

High IP3 Frequency Mixer

Level 23 (LO Power +23 dBm) 3220 to 4500 MHz

LAVI-452VH+

Maximum Ratings

Operating Temperature	-45°C to 85°C
Storage Temperature	-55°C to 100°C
LO Power	+25 dBm
RF Power	+23 dBm

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

Pin Connections

LO	10
RF	2
IF	14
GROUND	1,3,4,5,6,7,8,9,11,12,13,15,16

Features

- very high IP3, 33 dBm typ.
- excellent L-R isolation, 45 dB typ. and L-I isolation, 40 dB typ.
- high 1 dB compression, 20 dBm typ.
- shielded metal cover
- aqueous washable
- protected by US Patent 6,807,407

Applications

- broadband wireless 4G system
- WiMax
- amateur radio
- wireless communications
- fixed microwave



Generic photo used for illustration purposes only

CASE STYLE: CK605

+RoHS Compliant

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

Electrical Specifications at 25°C

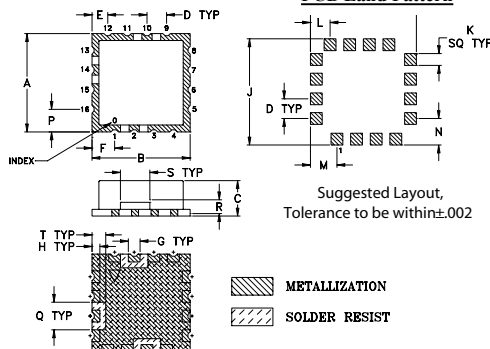
Parameter	Min.	Typ.	Max.	Unit
Frequency Range, RF	3220	—	4500	MHz
Frequency Range, LO	2370	—	3650	MHz
Frequency Range, IF	300	—	1500	MHz
Conversion Loss	—	8.6	9.8	dB
LO to RF Isolation	28	36	—	dB
LO to IF Isolation	25	32	—	dB
IP3	—	33	—	dBm
RF Input Power at 1 dB Compression	—	+20	—	dBm

Typical Performance Data

Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)	IP3 (dBm)	IF Freq. (MHz)	VSWR IF (:1)
RF	LO	LO +23dBm	LO +23dBm	LO +23dBm	LO +23dBm	LO +23dBm	LO +23dBm		LO +23dBm
3220	2370	7.73	36.18	37.19	2.45	3.74	33.77	290	1.98
3500	2650	7.49	43.81	45.20	1.84	4.88	32.85	410	1.78
3600	2750	7.42	44.44	41.81	1.66	4.23	33.39	500	1.64
3700	2850	7.40	43.91	39.37	1.48	3.34	34.11	600	1.52
3800	2950	7.45	44.73	37.42	1.36	3.04	34.40	700	1.45
3900	3050	7.55	47.43	36.34	1.30	2.97	35.16	800	1.42
4000	3150	7.59	49.82	35.87	1.25	2.85	34.80	900	1.43
4100	3250	7.69	49.67	35.83	1.19	2.71	33.56	1000	1.45
4150	3300	7.72	50.73	35.81	1.17	2.79	33.73	1100	1.48
4200	3350	7.90	51.77	35.68	1.14	2.74	33.36	1200	1.52
4300	3450	8.08	50.49	36.06	1.15	2.81	33.47	1300	1.57
4350	3500	8.06	47.88	35.81	1.22	2.48	35.11	1350	1.57
4400	3550	8.33	46.93	36.93	1.28	2.52	31.79	1400	1.61
4450	3600	8.31	44.70	37.50	1.38	2.42	31.63	1450	1.60
4500	3650	8.61	43.96	39.58	1.45	2.29	30.67	1500	1.65

Outline Drawing

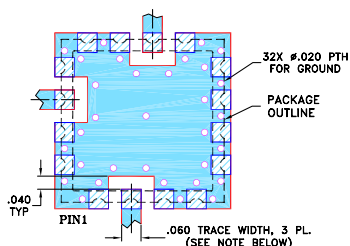
PCB Land Pattern



Outline Dimensions (inch)

A	B	C	D	E	F	G	H	J	K
.500	.500	.180	.100	.080	.115	.060	.040	.540	.060
12.7	12.7	4.572	2.54	2.032	2.921	1.524	1.016	13.72	1.524
L	M	N	P	Q	R	S	T	wt.	
.100	.135	.135	.115	.140	.070	.150	.070	grams	
2.54	3.429	3.429	2.921	3.556	1.778	3.81	1.778	1.0	

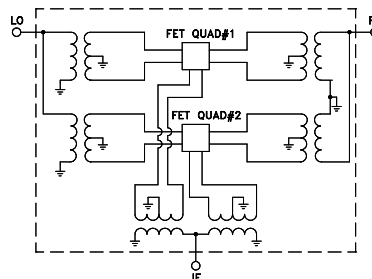
Demo Board MCL P/N: TB-433+ Suggested PCB Layout (PL-012)



NOTES: 1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

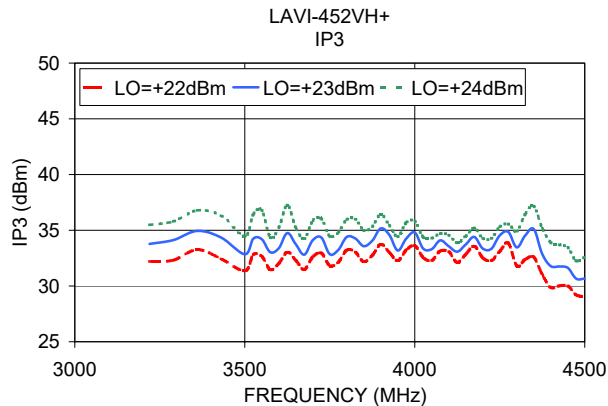
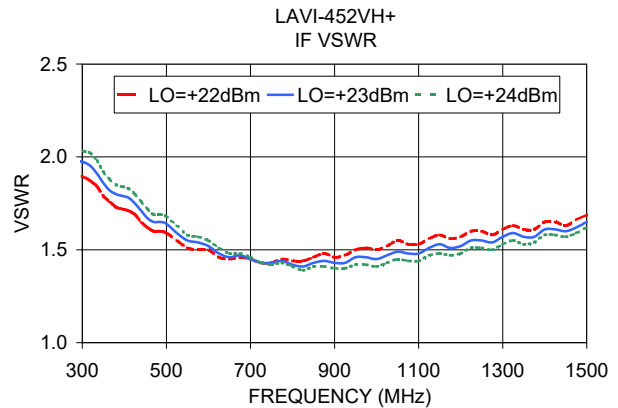
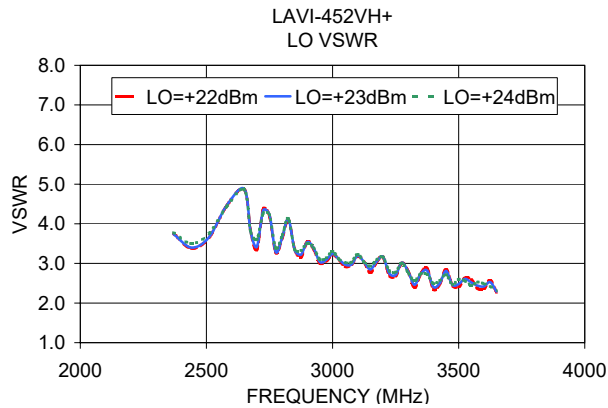
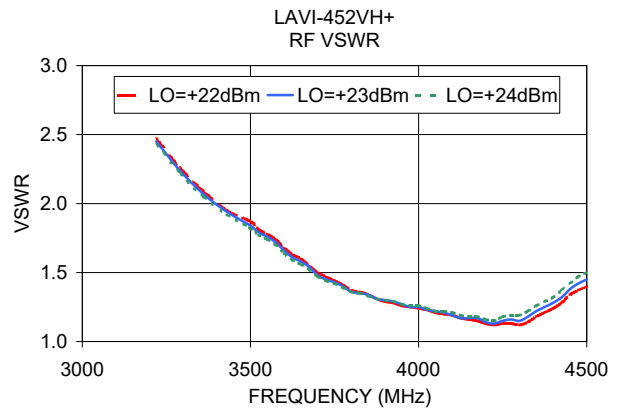
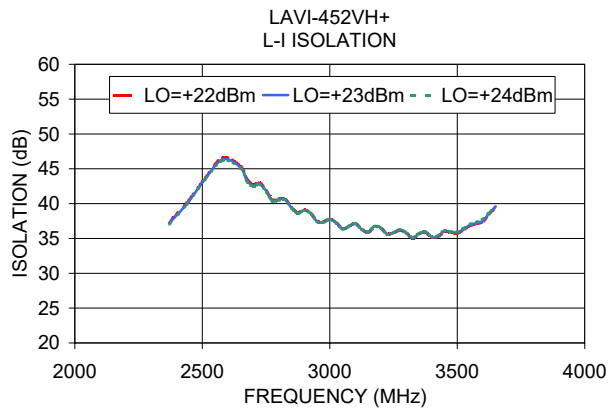
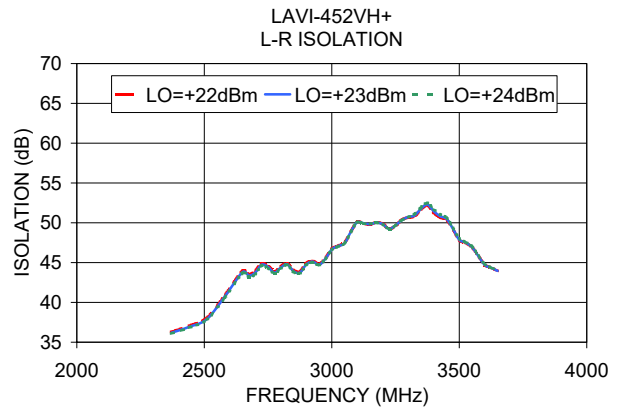
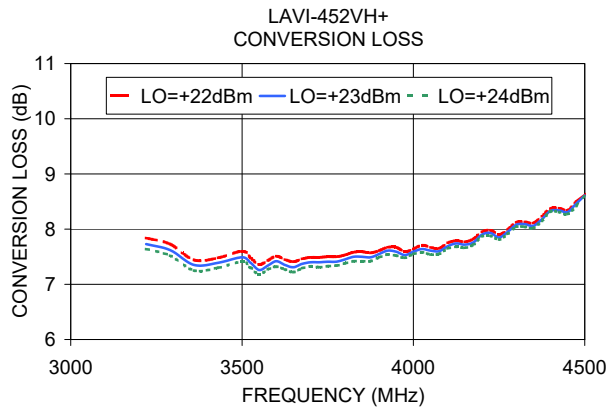
Electrical Schematic



Notes

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuits' 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





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

LAVI-452VH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=850MHz (dB)			RF (IN) (MHz)	LO (MHz)	IP-3 INPUT (dBm)			RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+20dBm (dB)		
		@LO (dBm)					@LO (dBm)					@LO (dBm)		
		+22	+23	+24			+22	+23	+24			+22	+23	+24
1500.1	650.1	10.69	10.62	10.54	1500.1	650.1	30.40	31.42	32.70	1500.1	650.1	1.80	2.09	2.03
1580.1	730.1	8.53	8.45	8.39	1580.1	730.1	27.30	28.17	29.08	1580.1	730.1	0.82	0.70	0.56
1660.1	810.1	7.77	7.73	7.69	1660.1	810.1	32.37	32.29	33.07	1660.1	810.1	0.53	0.36	0.19
1760.1	910.1	7.63	7.58	7.54	1760.1	910.1	36.56	37.51	36.51	1760.1	910.1	0.26	0.18	0.12
1840.1	990.1	7.72	7.65	7.59	1840.1	990.1	34.68	35.30	36.10	1840.1	990.1	0.34	0.25	0.18
1940.1	1090.1	7.81	7.75	7.68	1940.1	1090.1	33.96	35.13	37.16	1940.1	1090.1	0.35	0.26	0.21
2020.1	1170.1	8.12	8.05	7.99	2020.1	1170.1	32.38	33.93	35.21	2020.1	1170.1	0.47	0.35	0.27
2120.1	1270.1	8.27	8.20	8.14	2120.1	1270.1	32.00	33.28	35.06	2120.1	1270.1	0.47	0.35	0.27
2200.1	1350.1	8.49	8.42	8.35	2200.1	1350.1	31.25	31.96	33.14	2200.1	1350.1	0.50	0.37	0.29
2300.1	1450.1	8.74	8.68	8.62	2300.1	1450.1	31.42	32.01	33.07	2300.1	1450.1	0.41	0.29	0.20
2380.1	1530.1	8.76	8.70	8.66	2380.1	1530.1	30.57	31.16	31.79	2380.1	1530.1	0.53	0.40	0.30
2480.1	1630.1	9.00	8.95	8.90	2480.1	1630.1	31.89	32.15	33.31	2480.1	1630.1	0.43	0.31	0.23
2560.1	1710.1	8.54	8.47	8.40	2560.1	1710.1	31.44	32.18	33.07	2560.1	1710.1	0.41	0.30	0.22
2660.1	1810.1	8.40	8.30	8.22	2660.1	1810.1	30.49	31.79	32.79	2660.1	1810.1	0.58	0.43	0.31
2740.1	1890.1	8.39	8.29	8.21	2740.1	1890.1	32.04	32.51	34.09	2740.1	1890.1	0.46	0.33	0.24
2840.1	1990.1	8.45	8.35	8.26	2840.1	1990.1	30.81	32.36	33.11	2840.1	1990.1	0.47	0.34	0.25
2920.1	2070.1	8.51	8.41	8.33	2920.1	2070.1	32.18	33.88	34.77	2920.1	2070.1	0.36	0.28	0.21
3020.1	2170.1	8.42	8.32	8.24	3020.1	2170.1	30.71	32.55	33.33	3020.1	2170.1	0.42	0.30	0.21
3100.1	2250.1	8.18	8.09	8.00	3100.1	2250.1	31.48	33.02	35.24	3100.1	2250.1	0.42	0.31	0.22
3220.1	2370.1	7.98	7.87	7.77	3220.1	2370.1	29.78	31.10	32.51	3220.1	2370.1	0.55	0.42	0.31
3280.1	2430.1	7.84	7.74	7.65	3280.1	2430.1	30.20	31.38	32.71	3280.1	2430.1	0.43	0.32	0.23
3380.1	2530.1	7.76	7.66	7.57	3380.1	2530.1	30.13	31.37	32.60	3380.1	2530.1	0.42	0.31	0.24
3460.1	2610.1	7.70	7.59	7.50	3460.1	2610.1	28.76	29.86	31.12	3460.1	2610.1	0.49	0.39	0.30
3560.1	2710.1	7.76	7.67	7.58	3560.1	2710.1	30.07	31.14	32.17	3560.1	2710.1	0.39	0.31	0.24
3640.1	2790.1	7.87	7.78	7.69	3640.1	2790.1	30.31	31.16	32.82	3640.1	2790.1	0.41	0.32	0.25
3740.1	2890.1	7.95	7.86	7.78	3740.1	2890.1	30.80	32.29	33.36	3740.1	2890.1	0.36	0.28	0.22
3820.1	2970.1	8.07	7.98	7.91	3820.1	2970.1	32.62	33.63	35.06	3820.1	2970.1	0.37	0.29	0.22
3920.1	3070.1	8.18	8.10	8.04	3920.1	3070.1	31.66	32.43	33.60	3920.1	3070.1	0.34	0.26	0.20
4000.1	3150.1	8.33	8.25	8.18	4000.1	3150.1	31.09	32.11	32.73	4000.1	3150.1	0.32	0.24	0.17
4100.1	3250.1	8.25	8.20	8.15	4100.1	3250.1	31.14	31.99	32.54	4100.1	3250.1	0.87	0.70	0.61
4180.1	3330.1	8.37	8.32	8.27	4180.1	3330.1	30.96	31.43	31.91	4180.1	3330.1	0.59	0.47	0.38
4280.1	3430.1	8.48	8.42	8.38	4280.1	3430.1	32.16	32.62	33.21	4280.1	3430.1	0.51	0.36	0.23
4360.1	3510.1	8.57	8.52	8.48	4360.1	3510.1	30.48	31.98	33.19	4360.1	3510.1	0.77	0.59	0.46
4460.1	3610.1	8.61	8.55	8.50	4460.1	3610.1	30.29	31.33	32.98	4460.1	3610.1	0.72	0.56	0.40
4540.1	3690.1	8.84	8.75	8.71	4540.1	3690.1	26.83	28.10	29.04	4540.1	3690.1	1.15	0.83	0.65
4640.1	3790.1	9.06	8.99	8.97	4640.1	3790.1	27.52	28.77	29.38	4640.1	3790.1	0.94	0.68	0.52
4720.1	3870.1	9.24	9.20	9.17	4720.1	3870.1	28.85	30.26	31.13	4720.1	3870.1	0.87	0.60	0.43
4820.1	3970.1	9.48	9.44	9.41	4820.1	3970.1	28.12	29.27	30.06	4820.1	3970.1	1.03	0.74	0.54
4900.1	4050.1	9.82	9.75	9.71	4900.1	4050.1	26.03	27.35	27.87	4900.1	4050.1	1.92	1.49	1.25
5000.1	4150.1	10.11	10.04	10.00	5000.1	4150.1	26.86	28.35	29.76	5000.1	4150.1	1.72	1.30	1.02

Frequency Mixer

LAVI-452VH+

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=3860MHz (dB)
		@LO (dBm) +23
3169.9	690.1	11.12
3059.9	800.1	9.93
2949.9	910.1	9.36
2839.9	1020.1	9.26
2729.9	1130.1	8.85
2619.9	1240.1	8.79
2499.9	1360.1	8.70
2389.9	1470.1	8.68
2279.9	1580.1	8.63
2169.9	1690.1	8.59
2059.9	1800.1	8.36
1949.9	1910.1	8.69
1719.9	2140.1	8.29
1499.9	2360.1	8.19
1279.9	2580.1	7.89
1059.9	2800.1	7.98
839.9	3020.1	8.15
599.9	3260.1	8.31
379.9	3480.1	8.51
159.9	3700.1	8.99
60.1	3920.1	10.46
110.1	3970.1	9.37
170.1	4030.1	8.83
220.1	4080.1	8.73
280.1	4140.1	8.62
330.1	4190.1	8.69
390.1	4250.1	8.73
440.1	4300.1	8.70
500.1	4360.1	8.69
550.1	4410.1	8.58
610.1	4470.1	8.52
660.1	4520.1	8.51
720.1	4580.1	8.62
780.1	4640.1	8.77
830.1	4690.1	8.88
890.1	4750.1	9.02
940.1	4800.1	9.10
1000.1	4860.1	9.19
1050.1	4910.1	9.36
1110.1	4970.1	9.39

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=3220MHz (dB)
		@LO (dBm) +23
40.1	3260.1	11.00
70.1	3290.1	9.79
100.1	3320.1	9.21
130.1	3350.1	8.89
160.1	3380.1	8.77
190.1	3410.1	8.67
220.1	3440.1	8.56
260.1	3480.1	8.47
290.1	3510.1	8.48
320.1	3540.1	8.45
350.1	3570.1	8.46
380.1	3600.1	8.46
410.1	3630.1	8.42
450.1	3670.1	8.45
480.1	3700.1	8.47
510.1	3730.1	8.46
540.1	3760.1	8.53
570.1	3790.1	8.54
600.1	3820.1	8.51
630.1	3850.1	8.60
670.1	3890.1	8.61
700.1	3920.1	8.66
730.1	3950.1	8.66
760.1	3980.1	8.70
790.1	4010.1	8.73
820.1	4040.1	8.68
860.1	4080.1	8.69
890.1	4110.1	8.87
920.1	4140.1	8.80
950.1	4170.1	9.05
980.1	4200.1	8.98
1010.1	4230.1	9.12
1040.1	4260.1	9.30
1080.1	4300.1	9.15
1110.1	4330.1	9.35
1140.1	4360.1	9.20
1170.1	4390.1	9.12
1200.1	4420.1	9.21
1230.1	4450.1	9.09
1270.1	4490.1	9.16

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=4500.1MHz (dB)
		@LO (dBm) +23
3500.0	1000.1	10.63
3420.0	1080.1	10.28
3340.0	1160.1	9.94
3240.0	1260.1	9.78
3160.0	1340.1	9.67
3080.0	1420.1	9.32
2980.0	1520.1	8.95
2900.0	1600.1	9.41
2800.0	1700.1	9.83
2720.0	1780.1	9.19
2640.0	1860.1	9.10
2540.0	1960.1	9.08
2460.0	2040.1	8.92
2360.0	2140.1	8.82
2280.0	2220.1	9.17
2200.0	2300.1	8.83
2100.0	2400.1	9.07
2020.0	2480.1	8.87
1940.0	2560.1	8.91
1840.0	2660.1	8.82
1760.0	2740.1	8.68
1660.0	2840.1	8.60
1580.0	2920.1	8.63
1500.0	3000.1	8.53
1400.0	3100.1	8.75
1320.0	3180.1	8.78
1220.0	3280.1	8.84
1140.0	3360.1	8.76
1060.0	3440.1	8.70
960.0	3540.1	8.72
880.0	3620.1	8.70
800.0	3700.1	8.78
700.0	3800.1	8.89
620.0	3880.1	8.99
520.0	3980.1	8.98
440.0	4060.1	9.04
360.0	4140.1	9.06
260.0	4240.1	9.26
180.0	4320.1	9.68
80.0	4420.1	10.78

Frequency Mixer

LAVI-452VH+

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+22	+23	+24	+22	+23	+24
650.1	16.76	16.88	16.98	24.55	24.49	24.44
730.1	16.32	16.39	16.44	24.09	24.18	24.30
810.1	15.78	15.83	15.87	29.35	29.58	29.83
910.1	15.70	15.74	15.77	32.21	32.37	32.53
990.1	15.84	15.86	15.88	35.36	35.64	35.94
1090.1	15.87	15.87	15.87	39.82	40.07	40.35
1170.1	15.95	15.92	15.89	44.20	44.49	44.83
1270.1	16.84	16.78	16.74	52.85	52.78	52.80
1350.1	17.76	17.68	17.64	59.58	60.66	60.70
1450.1	19.55	19.46	19.40	47.31	47.59	47.70
1530.1	21.93	21.80	21.69	43.89	44.14	44.34
1630.1	24.70	24.56	24.45	41.20	41.39	41.51
1710.1	26.90	26.79	26.72	40.67	40.89	41.09
1810.1	29.27	29.15	29.06	41.49	41.72	41.92
1890.1	31.25	31.13	31.05	41.49	41.71	41.90
1990.1	32.92	32.83	32.77	40.60	40.76	40.92
2070.1	33.51	33.40	33.33	38.85	38.95	39.06
2170.1	34.35	34.22	34.13	36.58	36.62	36.70
2250.1	34.63	34.54	34.48	34.35	34.30	34.27
2370.1	33.88	33.80	33.76	33.78	33.64	33.51
2430.1	35.41	35.33	35.29	35.60	35.47	35.36
2530.1	36.59	36.50	36.47	38.22	38.10	37.98
2610.1	40.62	40.48	40.43	40.05	39.85	39.68
2710.1	40.03	40.00	40.03	39.08	38.89	38.72
2790.1	39.04	39.05	39.11	38.42	38.25	38.14
2890.1	40.50	40.54	40.64	37.63	37.56	37.50
2970.1	44.12	44.27	44.53	36.73	36.67	36.64
3070.1	44.91	45.04	45.29	35.66	35.62	35.60
3150.1	47.22	47.43	47.83	34.77	34.73	34.72
3250.1	50.67	51.08	51.59	34.22	34.15	34.14
3330.1	52.32	53.14	54.21	33.73	33.65	33.65
3430.1	51.94	52.92	54.03	33.01	32.94	32.92
3510.1	53.27	54.21	55.51	33.05	32.98	32.95
3610.1	44.43	44.78	45.24	33.80	33.74	33.72
3690.1	46.06	46.02	46.02	35.81	35.75	35.63
3790.1	46.27	46.39	46.36	38.67	38.64	38.49
3870.1	42.21	42.29	42.41	41.56	41.39	41.35
3970.1	46.15	46.55	47.03	44.72	44.46	44.33
4050.1	41.01	41.39	41.78	45.65	45.04	44.51
4150.1	36.80	36.93	37.16	44.08	43.86	43.75

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+22	+23	+24
1500.1	650.1	26.99	26.82	26.71
1580.1	730.1	36.79	36.42	36.26
1660.1	810.1	43.13	41.86	40.97
1760.1	910.1	38.58	38.45	38.47
1840.1	990.1	44.22	44.67	44.84
1940.1	1090.1	38.47	38.62	38.68
2020.1	1170.1	37.62	37.74	37.70
2120.1	1270.1	37.20	36.93	36.69
2200.1	1350.1	35.51	35.33	34.91
2300.1	1450.1	33.17	32.99	32.78
2380.1	1530.1	30.81	30.63	30.46
2480.1	1630.1	30.05	30.00	29.95
2560.1	1710.1	29.82	29.71	29.60
2660.1	1810.1	30.62	30.52	30.41
2740.1	1890.1	31.77	31.70	31.61
2840.1	1990.1	31.58	31.39	31.23
2920.1	2070.1	30.68	30.49	30.32
3020.1	2170.1	29.22	28.96	28.73
3100.1	2250.1	28.11	27.92	27.74
3220.1	2370.1	27.38	27.17	26.93
3280.1	2430.1	27.51	27.29	27.12
3380.1	2530.1	27.80	27.63	27.48
3460.1	2610.1	27.98	27.85	27.70
3560.1	2710.1	28.92	28.86	28.79
3640.1	2790.1	29.83	29.80	29.80
3740.1	2890.1	30.90	30.91	30.95
3820.1	2970.1	31.22	31.21	31.19
3920.1	3070.1	31.52	31.46	31.46
4000.1	3150.1	32.04	31.94	31.86
4100.1	3250.1	34.08	34.18	34.26
4180.1	3330.1	37.85	37.87	37.75
4280.1	3430.1	46.67	45.98	45.12
4360.1	3510.1	72.51	69.02	61.59
4460.1	3610.1	42.18	42.82	43.96
4540.1	3690.1	35.46	36.10	36.26
4640.1	3790.1	31.47	31.67	31.73
4720.1	3870.1	29.82	29.94	30.03
4820.1	3970.1	28.21	28.29	28.36
4900.1	4050.1	27.10	27.24	27.35
5000.1	4150.1	26.02	26.08	26.14

Frequency Mixer

LAVI-452VH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=3650MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+22	+23	+24		+22	+23	+24		+22	+23	+24
1500.1	650.1	2.33	2.34	2.34	650.1	3.50	3.51	3.52	100.1	3.16	3.25	3.34
1580.1	730.1	2.55	2.58	2.60	730.1	3.92	3.93	3.95	140.1	2.73	2.83	2.91
1660.1	810.1	2.62	2.64	2.66	810.1	4.08	4.09	4.09	190.1	2.39	2.48	2.56
1760.1	910.1	2.77	2.79	2.82	910.1	3.65	3.65	3.64	240.1	2.30	2.38	2.46
1840.1	990.1	2.85	2.87	2.89	990.1	3.29	3.28	3.28	300.1	2.12	2.17	2.23
1940.1	1090.1	3.01	3.02	3.04	1090.1	2.85	2.84	2.83	340.1	2.10	2.15	2.20
2020.1	1170.1	3.06	3.07	3.08	1170.1	2.59	2.59	2.58	390.1	1.99	2.02	2.05
2120.1	1270.1	3.08	3.08	3.09	1270.1	2.32	2.31	2.31	440.1	1.93	1.94	1.95
2200.1	1350.1	3.19	3.19	3.19	1350.1	2.15	2.14	2.14	480.1	1.88	1.87	1.87
2300.1	1450.1	3.32	3.32	3.32	1450.1	2.05	2.05	2.05	530.1	1.83	1.81	1.79
2380.1	1530.1	3.25	3.26	3.27	1530.1	2.05	2.05	2.04	580.1	1.78	1.74	1.71
2480.1	1630.1	3.13	3.13	3.14	1630.1	2.12	2.12	2.12	630.1	1.71	1.66	1.62
2560.1	1710.1	2.86	2.85	2.85	1710.1	2.27	2.27	2.26	680.1	1.71	1.66	1.61
2660.1	1810.1	2.88	2.87	2.86	1810.1	2.48	2.48	2.47	730.1	1.63	1.57	1.52
2740.1	1890.1	2.79	2.78	2.77	1890.1	2.69	2.69	2.68	780.1	1.62	1.57	1.52
2840.1	1990.1	2.69	2.68	2.67	1990.1	2.93	2.92	2.91	830.1	1.55	1.50	1.45
2920.1	2070.1	2.63	2.62	2.61	2070.1	3.15	3.15	3.14	870.1	1.52	1.47	1.43
3020.1	2170.1	2.40	2.39	2.38	2170.1	3.37	3.36	3.34	920.1	1.45	1.41	1.38
3100.1	2250.1	2.39	2.38	2.37	2250.1	3.49	3.48	3.45	970.1	1.40	1.37	1.35
3220.1	2370.1	2.24	2.23	2.23	2370.1	3.69	3.68	3.65	1020.1	1.32	1.31	1.29
3280.1	2430.1	2.14	2.14	2.13	2430.1	3.67	3.63	3.58	1070.1	1.26	1.26	1.25
3380.1	2530.1	2.12	2.11	2.11	2530.1	3.68	3.63	3.57	1120.1	1.18	1.19	1.20
3460.1	2610.1	1.96	1.96	1.96	2610.1	3.59	3.54	3.46	1170.1	1.11	1.12	1.14
3560.1	2710.1	1.91	1.90	1.90	2710.1	3.51	3.45	3.38	1220.1	1.03	1.04	1.07
3640.1	2790.1	1.91	1.91	1.91	2790.1	3.43	3.38	3.32	1260.1	1.04	1.03	1.05
3740.1	2890.1	1.82	1.82	1.82	2890.1	3.25	3.20	3.14	1310.1	1.14	1.12	1.11
3820.1	2970.1	1.79	1.79	1.79	2970.1	3.16	3.14	3.10	1360.1	1.24	1.21	1.19
3920.1	3070.1	1.73	1.73	1.74	3070.1	2.99	2.97	2.94	1410.1	1.38	1.34	1.31
4000.1	3150.1	1.64	1.65	1.65	3150.1	2.90	2.89	2.88	1460.1	1.50	1.46	1.42
4100.1	3250.1	1.58	1.58	1.59	3250.1	2.77	2.76	2.74	1510.1	1.66	1.61	1.56
4180.1	3330.1	1.55	1.55	1.56	3330.1	2.65	2.65	2.64	1560.1	1.81	1.76	1.70
4280.1	3430.1	1.44	1.44	1.45	3430.1	2.52	2.52	2.51	1610.1	1.90	1.85	1.79
4360.1	3510.1	1.37	1.37	1.38	3510.1	2.41	2.41	2.41	1650.1	2.00	1.94	1.89
4460.1	3610.1	1.31	1.31	1.32	3610.1	2.30	2.30	2.29	1700.1	2.03	1.97	1.91
4540.1	3690.1	1.21	1.21	1.22	3690.1	2.20	2.19	2.17	1750.1	2.09	2.03	1.98
4640.1	3790.1	1.18	1.20	1.21	3790.1	2.15	2.14	2.12	1800.1	2.04	1.98	1.93
4720.1	3870.1	1.21	1.24	1.26	3870.1	2.09	2.07	2.06	1850.1	2.07	2.02	1.97
4820.1	3970.1	1.23	1.26	1.28	3970.1	2.09	2.08	2.06	1900.1	1.97	1.93	1.89
4900.1	4050.1	1.21	1.25	1.27	4050.1	2.16	2.16	2.17	1950.1	1.96	1.93	1.90
5000.1	4150.1	1.32	1.36	1.39	4150.1	2.21	2.20	2.20	1990.1	1.84	1.81	1.79

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	---	---	6.69	3.08	36.83	36.46	34.24	65.88	39.14	56.80	---	---
1	---	34.65	---	30.55	23.74	40.09	44.19	47.16	67.29	68.51	82.29	76.17
2	117.63	52.51	65.78	73.78	67.59	65.61	69.32	66.06	95.29	88.27	83.01	95.97
3	125.87	102.86	85.65	82.33	73.60	71.63	82.03	88.02	102.19	95.28	111.69	109.31
4	121.36	112.48	113.09	108.62	109.02	103.73	95.01	102.54	112.18	111.07	114.35	111.39
5	119.55	111.79	111.26	114.56	115.01	115.21	110.84	116.73	106.21	114.02	114.16	112.78
6	117.26	106.98	107.75	109.41	111.39	115.75	116.83	115.34	114.79	116.52	115.37	115.03
7	116.97	---	103.37	107.64	110.65	112.65	114.07	114.36	112.19	115.61	118.09	113.42
8	117.51	---	---	105.04	108.83	111.85	111.57	114.53	113.92	115.18	113.05	115.90
9	116.47	---	---	---	103.13	109.14	109.28	107.66	112.88	113.50	115.13	116.93
10	116.01	---	---	---	---	---	106.53	110.23	110.90	110.87	114.74	114.18
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 3860 MHz; 0 dBm.
LO IN: 3010 MHz; +23.00 dBm
IF OUT: 850 MHz; -7.51 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	---	---	15.80	12.85	42.28	48.39	45.27	72.30	50.03	67.06	---	---
1	---	34.90	---	30.21	23.84	39.48	44.47	47.64	67.55	68.84	86.42	77.37
2	102.61	41.76	56.69	72.41	61.13	55.89	56.78	55.72	82.51	79.51	73.78	89.74
3	118.34	83.08	64.16	63.52	52.33	52.81	60.48	66.64	77.14	75.47	93.12	89.60
4	115.53	104.26	96.99	77.65	83.35	76.34	68.46	78.37	83.49	87.63	93.62	118.50
5	114.97	111.00	116.28	95.54	92.83	88.91	77.19	72.66	71.20	76.64	84.75	93.18
6	110.71	114.91	119.09	117.60	111.82	111.98	102.00	94.12	92.06	87.88	91.71	110.60
7	110.32	---	115.70	117.18	120.60	121.67	108.55	112.14	98.49	88.98	89.74	86.28
8	109.10	---	---	114.51	118.24	121.22	121.03	123.19	125.43	114.32	107.69	102.54
9	107.76	---	---	---	116.15	117.14	120.25	119.02	120.61	124.83	121.95	106.06
10	110.78	---	---	---	---	---	116.53	118.85	121.41	121.98	124.12	123.49
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 3860 MHz; 10 dBm.
LO IN: 3010 MHz; +23.00 dBm
IF OUT: 850 MHz; 2.48 dBm

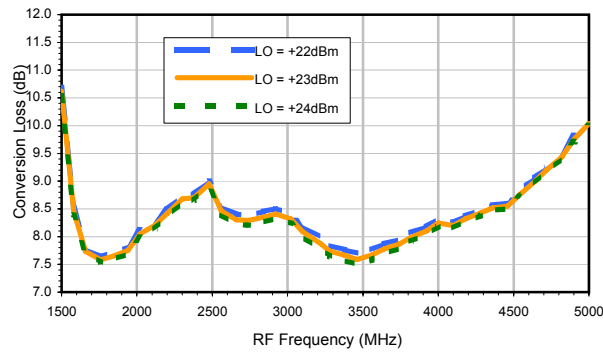
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

Frequency Mixer

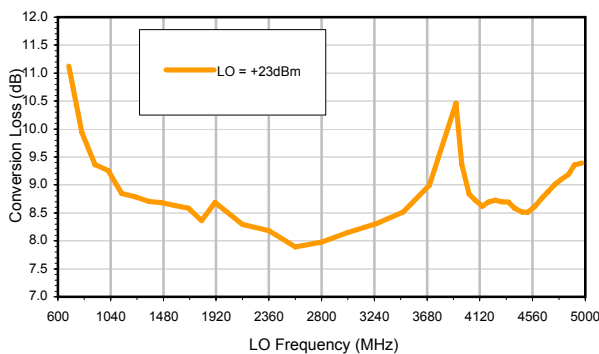
LAVI-452VH+

Typical Performance Curves

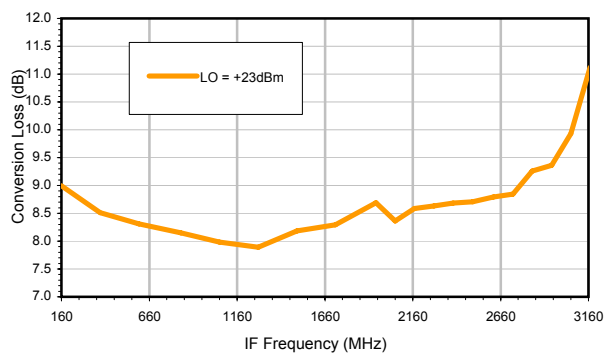
Conversion Loss @IF=850 MHz



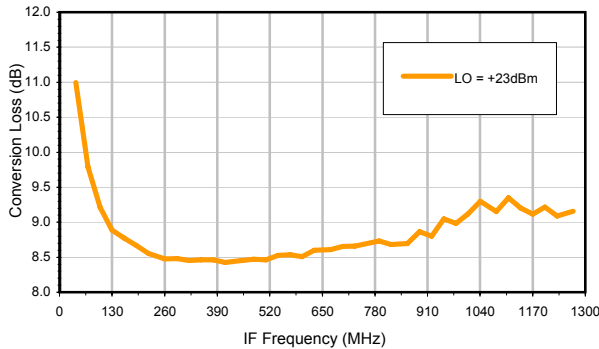
Conversion Loss vs. LO @ RF=3860 MHz



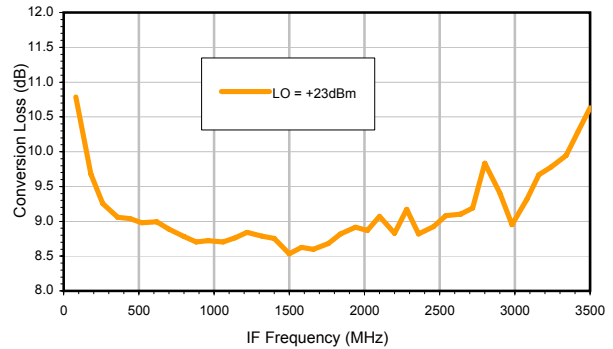
Conversion Loss vs. IF @ RF=3860 MHz



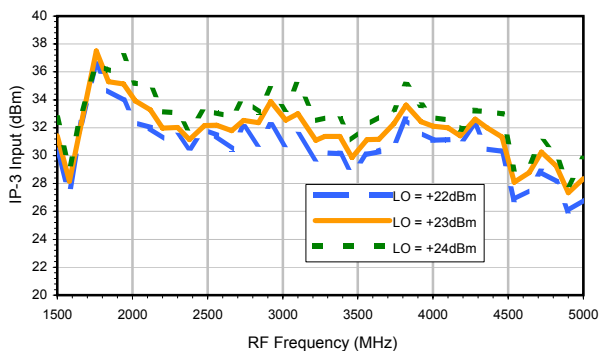
Conversion Loss vs. IF @ RF=3220 MHz



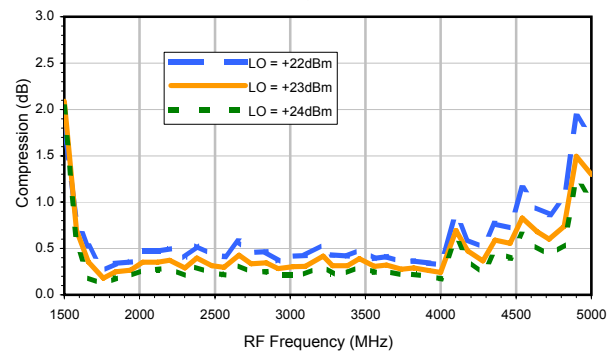
Conversion Loss vs. IF @ RF=4500.1 MHz



IP-3 Input



Compression @RF IN=+20 dBm

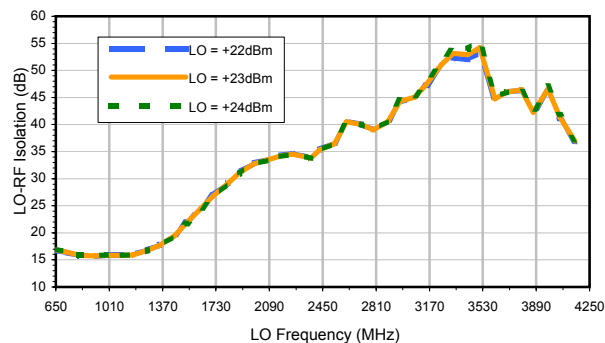


Frequency Mixer

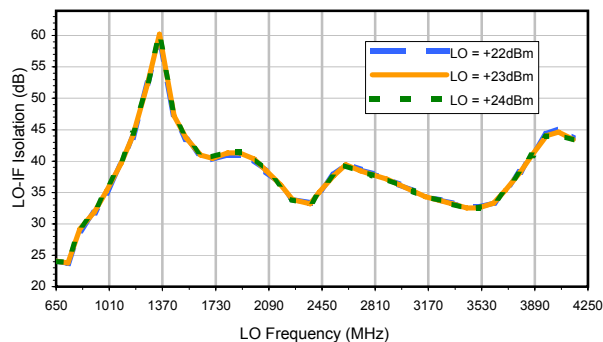
LAVI-452VH+

Typical Performance Curves

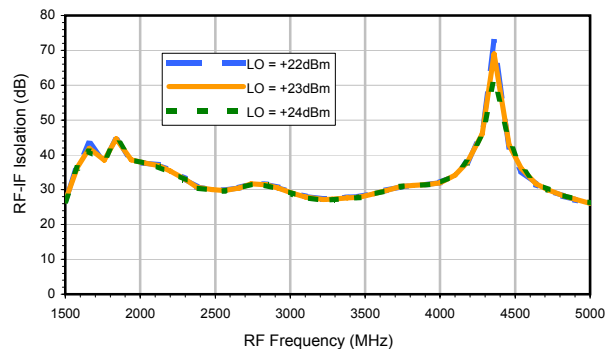
LO-RF Isolation



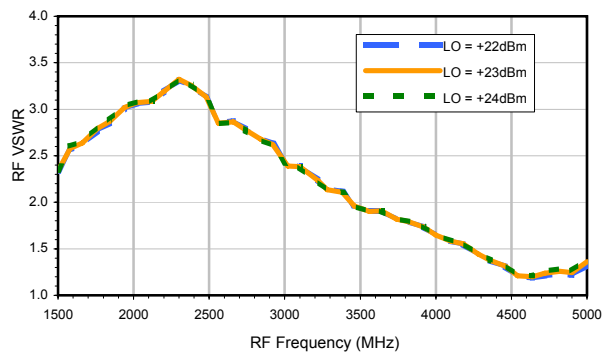
LO-IF Isolation



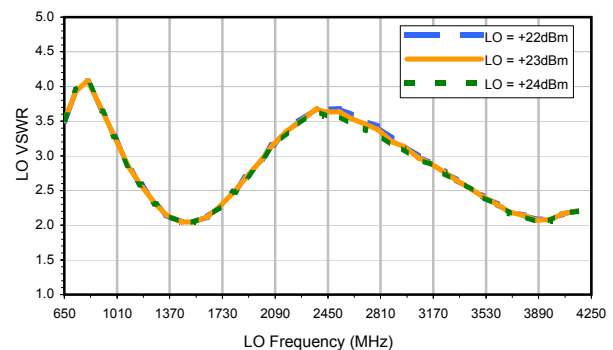
RF-IF Isolation



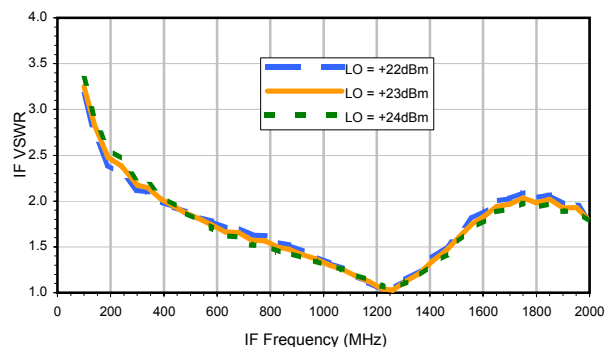
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	---	---	6.69	3.08	36.83	36.46	34.24	65.88	39.14	56.80	---	---
1	---	34.65	---	30.55	23.74	40.09	44.19	47.16	67.29	68.51	82.29	76.17
2	117.63	52.51	65.78	73.78	67.59	65.61	69.32	66.06	95.29	88.27	83.01	95.97
3	125.87	102.86	85.65	82.33	73.60	71.63	82.03	88.02	102.19	95.28	111.69	109.31
4	121.36	112.48	113.09	108.62	109.02	103.73	95.01	102.54	112.18	111.07	114.35	111.39
5	119.55	111.79	111.26	114.56	115.01	115.21	110.84	116.73	106.21	114.02	114.16	112.78
6	117.26	106.98	107.75	109.41	111.39	115.75	116.83	115.34	114.79	116.52	115.37	115.03
7	116.97	---	103.37	107.64	110.65	112.65	114.07	114.36	112.19	115.61	118.09	113.42
8	117.51	---	---	105.04	108.83	111.85	111.57	114.53	113.92	115.18	113.05	115.90
9	116.47	---	---	---	103.13	109.14	109.28	107.66	112.88	113.50	115.13	116.93
10	116.01	---	---	---	---	---	106.53	110.23	110.90	110.87	114.74	114.18
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 3860 MHz; 0 dBm.
LO IN: 3010 MHz; +23.00 dBm
IF OUT: 850 MHz; -7.51 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	---	---	15.80	12.85	42.28	48.39	45.27	72.30	50.03	67.06	---	---
1	---	34.90	---	30.21	23.84	39.48	44.47	47.64	67.55	68.84	86.42	77.37
2	102.61	41.76	56.69	72.41	61.13	55.89	56.78	55.72	82.51	79.51	73.78	89.74
3	118.34	83.08	64.16	63.52	52.33	52.81	60.48	66.64	77.14	75.47	93.12	89.60
4	115.53	104.26	96.99	77.65	83.35	76.34	68.46	78.37	83.49	87.63	93.62	118.50
5	114.97	111.00	116.28	95.54	92.83	88.91	77.19	72.66	71.20	76.64	84.75	93.18
6	110.71	114.91	119.09	117.60	111.82	111.98	102.00	94.12	92.06	87.88	91.71	110.60
7	110.32	---	115.70	117.18	120.60	121.67	108.55	112.14	98.49	88.98	89.74	86.28
8	109.10	---	---	114.51	118.24	121.22	121.03	123.19	125.43	114.32	107.69	102.54
9	107.76	---	---	---	116.15	117.14	120.25	119.02	120.61	124.83	121.95	106.06
10	110.78	---	---	---	---	---	116.53	118.85	121.41	121.98	124.12	123.49
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

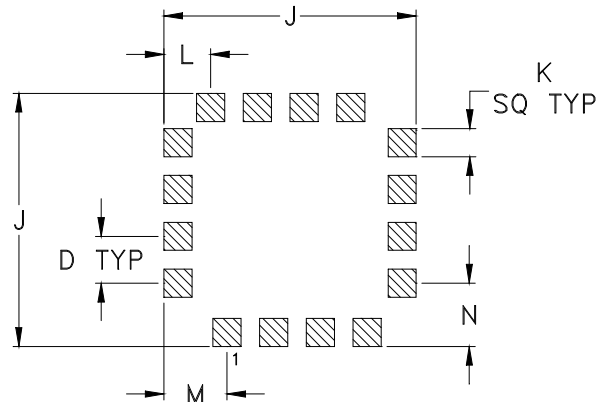
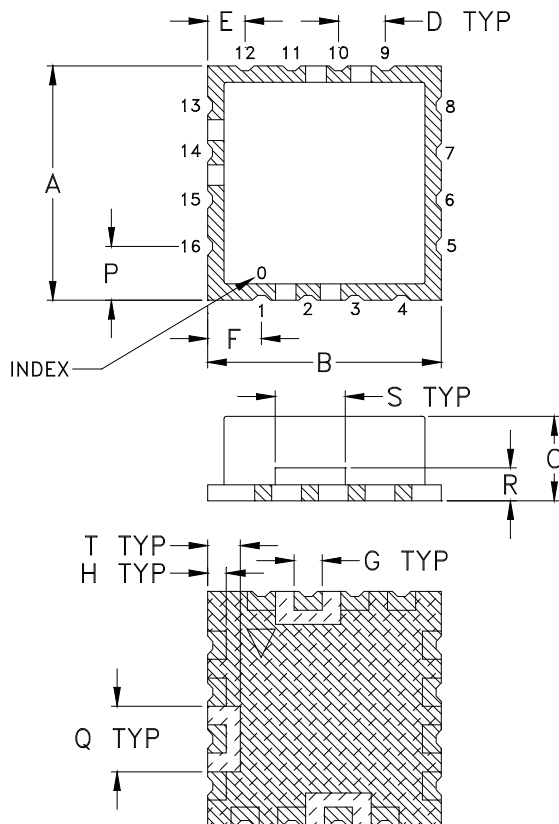
Test conditions: RF IN: 3860 MHz; 10 dBm.
LO IN: 3010 MHz; +23.00 dBm
IF OUT: 850 MHz; 2.48 dBm

- 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

CK605

PCB Land Pattern



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

CASE #	A	B	C	D	E	F	G	H	J	K
CK605	.500 (12.70)	.500 (12.70)	.180 (4.57)	.100 (2.54)	.080 (2.03)	.115 (2.92)	.060 (1.52)	.040 (1.02)	.540 (13.72)	.060 (1.52)

CASE #	L	M	N	P	Q	R	S	T	WT. GRAM
CK605	.100 (2.54)	.135 (3.43)	.135 (3.43)	.115 (2.92)	.140 (3.56)	.070 (1.78)	.150 (3.81)	.070 (1.78)	1.2 +0.5 -0.0

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .03$; 3Pl. $\pm .015$

Notes:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- Termination finish:
For RoHS Case Styles: 3-5 μ inch (.08-.13 microns) Gold over 120-240 μ inch (3.05-6.10 microns) Nickel plate.
All models, (+) suffix.



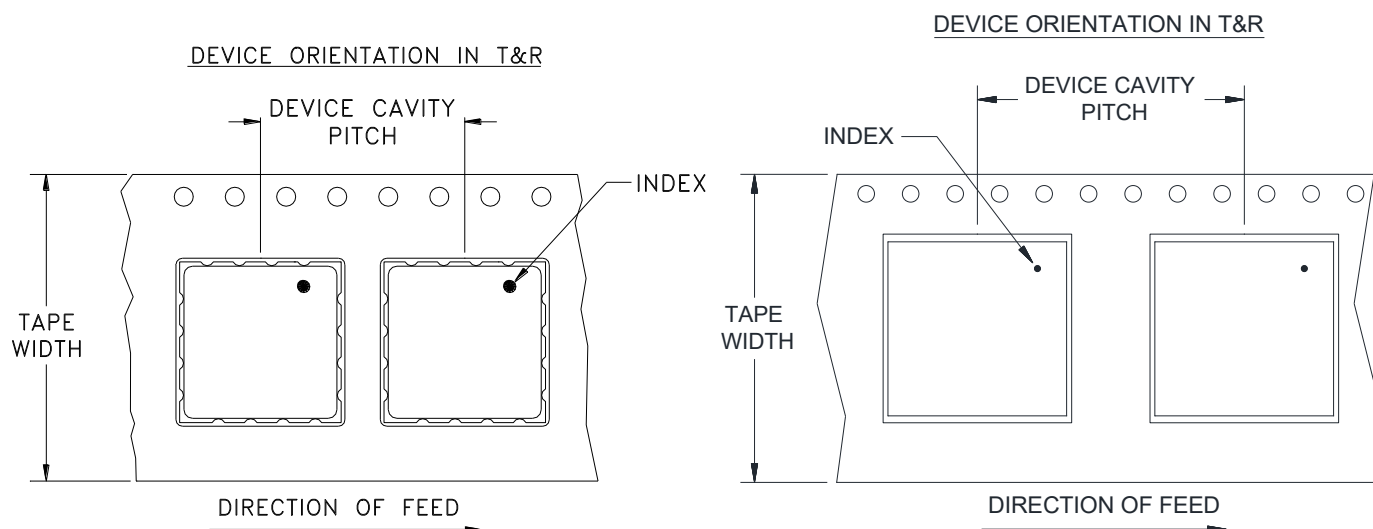
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F37



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
24	16	7	Small quantity standards (see note)	10
				20
				50
				100
		13	Standard	200
				500

Note: Please consult individual model data sheet to determine device per reel availability.

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



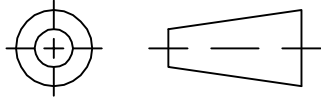
INTERNET <http://www.minicircuits.com>

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

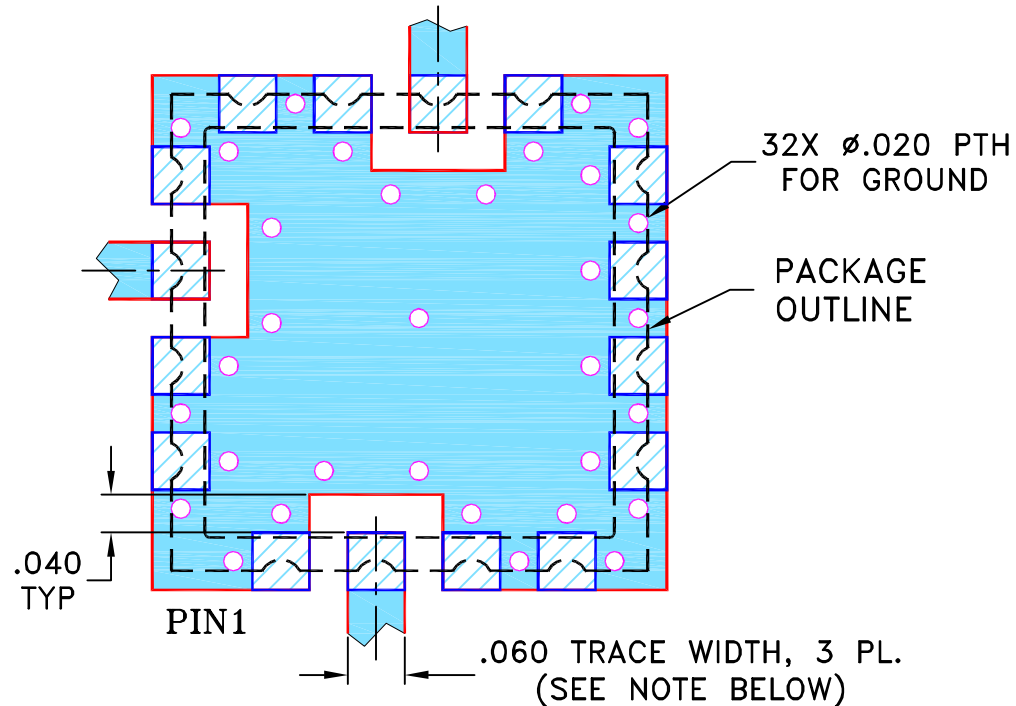
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
E	M105563	ADDED "rl" PIN CONNECTION	06/02/06	MMG	DJ
F	M105640	CORRECTED NOTE 2	06/08/06	MMG	MM
G	M124395	ADDED "RAMP"	09/09	EM	HH
G	R77589	ADDED "RAMP"	09/09	EM	HH

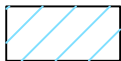
SUGGESTED MOUNTING CONFIGURATION FOR
CK605 CASE STYLE, "kg/rl/16AM01" PIN CONNECTION

NOTES:

1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS .030" $\pm$.002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE BOTTOM 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 $\pm$ 3 PL DECIMALS $\pm$.005ANGLES $\pm$ FRACTIONS $\pm$

DRAWN

AV

08/07/00

CHECKED

SK

08/08/00

APPROVED

DB

08/08/00

Mini-Circuits®

THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE, MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.

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



Mini-Circuits® 13 Neptune Avenue
Brooklyn NY 11235

PL,kg/rl/16AM01,CK605,ROS/LAVI/RAMP

SIZE
A

CODE IDENT
15542

DRAWING NO:
98-PL-012

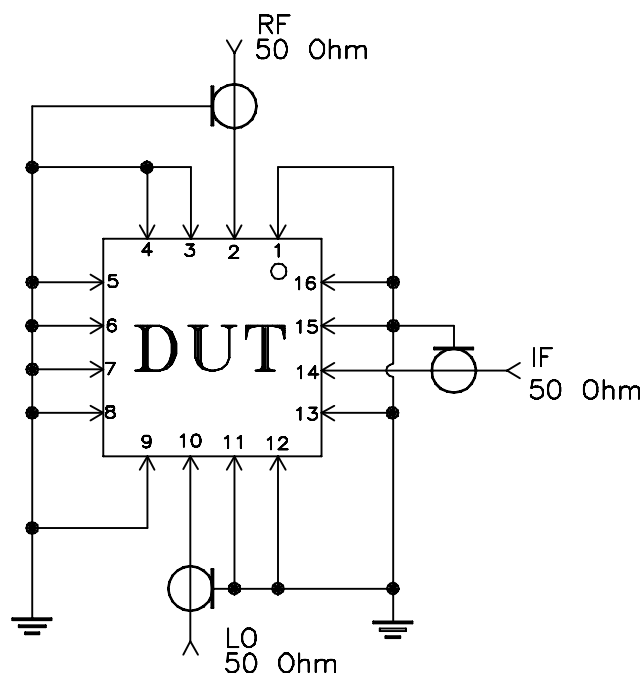
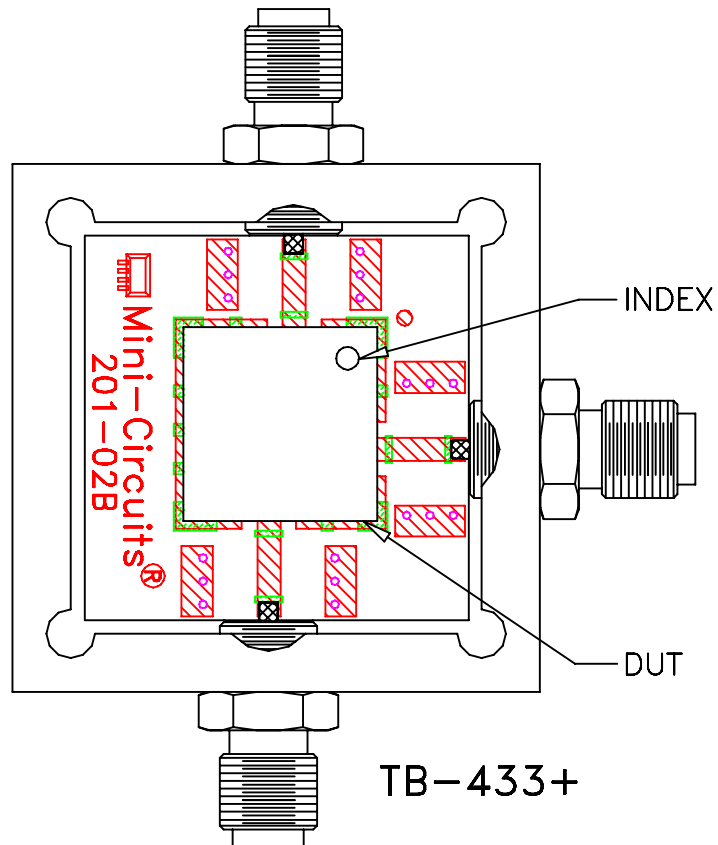
REV:
G

FILE: 98PL012

SCALE: 5:1

SHEET: 1 OF 1

Evaluation Board and Circuit



Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.028 inch.

Schematic Diagram

 **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	-45° to 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutectic Process: 225°C peak Pb-Free Process, 245°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, 95% Coverage
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215