Non-Catalog Model

Frequency Mixer TUF-11ALHSM

Level 10 (LO Power +10 dBm)

Important Note

This is a non-catalog model and can be manufactured on specific request.
Pricing and delivery information can be supplied upon request.

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CASE STYLE : NNN150

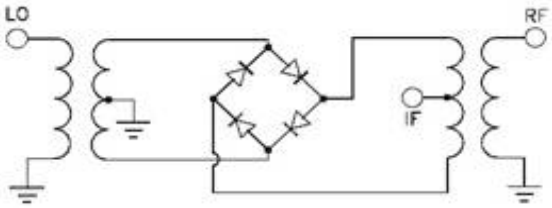
ELECTRICAL SPECIFICATIONS 50Ω @ +25°C					
Parameter		**Min.**	**Typ.**	**Max.**	**Units**
Frequency	**LO** (fL to fU)	1400		1900	MHz
	RF (fL to fU)	1400		1900	MHz
	IF	40		500	MHz
Conversion Loss			7.0	8.6	dB
LO-RF Isolation		20	36		dB
LO-IF Isolation		15	28		dB
1 dB Comp. Input Power			+5		dBm

Note: Non-hermetic.

MAXIMUM RATINGS	
Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
RF Power	50mW
IF Current	40mA

PIN CONNECTIONS	
LO	4
RF	1
IF	2
GROUND	3

Electrical Schematics



Frequency Mixer TUF-11ALHSM

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=40MHz (dB) @LO (dBm)		
		+7	+10	+13
800.1	840.1	10.73	10.10	9.76
880.6	920.6	8.99	8.59	8.38
961.1	1001.1	8.03	7.72	7.55
1041.6	1081.6	7.76	7.47	7.29
1122.1	1162.1	7.86	7.56	7.42
1202.6	1242.6	8.07	7.72	7.59
1283.1	1323.1	8.34	7.81	7.60
1363.6	1403.6	8.45	7.80	7.50
1444.1	1484.1	8.35	7.64	7.27
1524.6	1564.6	8.21	7.40	7.01
1605.1	1645.1	8.01	7.13	6.74
1685.6	1725.6	7.90	6.96	6.56
1766.1	1806.1	7.81	6.95	6.56
1846.6	1886.6	7.81	6.91	6.51
1927.1	1967.1	7.74	6.84	6.50
2007.6	2047.6	7.68	6.88	6.52
2088.2	2128.2	7.63	6.85	6.51
2168.7	2208.7	7.77	6.99	6.58
2249.2	2289.2	7.89	7.09	6.76
2329.7	2369.7	7.94	7.14	6.75
2410.2	2450.2	7.95	7.27	6.86
2490.7	2530.7	8.00	7.35	6.97
2571.2	2611.2	8.05	7.42	7.09
2651.7	2691.7	8.10	7.52	7.21
2732.2	2772.2	8.17	7.62	7.29
2812.7	2852.7	8.24	7.67	7.34
2893.2	2933.2	8.25	7.70	7.38
2973.7	3013.7	8.27	7.74	7.47
3054.2	3094.2	8.34	7.76	7.47
3134.7	3174.7	8.44	7.83	7.52
3215.2	3255.2	8.63	7.94	7.56
3295.7	3335.7	8.92	8.15	7.70
3376.2	3416.2	9.30	8.54	8.01
3456.7	3496.7	9.60	8.75	8.23
3537.2	3577.2	9.83	8.93	8.40
3637.8	3677.8	10.29	9.21	8.76
3718.3	3758.3	10.75	9.36	8.94
3819.0	3859.0	11.41	9.65	9.16
3899.5	3939.5	12.32	9.83	9.15
4000.1	4040.1	13.77	10.48	9.30

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm) @LO (dBm)		
		+7	+10	+13
800.1	840.1	20.20	23.37	24.54
880.6	920.6	19.32	20.89	20.90
961.1	1001.1	17.40	19.24	21.09
1041.6	1081.6	18.30	19.61	21.34
1122.1	1162.1	18.63	21.17	22.20
1202.6	1242.6	20.32	21.51	22.89
1283.1	1323.1	22.98	22.75	22.41
1363.6	1403.6	22.30	26.19	23.95
1444.1	1484.1	19.30	21.54	23.37
1524.6	1564.6	17.57	19.57	20.91
1605.1	1645.1	16.75	18.19	18.92
1685.6	1725.6	16.05	18.02	18.95
1766.1	1806.1	15.29	16.90	17.57
1846.6	1886.6	14.60	16.17	17.94
1927.1	1967.1	14.86	16.37	18.05
2007.6	2047.6	15.35	17.30	18.11
2088.2	2128.2	15.74	17.19	19.01
2168.7	2208.7	15.60	16.93	18.84
2249.2	2289.2	15.46	16.60	18.15
2329.7	2369.7	15.93	17.62	19.00
2410.2	2450.2	17.81	17.64	18.87
2490.7	2530.7	17.91	18.80	19.39
2571.2	2611.2	17.65	19.49	19.76
2651.7	2691.7	17.92	18.64	19.25
2732.2	2772.2	19.32	20.32	20.30
2812.7	2852.7	19.45	20.48	20.62
2893.2	2933.2	19.34	21.48	21.41
2973.7	3013.7	20.02	21.11	23.30
3054.2	3094.2	19.48	23.88	23.13
3134.7	3174.7	19.92	21.85	24.41
3215.2	3255.2	17.94	20.29	21.95
3295.7	3335.7	19.53	20.30	22.81
3376.2	3416.2	19.86	19.41	20.70
3456.7	3496.7	19.78	22.38	20.82
3537.2	3577.2	20.18	21.07	20.04
3637.8	3677.8	19.44	25.85	23.29
3718.3	3758.3	18.10	21.16	22.63
3819.0	3859.0	16.98	20.19	23.31
3899.5	3939.5	15.14	17.53	23.47
4000.1	4040.1	14.39	19.54	19.94

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+5dBm (dB) @LO (dBm)		
		+7	+10	+13
800.1	840.1	0.52	0.51	0.46
880.6	920.6	1.37	1.13	0.92
961.1	1001.1	1.39	1.13	0.91
1041.6	1081.6	1.08	0.76	0.57
1122.1	1162.1	0.84	0.48	0.35
1202.6	1242.6	0.83	0.49	0.34
1283.1	1323.1	0.96	0.71	0.51
1363.6	1403.6	1.13	0.92	0.74
1444.1	1484.1	1.38	1.24	1.06
1524.6	1564.6	1.62	1.50	1.31
1605.1	1645.1	1.80	1.76	1.50
1685.6	1725.6	2.00	1.87	1.64
1766.1	1806.1	2.00	1.87	1.60
1846.6	1886.6	2.01	1.83	1.57
1927.1	1967.1	2.08	1.86	1.61
2007.6	2047.6	1.99	1.79	1.54
2088.2	2128.2	2.10	1.79	1.55
2168.7	2208.7	2.08	1.74	1.49
2249.2	2289.2	2.07	1.71	1.43
2329.7	2369.7	1.86	1.63	1.36
2410.2	2450.2	1.77	1.45	1.26
2490.7	2530.7	1.94	1.54	1.28
2571.2	2611.2	1.93	1.48	1.17
2651.7	2691.7	1.96	1.44	1.12
2732.2	2772.2	1.84	1.36	1.03
2812.7	2852.7	1.89	1.32	1.09
2893.2	2933.2	2.11	1.43	1.04
2973.7	3013.7	2.17	1.38	1.00
3054.2	3094.2	2.26	1.36	0.97
3134.7	3174.7	2.41	1.43	0.95
3215.2	3255.2	2.39	1.39	0.91
3295.7	3335.7	2.46	1.34	0.86
3376.2	3416.2	2.64	1.35	0.78
3456.7	3496.7	2.69	1.37	0.72
3537.2	3577.2	2.62	1.27	0.62
3637.8	3677.8	2.59	1.28	0.48
3718.3	3758.3	2.73	1.49	0.61
3819.0	3859.0	2.16	1.49	0.58
3899.5	3939.5	1.53	1.55	0.63
4000.1	4040.1	0.60	1.28	0.57

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1650.1MHz (dB)
		@LO (dBm)
		+10
250.0	1400.1	6.74
237.4	1412.7	6.81
224.7	1425.4	6.82
212.1	1438.0	6.77
199.5	1450.6	6.84
186.8	1463.3	6.81
174.2	1475.9	6.82
161.6	1488.5	6.86
148.9	1501.2	6.82
136.3	1513.8	6.87
123.7	1526.4	6.90
111.1	1539.0	6.86
98.4	1551.7	6.93
85.8	1564.3	6.94
73.2	1576.9	6.91
60.5	1589.6	7.02
47.9	1602.2	7.03
35.3	1614.8	7.10
22.6	1627.5	7.32
10.0	1640.1	7.79
10.0	1660.1	7.67
22.6	1672.7	7.09
35.3	1685.4	7.08
47.9	1698.0	7.05
60.5	1710.6	7.03
73.2	1723.3	7.09
85.8	1735.9	7.04
98.4	1748.5	7.04
111.1	1761.2	7.08
123.7	1773.8	7.03
136.3	1786.4	7.06
148.9	1799.0	7.06
161.6	1811.7	6.99
174.2	1824.3	7.01
186.8	1836.9	6.97
199.5	1849.6	6.95
212.1	1862.2	6.96
224.7	1874.8	6.94
237.4	1887.5	6.96
250.0	1900.1	7.00

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1400.1MHz (dB)
		@LO (dBm)
		+10
40.0	1440.1	7.71
51.8	1451.9	7.69
63.6	1463.7	7.75
75.4	1475.5	7.70
87.2	1487.3	7.75
99.0	1499.1	7.82
110.8	1510.9	7.77
122.6	1522.7	7.76
134.4	1534.5	7.81
146.2	1546.3	7.76
157.9	1558.0	7.84
169.7	1569.8	7.90
181.5	1581.6	7.85
193.3	1593.4	7.90
205.1	1605.2	7.94
216.9	1617.0	7.88
228.7	1628.8	7.91
240.5	1640.6	7.89
252.3	1652.4	7.81
264.1	1664.2	7.86
275.9	1676.0	7.86
287.7	1687.8	7.80
299.5	1699.6	7.82
311.3	1711.4	7.80
323.1	1723.2	7.76
334.9	1735.0	7.78
346.7	1746.8	7.75
358.5	1758.6	7.73
370.3	1770.4	7.79
382.1	1782.2	7.79
393.8	1793.9	7.80
405.6	1805.7	7.82
417.4	1817.5	7.77
429.2	1829.3	7.75
441.0	1841.1	7.74
452.8	1852.9	7.68
464.6	1864.7	7.70
476.4	1876.5	7.71
488.2	1888.3	7.65
500.0	1900.1	7.64

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1900.1MHz (dB)
		@LO (dBm)
		+10
500.0	1400.1	6.20
488.2	1411.9	6.22
476.4	1423.7	6.20
464.6	1435.5	6.23
452.8	1447.3	6.22
441.0	1459.1	6.23
429.2	1470.9	6.27
417.4	1482.7	6.29
405.6	1494.5	6.28
393.8	1506.3	6.31
382.1	1518.0	6.29
370.3	1529.8	6.29
358.5	1541.6	6.34
346.7	1553.4	6.33
334.9	1565.2	6.35
323.1	1577.0	6.40
311.3	1588.8	6.39
299.5	1600.6	6.39
287.7	1612.4	6.45
275.9	1624.2	6.42
264.1	1636.0	6.42
252.3	1647.8	6.47
240.5	1659.6	6.46
228.7	1671.4	6.50
216.9	1683.2	6.58
205.1	1695.0	6.54
193.3	1706.8	6.60
181.5	1718.6	6.66
169.7	1730.4	6.59
157.9	1742.2	6.64
146.2	1753.9	6.66
134.4	1765.7	6.65
122.6	1777.5	6.73
110.8	1789.3	6.77
99.0	1801.1	6.73
87.2	1812.9	6.79
75.4	1824.7	6.82
63.6	1836.5	6.80
51.8	1848.3	6.91
40.0	1860.1	6.95

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm)			LO-IF ISOLATION (dB) @LO (dBm)		
	+7	+10	+13	+7	+10	+13
800.1	43.47	46.79	49.27	23.04	22.27	21.88
880.6	40.06	43.90	48.13	23.06	22.39	21.92
961.1	37.68	41.30	45.54	23.27	22.51	22.05
1041.6	37.22	40.58	44.01	23.59	22.66	22.18
1122.1	36.99	39.85	42.77	24.17	23.09	22.53
1202.6	36.51	39.48	42.32	24.76	23.64	22.97
1283.1	35.75	39.04	42.32	25.51	24.36	23.43
1363.6	34.79	38.35	42.20	26.29	25.00	24.06
1444.1	33.95	37.41	41.35	27.12	25.68	24.61
1524.6	32.87	36.36	39.92	28.23	26.63	25.43
1605.1	32.35	35.61	38.86	29.16	27.65	26.25
1685.6	31.97	34.98	37.81	29.96	28.77	27.36
1766.1	31.61	34.18	36.71	30.69	30.12	29.08
1846.6	31.05	33.53	35.58	31.29	32.24	31.63
1927.1	30.71	33.03	34.36	32.30	35.66	35.82
2007.6	30.40	32.61	34.04	34.03	42.68	41.71
2088.2	30.31	32.17	33.84	38.86	48.12	36.52
2168.7	30.17	31.51	33.33	45.65	34.83	31.00
2249.2	29.98	31.10	32.64	35.00	29.46	27.49
2329.7	29.75	31.27	32.56	29.51	26.41	25.04
2410.2	29.48	31.19	33.04	26.28	24.42	23.60
2490.7	29.38	31.14	32.66	23.67	23.01	22.65
2571.2	29.19	31.27	32.79	21.95	21.79	21.80
2651.7	29.29	31.18	33.00	20.75	20.79	21.21
2732.2	29.34	31.34	33.12	19.81	20.18	20.64
2812.7	29.34	31.64	33.63	19.03	19.66	20.18
2893.2	29.47	31.90	34.27	18.56	19.27	19.91
2973.7	29.70	32.15	34.57	18.14	18.93	19.56
3054.2	29.95	32.25	34.59	17.79	18.54	19.25
3134.7	30.31	32.63	34.84	17.63	18.37	18.93
3215.2	30.68	32.94	35.31	17.56	18.24	18.79
3295.7	31.16	33.32	34.89	17.46	18.14	18.59
3376.2	31.60	34.15	36.08	17.42	17.99	18.39
3456.7	32.13	34.65	36.46	17.37	17.81	18.09
3537.2	32.40	34.78	36.21	17.42	17.74	17.96
3637.8	33.18	35.97	37.08	17.54	17.77	17.79
3718.3	33.56	36.35	38.01	17.63	17.64	17.68
3819.0	34.40	36.82	38.38	17.58	17.62	17.50
3899.5	35.39	37.75	38.49	17.60	17.51	17.23
4000.1	37.22	41.23	39.55	17.54	17.31	16.90

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB) @LO (dBm)		
		+7	+10	+13
800.1	840.1	22.02	21.65	21.47
880.6	920.6	22.15	21.94	21.83
961.1	1001.1	22.55	22.71	22.87
1041.6	1081.6	23.14	23.47	23.75
1122.1	1162.1	22.81	23.09	23.23
1202.6	1242.6	21.99	22.20	22.28
1283.1	1323.1	21.75	21.97	22.10
1363.6	1403.6	21.78	22.01	22.19
1444.1	1484.1	22.60	22.83	23.06
1524.6	1564.6	24.10	24.34	24.58
1605.1	1645.1	26.35	26.68	26.97
1685.6	1725.6	29.33	29.62	30.05
1766.1	1806.1	33.42	33.81	34.15
1846.6	1886.6	38.17	38.17	38.61
1927.1	1967.1	39.04	38.32	37.64
2007.6	2047.6	36.19	35.13	34.02
2088.2	2128.2	33.49	32.23	30.94
2168.7	2208.7	31.91	30.75	29.13
2249.2	2289.2	30.53	29.16	28.06
2329.7	2369.7	29.62	27.90	26.76
2410.2	2450.2	28.97	27.61	26.39
2490.7	2530.7	28.64	27.20	26.27
2571.2	2611.2	28.66	27.19	26.20
2651.7	2691.7	28.28	27.20	26.33
2732.2	2772.2	27.98	27.07	26.04
2812.7	2852.7	27.77	27.02	26.26
2893.2	2933.2	27.61	26.95	26.14
2973.7	3013.7	27.57	26.97	26.39
3054.2	3094.2	27.37	26.77	26.20
3134.7	3174.7	27.04	26.67	26.27
3215.2	3255.2	26.58	26.47	26.33
3295.7	3335.7	26.23	25.62	25.45
3376.2	3416.2	25.91	25.38	25.18
3456.7	3496.7	25.56	25.04	24.86
3537.2	3577.2	24.91	24.53	24.21
3637.8	3677.8	24.17	23.81	23.46
3718.3	3758.3	23.60	23.49	23.00
3819.0	3859.0	22.67	22.72	22.17
3899.5	3939.5	21.88	22.35	21.86
4000.1	4040.1	20.92	21.89	21.58

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1) @LO (dBm)		
		+7	+10	+13
800.1	840.1	7.28	6.89	6.66
880.6	920.6	4.99	4.73	4.56
961.1	1001.1	3.52	3.30	3.19
1041.6	1081.6	2.83	2.69	2.63
1122.1	1162.1	2.57	2.49	2.47
1202.6	1242.6	2.41	2.37	2.37
1283.1	1323.1	2.25	2.21	2.22
1363.6	1403.6	2.01	1.95	1.94
1444.1	1484.1	1.74	1.64	1.62
1524.6	1564.6	1.55	1.43	1.39
1605.1	1645.1	1.41	1.25	1.21
1685.6	1725.6	1.30	1.12	1.06
1766.1	1806.1	1.25	1.10	1.09
1846.6	1886.6	1.31	1.22	1.23
1927.1	1967.1	1.39	1.33	1.35
2007.6	2047.6	1.46	1.42	1.44
2088.2	2128.2	1.56	1.55	1.58
2168.7	2208.7	1.71	1.71	1.73
2249.2	2289.2	1.86	1.85	1.86
2329.7	2369.7	1.93	1.90	1.89
2410.2	2450.2	1.94	1.92	1.90
2490.7	2530.7	1.99	1.97	1.97
2571.2	2611.2	2.08	2.09	2.10
2651.7	2691.7	2.15	2.15	2.17
2732.2	2772.2	2.11	2.11	2.11
2812.7	2852.7	2.05	2.04	2.04
2893.2	2933.2	2.07	2.08	2.10
2973.7	3013.7	2.18	2.23	2.27
3054.2	3094.2	2.32	2.36	2.41
3134.7	3174.7	2.38	2.41	2.43
3215.2	3255.2	2.42	2.44	2.46
3295.7	3335.7	2.54	2.55	2.57
3376.2	3416.2	2.75	2.78	2.82
3456.7	3496.7	2.95	2.98	3.02
3537.2	3577.2	3.03	3.03	3.05
3637.8	3677.8	3.07	2.99	3.02
3718.3	3758.3	3.19	3.08	3.14
3819.0	3859.0	3.50	3.28	3.37
3899.5	3939.5	3.77	3.40	3.48
4000.1	4040.1	4.05	3.48	3.45

LO (MHz)	LO VSWR (:1) @LO (dBm)		
	+7	+10	+13
800.1	1.46	1.90	2.44
880.6	1.49	1.87	2.37
961.1	1.53	1.86	2.34
1041.6	1.58	1.86	2.31
1122.1	1.62	1.84	2.26
1202.6	1.68	1.82	2.21
1283.1	1.75	1.83	2.17
1363.6	1.81	1.85	2.16
1444.1	1.84	1.85	2.14
1524.6	1.90	1.83	2.08
1605.1	1.94	1.81	2.00
1685.6	1.99	1.80	1.92
1766.1	2.02	1.79	1.84
1846.6	2.09	1.77	1.75
1927.1	2.15	1.75	1.65
2007.6	2.25	1.75	1.57
2088.2	2.27	1.75	1.49
2168.7	2.28	1.74	1.44
2249.2	2.26	1.73	1.41
2329.7	2.27	1.74	1.42
2410.2	2.27	1.75	1.44
2490.7	2.23	1.76	1.48
2571.2	2.22	1.78	1.54
2651.7	2.15	1.81	1.62
2732.2	2.12	1.84	1.70
2812.7	2.09	1.88	1.79
2893.2	2.04	1.90	1.87
2973.7	1.98	1.93	1.94
3054.2	1.94	1.97	2.04
3134.7	1.90	2.00	2.11
3215.2	1.86	2.02	2.17
3295.7	1.87	2.07	2.25
3376.2	1.96	2.19	2.40
3456.7	2.05	2.30	2.52
3537.2	2.11	2.36	2.60
3637.8	2.28	2.53	2.76
3718.3	2.44	2.66	2.90
3819.0	2.66	2.82	3.05
3899.5	2.89	2.99	3.19
4000.1	3.18	3.22	3.37

IF (OUT) (MHz)	IF VSWR @LO=1900.1MHz (:1) @LO (dBm)		
	+7	+10	+13
40.0	1.44	1.27	1.20
51.8	1.39	1.20	1.13
63.6	1.34	1.16	1.09
75.4	1.33	1.13	1.07
87.2	1.36	1.16	1.06
99.0	1.40	1.19	1.08
110.8	1.41	1.20	1.08
122.6	1.40	1.19	1.08
134.4	1.39	1.18	1.08
146.2	1.37	1.17	1.09
157.9	1.37	1.16	1.08
169.7	1.36	1.16	1.06
181.5	1.35	1.15	1.04
193.3	1.35	1.14	1.04
205.1	1.36	1.15	1.06
216.9	1.38	1.18	1.09
228.7	1.39	1.18	1.10
240.5	1.37	1.17	1.09
252.3	1.34	1.14	1.07
264.1	1.32	1.13	1.07
275.9	1.32	1.13	1.08
287.7	1.33	1.14	1.09
299.5	1.34	1.15	1.08
311.3	1.34	1.15	1.07
323.1	1.33	1.13	1.07
334.9	1.32	1.13	1.09
346.7	1.31	1.14	1.11
358.5	1.31	1.14	1.12
370.3	1.31	1.13	1.10
382.1	1.29	1.11	1.09
393.8	1.27	1.10	1.10
405.6	1.26	1.10	1.12
417.4	1.26	1.11	1.13
429.2	1.26	1.11	1.14
441.0	1.25	1.10	1.13
452.8	1.23	1.09	1.14
464.6	1.21	1.09	1.16
476.4	1.20	1.11	1.19
488.2	1.21	1.13	1.20
500.0	1.21	1.13	1.20

Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	12	29	19	44	31	45	55	55	57	82
1	-	23	+0	38	16	42	47	52	61	62	66	74
2	>100	48	43	41	55	61	45	60	52	63	64	69
3	>100	40	37	54	31	59	49	50	63	64	62	81
4	>100	70	65	71	53	49	67	67	67	71	71	67
5	>100	65	70	55	52	58	43	73	51	71	67	76
6	>100	75	75	78	83	71	58	60	75	70	76	78
7	>100	79	87	83	81	74	62	73	56	86	73	74
8	>100	85	84	90	85	87	86	77	67	64	90	81
9	>100	>93	84	>93	>93	85	88	76	72	74	64	87
10	>100	>93	92	91	>93	>93	>93	90	>93	82	71	73
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:
RF IN: 1650.1 MHz; 0.00 dBm.
LO IN: 1690.01 MHz; +10.00 dBm
IF OUT: 39.91 MHz; -7.25 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	2	20	8	30	17	32	40	43	48	62
1	-	24	+0	39	15	33	46	43	52	53	49	55
2	>100	58	52	46	59	62	52	67	54	57	66	60
3	>100	64	57	77	49	>83	58	74	69	80	73	>83
4	>100	>83	>83	>83	80	79	>83	>83	>83	>83	81	>83
5	>100	>83	>83	>83	>83	>83	80	>83	>83	>83	>83	>83
6	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
7	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
8	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
9	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
10	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

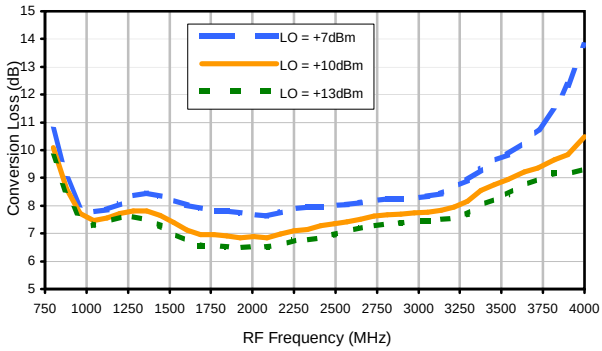
LO HARMONICS ORDER

Test conditions:
RF IN: 1650.1 MHz; -10.00 dBm.
LO IN: 1690.01 MHz; +10.00 dBm
IF OUT: 39.91 MHz; -17.15 dBm

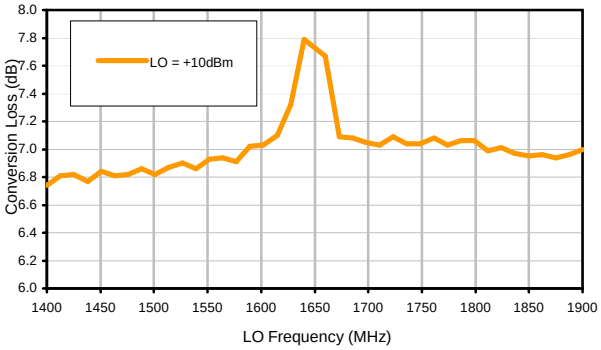
Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

Typical Performance Curves

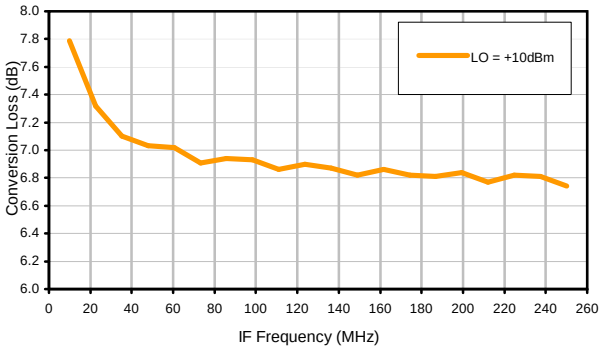
Conversion Loss @ IF=40MHz



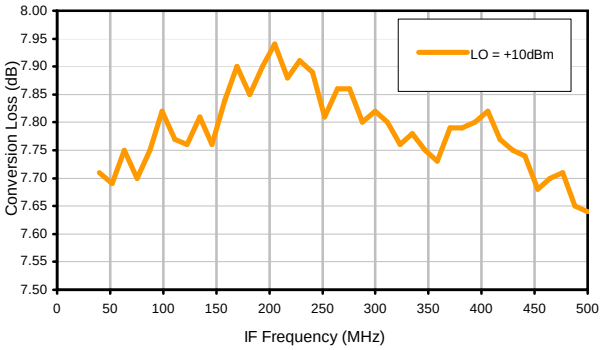
Conversion Loss vs. LO @ RF=1650.1MHz



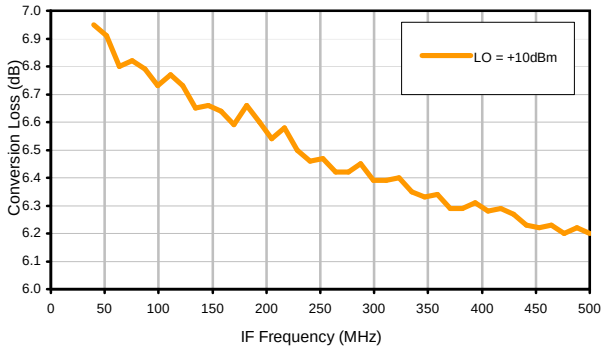
Conversion Loss vs. IF @ RF=1650.1MHz



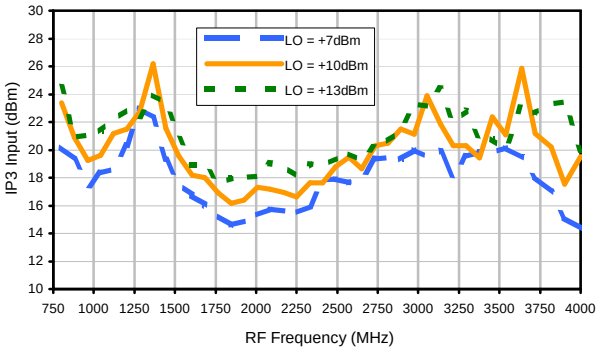
Conversion Loss vs. IF @ RF=1400.1MHz



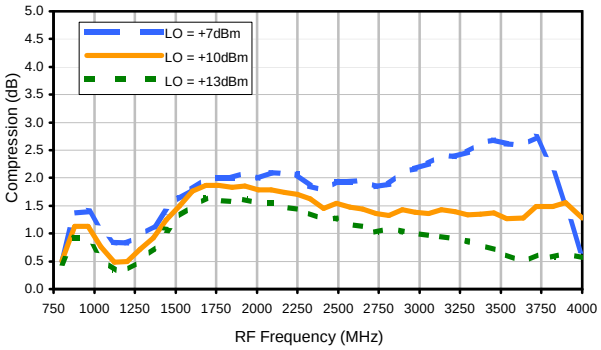
Conversion Loss vs. IF @ RF=1900.1MHz



IP3 Input

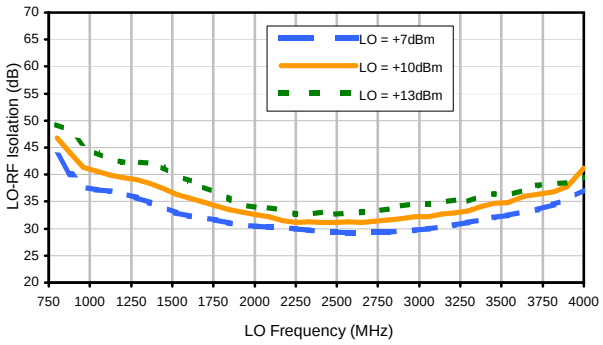


Compression @ RF IN=+5dBm

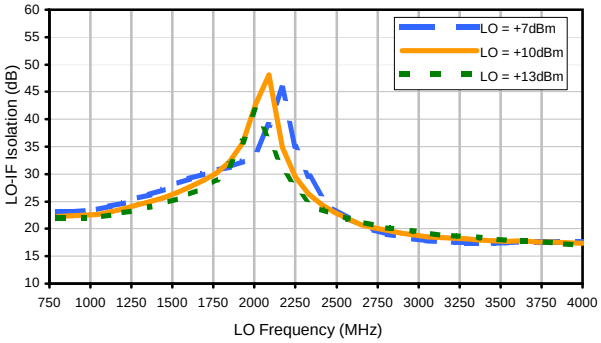


Typical Performance Curves

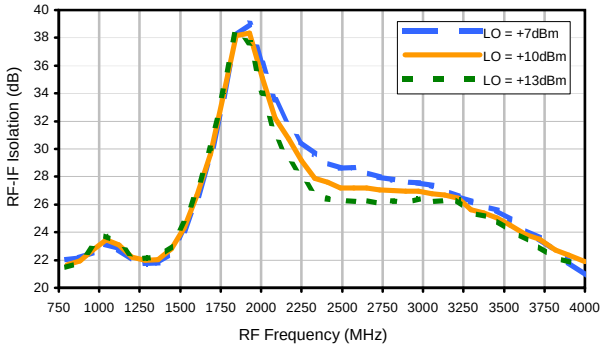
LO-RF Isolation



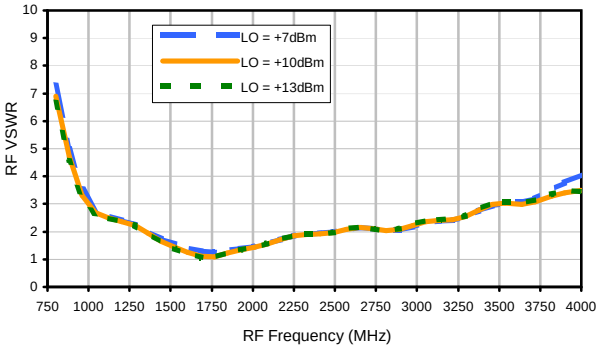
LO-IF Isolation



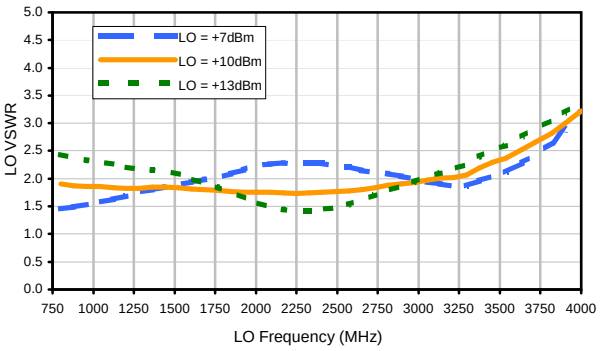
RF-IF Isolation



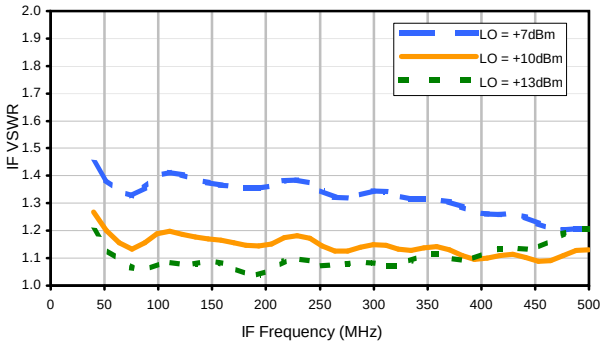
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	12	29	19	44	31	45	55	55	57	82
1	-	23	+0	38	16	42	47	52	61	62	66	74
2	>100	48	43	41	55	61	45	60	52	63	64	69
3	>100	40	37	54	31	59	49	50	63	64	62	81
4	>100	70	65	71	53	49	67	67	67	71	71	67
5	>100	65	70	55	52	58	43	73	51	71	67	76
6	>100	75	75	78	83	71	58	60	75	70	76	78
7	>100	79	87	83	81	74	62	73	56	86	73	74
8	>100	85	84	90	85	87	86	77	67	64	90	81
9	>100	>93	84	>93	>93	85	88	76	72	74	64	87
10	>100	>93	92	91	>93	>93	>93	90	>93	82	71	73
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:
RF IN: 1650.1 MHz; 0.00 dBm.
LO IN: 1690.01 MHz; +10.00 dBm
IF OUT: 39.91 MHz; -7.25 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	2	20	8	30	17	32	40	43	48	62
1	-	24	+0	39	15	33	46	43	52	53	49	55
2	>100	58	52	46	59	62	52	67	54	57	66	60
3	>100	64	57	77	49	>83	58	74	69	80	73	>83
4	>100	>83	>83	>83	80	79	>83	>83	>83	>83	81	>83
5	>100	>83	>83	>83	>83	>83	80	>83	>83	>83	>83	>83
6	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
7	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
8	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
9	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
10	>100	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83	>83
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

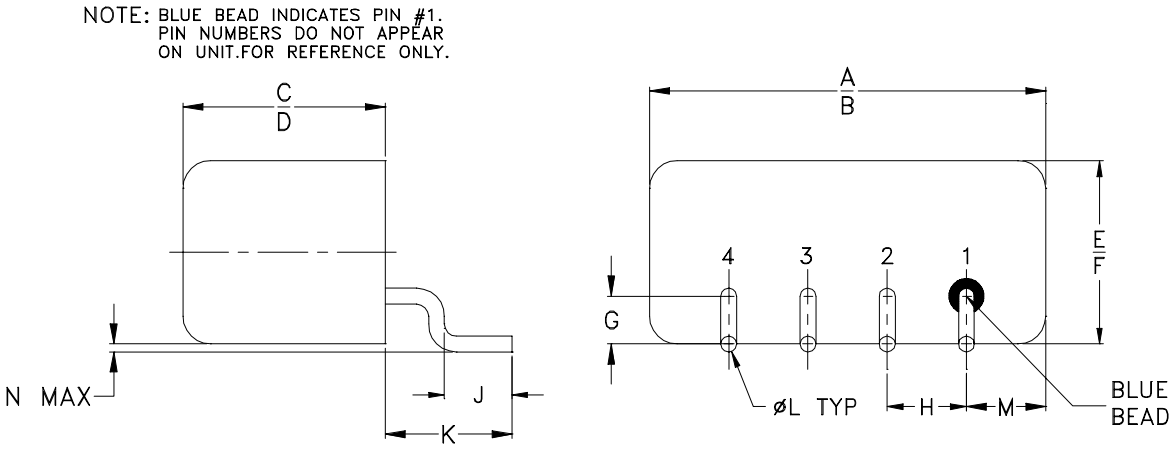
Test conditions:
RF IN: 1650.1 MHz; -10.00 dBm.
LO IN: 1690.01 MHz; +10.00 dBm
IF OUT: 39.91 MHz; -17.15 dBm

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

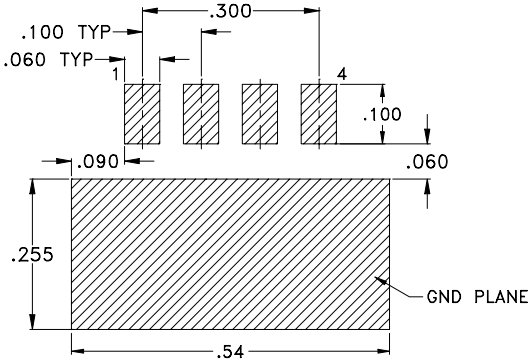
Case Style NNN

Outline Dimensions

NNN150



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE #.	A	B	C	D	E	F	G	H	J	K	L	M	N	WT, GRAM
NNN150	.50 (12.70)	.48 (12.19)	.255 (6.48)	.240 (6.10)	.23 (5.84)	.21 (5.33)	.06 (1.52)	.100 (2.54)	.09 (2.29)	.16 (4.06)	.020 (0.51)	.09 (2.29)	.005 (0.13)	1.9

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

Notes:

1. Header material C.R.S. Pin material #52 alloy.
2. Finish: Electro-Tin, hot-oil flowed or electro-Tin-Silver.
3. Cover material: Cupro-Nickel.
4. Pin's meniscus 0.015 inch max.
5. Special Tolerances: Pin diameter ± .005 inch.

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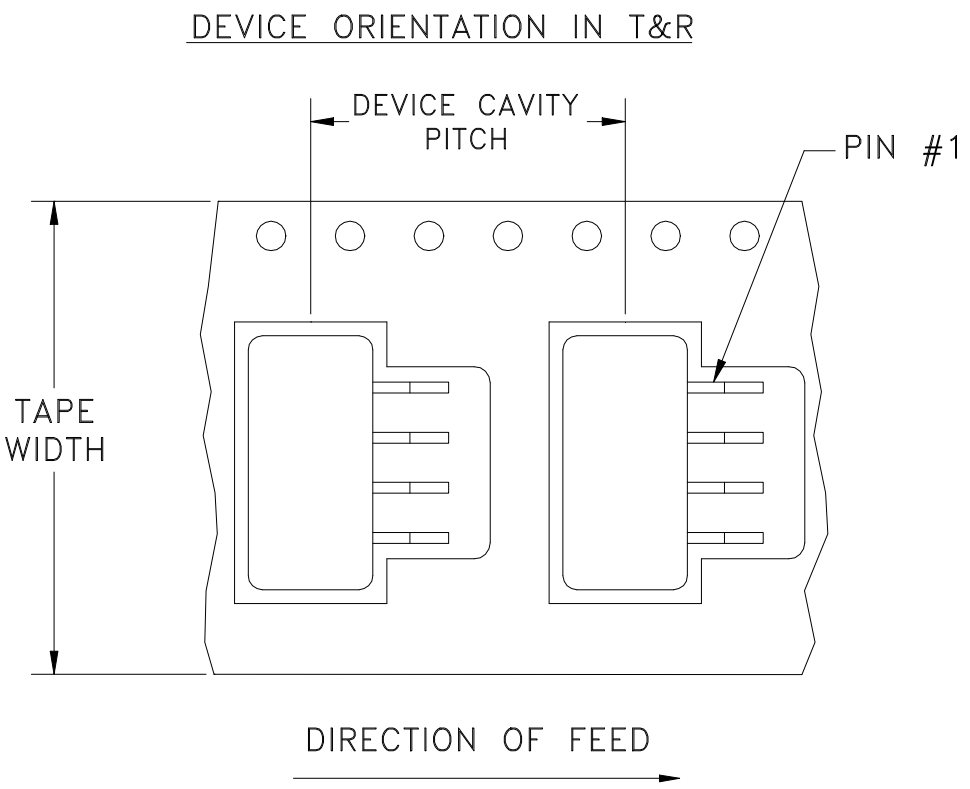
Tape & Reel Packaging TR-F9



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
24	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.

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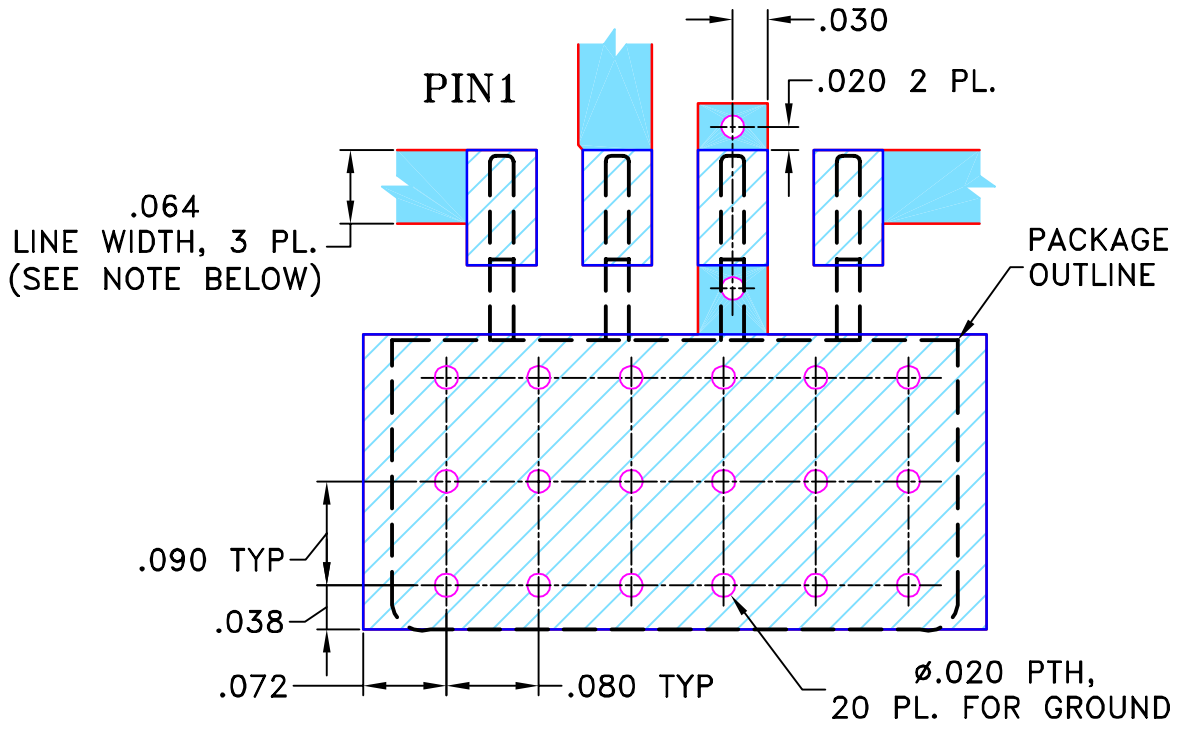
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M86549	NEW RELEASE	04/15/03	GF	DJ
A	M102713	UPDATED NOTES & DISCRIPTION	01/14/06	GF	IL

SUGGESTED MOUNTING CONFIGURATION
FOR NNN150 CASE STYLE, "z"/"cm" PIN CONNECTIONS.



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.

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	GF	04/11/03
TOLERANCES ON:	CHECKED	AV	04/15/03
2 PL DECIMALS ±	APPROVED	DJ	04/15/03
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

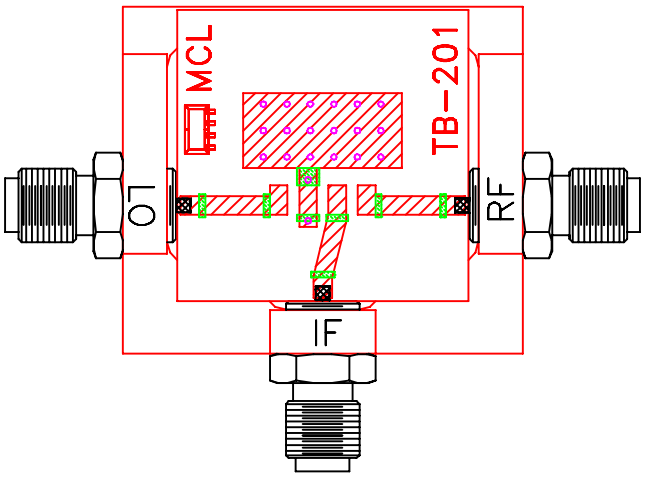
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, z/cm NNN150, TUF/TFAS-SM, TB-201

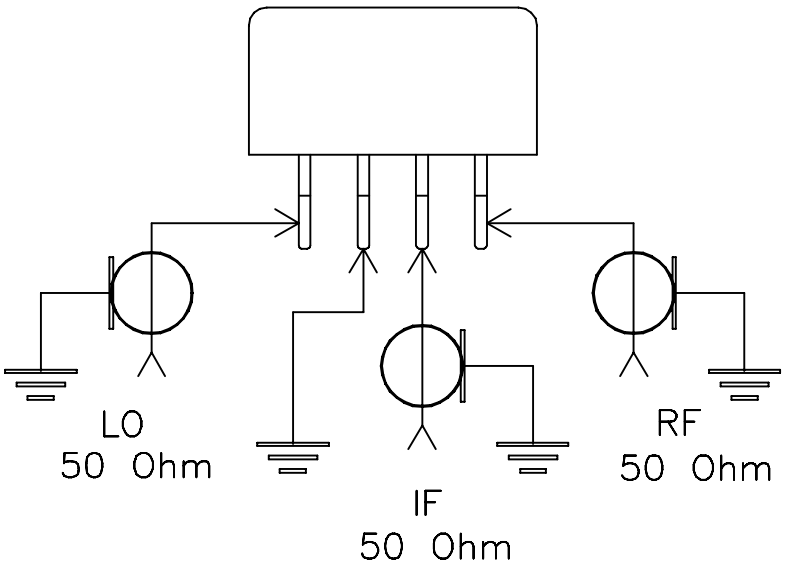
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-081	A

FILE:	SCALE:	SHEET:
98PL081	6:1	1 OF 1

Evaluation Board and Circuit



TB-201



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.030 inch.

Mini-Circuits®

Mini-Circuits

Environmental Specifications ENV30

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
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
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
Moisture Resistance	10 cycles, 24 hours per cycle	MIL-STD-202, Method 106, Condition A, except 50°C and end point electrical test done within 12 hours
Solderability	10X Magnification	J-STD-002, 95% Coverage
Resistance to Solder Heat	260°C for 10 seconds	MIL-STD-202, Method 210, Condition B
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
Terminal Strength	4 1/2 Pound Pull	MIL-STD-202, Method 211, Condition A

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
Barometric Pressure	100,000 Feet	MIL-STD-202, Method 105, Condition D