

Frequency Mixer

HJK-ED12738/1

Level 17 (LO Power +17 dBm)

Important Note

This model has been designed, built and tested in our engineering department. Performance data represents model capability. At present it is a non-catalog model. On request, we can supply a final specification sheet, part number and price/delivery information.



Please click "Back", and then click "Contact Us" for Applications support.

CASE STYLE : TTT167

ELECTRICAL SPECIFICATIONS 50Ω @ +25°C					
Parameter		Min.	Typ.	Max.	Units
Frequency	LO (fL to fU)	585.2		1758.5	MHz
	RF (fL to fU)	585.2		1758.5	MHz
	IF	30		650	MHz
Conversion Loss	Total Range		8.0		dB
LO-RF Isolation			42		dB
LO-IF Isolation			34		dB
IP3 Input			+25		dBm

MAXIMUM RATINGS	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C

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

Frequency Mixer

HJK-ED12738/1

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)		
		@LO (dBm)		
		+14	+17	+20
280.1	310.1	10.55	10.39	10.27
340.5	370.5	8.30	8.07	7.91
401.0	431.0	7.22	7.05	6.95
461.4	491.4	6.90	6.81	6.76
542.0	572.0	6.65	6.59	6.56
602.5	632.5	6.38	6.33	6.31
683.1	713.1	6.33	6.28	6.27
743.5	773.5	6.42	6.38	6.37
824.1	854.1	6.49	6.44	6.42
884.5	914.5	6.53	6.48	6.45
965.1	995.1	6.84	6.78	6.75
1025.6	1055.6	7.06	7.01	6.97
1106.2	1136.2	7.36	7.31	7.28
1166.6	1196.6	7.58	7.53	7.51
1247.2	1277.2	7.81	7.77	7.75
1307.7	1337.7	7.90	7.85	7.81
1388.2	1418.2	8.01	7.96	7.93
1448.7	1478.7	8.13	8.09	8.07
1529.3	1559.3	7.96	7.90	7.87
1589.7	1619.7	7.81	7.73	7.68
1670.3	1700.3	7.92	7.83	7.79
1730.8	1760.8	7.91	7.83	7.80
1811.4	1841.4	7.70	7.60	7.55
1871.8	1901.8	7.55	7.43	7.37
1952.4	1982.4	7.43	7.28	7.21
2012.8	2042.8	7.32	7.17	7.08
2093.4	2123.4	7.32	7.16	7.07
2153.9	2183.9	7.39	7.22	7.13
2234.5	2264.5	7.46	7.31	7.25
2294.9	2324.9	7.59	7.47	7.43
2375.5	2405.5	7.90	7.83	7.83
2436.0	2466.0	8.15	8.11	8.14
2516.5	2546.5	8.33	8.34	8.40
2577.0	2607.0	8.41	8.44	8.52
2657.6	2687.6	8.75	8.79	8.88
2718.0	2748.0	9.11	9.15	9.25
2798.6	2828.6	9.44	9.42	9.48
2859.1	2889.1	9.72	9.55	9.53
2939.7	2969.7	10.77	10.27	10.11
3000.1	3030.1	11.84	11.06	10.75

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+14	+17	+20
280.1	310.1	15.90	16.53	18.31
340.5	370.5	18.98	21.36	23.63
401.0	431.0	20.55	22.92	25.10
461.4	491.4	21.65	23.64	25.72
542.0	572.0	22.36	24.46	26.58
602.5	632.5	23.34	25.62	27.85
683.1	713.1	23.71	25.92	28.31
743.5	773.5	24.31	26.79	29.40
824.1	854.1	24.16	26.72	29.47
884.5	914.5	23.02	25.59	28.08
965.1	995.1	22.81	25.37	27.90
1025.6	1055.6	22.61	25.18	27.80
1106.2	1136.2	22.32	25.04	27.72
1166.6	1196.6	22.42	25.11	27.76
1247.2	1277.2	22.82	25.55	28.48
1307.7	1337.7	23.97	27.17	30.11
1388.2	1418.2	22.96	25.90	29.23
1448.7	1478.7	22.20	25.09	28.16
1529.3	1559.3	21.48	24.10	27.31
1589.7	1619.7	21.57	23.77	26.75
1670.3	1700.3	22.20	24.71	27.38
1730.8	1760.8	22.27	25.17	28.10
1811.4	1841.4	21.99	24.80	28.00
1871.8	1901.8	20.66	23.13	26.03
1952.4	1982.4	20.31	22.77	25.51
2012.8	2042.8	20.11	22.68	25.50
2093.4	2123.4	19.53	22.23	24.93
2153.9	2183.9	18.99	21.60	24.41
2234.5	2264.5	19.30	22.02	24.71
2294.9	2324.9	19.95	22.95	26.00
2375.5	2405.5	20.22	23.26	26.39
2436.0	2466.0	20.57	23.56	26.89
2516.5	2546.5	22.16	25.29	29.00
2577.0	2607.0	22.97	26.34	30.40
2657.6	2687.6	23.72	27.26	31.70
2718.0	2748.0	23.57	27.59	31.97
2798.6	2828.6	21.58	25.19	29.00
2859.1	2889.1	18.39	22.16	25.45
2939.7	2969.7	14.87	19.01	22.45
3000.1	3030.1	13.54	16.87	21.21

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+17dBm (dB)		
		@LO (dBm)		
		+14	+17	+20
280.1	310.1	3.96	2.47	1.06
340.5	370.5	3.76	2.26	1.02
401.0	431.0	3.20	1.67	0.73
461.4	491.4	2.29	1.07	0.51
542.0	572.0	1.77	0.80	0.41
602.5	632.5	1.62	0.69	0.34
683.1	713.1	1.63	0.69	0.34
743.5	773.5	1.62	0.63	0.31
824.1	854.1	1.70	0.61	0.30
884.5	914.5	1.70	0.67	0.33
965.1	995.1	1.55	0.66	0.34
1025.6	1055.6	1.45	0.63	0.33
1106.2	1136.2	1.27	0.62	0.33
1166.6	1196.6	1.22	0.61	0.34
1247.2	1277.2	1.18	0.61	0.33
1307.7	1337.7	1.11	0.56	0.29
1388.2	1418.2	1.18	0.60	0.31
1448.7	1478.7	1.32	0.67	0.36
1529.3	1559.3	1.44	0.74	0.41
1589.7	1619.7	1.64	0.82	0.43
1670.3	1700.3	1.93	0.92	0.49
1730.8	1760.8	2.09	0.94	0.45
1811.4	1841.4	2.56	1.23	0.55
1871.8	1901.8	3.11	1.58	0.71
1952.4	1982.4	3.59	1.84	0.82
2012.8	2042.8	3.88	2.01	0.86
2093.4	2123.4	4.31	2.37	1.03
2153.9	2183.9	4.61	2.65	1.15
2234.5	2264.5	4.30	2.36	1.11
2294.9	2324.9	3.96	2.13	0.95
2375.5	2405.5	3.82	2.00	0.89
2436.0	2466.0	3.38	1.70	0.75
2516.5	2546.5	2.53	1.19	0.52
2577.0	2607.0	2.17	0.98	0.42
2657.6	2687.6	2.05	0.86	0.36
2718.0	2748.0	2.23	0.94	0.37
2798.6	2828.6	3.48	1.57	0.61
2859.1	2889.1	5.14	2.97	1.36
2939.7	2969.7	6.69	4.75	2.82
3000.1	3030.1	7.28	5.72	3.61

REV. X3

HJK-ED12738/1

101012

Page 1 of 5



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED • RoHS compliant

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



The Design Engineers Search Engine finds the model you need, instantly • For detailed performance specs & shopping online see



Frequency Mixer

HJK-ED12738/1

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1170MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=585.2MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1758.5MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+17			+17			+17
890.0	280.0	10.44	10.0	595.2	6.43	1490.0	268.5	10.92
850.6	319.4	8.34	70.6	655.8	6.38	1449.5	309.0	8.64
811.2	358.8	7.65	131.1	716.3	6.69	1408.9	349.6	7.39
771.8	398.2	7.33	191.7	776.9	7.12	1368.4	390.1	6.96
719.3	450.7	7.08	252.2	837.4	7.26	1327.8	430.7	6.87
679.9	490.1	7.08	312.8	898.0	7.44	1287.3	471.2	6.70
627.3	542.7	7.54	373.3	958.5	7.67	1246.7	511.8	6.59
587.9	582.1	8.11	433.9	1019.1	7.63	1206.2	552.3	6.53
535.4	634.6	8.61	494.4	1079.6	7.57	1165.6	592.9	6.55
496.0	674.0	8.41	555.0	1140.2	7.53	1125.1	633.4	6.51
443.4	726.6	7.95	615.5	1200.7	7.60	1084.5	674.0	6.50
404.0	766.0	7.56	676.1	1261.3	7.51	1044.0	714.5	6.48
351.5	818.5	7.19	736.6	1321.8	7.30	1003.4	755.1	6.57
312.1	857.9	7.06	797.2	1382.4	7.16	962.9	795.6	6.78
259.6	910.4	6.90	857.7	1442.9	7.03	922.3	836.2	7.11
220.1	949.9	6.92	918.3	1503.5	7.03	881.8	876.7	7.49
167.6	1002.4	6.96	978.8	1564.0	7.04	841.2	917.3	7.55
128.2	1041.8	7.11	1039.4	1624.6	7.06	800.7	957.8	7.17
75.7	1094.3	7.18	1099.9	1685.1	7.09	760.1	998.4	6.85
36.3	1133.7	7.24	1160.5	1745.7	7.34	719.6	1038.9	6.57
37.2	1207.2	7.57	1221.0	1806.2	7.35	679.0	1079.5	6.44
118.7	1288.7	7.86	1281.6	1866.8	7.29	638.5	1120.0	6.34
227.3	1397.3	7.92	1342.1	1927.3	7.31	597.9	1160.6	6.24
308.8	1478.8	7.85	1402.7	1987.9	7.43	557.4	1201.1	6.21
417.5	1587.5	7.54	1443.0	2028.2	7.51	516.8	1241.7	6.19
499.0	1669.0	7.33	1503.6	2088.8	7.73	476.3	1282.2	6.32
607.6	1777.6	7.41	1543.9	2129.1	7.80	435.8	1322.7	6.38
689.1	1859.1	7.45	1604.5	2189.7	8.12	395.2	1363.3	6.56
797.8	1967.8	7.55	1644.9	2230.1	8.27	354.7	1403.8	6.69
879.3	2049.3	7.71	1705.4	2290.6	8.62	314.1	1444.4	6.79
987.9	2157.9	7.82	1745.8	2331.0	8.92	273.6	1484.9	6.90
1069.4	2239.4	7.90	1806.3	2391.5	9.41	253.3	1505.2	7.02
1178.1	2348.1	8.10	1846.7	2431.9	9.75	212.7	1545.8	7.15
1259.6	2429.6	8.25	1907.2	2492.4	9.88	192.5	1566.0	7.19
1368.2	2538.2	8.51	1947.6	2532.8	10.26	151.9	1606.6	7.28
1449.7	2619.7	8.67	2008.2	2593.4	10.70	131.6	1626.9	7.28
1558.4	2728.4	9.11	2048.5	2633.7	11.12	91.1	1667.4	7.40
1639.9	2809.9	9.45	2109.1	2694.3	11.46	70.8	1687.7	7.58
1748.5	2918.5	10.06	2149.4	2734.6	11.74	30.3	1728.2	7.76
1830.0	3000.0	10.76	2210.0	2795.2	12.04	10.0	1748.5	7.65

REV. X3

HJK-ED12738/1

101012

Page 2 of 5



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED • RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0006 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, instantly • For detailed performance specs & shopping online see



Frequency Mixer

HJK-ED12738/1

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+14	+17	+20	+14	+17	+20
310.1	59.09	60.11	61.16	44.08	44.10	44.22
370.5	55.58	56.67	57.25	41.09	41.13	41.21
431.0	52.30	52.58	52.83	38.51	38.46	38.53
491.4	50.41	50.68	50.96	36.76	36.85	36.90
572.0	52.80	53.67	54.41	35.27	35.22	35.29
632.5	50.43	50.81	51.02	34.81	34.78	34.80
713.1	40.82	40.69	40.55	36.48	36.68	36.83
773.5	43.26	43.33	43.42	35.25	35.35	35.47
854.1	44.92	44.99	45.00	33.35	33.27	33.44
914.5	44.89	45.07	45.17	31.96	31.84	31.81
995.1	44.31	44.58	44.63	29.79	29.72	29.62
1055.6	43.74	43.98	43.99	28.32	28.24	28.15
1136.2	44.48	44.63	44.60	26.51	26.42	26.28
1196.6	45.64	45.03	44.44	25.50	25.42	25.35
1277.2	39.48	39.05	38.82	24.35	24.31	24.31
1337.7	37.43	37.08	36.90	23.39	23.29	23.32
1418.2	36.54	36.25	36.00	22.53	22.53	22.53
1478.7	39.56	39.45	39.49	22.55	22.62	22.76
1559.3	37.51	37.29	37.21	22.50	22.62	22.80
1619.7	36.72	36.41	36.19	22.63	22.69	22.75
1700.3	33.57	33.10	32.77	23.59	23.70	23.89
1760.8	32.53	32.17	31.92	24.44	24.56	24.74
1841.4	32.96	32.80	32.58	25.13	25.40	25.55
1901.8	33.14	32.98	32.75	25.81	26.06	26.20
1982.4	33.67	33.51	33.46	26.82	27.05	27.31
2042.8	34.06	33.83	33.79	27.68	27.84	28.12
2123.4	34.71	34.53	34.43	28.75	28.96	29.18
2183.9	35.31	35.19	35.13	29.46	29.72	29.98
2264.5	35.89	35.78	35.97	30.31	30.59	31.02
2324.9	36.94	36.90	37.01	30.95	31.31	31.74
2405.5	39.21	39.20	39.30	31.16	31.41	31.74
2466.0	40.58	40.74	40.85	30.83	31.03	31.14
2546.5	40.29	40.65	40.84	29.40	29.60	29.57
2607.0	39.19	39.49	39.64	27.96	28.14	28.06
2687.6	37.83	38.07	38.11	26.15	26.30	26.18
2748.0	37.33	37.49	37.45	25.53	25.67	25.56
2828.6	37.08	36.90	37.05	25.89	25.75	25.93
2889.1	37.11	36.90	37.01	26.68	26.51	26.69
2969.7	37.29	37.03	37.08	27.99	27.83	27.98
3030.1	37.23	37.20	36.97	28.79	28.85	28.76

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+14	+17	+20
280.1	310.1	17.12	16.39	15.94
340.5	370.5	20.50	20.24	20.04
401.0	431.0	23.21	23.04	22.93
461.4	491.4	25.51	25.39	25.32
542.0	572.0	28.51	28.49	28.50
602.5	632.5	29.63	29.51	29.37
683.1	713.1	31.30	31.22	31.20
743.5	773.5	33.59	33.85	34.10
824.1	854.1	36.39	36.74	36.85
884.5	914.5	37.44	37.87	38.24
965.1	995.1	37.48	38.15	38.73
1025.6	1055.6	35.68	35.94	35.85
1106.2	1136.2	34.73	35.00	35.10
1166.6	1196.6	34.07	34.27	34.26
1247.2	1277.2	33.13	33.14	32.65
1307.7	1337.7	33.40	33.83	33.93
1388.2	1418.2	31.51	31.56	31.44
1448.7	1478.7	29.43	29.42	29.46
1529.3	1559.3	28.99	29.00	29.05
1589.7	1619.7	29.31	29.42	29.58
1670.3	1700.3	29.46	29.65	29.92
1730.8	1760.8	30.38	30.68	31.02
1811.4	1841.4	31.49	32.11	32.86
1871.8	1901.8	31.47	31.94	32.49
1952.4	1982.4	32.41	33.18	34.03
2012.8	2042.8	33.00	33.86	34.87
2093.4	2123.4	33.98	35.00	35.99
2153.9	2183.9	34.56	35.47	36.47
2234.5	2264.5	35.02	35.62	36.08
2294.9	2324.9	35.05	35.46	35.61
2375.5	2405.5	34.34	34.53	34.56
2436.0	2466.0	33.78	33.78	33.67
2516.5	2546.5	32.61	32.42	32.17
2577.0	2607.0	31.80	31.61	31.38
2657.6	2687.6	31.29	31.09	30.94
2718.0	2748.0	31.28	31.12	30.95
2798.6	2828.6	31.73	31.49	31.30
2859.1	2889.1	32.30	31.91	31.67
2939.7	2969.7	33.33	32.65	32.22
3000.1	3030.1	34.23	33.25	32.56

Frequency Mixer

HJK-ED12738/1

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=1758.5MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+14	+17	+20		+14	+17	+20		+14	+17	+20
280.1	310.1	5.54	5.51	5.47	310.1	5.34	5.33	5.33	10.1	2.99	3.15	3.30
340.5	370.5	3.86	3.83	3.81	370.5	4.95	4.95	4.93	50.6	2.81	2.97	3.12
401.0	431.0	3.17	3.17	3.18	431.0	4.60	4.60	4.59	91.0	2.75	2.91	3.06
461.4	491.4	2.80	2.82	2.86	491.4	4.46	4.46	4.45	131.5	2.59	2.73	2.87
542.0	572.0	2.52	2.57	2.62	572.0	4.74	4.73	4.73	172.0	2.58	2.72	2.85
602.5	632.5	2.39	2.45	2.51	632.5	5.23	5.22	5.20	212.5	2.38	2.50	2.61
683.1	713.1	2.23	2.29	2.34	713.1	5.89	5.85	5.81	252.9	2.36	2.48	2.59
743.5	773.5	2.14	2.19	2.24	773.5	6.42	6.39	6.39	293.4	2.16	2.26	2.36
824.1	854.1	2.08	2.12	2.16	854.1	6.63	6.63	6.61	333.9	2.14	2.23	2.32
884.5	914.5	2.20	2.23	2.26	914.5	6.53	6.51	6.46	374.3	1.97	2.06	2.14
965.1	995.1	2.46	2.49	2.51	995.1	6.09	6.05	6.01	414.8	1.90	1.97	2.04
1025.6	1055.6	2.62	2.64	2.66	1055.6	5.46	5.44	5.42	455.3	1.78	1.84	1.90
1106.2	1136.2	2.82	2.84	2.86	1136.2	4.48	4.47	4.46	495.7	1.68	1.73	1.77
1166.6	1196.6	2.90	2.92	2.95	1196.6	3.77	3.75	3.73	536.2	1.63	1.67	1.71
1247.2	1277.2	2.92	2.92	2.93	1277.2	3.04	3.03	3.02	576.7	1.54	1.56	1.59
1307.7	1337.7	2.94	2.95	2.95	1337.7	2.54	2.54	2.53	617.2	1.55	1.56	1.58
1388.2	1418.2	2.84	2.86	2.87	1418.2	2.08	2.08	2.08	657.6	1.48	1.48	1.49
1448.7	1478.7	2.81	2.82	2.84	1478.7	1.95	1.96	1.96	698.1	1.53	1.52	1.52
1529.3	1559.3	2.59	2.59	2.60	1559.3	2.08	2.09	2.10	738.6	1.50	1.48	1.47
1589.7	1619.7	2.39	2.40	2.40	1619.7	2.37	2.38	2.39	779.0	1.57	1.54	1.52
1670.3	1700.3	2.07	2.08	2.08	1700.3	2.86	2.86	2.85	819.5	1.56	1.53	1.51
1730.8	1760.8	1.92	1.93	1.94	1760.8	3.48	3.48	3.50	860.0	1.61	1.58	1.55
1811.4	1841.4	1.76	1.77	1.78	1841.4	4.35	4.36	4.38	900.5	1.63	1.60	1.56
1871.8	1901.8	1.62	1.64	1.66	1901.8	5.06	5.03	4.98	940.9	1.64	1.60	1.56
1952.4	1982.4	1.48	1.50	1.53	1982.4	6.01	5.97	5.85	981.4	1.69	1.65	1.61
2012.8	2042.8	1.43	1.47	1.50	2042.8	6.66	6.66	6.63	1021.9	1.64	1.60	1.57
2093.4	2123.4	1.41	1.46	1.51	2123.4	7.34	7.28	7.20	1062.3	1.70	1.66	1.62
2153.9	2183.9	1.43	1.49	1.55	2183.9	7.83	7.66	7.34	1123.0	1.66	1.62	1.59
2234.5	2264.5	1.52	1.60	1.67	2264.5	8.01	7.87	7.66	1163.5	1.62	1.58	1.55
2294.9	2324.9	1.65	1.74	1.82	2324.9	7.90	7.83	7.70	1224.2	1.59	1.56	1.53
2375.5	2405.5	1.89	1.99	2.09	2405.5	7.56	7.44	7.25	1264.7	1.58	1.57	1.55
2436.0	2466.0	2.09	2.20	2.31	2466.0	6.97	6.86	6.66	1325.4	1.53	1.54	1.54
2516.5	2546.5	2.39	2.51	2.63	2546.5	5.65	5.59	5.49	1365.9	1.57	1.60	1.61
2577.0	2607.0	2.60	2.73	2.86	2607.0	4.46	4.43	4.34	1426.6	1.66	1.72	1.76
2657.6	2687.6	2.91	3.05	3.19	2687.6	3.14	3.11	3.04	1467.0	1.78	1.87	1.93
2718.0	2748.0	3.17	3.31	3.47	2748.0	2.78	2.77	2.74	1527.7	2.03	2.15	2.25
2798.6	2828.6	3.43	3.60	3.75	2828.6	3.42	3.41	3.40	1568.2	2.25	2.40	2.53
2859.1	2889.1	3.51	3.67	3.82	2889.1	4.45	4.39	4.32	1628.9	2.61	2.81	3.00
2939.7	2969.7	3.86	3.99	4.14	2969.7	6.09	5.95	5.74	1669.4	2.80	3.02	3.24
3000.1	3030.1	4.24	4.33	4.48	3030.1	7.38	7.28	7.14	1730.1	3.01	3.24	3.47

REV. X3
HJK-ED12738/1
101012
Page 4 of 5

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	1	29	18	27	25	44	30	42	41	40
1	-	28	+0	35	18	45	29	49	31	36	33	47
2	63	64	54	59	65	57	57	58	58	61	59	65
3	>90	>82	60	73	58	72	61	80	65	77	65	67
4	>90	>82	>82	>82	82	>82	>82	>82	>82	>82	>82	>82
5	>90	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
6	>90	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
7	>90	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
8	>90	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
9	>90	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
10	>90	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 1170 MHz; 0.00 dBm.
LO IN: 1200 MHz; +17.00 dBm
IF OUT: 30 MHz; -7.8 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	11	36	28	41	36	46	45	49	61	51
1	-	28	+0	37	19	46	30	51	33	39	36	53
2	44	56	45	51	52	48	50	51	53	54	56	59
3	67	65	42	56	40	56	44	64	48	63	49	53
4	89	77	70	69	68	64	70	68	70	69	67	74
5	>90	79	70	81	65	71	62	74	63	76	64	74
6	>90	89	86	>92	88	90	82	83	89	86	85	84
7	>90	>92	90	>92	87	>92	81	85	78	88	79	90
8	>90	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
9	>90	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
10	>90	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

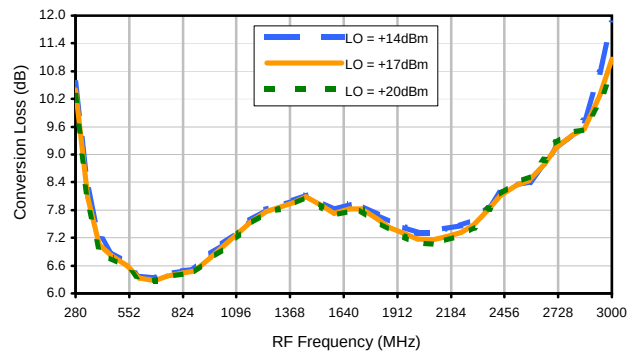
RF IN: 1170 MHz; 10.00 dBm.
LO IN: 1200 MHz; +17.00 dBm
IF OUT: 30 MHz; 2.01 dBm

- 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.

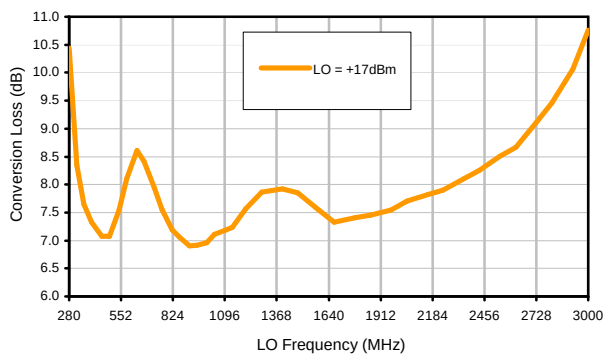
REV. X3
HJK-ED12738/1
101012
Page 5 of 5

Typical Performance Curves

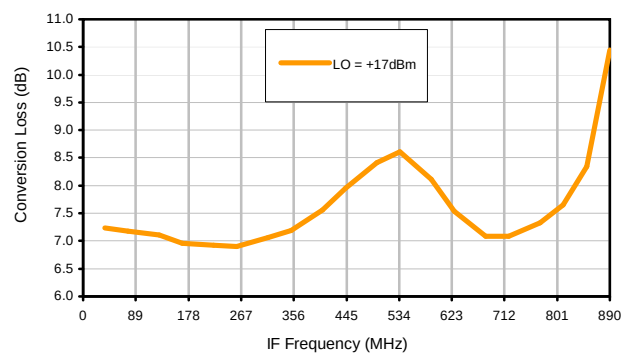
Conversion Loss @ IF=30MHz



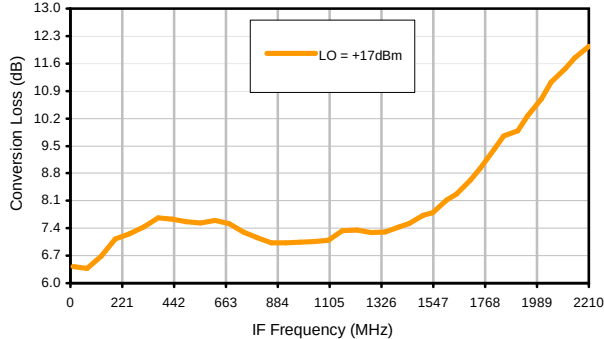
Conversion Loss vs. LO @ RF=1170MHz



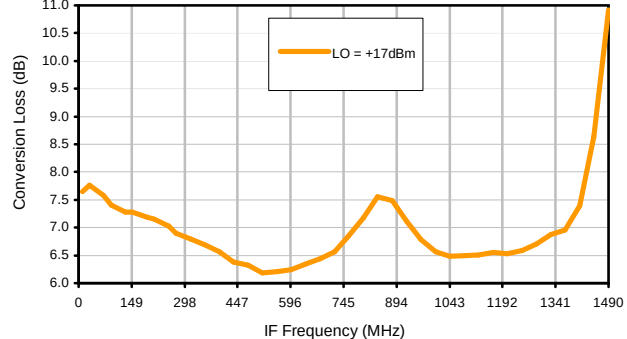
Conversion Loss vs. IF @ RF=1170MHz



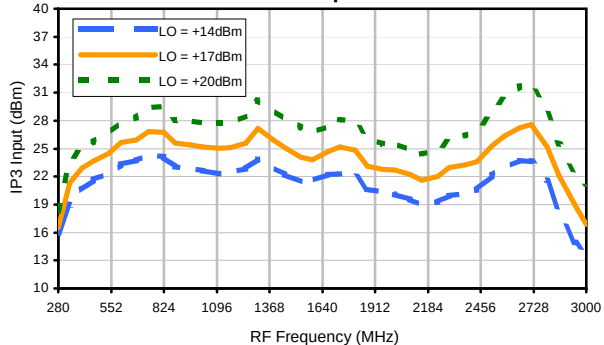
Conversion Loss vs. IF @ RF=585.2MHz



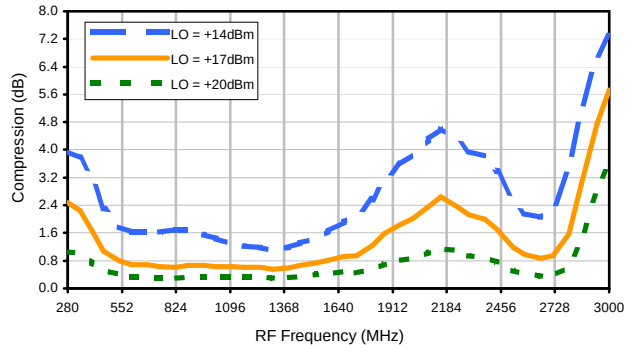
Conversion Loss vs. IF @ RF=1758.5MHz



IP3 Input



Compression @ RF IN=+17dBm



REV. X3

HJK-ED12738/1

101012

Page 1 of 3



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED • RoHS compliant

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

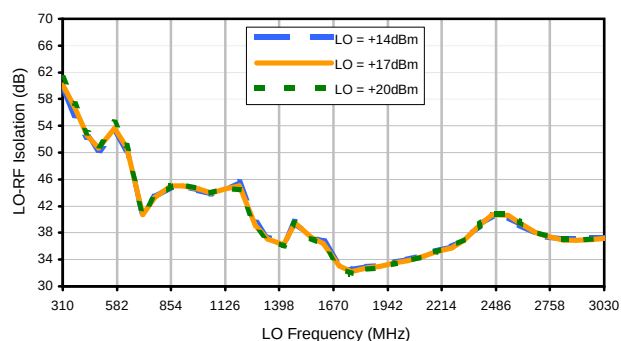


The Design Engineers Search Engine finds the model you need, instantly • For detailed performance specs & shopping online see

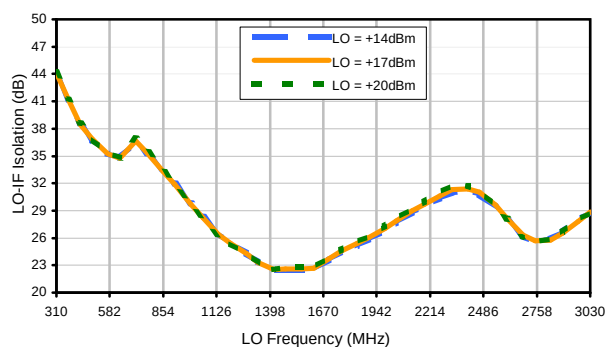


Typical Performance Curves

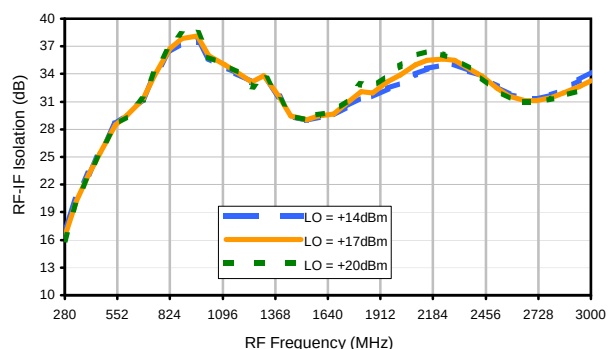
LO-RF Isolation



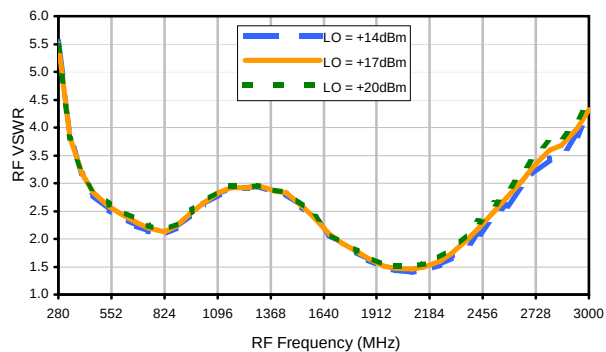
LO-IF Isolation



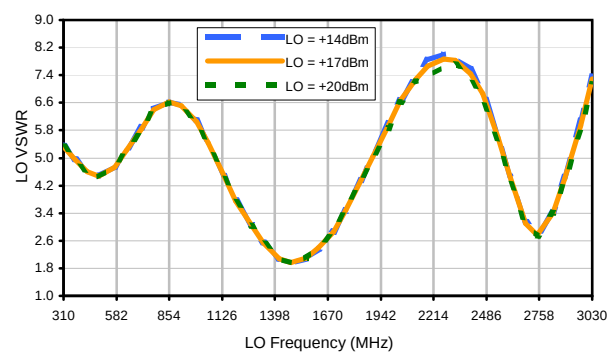
RF-IF Isolation



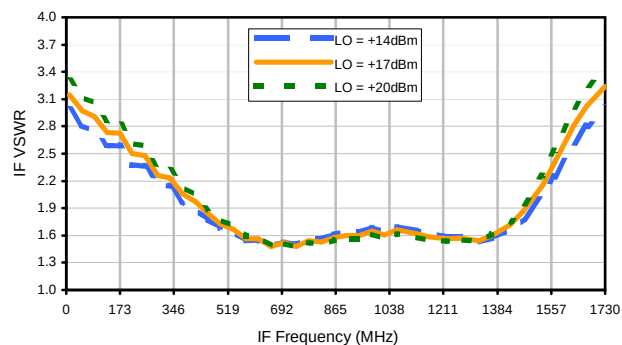
RF VSWR



LO VSWR



IF VSWR



REV. X3

HJK-ED12738/1

101012

Page 2 of 3



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED • RoHS compliant

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



The Design Engineers Search Engine finds the model you need, instantly • For detailed performance specs & shopping online see



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	1	29	18	27	25	44	30	42	41	40
1	-	28	+0	35	18	45	29	49	31	36	33	47
2	63	64	54	59	65	57	57	58	58	61	59	65
3	>90	>82	60	73	58	72	61	80	65	77	65	67
4	>90	>82	>82	>82	82	>82	>82	>82	>82	>82	>82	>82
5	>90	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
6	>90	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
7	>90	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
8	>90	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
9	>90	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
10	>90	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82	>82
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 1170 MHz; 0.00 dBm.
LO IN: 1200 MHz; +17.00 dBm
IF OUT: 30 MHz; -7.8 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	11	36	28	41	36	46	45	49	61	51
1	-	28	+0	37	19	46	30	51	33	39	36	53
2	44	56	45	51	52	48	50	51	53	54	56	59
3	67	65	42	56	40	56	44	64	48	63	49	53
4	89	77	70	69	68	64	70	68	70	69	67	74
5	>90	79	70	81	65	71	62	74	63	76	64	74
6	>90	89	86	>92	88	90	82	83	89	86	85	84
7	>90	>92	90	>92	87	>92	81	85	78	88	79	90
8	>90	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
9	>90	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
10	>90	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92	>92
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:

RF IN: 1170 MHz; 10.00 dBm.
LO IN: 1200 MHz; +17.00 dBm
IF OUT: 30 MHz; 2.01 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.

REV. X3

HJK-ED12738/1

101012

Page 3 of 3



Mini-Circuits®

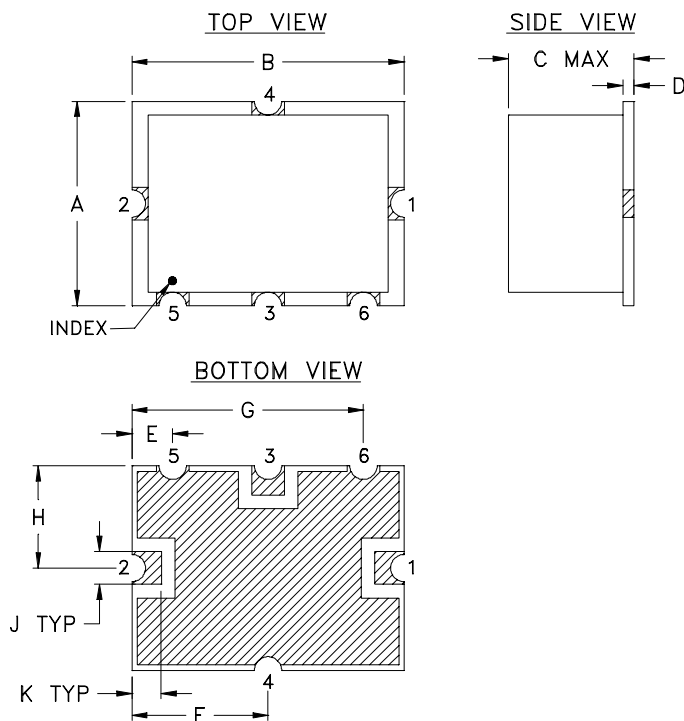
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED • RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see

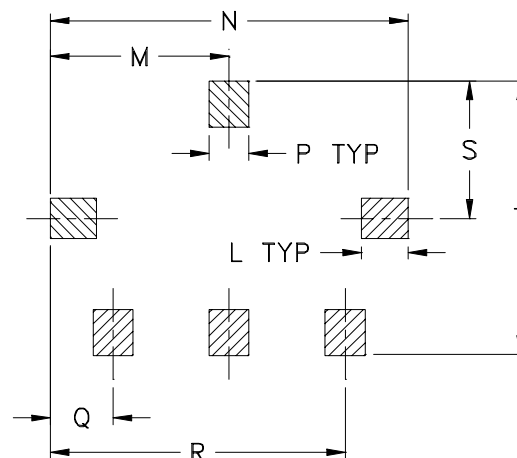


Outline Dimensions

TTT166
TTT167



PCB Land Pattern



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

CASE #	A	B	C	D	E	F	G	H	J	K	L	M	N
TTT166	.38 (9.65)	.50 (12.70)	.15 (3.81)	.020 (0.51)	.075 (1.91)	.250 (6.35)	.425 (10.80)	.187 (4.75)	.050 (1.27)	.050 (1.27)	.070 (1.78)	.270 (6.86)	.540 (13.72)
TTT167			.23 (5.84)										

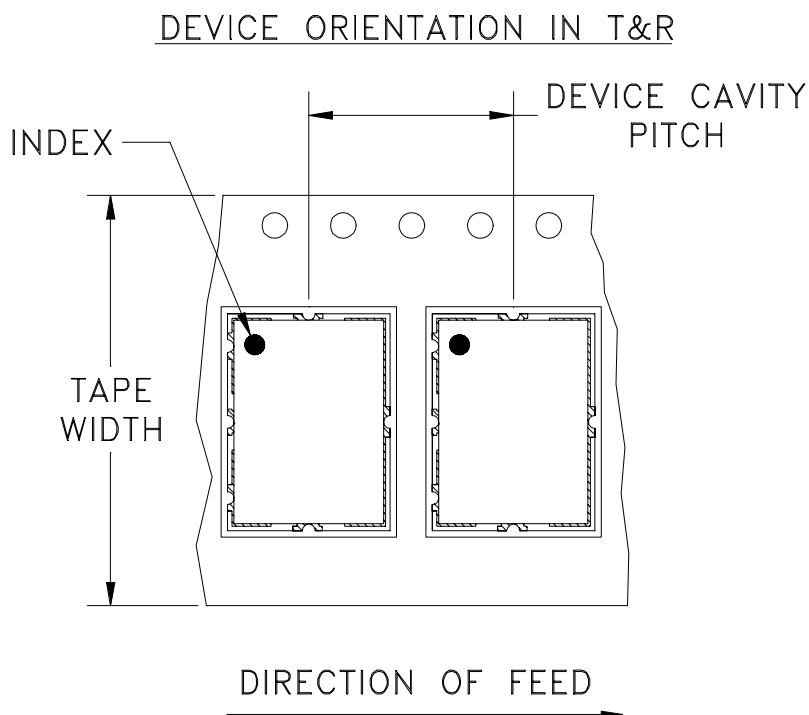
CASE #	P	Q	R	S	T	WT. GRAM
TTT166	.060 (1.52)	.095 (2.41)	.445 (11.30)	.208 (5.28)	.415 (10.54)	.8
TTT167						.8

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

Note:

- Case material: Plastic.
- Base material: 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.
 - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

Tape & Reel Packaging TR-F12



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
24	12	7	Small quantity standards (see note)	10
				20
				50
				100
				200
		13	Standard	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



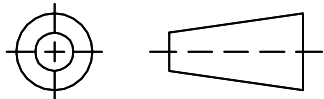
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

Mini-Circuits ISO 9001 & ISO 14001 Certified

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

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

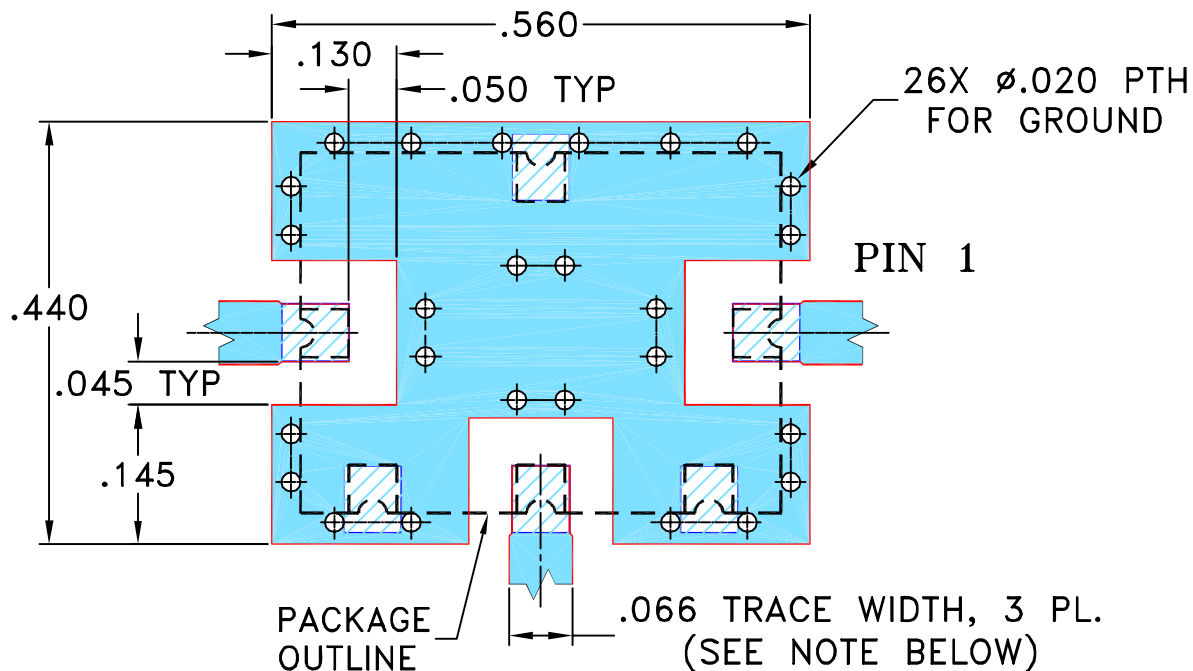
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
A	M86762	ADDED CONNECTIONS "lp & lq"	05/23/03	MMG	WL
B	M94598	ADDED CONNECTION "hk"	10/08/04	MMG	HY
C	M102713	UPDATED NOTES & DESCRIPTION	01/14/06	GF	IL
D	M132989	UPDATED NOTE 2	08/24/11	GF	DJ

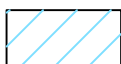
**SUGGESTED MOUNTING CONFIGURATION FOR
TTT166/167 CASE STYLE, "hk"/"lp"/"lq"
"x"/"ck"/"ec" PIN CONNECTIONS**

**NOTE:**

1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030" $\pm$.002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. THE USE OF SOLDER MASK OVER THE GROUND AREA UNDER THE UNIT AS SHOWN IS RECOMMENDED TO PREVENT POTENTIAL SHORTING. IF USER CHOOSES TO EXPOSE METAL UNDER THE ENTIRE UNIT GROUND PAD FOR IMPROVED GROUNDING, IT IS RECOMMENDED A SOLDER MASK DAM BE APPLIED AROUND EACH GROUND PAD TO ENSURE FILLET AND CONNECTION AT GROUND PADS.
3. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.



DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER), SEE NOTE 2.



DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES

TOLERANCES ON:

2 PL DECIMALS $\pm$ 3 PL DECIMALS $\pm$.005ANGLES $\pm$ FRACTIONS $\pm$

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

INITIALS

DATE

DRAWN

GF

03/18/03

CHECKED

IL

04/15/03

APPROVED

DJ

04/15/03



Mini-Circuits® 13 Neptune Avenue
Brooklyn NY 11235

PL, hk/lp/lq/x/ck/ec, TTT166/167,
SYM/HJK/SYAS/SYPD, TB-12

SIZE
A

CODE IDENT
15542

DRAWING NO:
98-PL-079

REV:
D

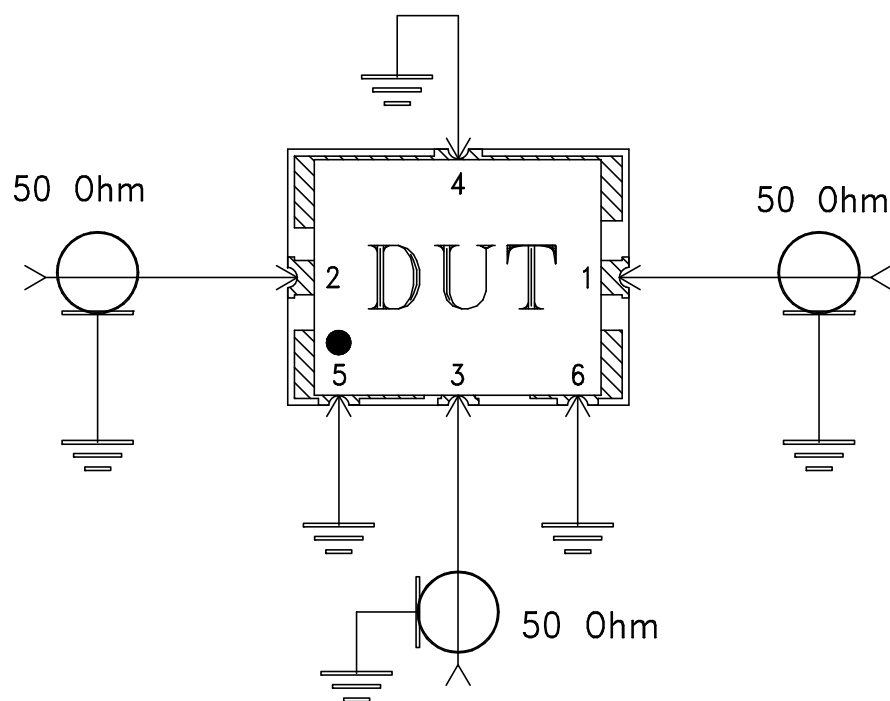
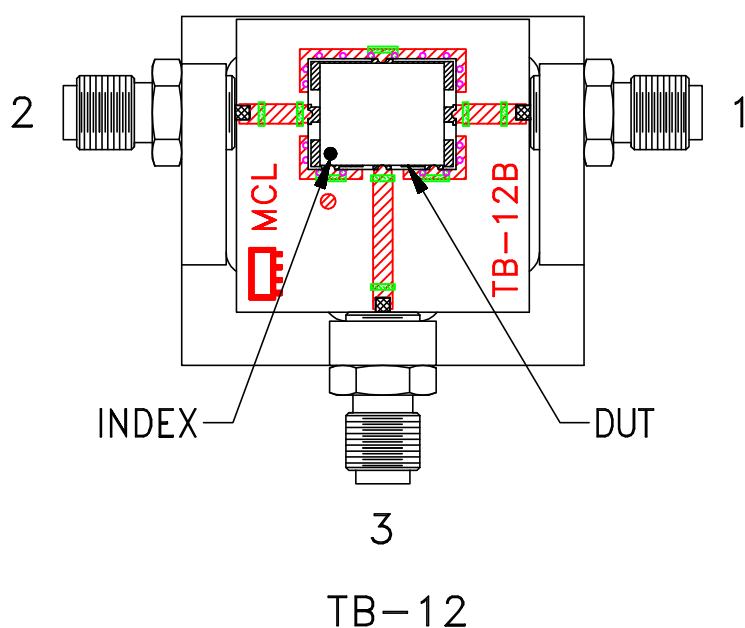
FILE: 98PL079

SCALE: 5:1

SHEET: 1 OF 1

Evaluation Board and Circuit

For Pin Connections Refer to Data Sheet of the DUT



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.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	-20° 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