

High IP3 Frequency Mixer

Level 21 (LO Power +21 dBm) 270 to 970 MHz

LAVI-971VH+

Maximum Ratings

Operating Temperature	-45°C to 85°C
Storage Temperature	-55°C to 100°C
LO Power	+24 dBm
RF Power	+21 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

- excellent IP2, 60 dBm typ.
- very high IP3, 33 dBm typ.
- excellent L-R isolation, 48 dB typ; and L-I isolation, 36 dB typ.
- high 1 dB compression, 20 dBm typ.
- shielded metal cover
- aqueous washable
- protected by US Patent 6,807,407

Applications

- cellular base stations
- mobile radio
- defense communications
- industrial communications



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 (T_{AMB} = 25°C)

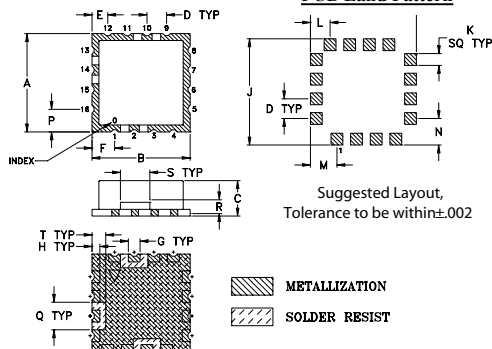
FREQUENCY (MHz)			CONVERSION LOSS (dB)			RF in at 1dB Compr. (dBm)	IP3 (dBm)	IP2 (dBm)	LO-RF ISOLATION (dB)		LO-IF ISOLATION (dB)	
RF	LO	IF	Typ.	σ	Max.	Typ.	Typ.	Typ.	Typ.	Min.	Typ.	Min.
270-970	340-1040	10-600	7.5	0.12	9.5	+20	33	60	48	32	36	28

Typical Performance Data

Frequency (MHz)		Conv. Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)	IP3 (dBm)	IP2 (dBm)	IF Freq. (MHz)	VSWR IF (:1)
RF	LO	LO +21dBm	LO +21dBm	LO +21dBm	LO +21dBm	LO +21dBm	LO +21dBm	LO +21dBm		LO +21dBm
263.60	336.60	6.86	56.36	40.04	1.36	4.43	30.78	70.53	10.00	1.14
295.30	368.30	6.90	58.28	39.90	1.36	4.54	31.20	70.77	41.70	1.10
327.00	400.00	7.01	56.66	39.10	1.36	4.75	30.63	66.84	73.40	1.17
367.00	440.00	6.91	54.07	37.65	1.33	3.38	32.15	65.28	105.10	1.25
407.00	480.00	7.01	53.48	38.10	1.32	3.59	31.30	60.99	136.80	1.30
487.00	560.00	7.11	50.85	38.26	1.28	2.61	33.82	63.96	200.20	1.42
527.00	600.00	7.24	47.68	37.36	1.27	2.37	33.56	64.16	231.90	1.50
567.00	640.00	7.42	46.99	37.73	1.26	2.07	34.15	59.84	263.60	1.57
607.00	680.00	7.54	45.44	36.77	1.26	2.17	33.70	60.56	295.30	1.66
647.00	720.00	7.58	43.92	35.61	1.26	1.92	34.92	58.31	327.00	1.76
687.00	760.00	7.56	43.00	35.27	1.27	2.35	35.35	60.45	367.00	1.85
767.00	840.00	7.50	43.00	36.38	1.33	2.68	33.34	59.13	447.00	2.12
807.00	880.00	7.61	43.56	37.66	1.36	2.23	33.60	60.43	527.00	2.35
847.00	920.00	7.89	44.73	40.20	1.39	2.88	32.28	57.83	967.00	2.51
1007.00	1080.00	8.31	40.03	43.62	1.59	2.19	31.58	55.31	1007.00	2.63

Outline Drawing

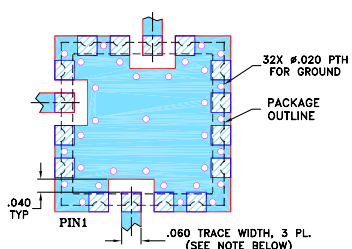
PCB Land Pattern



Outline Dimensions (inch)

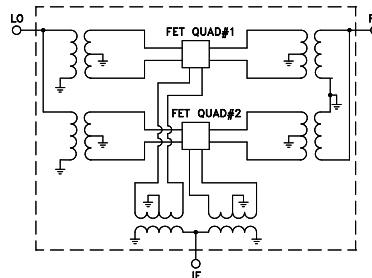
A	B	C	D	E	F	G	H	J	K
.500	.500	.180	.100	.080	.115	.060	.040	.540	.060
12.7	12.7	4.572	2.54	2.032	2.921	1.524	1.016	13.72	1.524
L	M	N	P	Q	R	S	T	wt.	
.100	.135	.135	.115	.140	.070	.150	.070	grams	
2.54	3.429	3.429	2.921	3.556	1.778	3.81	1.778	1.0	

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

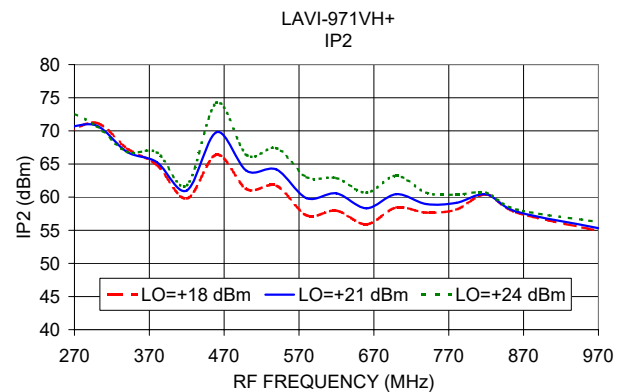
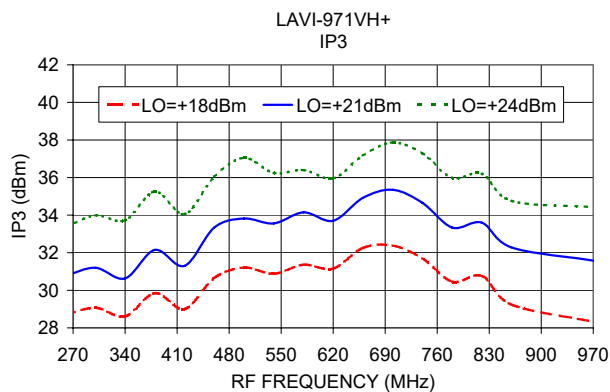
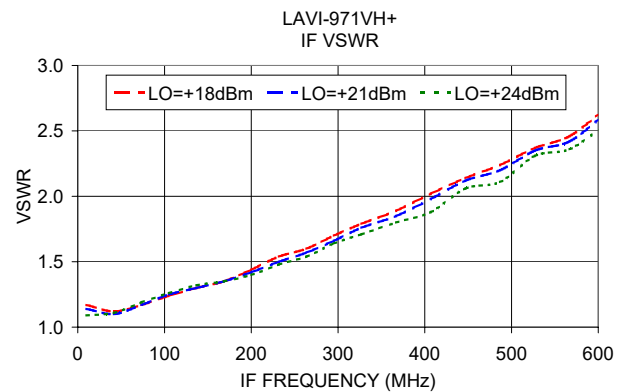
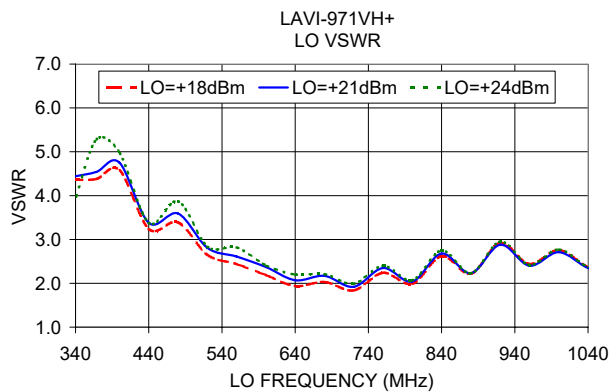
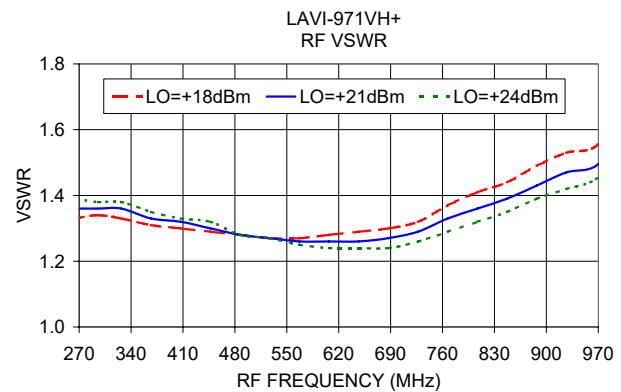
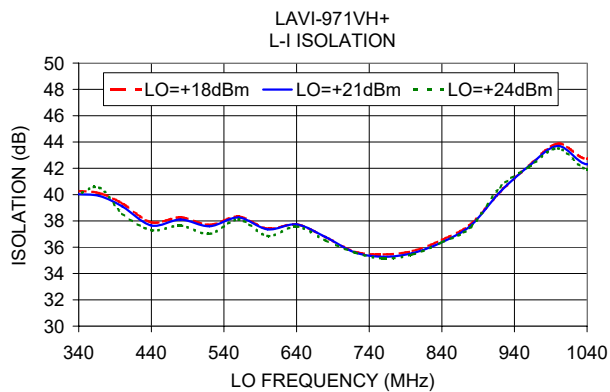
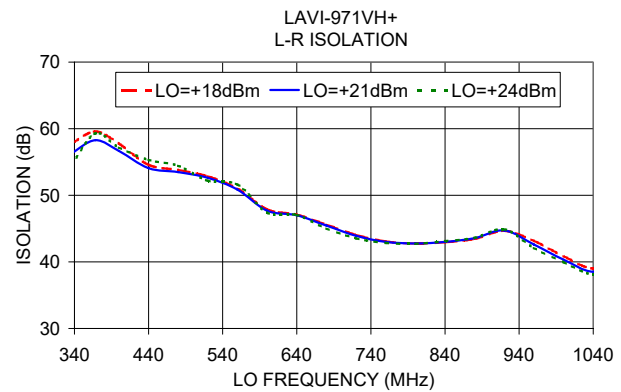
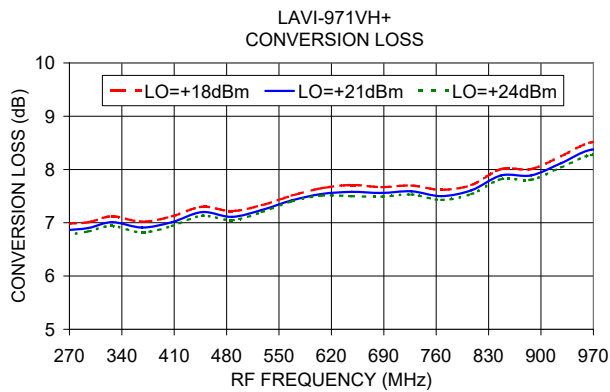
Electrical Schematic



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





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Frequency Mixer

LAVI-971VH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=70MHz (dB)		
		@LO (dBm)		
		+19	+21	+23
10.1	80.1	7.00	6.90	6.81
40.1	110.1	7.06	6.95	6.88
70.1	140.1	7.28	7.21	7.14
100.1	170.1	7.41	7.33	7.26
130.1	200.1	7.39	7.30	7.23
160.1	230.1	7.45	7.37	7.31
190.1	260.1	7.47	7.39	7.33
220.1	290.1	7.36	7.29	7.23
250.1	320.1	7.37	7.30	7.24
280.1	350.1	7.51	7.43	7.37
310.1	380.1	7.40	7.32	7.26
340.1	410.1	7.41	7.34	7.29
370.1	440.1	7.52	7.45	7.40
400.1	470.1	7.52	7.45	7.40
430.1	500.1	7.56	7.49	7.45
460.1	530.1	7.63	7.58	7.54
490.1	560.1	7.63	7.57	7.53
520.1	590.1	7.64	7.58	7.53
550.1	620.1	7.74	7.69	7.65
580.1	650.1	7.85	7.80	7.75
610.1	680.1	7.95	7.88	7.83
640.1	710.1	8.00	7.93	7.88
670.1	740.1	8.01	7.94	7.89
700.1	770.1	8.00	7.94	7.86
730.1	800.1	8.05	7.98	7.94
760.1	830.1	8.09	8.02	7.97
790.1	860.1	8.12	8.04	7.99
820.1	890.1	8.20	8.12	8.06
850.1	920.1	8.28	8.21	8.14
880.1	950.1	8.40	8.32	8.27
910.1	980.1	8.56	8.49	8.43
940.1	1010.1	8.71	8.62	8.56
970.1	1040.1	8.80	8.70	8.64
1000.1	1070.1	8.90	8.80	8.72
1040.1	1110.1	9.07	8.95	8.84
1070.1	1140.1	9.23	9.09	8.96
1110.1	1180.1	9.73	9.55	9.40
1140.1	1210.1	10.35	10.16	10.02
1180.1	1250.1	11.45	11.24	11.07
1210.1	1280.1	12.83	12.58	12.38

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+19	+21	+23
10.1	80.1	23.69	25.84	27.71
40.1	110.1	26.99	27.60	28.34
70.1	140.1	26.88	27.85	28.88
100.1	170.1	27.08	28.31	29.03
130.1	200.1	27.35	28.46	29.48
160.1	230.1	27.66	28.58	29.69
190.1	260.1	28.49	29.63	30.73
220.1	290.1	28.91	30.11	31.29
250.1	320.1	28.40	29.68	30.86
280.1	350.1	28.23	29.44	30.67
310.1	380.1	29.09	30.44	31.95
340.1	410.1	28.96	30.47	31.79
370.1	440.1	29.39	30.79	32.05
400.1	470.1	29.92	31.57	32.78
430.1	500.1	30.34	31.87	33.81
460.1	530.1	31.02	32.74	34.27
490.1	560.1	31.56	33.26	34.83
520.1	590.1	32.19	34.06	35.95
550.1	620.1	33.25	34.60	36.38
580.1	650.1	32.73	34.40	36.02
610.1	680.1	32.92	34.76	35.94
640.1	710.1	33.16	34.45	35.96
670.1	740.1	32.85	34.48	35.92
700.1	770.1	33.45	35.15	37.16
730.1	800.1	33.03	34.99	36.42
760.1	830.1	32.59	34.51	35.93
790.1	860.1	32.21	34.04	36.33
820.1	890.1	31.27	33.32	34.73
850.1	920.1	30.36	31.99	33.65
880.1	950.1	30.04	31.61	33.29
910.1	980.1	29.71	31.36	33.02
940.1	1010.1	29.27	31.18	33.41
970.1	1040.1	28.65	30.72	32.56
1000.1	1070.1	27.47	29.57	31.56
1040.1	1110.1	25.47	27.36	29.26
1070.1	1140.1	23.53	25.39	27.26
1110.1	1180.1	20.30	21.83	23.48
1140.1	1210.1	18.96	20.48	22.13
1180.1	1250.1	16.93	18.58	20.61
1210.1	1280.1	15.41	16.69	18.43

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+20dBm (dB)		
		@LO (dBm)		
		+19	+21	+23
10.1	80.1	3.07	1.92	1.15
40.1	110.1	1.13	0.65	0.42
70.1	140.1	0.64	0.41	0.28
100.1	170.1	0.60	0.39	0.27
130.1	200.1	0.55	0.36	0.25
160.1	230.1	0.55	0.36	0.24
190.1	260.1	0.45	0.30	0.20
220.1	290.1	0.39	0.26	0.17
250.1	320.1	0.43	0.28	0.19
280.1	350.1	0.52	0.34	0.22
310.1	380.1	0.41	0.26	0.17
340.1	410.1	0.37	0.24	0.16
370.1	440.1	0.37	0.24	0.16
400.1	470.1	0.39	0.25	0.16
430.1	500.1	0.32	0.19	0.13
460.1	530.1	0.27	0.16	0.11
490.1	560.1	0.27	0.16	0.11
520.1	590.1	0.33	0.20	0.13
550.1	620.1	0.30	0.17	0.11
580.1	650.1	0.30	0.18	0.11
610.1	680.1	0.29	0.16	0.10
640.1	710.1	0.30	0.18	0.11
670.1	740.1	0.34	0.20	0.13
700.1	770.1	0.34	0.21	0.13
730.1	800.1	0.40	0.24	0.15
760.1	830.1	0.45	0.27	0.17
790.1	860.1	0.49	0.29	0.17
820.1	890.1	0.61	0.37	0.23
850.1	920.1	0.71	0.45	0.26
880.1	950.1	0.80	0.48	0.28
910.1	980.1	0.96	0.57	0.32
940.1	1010.1	1.21	0.67	0.37
970.1	1040.1	1.48	0.82	0.45
1000.1	1070.1	1.85	1.08	0.60
1040.1	1110.1	2.63	1.69	0.98
1070.1	1140.1	3.28	2.30	1.43
1110.1	1180.1	4.11	3.07	2.13
1140.1	1210.1	4.68	3.61	2.58
1180.1	1250.1	5.16	4.13	3.09
1210.1	1280.1	5.27	4.24	3.22

Frequency Mixer

LAVI-971VH+

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=490.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=10.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=970.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+21			+21			+21
480.0	10.1	9.76	10.0	20.1	7.82	960.0	10.1	10.88
447.6	42.5	8.15	50.0	60.1	6.94	940.0	30.1	9.54
415.2	74.9	7.95	90.0	100.1	6.84	920.0	50.1	9.40
399.0	91.1	7.96	130.0	140.1	6.87	900.0	70.1	9.29
366.6	123.5	7.92	170.0	180.1	6.87	880.0	90.1	9.17
350.3	139.8	7.86	190.0	200.1	6.96	860.0	110.1	9.14
317.9	172.2	7.84	230.0	240.1	7.05	840.0	130.1	9.10
301.7	188.4	7.82	250.0	260.1	7.01	810.0	160.1	9.07
269.3	220.8	7.72	290.0	300.1	6.97	790.0	180.1	9.04
253.1	237.0	7.72	310.0	320.1	7.10	760.0	210.1	9.02
220.7	269.4	7.68	350.0	360.1	7.11	740.0	230.1	9.09
204.5	285.6	7.63	370.0	380.1	7.08	710.0	260.1	8.94
172.1	318.0	7.67	410.0	420.1	7.10	690.0	280.1	8.96
155.9	334.2	7.63	430.0	440.1	7.14	660.0	310.1	8.98
123.4	366.7	7.65	470.0	480.1	7.18	640.0	330.1	8.91
107.2	382.9	7.66	490.0	500.1	7.19	610.0	360.1	8.94
74.8	415.3	7.67	530.0	540.1	7.26	590.0	380.1	8.96
58.6	431.5	7.66	550.0	560.1	7.30	560.0	410.1	8.91
26.2	463.9	7.64	590.0	600.1	7.37	540.0	430.1	8.87
10.0	480.1	7.78	610.0	620.1	7.33	510.0	460.1	8.81
34.8	524.9	7.53	650.0	660.1	7.26	490.0	480.1	8.77
59.7	549.8	7.60	670.0	680.1	7.34	460.0	510.1	8.73
109.3	599.4	7.58	710.0	720.1	7.31	440.0	530.1	8.64
134.1	624.2	7.54	730.0	740.1	7.38	410.0	560.1	8.68
183.8	673.9	7.84	770.0	780.1	7.58	390.0	580.1	8.65
208.6	698.7	7.84	790.0	800.1	7.55	360.0	610.1	8.65
258.3	748.4	7.75	830.0	840.1	7.68	340.0	630.1	8.58
283.1	773.2	7.76	850.0	860.1	7.60	310.0	660.1	8.52
332.8	822.9	7.87	890.0	900.1	7.74	290.0	680.1	8.40
357.6	847.7	7.94	910.0	920.1	7.89	260.0	710.1	8.45
407.2	897.3	8.09	950.0	960.1	8.09	240.0	730.1	8.44
432.1	922.2	8.12	970.0	980.1	8.18	210.0	760.1	8.41
481.7	971.8	8.38	1010.0	1020.1	8.27	190.0	780.1	8.34
506.6	996.7	8.41	1030.0	1040.1	8.25	160.0	810.1	8.30
556.2	1046.3	8.58	1070.0	1080.1	8.53	140.0	830.1	8.28
581.0	1071.1	8.72	1090.0	1100.1	8.50	110.0	860.1	8.27
630.7	1120.8	8.88	1130.0	1140.1	8.87	90.0	880.1	8.27
655.5	1145.6	9.03	1150.0	1160.1	8.97	60.0	910.1	8.34
705.2	1195.3	9.81	1190.0	1200.1	9.61	40.0	930.1	8.36
730.0	1220.1	10.43	1210.0	1220.1	10.00	10.0	960.1	8.63

Frequency Mixer

LAVI-971VH+

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+19	+21	+23	+19	+21	+23
80.1	62.50	62.12	61.79	44.80	44.52	44.35
110.1	59.11	58.54	58.05	44.15	44.02	43.88
140.1	57.94	56.90	56.54	44.10	44.03	44.00
170.1	56.60	55.81	55.08	44.00	43.94	43.93
200.1	56.53	55.76	55.25	43.36	43.22	43.09
230.1	56.27	55.49	54.89	42.77	42.65	42.58
260.1	55.44	54.71	54.13	41.89	41.77	41.70
290.1	54.95	54.27	53.63	40.93	40.82	40.76
320.1	54.95	54.30	53.72	40.16	40.00	39.89
350.1	54.72	54.07	53.52	39.63	39.44	39.29
380.1	53.02	52.55	52.27	38.96	38.79	38.68
410.1	51.53	51.18	50.89	38.27	38.10	37.98
440.1	50.00	49.69	49.42	37.76	37.58	37.47
470.1	49.64	49.37	49.10	37.94	37.78	37.68
500.1	48.67	48.36	48.28	38.17	37.98	38.03
530.1	47.67	47.36	47.36	37.99	37.76	37.49
560.1	46.09	45.82	45.70	37.70	37.49	37.47
590.1	44.67	44.38	44.34	37.37	37.13	37.16
620.1	43.90	43.84	43.70	37.30	37.26	37.03
650.1	43.65	43.62	43.48	36.97	36.89	36.63
680.1	42.96	42.76	42.71	36.18	36.01	36.02
710.1	41.68	41.45	41.41	35.90	35.69	35.65
740.1	41.06	40.85	40.83	35.88	35.54	35.43
770.1	41.02	41.10	40.98	36.18	36.07	35.80
800.1	41.48	41.44	41.62	36.57	36.25	36.26
830.1	42.22	42.31	42.59	37.11	36.85	36.86
860.1	43.92	44.05	44.39	38.03	37.72	37.67
890.1	46.00	46.04	46.36	39.19	38.77	38.74
920.1	48.24	48.16	47.92	41.00	40.85	40.66
950.1	46.29	45.89	45.35	42.77	42.79	42.83
980.1	42.95	42.51	41.96	43.53	43.50	43.38
1010.1	40.52	39.92	39.67	42.63	42.30	42.19
1040.1	39.53	39.03	38.84	42.72	42.41	42.33
1070.1	39.51	39.00	38.80	43.20	42.81	42.72
1110.1	39.96	39.63	39.19	44.47	44.23	43.84
1140.1	40.35	39.96	39.41	45.84	45.44	44.89
1180.1	40.67	40.20	39.49	47.43	46.80	45.85
1210.1	41.19	40.70	40.02	49.72	49.14	48.26
1250.1	42.23	41.76	41.05	52.09	52.36	52.18
1280.1	43.20	42.73	42.09	50.04	50.39	50.57

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+19	+21	+23
10.1	80.1	34.89	35.34	36.57
40.1	110.1	37.77	38.07	38.57
70.1	140.1	38.49	38.29	37.88
100.1	170.1	39.93	39.25	38.13
130.1	200.1	47.89	48.63	52.26
160.1	230.1	57.28	63.54	64.02
190.1	260.1	60.39	58.46	55.10
220.1	290.1	44.21	43.61	42.44
250.1	320.1	43.49	42.74	41.33
280.1	350.1	44.18	43.38	42.18
310.1	380.1	45.54	45.67	45.73
340.1	410.1	43.89	43.71	43.24
370.1	440.1	41.86	41.36	40.76
400.1	470.1	40.03	39.39	38.38
430.1	500.1	39.05	38.31	37.26
460.1	530.1	39.90	39.46	39.85
490.1	560.1	39.55	39.20	38.83
520.1	590.1	39.59	39.27	38.84
550.1	620.1	39.55	39.19	38.67
580.1	650.1	40.51	40.30	39.99
610.1	680.1	40.57	40.37	40.27
640.1	710.1	40.28	40.04	39.85
670.1	740.1	39.75	39.65	39.56
700.1	770.1	39.47	39.32	39.25
730.1	800.1	39.62	39.56	39.54
760.1	830.1	39.59	39.54	39.59
790.1	860.1	39.62	39.48	39.41
820.1	890.1	38.96	38.74	38.70
850.1	920.1	39.24	39.05	38.95
880.1	950.1	39.68	39.60	39.64
910.1	980.1	39.30	39.30	39.28
940.1	1010.1	38.56	38.43	38.33
970.1	1040.1	37.32	37.25	37.19
1000.1	1070.1	35.95	35.88	35.87
1040.1	1110.1	34.14	34.08	34.18
1070.1	1140.1	32.71	32.65	32.69
1110.1	1180.1	32.34	32.35	32.66
1140.1	1210.1	32.39	32.31	32.50
1180.1	1250.1	30.47	29.60	28.77
1210.1	1280.1	29.42	27.97	26.65

Frequency Mixer

LAVI-971VH+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)				IF (OUT) (MHz)	IF VSWR @LO=1040MHz (:1)			
		@LO (dBm)				@LO (dBm)					@LO (dBm)			
		+19	+21	+23		+19	+21	+23	+19		+21	+23		
10.1	80.1	1.18	1.20	1.22	80.1	7.31	7.31	7.28	10.0	1.18	1.22	1.25		
40.1	110.1	1.20	1.22	1.25	110.1	6.89	6.89	6.89	30.0	1.22	1.26	1.29		
70.1	140.1	1.18	1.21	1.23	140.1	7.38	7.34	7.34	50.0	1.21	1.25	1.28		
100.1	170.1	1.19	1.21	1.23	170.1	7.66	7.66	7.66	70.0	1.25	1.29	1.32		
130.1	200.1	1.20	1.22	1.24	200.1	8.01	8.01	8.01	90.0	1.28	1.31	1.34		
160.1	230.1	1.22	1.24	1.26	230.1	8.20	8.20	8.16	110.0	1.30	1.33	1.35		
190.1	260.1	1.25	1.27	1.29	260.1	8.23	8.23	8.20	130.0	1.38	1.40	1.42		
220.1	290.1	1.27	1.29	1.31	290.1	8.05	8.05	8.05	150.0	1.39	1.41	1.43		
250.1	320.1	1.27	1.30	1.32	320.1	7.73	7.73	7.73	170.0	1.43	1.45	1.47		
280.1	350.1	1.27	1.29	1.31	350.1	7.34	7.31	7.31	190.0	1.50	1.52	1.53		
310.1	380.1	1.28	1.30	1.32	380.1	6.73	6.73	6.73	210.0	1.53	1.54	1.56		
340.1	410.1	1.28	1.30	1.32	410.1	6.09	6.09	6.09	230.0	1.61	1.62	1.64		
370.1	440.1	1.27	1.29	1.30	440.1	5.52	5.52	5.52	250.0	1.62	1.63	1.64		
400.1	470.1	1.26	1.28	1.30	470.1	4.87	4.88	4.88	270.0	1.68	1.68	1.69		
430.1	500.1	1.26	1.28	1.29	500.1	4.25	4.25	4.26	290.0	1.76	1.76	1.76		
460.1	530.1	1.25	1.27	1.29	530.1	3.70	3.71	3.70	310.0	1.77	1.77	1.77		
490.1	560.1	1.24	1.26	1.27	560.1	3.25	3.26	3.26	350.0	1.86	1.86	1.85		
520.1	590.1	1.22	1.23	1.24	590.1	2.84	2.85	2.86	370.0	1.90	1.90	1.90		
550.1	620.1	1.20	1.21	1.22	620.1	2.49	2.50	2.50	410.0	1.97	1.96	1.96		
580.1	650.1	1.18	1.19	1.19	650.1	2.22	2.22	2.22	430.0	2.04	2.03	2.02		
610.1	680.1	1.17	1.17	1.17	680.1	2.03	2.04	2.04	470.0	2.08	2.06	2.05		
640.1	710.1	1.17	1.16	1.16	710.1	1.94	1.95	1.96	490.0	2.15	2.13	2.12		
670.1	740.1	1.17	1.17	1.16	740.1	1.95	1.96	1.97	530.0	2.16	2.13	2.11		
700.1	770.1	1.18	1.17	1.16	770.1	2.06	2.07	2.09	550.0	2.15	2.12	2.10		
730.1	800.1	1.20	1.19	1.17	800.1	2.25	2.26	2.27	590.0	2.23	2.20	2.17		
760.1	830.1	1.23	1.21	1.20	830.1	2.50	2.51	2.52	610.0	2.16	2.12	2.10		
790.1	860.1	1.25	1.23	1.21	860.1	2.78	2.79	2.80	650.0	2.21	2.17	2.13		
820.1	890.1	1.28	1.25	1.23	890.1	3.05	3.06	3.08	670.0	2.22	2.17	2.14		
850.1	920.1	1.29	1.27	1.24	920.1	3.31	3.31	3.32	710.0	2.13	2.08	2.04		
880.1	950.1	1.29	1.27	1.24	950.1	3.52	3.53	3.54	730.0	2.17	2.12	2.08		
910.1	980.1	1.30	1.27	1.24	980.1	3.65	3.67	3.68	770.0	2.13	2.08	2.03		
940.1	1010.1	1.31	1.27	1.25	1010.1	3.68	3.68	3.67	790.0	2.14	2.08	2.04		
970.1	1040.1	1.33	1.30	1.27	1040.1	3.64	3.65	3.65	830.0	2.12	2.07	2.02		
1000.1	1070.1	1.37	1.33	1.30	1070.1	3.47	3.48	3.50	850.0	2.12	2.07	2.01		
1040.1	1110.1	1.43	1.39	1.36	1110.1	3.14	3.14	3.14	890.0	2.11	2.05	2.00		
1070.1	1140.1	1.48	1.44	1.40	1140.1	2.86	2.87	2.88	910.0	2.06	2.00	1.94		
1110.1	1180.1	1.53	1.49	1.44	1180.1	2.46	2.47	2.47	950.0	2.09	2.03	1.97		
1140.1	1210.1	1.55	1.51	1.46	1210.1	2.20	2.20	2.20	970.0	2.05	1.99	1.93		
1180.1	1250.1	1.58	1.55	1.51	1250.1	1.88	1.89	1.89	1010.0	2.00	1.93	1.88		
1210.1	1280.1	1.57	1.54	1.51	1280.1	1.68	1.68	1.69	1030.0	2.04	1.97	1.92		

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	14	19	16	26	35	45	37	46	50	55
1	-	33	+0	37	12	42	22	44	33	46	41	51
2	55	61	63	63	63	55	54	54	55	56	57	58
3	83	86	68	82	65	81	69	79	72	80	78	84
4	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
5	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
6	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
7	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
8	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
9	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
10	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 490.1 MHz; 5.00 dBm.
LO IN: 560.1 MHz; +21.00 dBm
IF OUT: 70 MHz; -2.95 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	24	27	25	34	44	52	43	52	46	57
1	-	33	+0	37	13	43	23	45	36	48	39	53
2	36	52	53	53	54	46	45	45	46	46	49	50
3	55	70	50	67	48	63	50	62	53	63	59	66
4	76	90	81	80	77	76	78	74	75	72	74	73
5	>90	94	76	92	76	86	75	84	80	85	79	89
6	>90	>96	>96	>96	95	>96	91	>96	91	>96	>96	>96
7	>90	>96	>96	>96	>96	>96	>96	>96	>96	92	>96	>96
8	>90	>96	>96	>96	>96	>96	>96	>96	94	>96	>96	>96
9	>90	>96	>96	>96	>96	>96	>96	92	>96	>96	>96	>96
10	>90	>96	>96	>96	>96	>96	>96	>96	>96	>96	>96	>96
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 490.1 MHz; 15.00 dBm.
LO IN: 560.1 MHz; +21.00 dBm
IF OUT: 70 MHz; 6.38 dBm

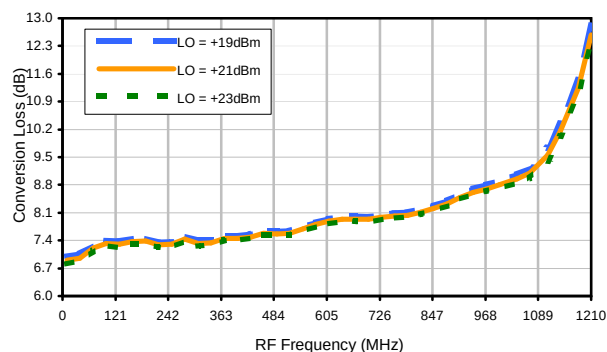
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

Frequency Mixer

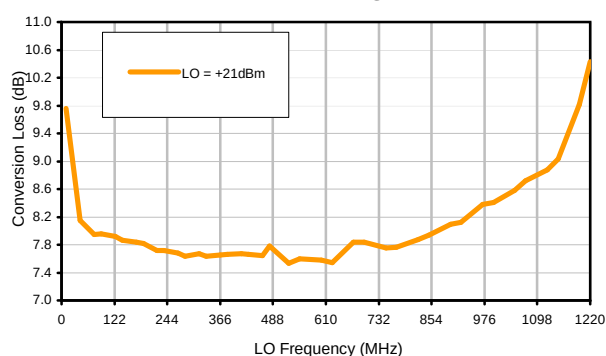
LAVI-971VH+

Typical Performance Curves

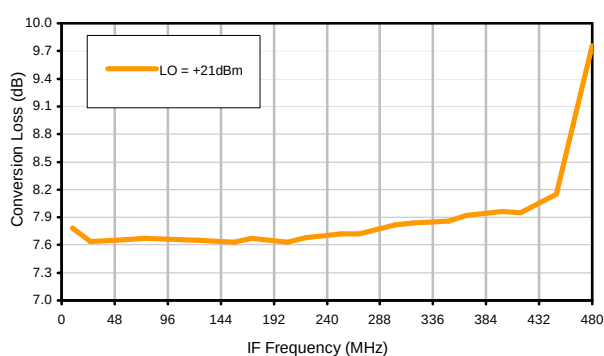
Conversion Loss @ IF=70MHz



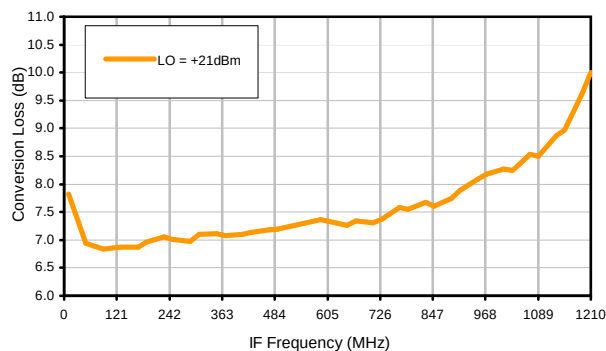
Conversion Loss vs. LO @ RF=490.1MHz



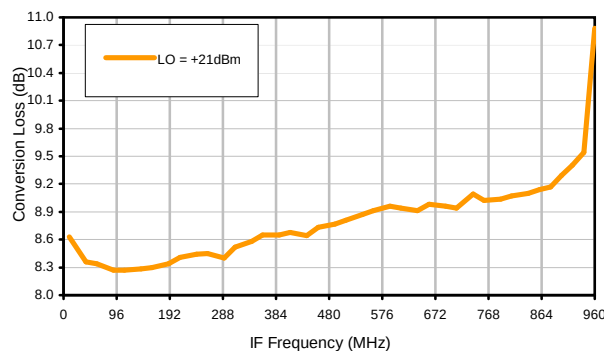
Conversion Loss vs. IF @ RF=490.1MHz



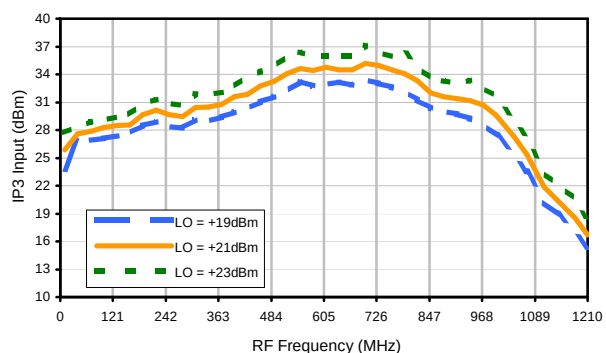
Conversion Loss vs. IF @ RF=10.1MHz



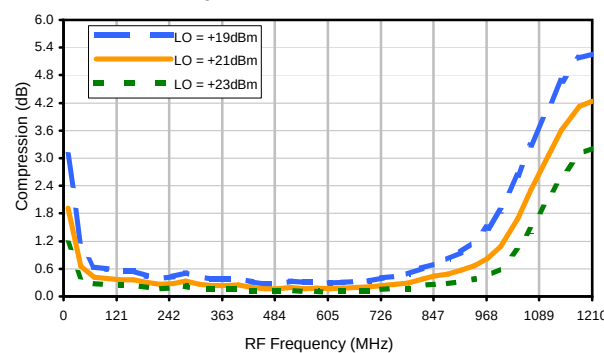
Conversion Loss vs. IF @ RF=970.1MHz



IP3 Input



Compression @ RF IN=+20dBm

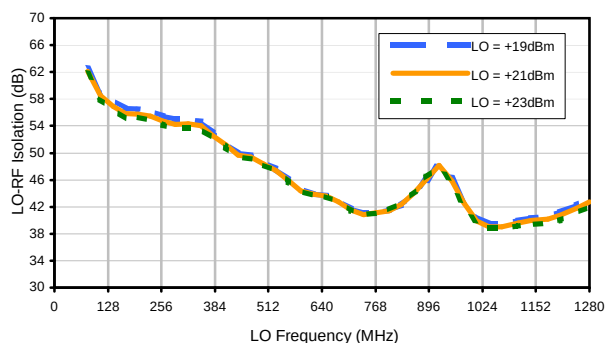


Frequency Mixer

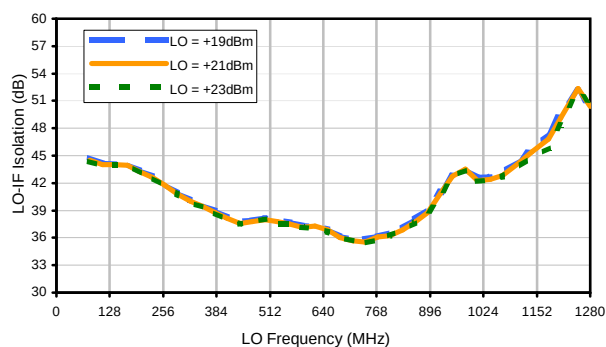
LAVI-971VH+

Typical Performance Curves

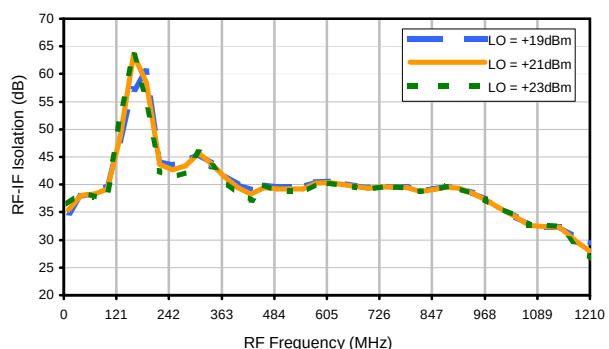
LO-RF Isolation



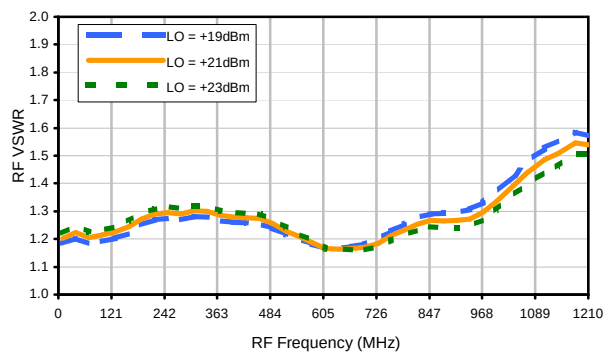
LO-IF Isolation



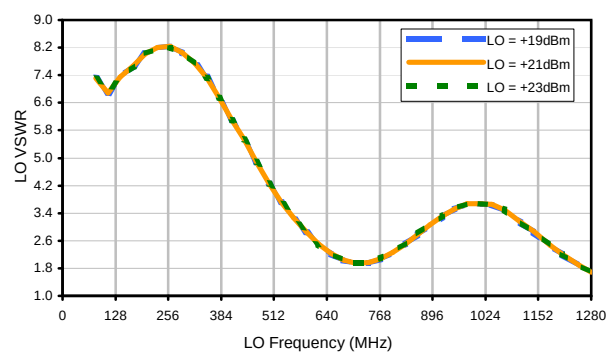
RF-IF Isolation



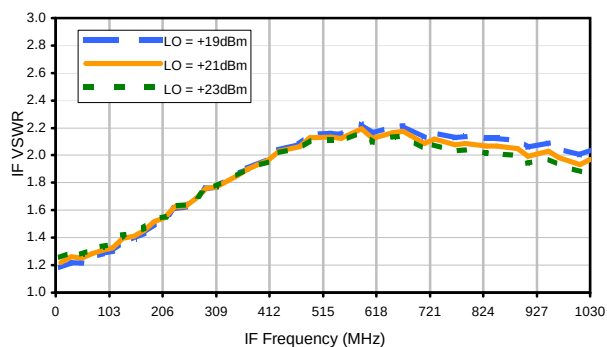
RF VSWR



LO VSWR



IF VSWR



REV. X2
LAVI-971VH+
101012
Page 2 of 3



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	14	19	16	26	35	45	37	46	50	55
1	-	33	+0	37	12	42	22	44	33	46	41	51
2	55	61	63	63	63	55	54	54	55	56	57	58
3	83	86	68	82	65	81	69	79	72	80	78	84
4	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
5	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
6	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
7	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
8	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
9	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
10	>90	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87	>87
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions:

RF IN: 490.1 MHz; 5.00 dBm.
LO IN: 560.1 MHz; +21.00 dBm
IF OUT: 70 MHz; -2.95 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	24	27	25	34	44	52	43	52	46	57
1	-	33	+0	37	13	43	23	45	36	48	39	53
2	36	52	53	53	54	46	45	45	46	46	49	50
3	55	70	50	67	48	63	50	62	53	63	59	66
4	76	90	81	80	77	76	78	74	75	72	74	73
5	>90	94	76	92	76	86	75	84	80	85	79	89
6	>90	>96	>96	>96	95	>96	91	>96	91	>96	>96	>96
7	>90	>96	>96	>96	>96	>96	>96	>96	>96	92	>96	>96
8	>90	>96	>96	>96	>96	>96	>96	>96	94	>96	>96	>96
9	>90	>96	>96	>96	>96	>96	>96	92	>96	>96	>96	>96
10	>90	>96	>96	>96	>96	>96	>96	>96	>96	>96	>96	>96
RF CAL	0	1	2	3	4	5	6	7	8	9	10	

LO HARMONICS ORDER

Test conditions:

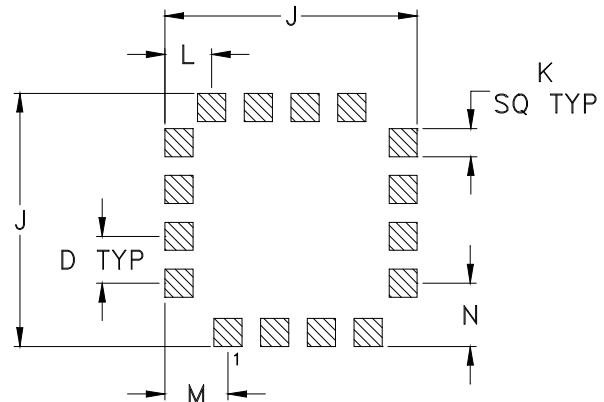
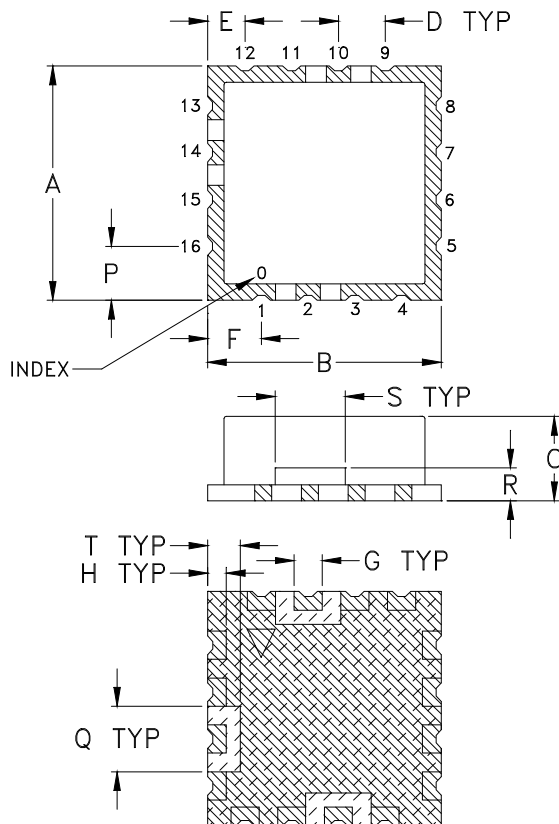
RF IN: 490.1 MHz; 15.00 dBm.
LO IN: 560.1 MHz; +21.00 dBm
IF OUT: 70 MHz; 6.38 dBm

- 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:

1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. 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.



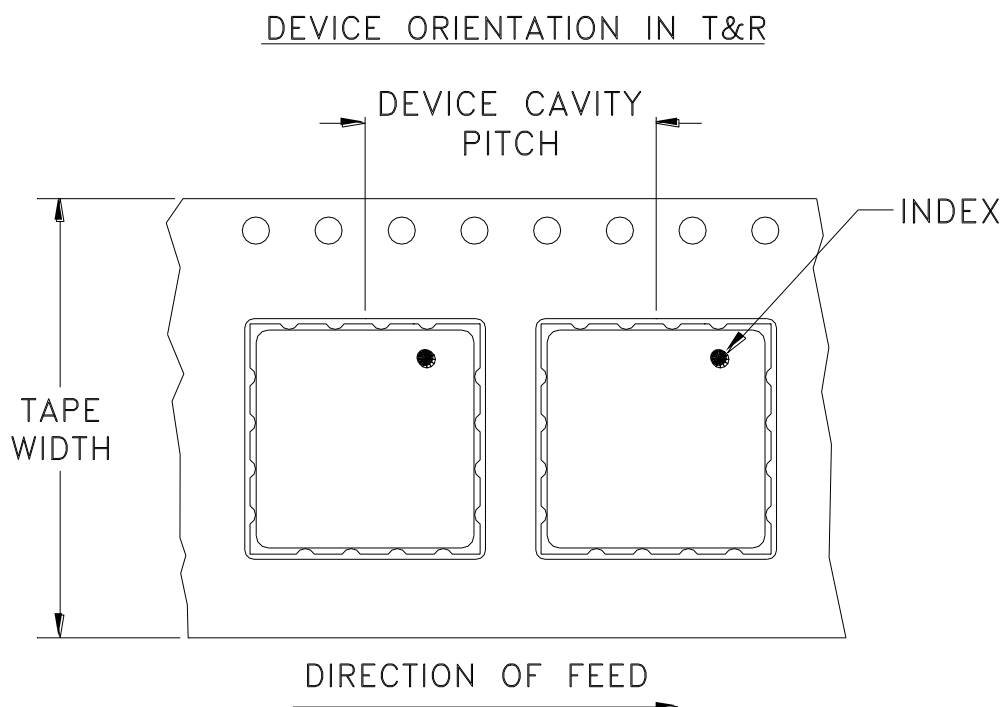
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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.

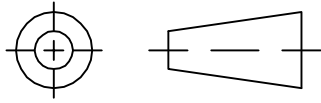
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf



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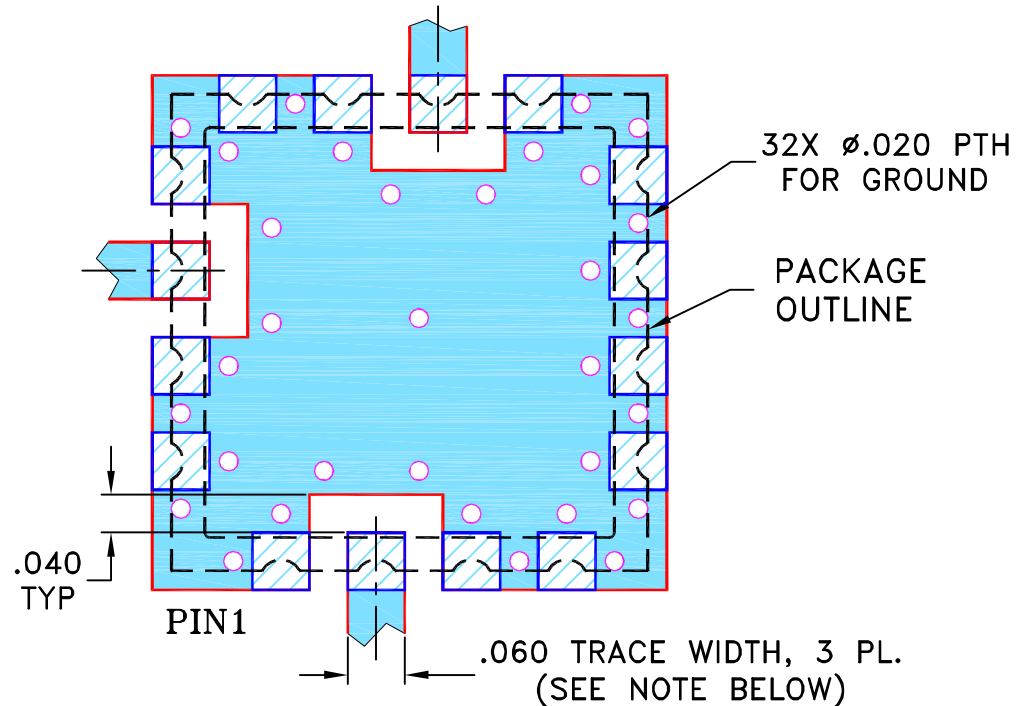
THIRD ANGLE PROJECTION



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

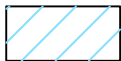
SUGGESTED MOUNTING CONFIGURATION FOR
CK605 CASE STYLE, "kg/rl/16AM01" PIN CONNECTION

NOTES:

- 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.
- 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

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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

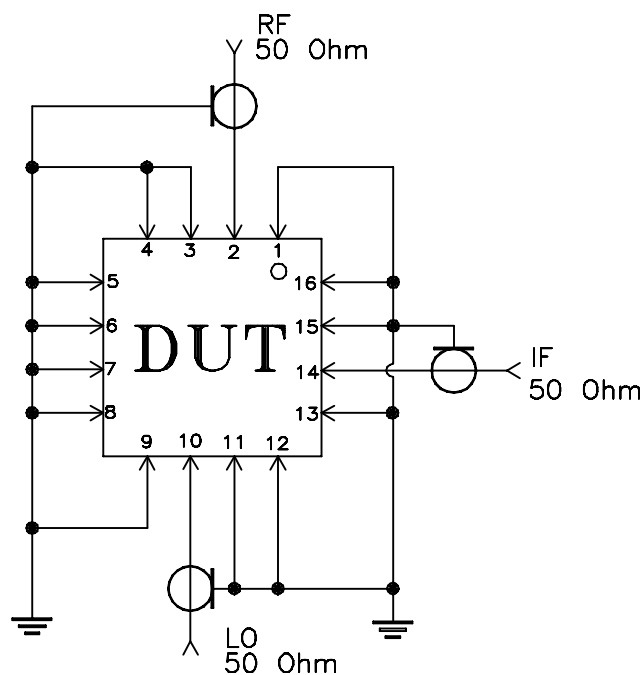
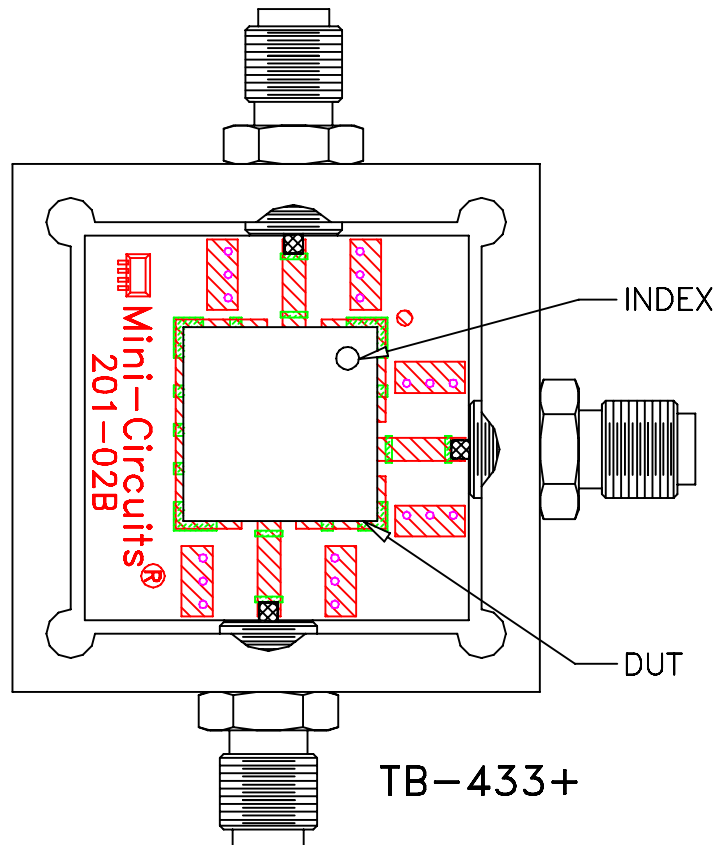
REV:
G

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	-55° to 100°C Ambient Environment	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