dBm
 IF OUT: 30 MHz; -21.14 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	---	---	-5.99	43.11	---	---	---	---	---	---	---	---
1	---	25.69	---	32.80	38.06	---	---	---	---	---	---	---
2	-91.45	67.62	60.04	49.89	60.78	67.58	---	---	---	---	---	---
3	-113.83	---	82.64	81.07	60.37	78.67	89.18	---	---	---	---	---
4	-114.17	---	---	102.36	104.36	89.73	103.71	98.09	---	---	---	---
5	-111.38	---	---	---	102.59	111.69	93.95	111.21	---	---	---	---
6	-114.65	---	---	---	---	103.17	99.67	95.69	100.33	---	---	---
7	-114.09	---	---	---	---	---	102.30	99.78	95.63	101.48	---	---
8	-113.95	---	---	---	---	---	---	100.31	107.72	100.28	107.42	---
9	-112.34	---	---	---	---	---	---	---	100.85	110.44	99.48	109.14
10	-113.17	---	---	---	---	---	---	---	---	102.69	111.37	113.77
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

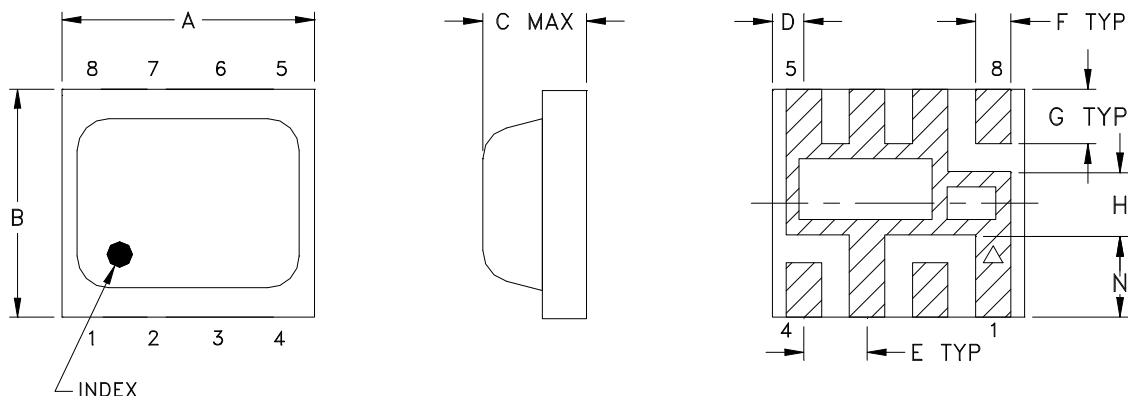
LO HARMONICS ORDER

Test conditions: RF IN: 13150 MHz; -5 dBm.
 LO IN: 13180 MHz; +17.00 dBm
 IF OUT: 30 MHz; -10.99 dBm

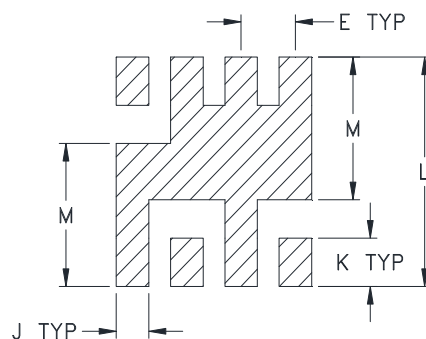
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.
 2. + entry denotes harmonics are in (dBc) above IF OUTPUT.
 3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

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.



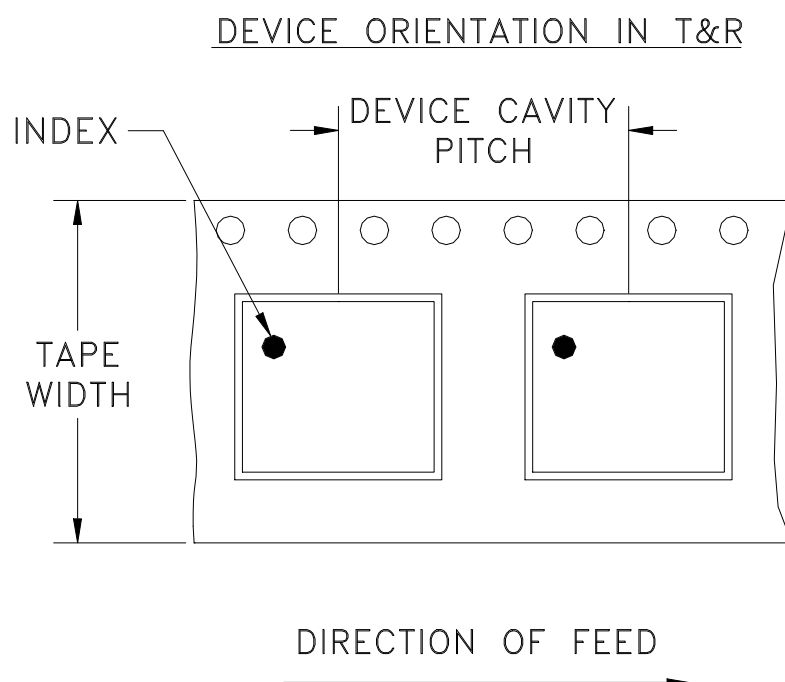
P.O. Box 350186, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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

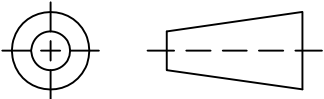


INTERNET <http://www.minicircuits.com>

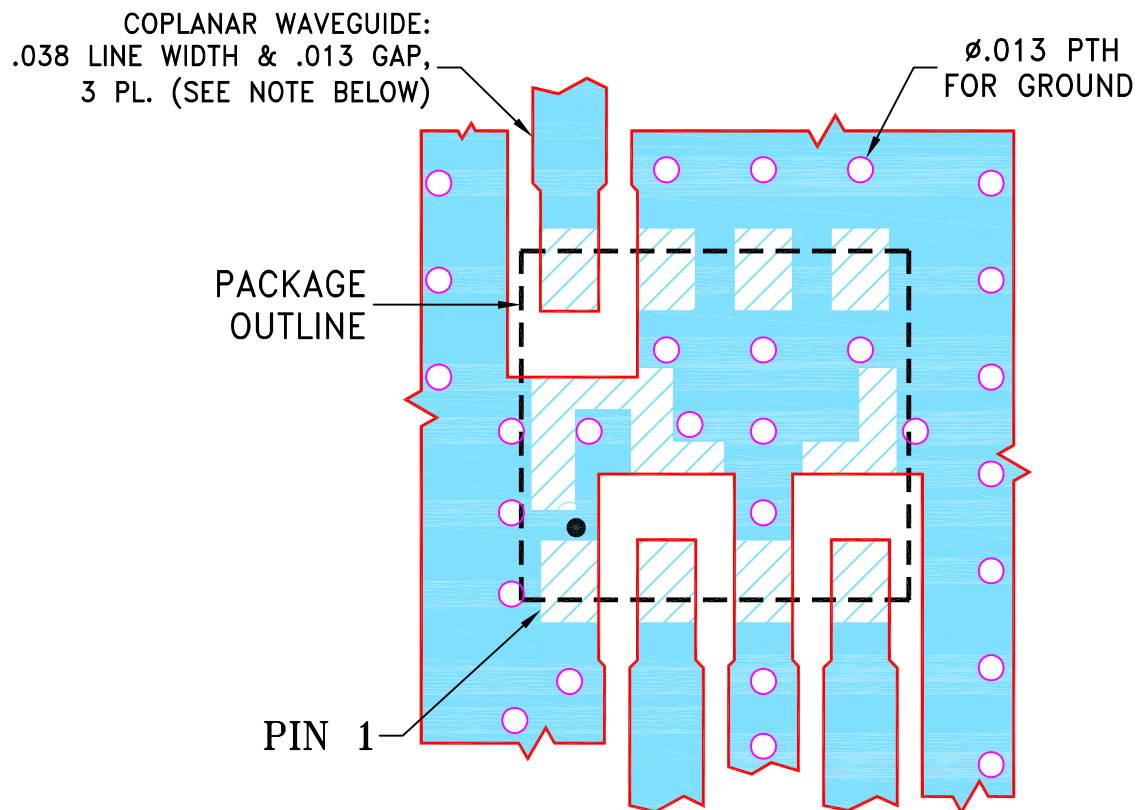
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

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

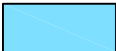
THIRD ANGLE PROJECTION		REVISIONS				
	REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
	OR	M116031	NEW RELEASE	02/14/08	MMG	DJ
	A	ECO-000060	MODIFIED CASE STYLE	10/16/19	ITG	RB

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



NOTES:

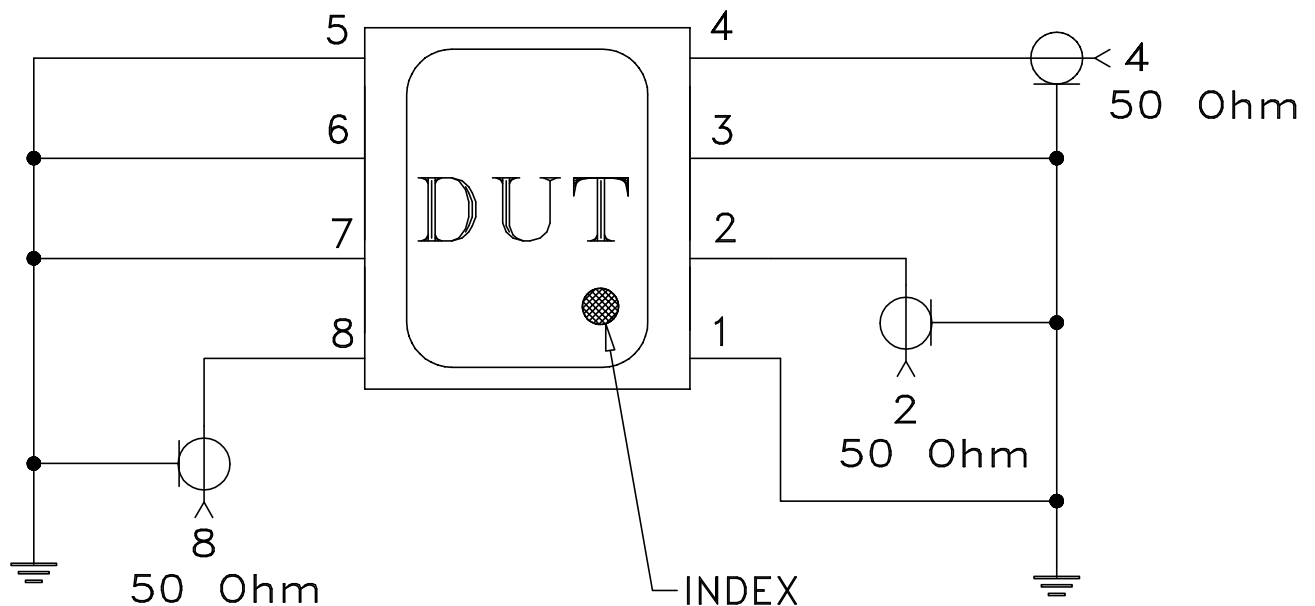
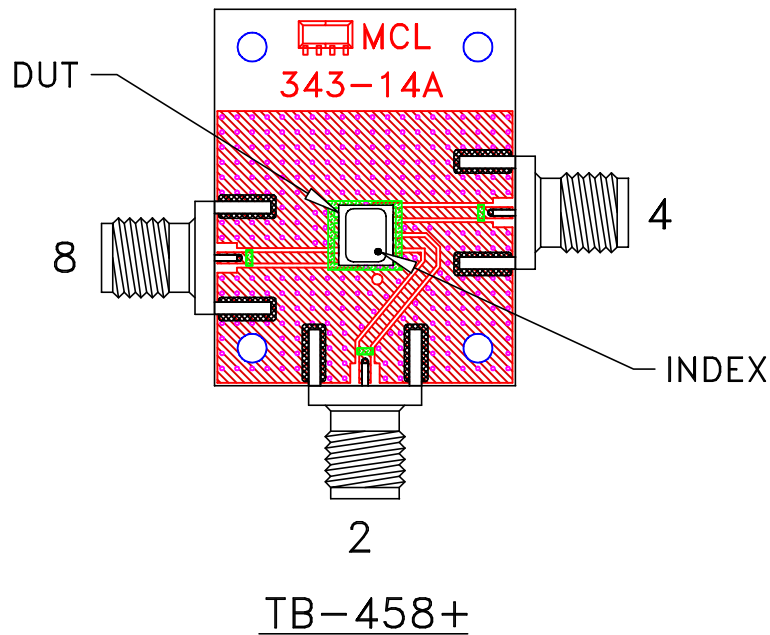
1. TRACE WIDTH AND GAP ARE SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS $.020 \pm .0015$ "; COPPER: 1/2 OZ. EACH SIDE.
FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

	DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).
	DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

UNLESS OTHERWISE SPECIFIED		INITIALS		DATE		Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235		
DIMENSIONS ARE IN INCHES		DRAWN	MMG	02/13/08		PL, 08MX05, HV1195, SIM, TB-458+		
TOLERANCES ON:		CHECKED	AV	02/14/08				
2 PL DECIMALS ±		APPROVED	DJ	02/14/08				
3 PL DECIMALS ± .005								
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.						FILE: 98PL284		
ASHEETA1.DWG REV:A DATE:01/12/95						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