

Surface Mount Frequency Mixer

Level 10 (LO Power +10dBm) 1500 to 2000 MHz

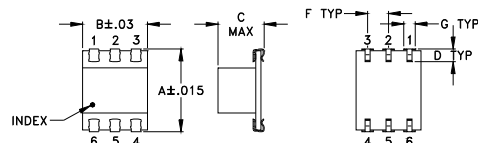
Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	50mW
IF Current	40mA
Permanent damage may occur if any of these limits are exceeded.	

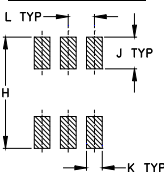
Pin Connections

LO	1
RF	4
IF	5
GROUND	2,3,6

Outline Drawing



PCB Land Pattern

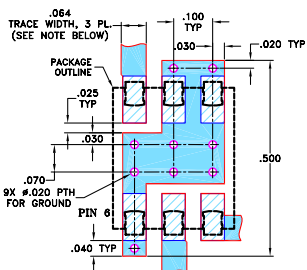


Suggested Layout,
Tolerance to be within ±0.002

Outline Dimensions (inch/mm)

A	B	C	D	E	F	G
.390	.31	.225	.060	--	.100	.045
9.91	7.87	5.72	1.52	--	2.54	1.14
H	J	K	L	M	wt	
.420	.120	.060	.100	--	grams	
10.67	3.05	1.52	2.54	--	0.50	

Demo Board MCL P/N: TB-44+ Suggested PCB Layout (PL-083)



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.030" ± 0.002"; 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
- 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



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LRMS-20J+ LRMS-20J



Generic photo used for illustration purposes only

CASE STYLE: QQQ569

+RoHS Compliant

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

Features

- low conversion loss, 5.0 dB typ.
- aqueous washable
- J-leads for strain relief

Applications

- PCS
- GPS

Electrical Specifications

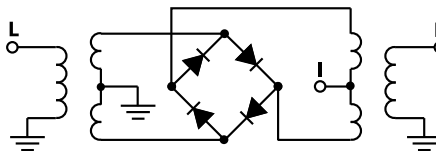
FREQUENCY (MHz)	CONVERSION LOSS (dB)	LO-RF ISOLATION (dB)	LO-IF ISOLATION (dB)	IP3 at center band (dBm)
LO/RF $f_L - f_U$	IF			
1500-2000	DC-500	5.0 $\bar{X}$ σ Max.	Typ. Min.	Typ. Min.
1500-2000	DC-500	5.0 .15 7.5	35 22	26 18

1 dB COMP.: +1 dBm typ.

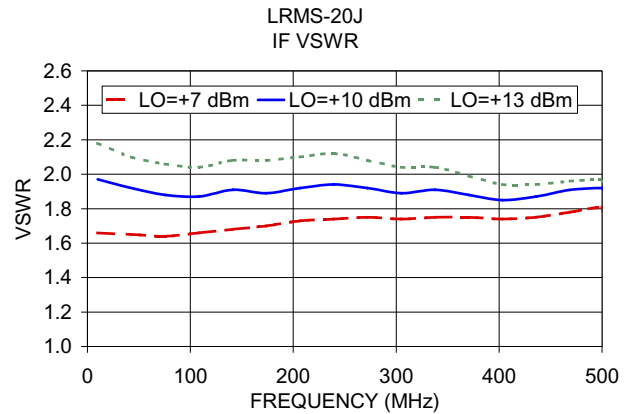
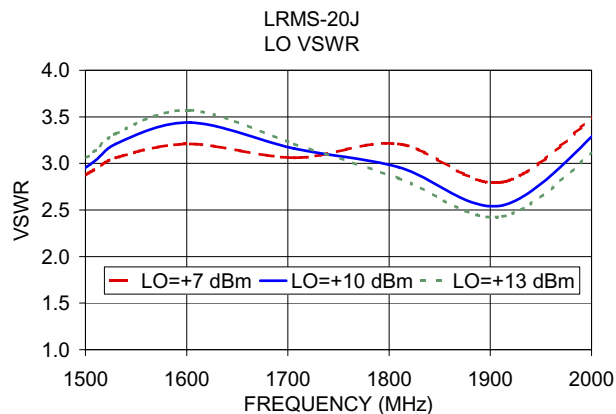
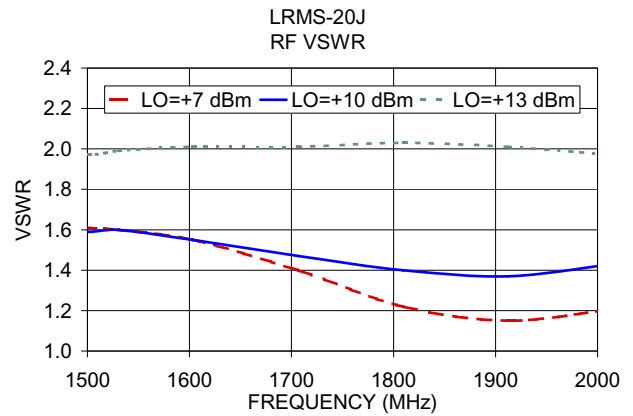
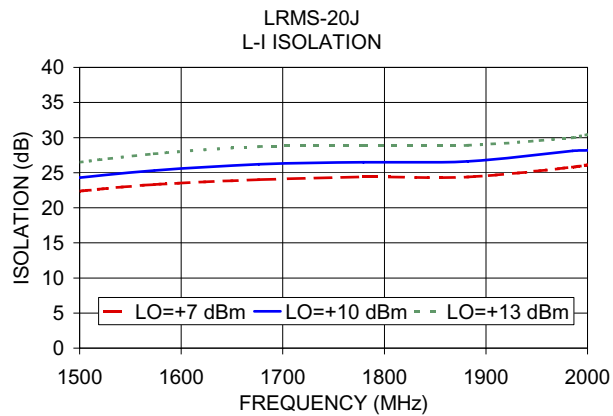
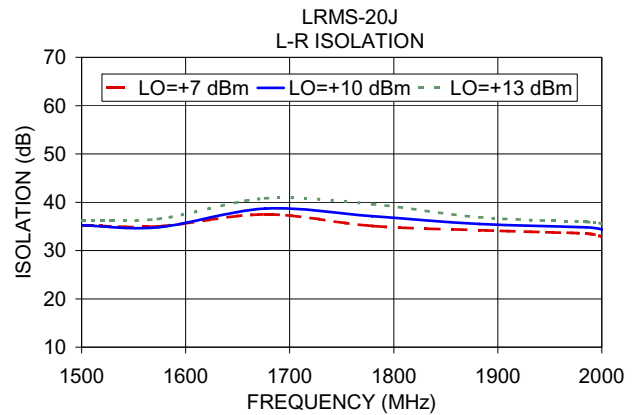
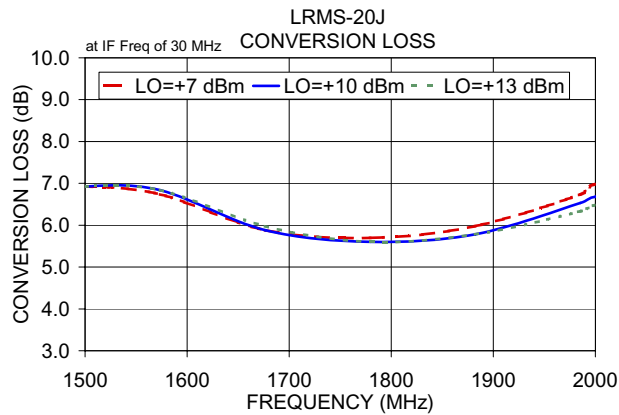
Typical Performance Data

Frequency (MHz)	Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)
RF	LO	LO +10dBm	LO +10dBm	LO +10dBm	LO +10dBm
1500.00	1530.00	6.92	35.20	24.30	1.60
1573.53	1603.53	6.84	34.80	25.30	1.55
1676.47	1706.47	5.88	38.70	26.20	1.47
1779.41	1809.41	5.60	37.10	26.50	1.40
1882.35	1912.35	5.78	35.50	26.60	1.37
1985.29	2015.29	6.53	34.80	28.10	1.43
2000.00	2030.00	6.68	34.40	28.20	1.42

Electrical Schematic



Performance Charts



Notes

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Frequency Mixer

LRMS-20J+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)		
		@LO (dBm)		
		+7	+10	+13
600.1	630.1	12.49	11.44	10.99
660.1	690.1	11.21	10.45	10.13
720.1	750.1	10.59	9.90	9.59
780.1	810.1	9.96	9.19	8.88
840.1	870.1	9.19	8.49	8.18
900.1	930.1	8.52	7.83	7.52
960.1	990.1	7.95	7.39	7.09
1020.1	1050.1	7.30	6.77	6.49
1080.1	1110.1	6.99	6.53	6.17
1140.1	1170.1	6.78	6.22	5.86
1200.1	1230.1	6.71	6.17	5.75
1260.1	1290.1	6.88	6.33	5.88
1320.1	1350.1	6.89	6.42	5.96
1380.1	1410.1	6.59	6.36	6.06
1440.1	1470.1	6.61	6.47	6.36
1500.1	1530.1	6.58	6.40	6.28
1560.1	1590.1	6.83	6.76	6.72
1620.1	1650.1	6.57	6.59	6.64
1680.1	1710.1	6.15	6.15	6.21
1740.1	1770.1	6.18	6.13	6.16
1800.1	1830.1	6.07	6.04	6.08
1860.1	1890.1	5.95	5.86	5.86
1920.1	1950.1	6.05	5.85	5.79
1980.1	2010.1	6.97	6.66	6.48
2040.1	2070.1	7.39	6.96	6.69
2100.1	2130.1	7.09	6.63	6.39
2160.1	2190.1	6.70	6.32	6.13
2220.1	2250.1	6.80	6.43	6.23
2280.1	2310.1	6.59	6.18	5.99
2340.1	2370.1	6.25	5.94	5.77
2400.1	2430.1	6.19	5.84	5.69
2460.1	2490.1	6.25	5.87	5.71
2520.1	2550.1	6.31	6.02	5.88
2580.1	2610.1	6.66	6.36	6.24
2660.1	2690.1	7.33	7.06	7.00
2720.1	2750.1	7.97	7.75	7.70
2800.1	2830.1	8.86	8.68	8.63
2860.1	2890.1	9.67	9.40	9.34
2940.1	2970.1	10.88	10.66	10.59
3000.1	3030.1	11.85	11.67	11.62

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+7	+10	+13
600.1	630.1	8.28	10.76	14.36
660.1	690.1	6.27	8.92	10.51
720.1	750.1	7.52	9.13	9.71
780.1	810.1	10.00	12.92	12.63
840.1	870.1	13.91	16.19	14.68
900.1	930.1	10.88	20.09	15.82
960.1	990.1	9.35	17.48	16.58
1020.1	1050.1	8.07	7.58	8.68
1080.1	1110.1	10.64	9.40	8.26
1140.1	1170.1	10.31	7.16	7.58
1200.1	1230.1	10.83	7.81	7.60
1260.1	1290.1	8.98	8.39	8.02
1320.1	1350.1	3.24	6.94	14.21
1380.1	1410.1	6.49	9.20	15.14
1440.1	1470.1	11.91	16.07	17.16
1500.1	1530.1	11.62	13.17	15.78
1560.1	1590.1	13.10	14.62	16.39
1620.1	1650.1	19.36	20.71	20.68
1680.1	1710.1	20.93	20.93	20.89
1740.1	1770.1	19.39	19.97	20.92
1800.1	1830.1	20.97	18.58	20.50
1860.1	1890.1	10.79	15.55	21.07
1920.1	1950.1	8.64	10.42	13.13
1980.1	2010.1	12.33	14.87	18.85
2040.1	2070.1	19.17	18.75	18.82
2100.1	2130.1	19.43	18.77	18.48
2160.1	2190.1	17.68	17.77	17.89
2220.1	2250.1	16.08	17.44	18.20
2280.1	2310.1	11.59	13.56	15.33
2340.1	2370.1	11.38	12.77	14.46
2400.1	2430.1	11.26	12.59	14.38
2460.1	2490.1	10.63	12.76	15.04
2520.1	2550.1	13.78	15.45	16.49
2580.1	2610.1	15.04	17.67	18.36
2660.1	2690.1	15.87	17.82	17.68
2720.1	2750.1	16.82	20.13	20.15
2800.1	2830.1	15.05	17.43	19.37
2860.1	2890.1	16.07	17.75	19.33
2940.1	2970.1	18.56	18.62	18.70
3000.1	3030.1	18.08	18.17	18.19

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+1dBm (dB)		
		@LO (dBm)		
		+7	+10	+13
600.1	630.1	0.03	0.03	0.03
660.1	690.1	0.30	0.10	0.02
720.1	750.1	0.67	0.34	0.14
780.1	810.1	0.76	0.53	0.33
840.1	870.1	0.90	0.69	0.57
900.1	930.1	1.08	0.89	0.77
960.1	990.1	1.05	0.86	0.74
1020.1	1050.1	1.01	0.87	0.78
1080.1	1110.1	0.91	0.68	0.53
1140.1	1170.1	0.99	0.86	0.73
1200.1	1230.1	1.09	1.01	0.91
1260.1	1290.1	0.90	0.87	0.83
1320.1	1350.1	0.64	0.54	0.53
1380.1	1410.1	0.66	0.49	0.40
1440.1	1470.1	0.48	0.33	0.25
1500.1	1530.1	0.42	0.29	0.21
1560.1	1590.1	0.33	0.22	0.16
1620.1	1650.1	0.22	0.16	0.13
1680.1	1710.1	0.19	0.13	0.11
1740.1	1770.1	0.17	0.09	0.08
1800.1	1830.1	0.18	0.06	0.04
1860.1	1890.1	0.24	0.13	0.08
1920.1	1950.1	0.27	0.20	0.14
1980.1	2010.1	0.13	0.06	0.03
2040.1	2070.1	-0.05	-0.05	-0.02
2100.1	2130.1	0.03	0.02	0.02
2160.1	2190.1	0.12	0.08	0.06
2220.1	2250.1	0.09	0.06	0.04
2280.1	2310.1	0.19	0.13	0.08
2340.1	2370.1	0.26	0.19	0.13
2400.1	2430.1	0.28	0.19	0.13
2460.1	2490.1	0.36	0.27	0.18
2520.1	2550.1	0.33	0.23	0.17
2580.1	2610.1	0.28	0.17	0.12
2660.1	2690.1	0.18	0.10	0.08
2720.1	2750.1	0.11	0.08	0.06
2800.1	2830.1	0.06	0.06	0.04
2860.1	2890.1	0.03	0.04	0.03
2940.1	2970.1	0.05	0.02	0.02
3000.1	3030.1	0.04	0.02	0.02

Frequency Mixer

LRMS-20J+

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1750MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1490MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=2010.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+10			+10			+10
249.9	1500.1	6.97	10.1	1500.1	6.72	510.0	1500.1	6.97
237.3	1512.7	6.85	22.6	1512.6	6.42	497.5	1512.6	6.85
224.6	1525.4	6.83	35.1	1525.1	6.39	485.0	1525.1	6.76
212.0	1538.0	6.80	47.6	1537.6	6.40	472.5	1537.6	6.58
199.4	1550.6	6.69	60.1	1550.1	6.42	460.0	1550.1	6.45
186.8	1563.2	6.58	72.6	1562.6	6.45	447.5	1562.6	6.44
174.1	1575.9	6.50	85.1	1575.1	6.52	435.0	1575.1	6.38
161.5	1588.5	6.35	97.6	1587.6	6.61	422.5	1587.6	6.24
148.9	1601.1	6.23	110.1	1600.1	6.77	410.0	1600.1	6.17
136.3	1613.7	6.12	122.6	1612.6	6.90	397.5	1612.6	6.15
123.6	1626.4	6.02	135.1	1625.1	6.96	385.0	1625.1	6.04
111.0	1639.0	5.93	147.6	1637.6	7.09	372.5	1637.6	6.00
98.4	1651.6	5.89	160.1	1650.1	7.20	360.0	1650.1	5.95
85.8	1664.2	5.89	172.6	1662.6	7.22	347.5	1662.6	5.95
73.1	1676.9	5.86	185.1	1675.1	7.23	335.0	1675.1	5.90
60.5	1689.5	5.87	197.6	1687.6	7.28	322.5	1687.6	5.80
47.9	1702.1	5.90	210.1	1700.1	7.26	310.0	1700.1	5.75
35.3	1714.7	5.93	222.6	1712.6	7.20	297.5	1712.6	5.78
22.6	1727.4	5.98	235.1	1725.1	7.18	285.0	1725.1	5.69
10.0	1740.0	6.36	247.6	1737.6	7.13	272.5	1737.6	5.69
10.0	1760.0	6.43	260.1	1750.1	7.00	260.0	1750.1	5.82
22.0	1772.0	6.10	272.6	1762.6	6.88	247.5	1762.6	5.89
34.0	1784.0	6.12	285.1	1775.1	6.76	235.0	1775.1	5.86
46.0	1796.0	6.18	297.6	1787.6	6.60	222.5	1787.6	5.97
58.0	1808.0	6.22	310.1	1800.1	6.40	210.0	1800.1	6.04
70.0	1820.0	6.28	322.6	1812.6	6.24	197.5	1812.6	6.01
82.0	1832.0	6.36	335.1	1825.1	6.18	185.0	1825.1	6.03
94.0	1844.0	6.32	347.6	1837.6	6.15	172.5	1837.6	6.15
106.0	1856.0	6.35	360.1	1850.1	6.10	160.0	1850.1	6.22
118.0	1868.0	6.29	372.6	1862.6	6.22	147.5	1862.6	6.28
130.1	1880.1	6.14	385.1	1875.1	6.37	135.0	1875.1	6.39
142.1	1892.1	5.95	397.6	1887.6	6.39	122.5	1887.6	6.55
154.1	1904.1	5.83	410.1	1900.1	6.36	110.0	1900.1	6.70
166.1	1916.1	5.74	422.6	1912.6	6.50	97.5	1912.6	6.82
178.1	1928.1	5.65	435.1	1925.1	6.51	85.0	1925.1	6.95
190.1	1940.1	5.66	447.6	1937.6	6.39	72.5	1937.6	7.06
202.1	1952.1	5.80	460.1	1950.1	6.41	60.0	1950.1	7.11
214.1	1964.1	5.87	472.6	1962.6	6.43	47.5	1962.6	7.13
238.1	1988.1	6.07	497.6	1987.6	6.31	22.5	1987.6	7.07
250.1	2000.1	6.24	510.1	2000.1	6.39	10.0	2000.1	7.37

REV. X3

LRMS-20J+

101012

Page 2 of 5



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
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The Design Engineers Search Engine finds the model you need, instantly • For detailed performance specs & shopping online see



Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+7	+10	+13	+7	+10	+13
630.1	23.62	24.67	26.02	8.53	9.52	10.77
690.1	23.17	24.23	25.47	8.45	9.50	10.75
750.1	22.82	24.00	25.16	8.05	9.19	10.45
810.1	23.44	24.59	25.77	8.30	9.50	10.83
870.1	25.00	26.44	27.61	8.90	10.22	11.57
930.1	26.63	28.07	29.15	9.55	10.94	12.29
990.1	28.65	30.09	31.18	10.42	11.89	13.27
1050.1	32.55	34.56	35.45	11.52	13.04	14.39
1110.1	37.49	36.88	35.72	12.66	14.20	15.55
1170.1	37.92	37.30	36.61	14.03	15.46	16.82
1230.1	34.45	34.76	35.21	15.57	16.98	18.27
1290.1	32.29	32.67	33.58	16.97	18.32	19.63
1350.1	32.73	32.58	33.36	18.40	19.77	21.10
1410.1	33.98	32.72	33.15	19.44	20.95	22.47
1470.1	35.97	34.99	34.79	20.24	21.83	23.39
1530.1	35.06	34.53	34.81	21.08	22.76	24.42
1590.1	36.57	35.89	35.86	21.72	23.48	25.13
1650.1	38.81	38.12	38.14	22.21	24.08	25.86
1710.1	38.91	40.39	41.74	22.83	24.78	26.55
1770.1	40.33	43.70	47.00	23.45	25.49	27.32
1830.1	39.10	42.89	47.14	24.06	26.17	28.10
1890.1	37.88	40.73	42.90	24.72	26.82	28.74
1950.1	36.98	39.04	40.52	25.35	27.51	29.44
2010.1	38.82	41.22	42.78	25.95	28.09	29.83
2070.1	33.78	36.04	38.27	26.37	28.40	30.01
2130.1	31.57	33.65	35.35	26.74	28.82	30.34
2190.1	29.71	32.81	35.44	27.20	29.06	30.67
2250.1	25.97	28.24	30.46	27.44	29.14	30.60
2310.1	24.65	26.91	29.12	27.70	29.38	30.73
2370.1	23.82	25.70	27.52	28.02	29.60	30.71
2430.1	23.44	25.71	27.64	28.79	30.36	31.38
2490.1	22.42	24.43	26.30	29.90	31.92	32.99
2550.1	22.35	24.20	25.83	32.22	34.08	34.60
2610.1	21.99	23.79	25.45	33.19	34.66	34.94
2690.1	21.77	23.59	25.20	33.46	34.84	35.06
2750.1	22.43	24.05	25.57	33.52	34.71	34.78
2830.1	23.58	25.14	26.47	33.60	34.39	34.14
2890.1	23.91	25.55	26.87	33.51	34.02	33.71
2970.1	25.29	26.69	27.53	34.55	35.13	33.97
3030.1	26.50	27.44	28.14	35.41	35.78	34.63

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+7	+10	+13
600.1	630.1	14.76	15.71	16.20
660.1	690.1	13.55	14.22	14.44
720.1	750.1	12.09	12.50	12.90
780.1	810.1	10.73	11.04	11.34
840.1	870.1	10.58	10.69	10.82
900.1	930.1	10.58	10.80	10.90
960.1	990.1	11.14	10.98	10.84
1020.1	1050.1	12.26	12.18	11.99
1080.1	1110.1	13.01	12.96	12.80
1140.1	1170.1	13.07	12.92	12.54
1200.1	1230.1	12.23	12.05	11.97
1260.1	1290.1	11.43	11.36	11.30
1320.1	1350.1	11.08	11.02	11.02
1380.1	1410.1	10.89	10.80	10.85
1440.1	1470.1	10.91	10.85	10.90
1500.1	1530.1	11.21	11.32	11.37
1560.1	1590.1	11.92	12.04	12.13
1620.1	1650.1	13.07	13.31	13.42
1680.1	1710.1	13.68	14.15	14.36
1740.1	1770.1	14.23	14.78	15.20
1800.1	1830.1	14.92	15.61	16.03
1860.1	1890.1	15.27	15.81	16.20
1920.1	1950.1	15.18	15.39	15.50
1980.1	2010.1	14.67	14.83	14.91
2040.1	2070.1	16.12	16.30	16.44
2100.1	2130.1	17.69	17.94	18.10
2160.1	2190.1	19.64	19.77	19.89
2220.1	2250.1	20.87	21.05	21.18
2280.1	2310.1	21.81	22.09	22.13
2340.1	2370.1	22.51	22.94	23.04
2400.1	2430.1	22.96	23.66	23.91
2460.1	2490.1	23.00	23.82	24.25
2520.1	2550.1	22.22	22.90	23.26
2580.1	2610.1	21.18	21.79	22.03
2660.1	2690.1	19.34	19.72	19.98
2720.1	2750.1	18.09	18.41	18.54
2800.1	2830.1	16.39	16.73	16.84
2860.1	2890.1	15.23	15.61	15.76
2940.1	2970.1	14.10	14.48	14.67
3000.1	3030.1	13.61	13.98	14.14

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=2000.1MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+7	+10	+13		+7	+10	+13		+7	+10	+13
600.1	630.1	13.39	12.35	11.69	630.1	3.26	2.13	1.76	10.0	1.06	1.08	1.17
660.1	690.1	10.37	10.02	9.79	690.1	2.98	1.99	1.72	30.2	1.06	1.11	1.20
720.1	750.1	8.01	7.73	7.70	750.1	2.82	1.92	1.72	50.4	1.12	1.15	1.22
780.1	810.1	6.07	6.01	6.09	810.1	2.68	1.86	1.73	70.6	1.14	1.19	1.26
840.1	870.1	4.67	4.57	4.55	870.1	2.50	1.78	1.73	90.8	1.22	1.24	1.29
900.1	930.1	3.56	3.45	3.41	930.1	2.41	1.74	1.73	111.0	1.24	1.28	1.33
960.1	990.1	3.05	3.10	3.10	990.1	2.31	1.71	1.73	131.2	1.30	1.34	1.38
1020.1	1050.1	2.36	2.31	2.28	1050.1	2.25	1.72	1.78	151.4	1.39	1.44	1.47
1080.1	1110.1	1.95	1.90	1.88	1110.1	2.19	1.74	1.83	171.6	1.41	1.44	1.46
1140.1	1170.1	1.52	1.49	1.49	1170.1	2.18	1.78	1.89	191.8	1.51	1.55	1.57
1200.1	1230.1	1.25	1.27	1.32	1230.1	2.08	1.78	1.94	212.0	1.52	1.54	1.56
1260.1	1290.1	1.24	1.27	1.31	1290.1	2.04	1.79	1.97	232.2	1.63	1.66	1.68
1320.1	1350.1	1.45	1.50	1.51	1350.1	1.96	1.78	2.00	252.4	1.66	1.68	1.69
1380.1	1410.1	1.59	1.68	1.68	1410.1	1.91	1.76	2.00	272.7	1.71	1.73	1.74
1440.1	1470.1	1.78	1.90	1.95	1470.1	1.91	1.77	2.02	292.9	1.76	1.78	1.78
1500.1	1530.1	2.03	2.13	2.15	1530.1	1.84	1.75	2.05	313.1	1.79	1.79	1.79
1560.1	1590.1	2.24	2.35	2.40	1590.1	1.77	1.71	2.04	333.3	1.89	1.91	1.91
1620.1	1650.1	2.16	2.29	2.37	1650.1	1.68	1.65	2.03	353.5	1.89	1.88	1.87
1680.1	1710.1	2.07	2.16	2.24	1710.1	1.54	1.59	2.03	373.7	1.92	1.91	1.90
1740.1	1770.1	2.04	2.06	2.10	1770.1	1.41	1.51	1.99	393.9	1.89	1.88	1.86
1800.1	1830.1	1.95	1.90	1.90	1830.1	1.27	1.48	2.02	434.3	1.96	1.95	1.93
1860.1	1890.1	1.86	1.72	1.65	1890.1	1.15	1.46	2.00	454.5	1.98	1.96	1.92
1920.1	1950.1	1.85	1.71	1.61	1950.1	1.06	1.46	2.03	494.9	1.94	1.91	1.88
1980.1	2010.1	2.74	2.61	2.50	2010.1	1.04	1.48	2.06	515.1	1.97	1.94	1.91
2040.1	2070.1	3.15	2.96	2.78	2070.1	1.13	1.48	2.03	555.5	1.88	1.84	1.81
2100.1	2130.1	2.81	2.60	2.44	2130.1	1.21	1.53	2.09	575.7	1.77	1.73	1.70
2160.1	2190.1	2.40	2.26	2.15	2190.1	1.27	1.50	2.02	616.1	1.73	1.70	1.68
2220.1	2250.1	2.22	2.08	1.98	2250.1	1.38	1.53	2.03	636.3	1.71	1.68	1.65
2280.1	2310.1	1.95	1.82	1.74	2310.1	1.54	1.59	2.05	676.7	1.60	1.59	1.59
2340.1	2370.1	1.63	1.52	1.45	2370.1	1.66	1.62	2.00	696.9	1.61	1.60	1.62
2400.1	2430.1	1.38	1.28	1.23	2430.1	1.80	1.69	2.05	737.3	1.57	1.59	1.63
2460.1	2490.1	1.30	1.28	1.28	2490.1	1.98	1.75	2.03	757.6	1.52	1.56	1.62
2520.1	2550.1	1.50	1.54	1.57	2550.1	2.11	1.83	2.04	798.0	1.62	1.69	1.76
2580.1	2610.1	1.84	1.94	1.98	2610.1	2.32	1.91	2.06	818.2	1.71	1.78	1.87
2660.1	2690.1	2.47	2.61	2.68	2690.1	2.57	1.99	2.01	858.6	1.92	2.01	2.12
2720.1	2750.1	3.11	3.23	3.27	2750.1	2.80	2.10	2.04	878.8	2.04	2.14	2.26
2800.1	2830.1	4.01	4.12	4.17	2830.1	3.25	2.30	2.10	919.2	2.39	2.51	2.63
2860.1	2890.1	4.61	4.75	4.80	2890.1	3.76	2.49	2.13	939.4	2.54	2.66	2.79
2940.1	2970.1	5.23	5.36	5.39	2970.1	4.16	2.69	2.18	979.8	2.94	3.07	3.20
3000.1	3030.1	5.46	5.58	5.59	3030.1	4.30	2.78	2.21	1000.0	3.27	3.38	3.50

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+11	1	+0	14	6	14	26	32	18	30
1	-	9	+0	31	32	32	22	23	35	38	43	38
2	>90	>64	>64	60	>64	63	51	>64	54	60	>64	>64
3	>90	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64
4	>90	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64
5	>90	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64
6	>90	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64
7	>90	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64
8	>90	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64
9	>90	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64
10	>90	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 1750 MHz; -14.00 dBm.
LO IN: 1780 MHz; +10.00 dBm
IF OUT: 30 MHz; -26.36 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	1	13	12	26	18	26	38	47	31	42
1	-	9	+0	31	32	32	22	23	37	38	45	39
2	76	61	64	49	55	52	40	68	44	51	56	60
3	>90	73	>75	74	62	71	74	70	60	59	59	68
4	>90	>75	>75	>75	>75	>75	>75	>75	72	>75	71	>75
5	>90	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75
6	>90	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75
7	>90	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75
8	>90	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75
9	>90	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75
10	>90	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

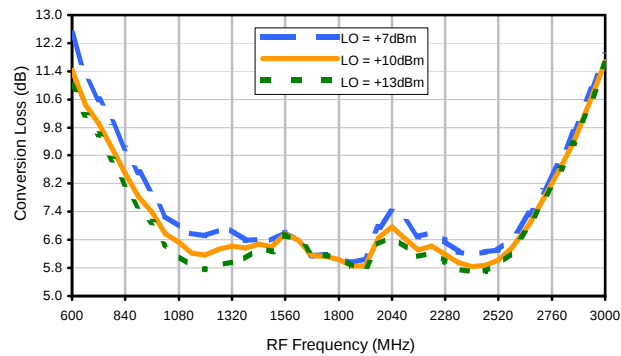
LO HARMONICS ORDER

Test conditions: RF IN: 1750 MHz; -4.00 dBm.
LO IN: 1780 MHz; +10.00 dBm
IF OUT: 30 MHz; -14.83 dBm

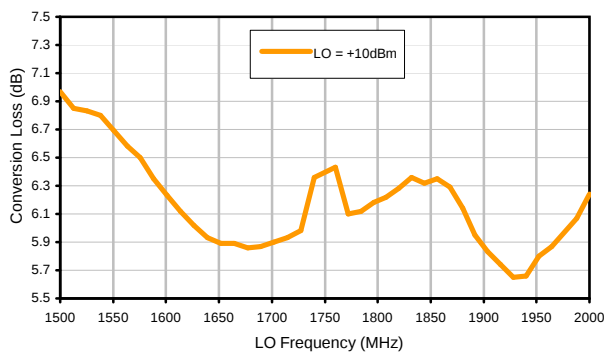
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

Typical Performance Curves

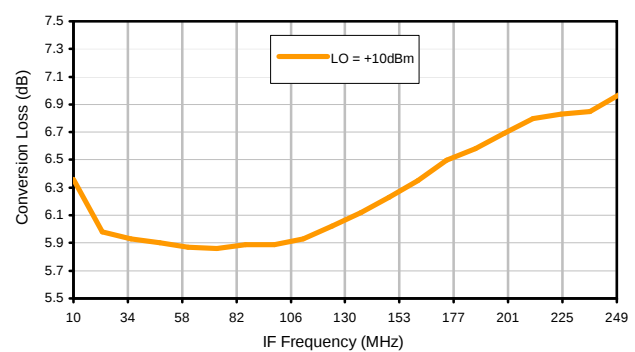
Conversion Loss @ IF=30MHz



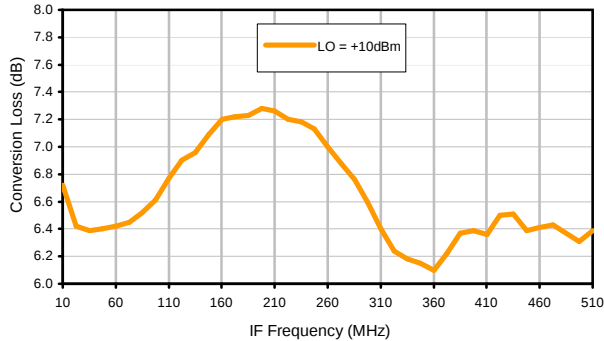
Conversion Loss vs. LO @ RF=1750MHz



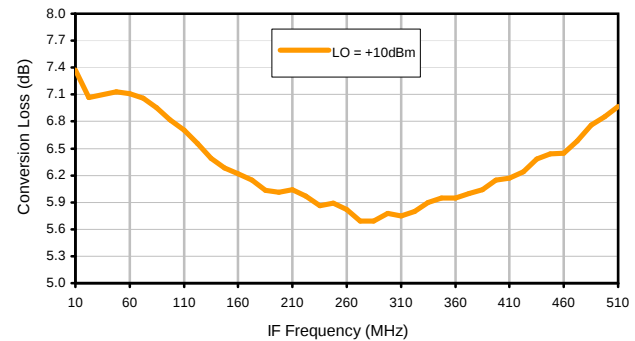
Conversion Loss vs. IF @ RF=1750MHz



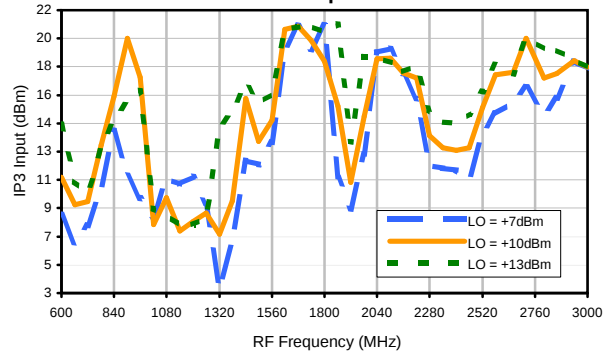
Conversion Loss vs. IF @ RF=1490MHz



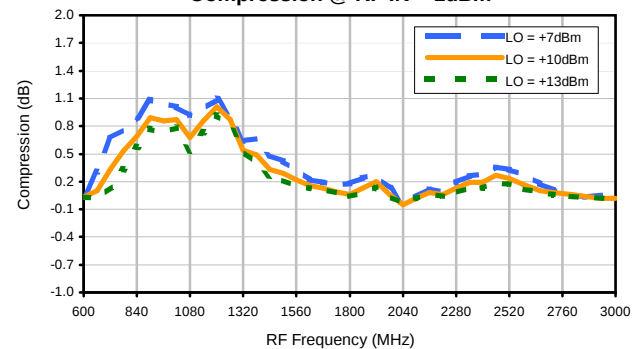
Conversion Loss vs. IF @ RF=2010.1MHz



IP3 Input

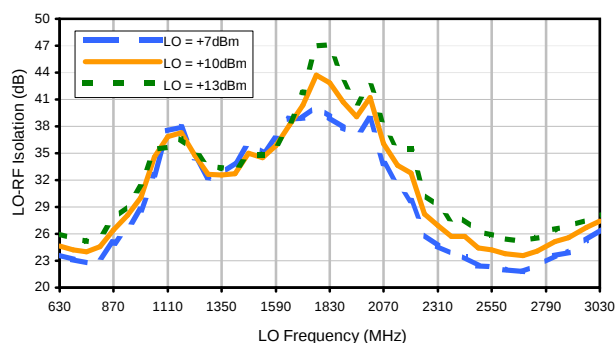


Compression @ RF IN=+1dBm

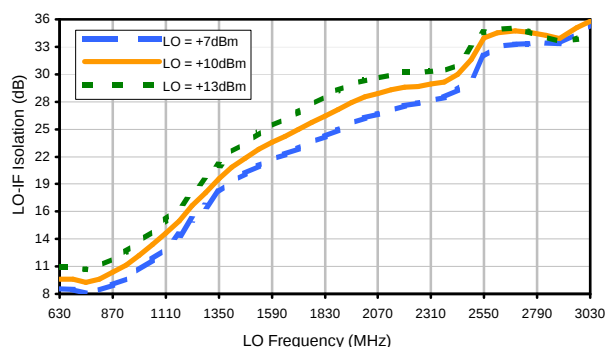


Typical Performance Curves

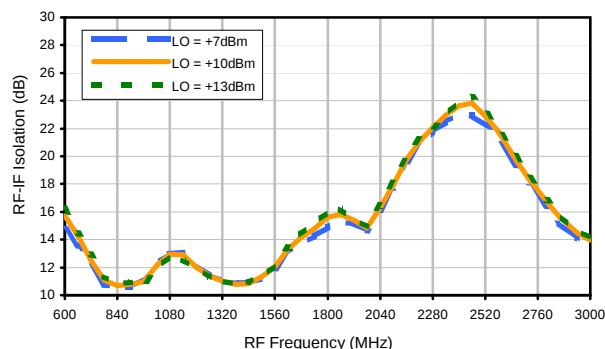
LO-RF Isolation



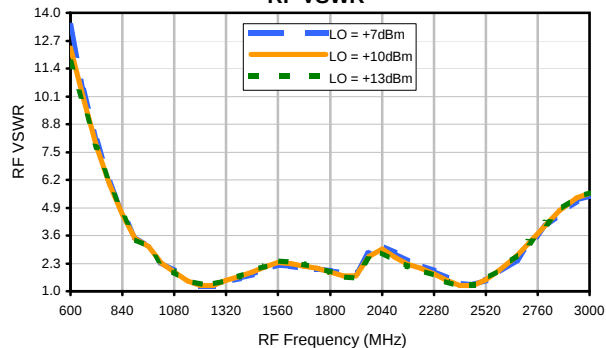
LO-IF Isolation



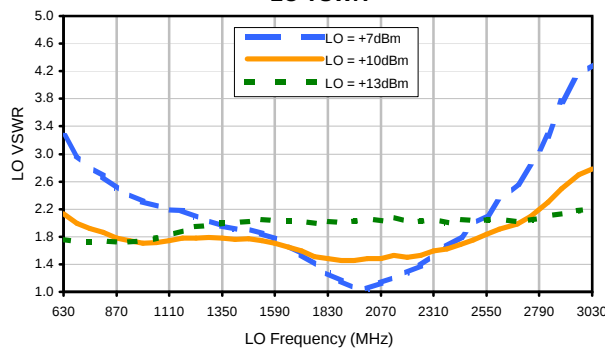
RF-IF Isolation



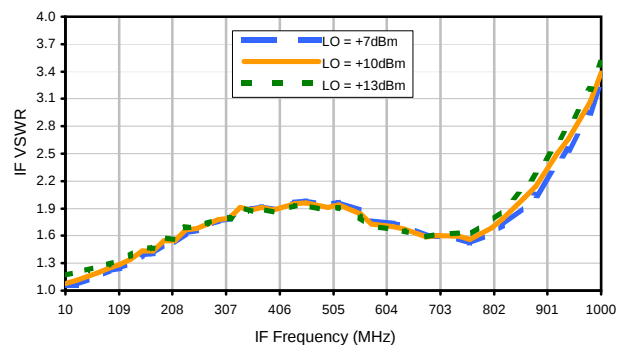
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+11	1	+0	14	6	14	26	32	18	30
1	-	9	+0	31	32	32	22	23	35	38	43	38
2	>90	>64	>64	60	>64	63	51	>64	54	60	>64	>64
3	>90	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64
4	>90	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64
5	>90	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64
6	>90	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64
7	>90	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64
8	>90	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64
9	>90	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64
10	>90	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64	>64
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 1750 MHz; -14.00 dBm.
LO IN: 1780 MHz; +10.00 dBm
IF OUT: 30 MHz; -26.36 dBm

RF HARMONICS ORDER

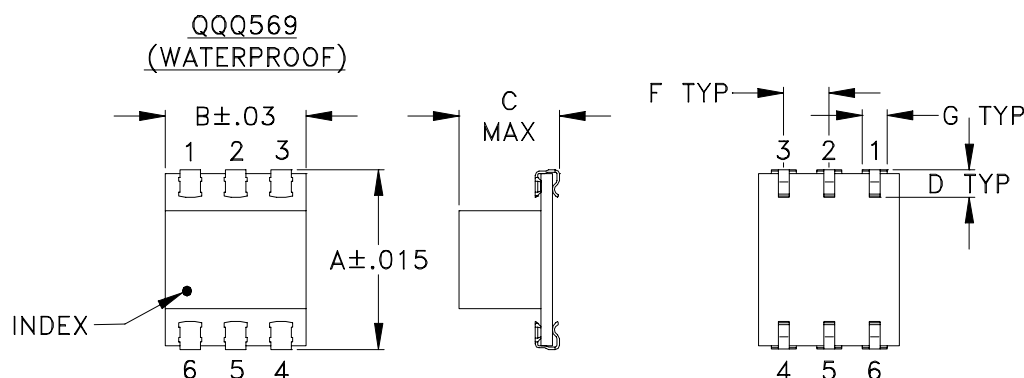
	(-dBm)	(-dBc)										
0	-	-	1	13	12	26	18	26	38	47	31	42
1	-	9	+0	31	32	32	22	23	37	38	45	39
2	76	61	64	49	55	52	40	68	44	51	56	60
3	>90	73	>75	74	62	71	74	70	60	59	59	68
4	>90	>75	>75	>75	>75	>75	>75	>75	72	>75	71	>75
5	>90	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75
6	>90	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75
7	>90	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75
8	>90	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75
9	>90	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75
10	>90	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75	>75
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

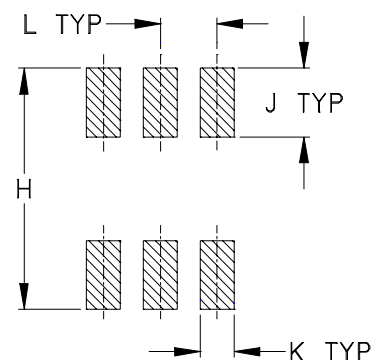
Test conditions: RF IN: 1750 MHz; -4.00 dBm.
LO IN: 1780 MHz; +10.00 dBm
IF OUT: 30 MHz; -14.83 dBm

- 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



PCB Land Pattern



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

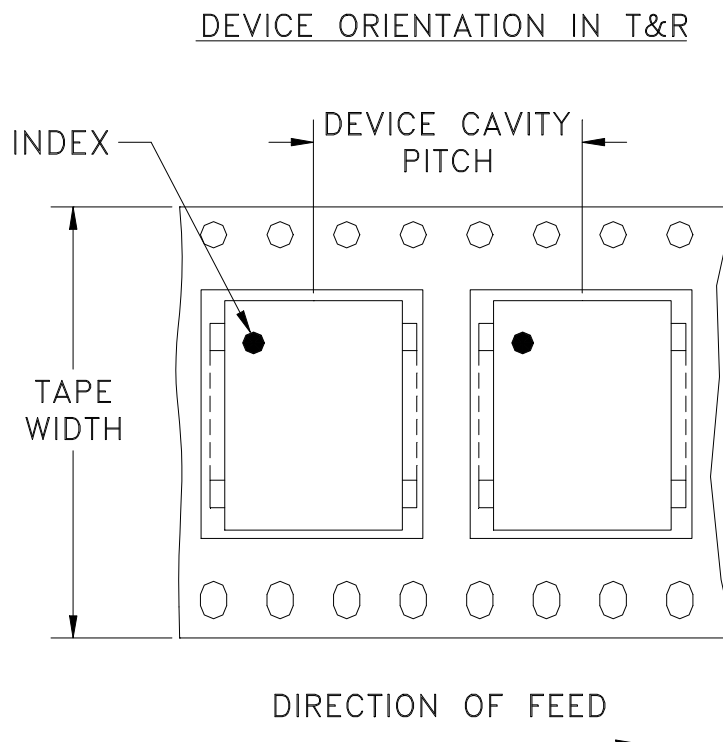
CASE#	A	B	C	D	E	F	G	H	J	K	L	M	WT, GRAM
QQQ569	.390 (9.90)	.31 (7.87)	.225 (5.72)	.060 (1.52)	-	.100 (2.54)	.045 (1.14)	.420 (10.67)	.120 (3.05)	.060 (1.52)	.100 (2.54)	-	.50

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .01$; 3 Pl. $\pm .005$

Notes:

- Case material: Ceramic.
- Termination finish:
 - For RoHS Case Styles: Tin plate over Nickel plate.
 - For RoHS-5 Case Styles: Tin-Lead plate.

Tape & Reel Packaging TR-F5



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
32	16	13	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



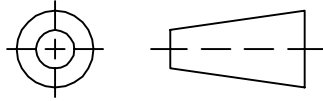
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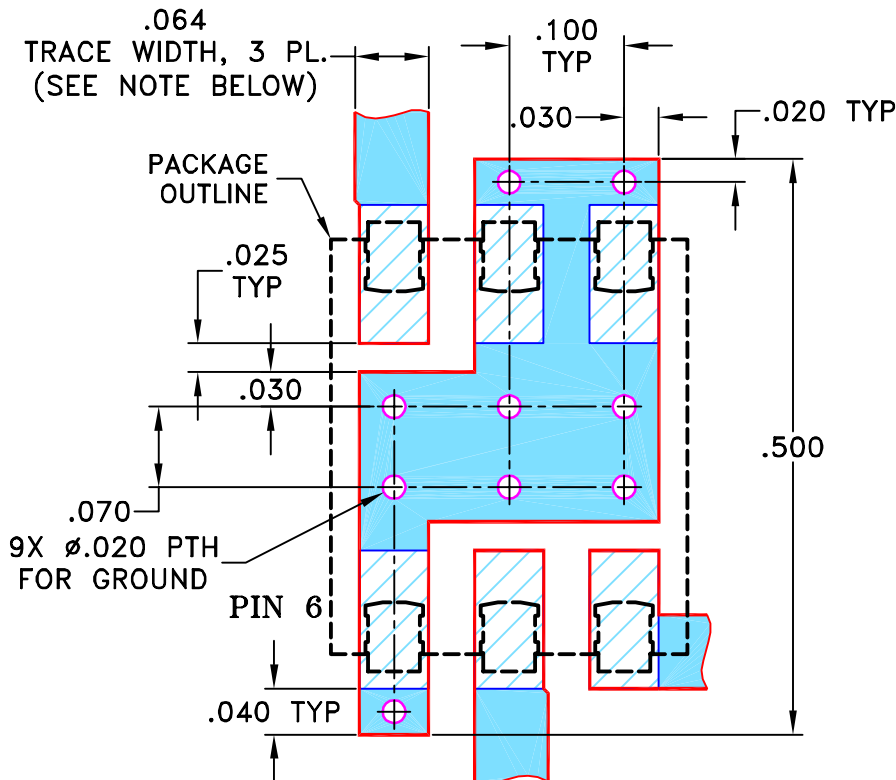
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M82272	NEW RELEASE	08/02/02	AV	DJ
A	M102713	UPDATED NOTES	01/14/06	GF	IL

SUGGESTED MOUNTING CONFIGURATION FOR QQQ569 CASE STYLE, "w" PIN CONNECTION



NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.030" $\pm$ 0.002"; 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

UNLESS OTHERWISE SPECIFIED

INITIALS

DATE

DIMENSIONS ARE IN INCHES

DRAWN

AV

07/19/02

TOLERANCES ON:

CHECKED

WL

08/02/02

2 PL DECIMALS $\pm$

APPROVED

DJ

08/02/02

3 PL DECIMALS $\pm$.005

ANGLES $\pm$

FRACTIONS $\pm$

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



Mini-Circuits®

13 Neptune Avenue
Brooklyn NY 11235

PL, w, QQQ569, LRMS-J, TB-44

SIZE

A

CODE IDENT

15542

DRAWING NO:

98-PL-083

REV:

A

FILE:

98PL083

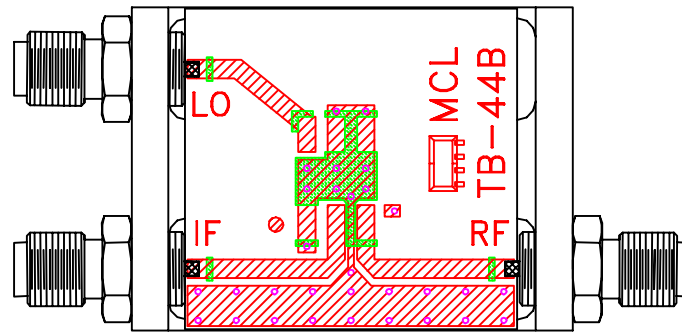
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6:1

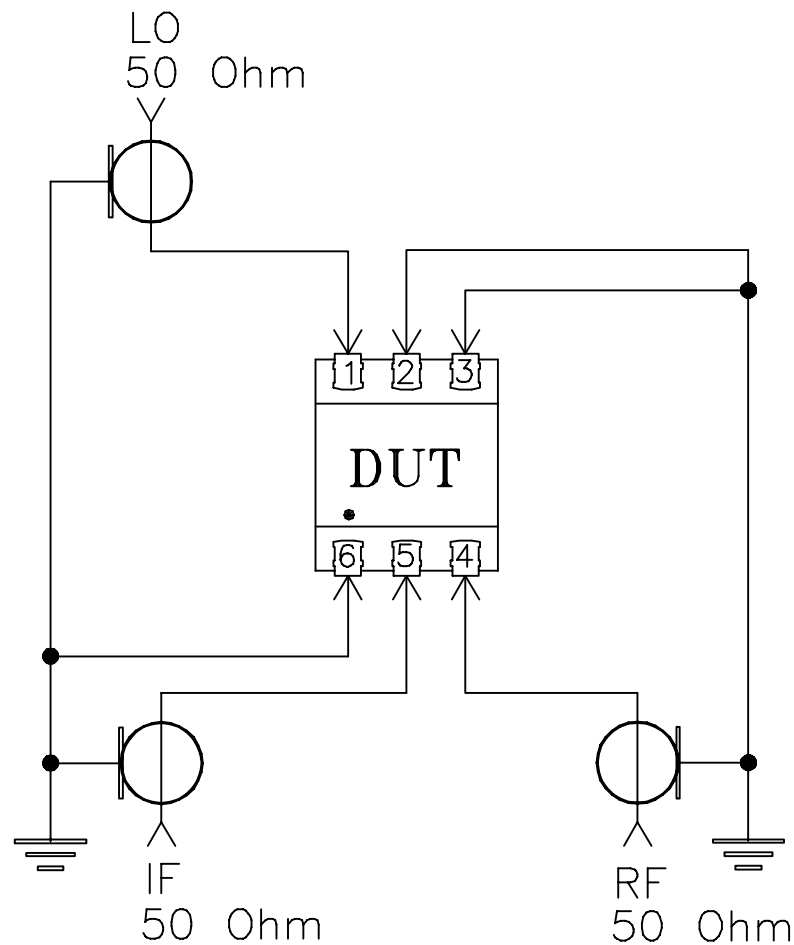
SHEET:

1 OF 1

Evaluation Board and Circuit



TB-44+



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.030 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 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 Eutetic Process: 225°C peak Pb-Free Process 245° - 250°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