

Non-Catalog Model

Frequency Mixer

TUF-860HSM

Level 17 (LO Power +17 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.



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

CASE STYLE : NNN150

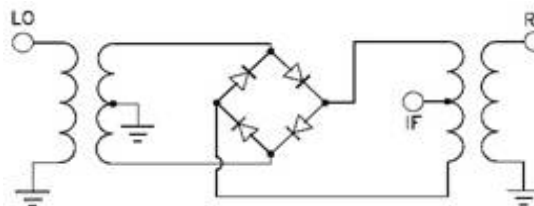
ELECTRICAL SPECIFICATIONS 50Ω @ +25°C					
Parameter		Min.	Typ.	Max.	Units
Frequency	LO (fL to fU)	800		1050	MHz
	RF (fL to fU)	800		1050	MHz
	IF	0		250	MHz
Conversion Loss			6.8	8.3	dB
LO-RF Isolation		25	38		dB
LO-IF Isolation		18	24		dB
1 dB Comp. Input Power			+14		dBm

Note: Non-hermetic

MAXIMUM RATINGS	
Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
RF Power	200mW
IF Current	40mA

PIN CONNECTIONS	
LO	4
RF	1
IF	2
GROUND	3

Electrical Schematics



Frequency Mixer

TUF-860HSM

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)		
		@LO (dBm)		
		+14	+17	+20
100.1	130.1	16.73	11.35	10.26
140.6	170.6	11.06	8.80	8.19
181.1	211.1	8.27	7.29	6.97
221.6	251.6	7.31	6.50	6.25
262.1	292.1	6.49	5.96	5.79
302.6	332.6	6.00	5.62	5.46
343.1	373.1	5.83	5.47	5.33
383.6	413.6	5.61	5.34	5.19
424.2	454.2	5.44	5.22	5.10
464.7	494.7	5.37	5.13	5.02
505.2	535.2	5.38	5.10	4.97
545.7	575.7	5.51	5.24	4.98
586.2	616.2	5.50	5.31	5.13
626.7	656.7	5.47	5.30	5.17
667.2	697.2	5.44	5.25	5.13
707.7	737.7	5.37	5.17	5.03
748.2	778.2	5.33	5.09	4.90
788.7	818.7	5.40	5.06	4.95
829.2	859.2	5.67	5.19	5.07
869.7	899.7	5.90	5.54	5.24
910.2	940.2	6.04	5.81	5.49
950.7	980.7	6.36	6.12	5.69
991.2	1021.2	6.58	6.34	6.13
1031.7	1061.7	6.91	6.61	6.40
1072.3	1102.3	7.26	6.92	6.63
1112.8	1142.8	7.65	7.28	6.88
1153.3	1183.3	8.11	7.65	7.04
1193.8	1223.8	8.50	7.84	6.75
1234.3	1264.3	8.74	7.58	5.97
1274.8	1304.8	8.72	6.82	5.60
1315.3	1345.3	8.34	6.16	5.61
1355.8	1385.8	7.66	6.09	5.73
1396.3	1426.3	7.22	6.25	5.95
1436.8	1466.8	7.28	6.59	6.29
1477.3	1507.3	7.64	7.03	6.69
1517.8	1547.8	8.19	7.57	7.16
1558.3	1588.3	8.90	8.30	7.84
1598.8	1628.8	9.22	8.76	8.46
1639.3	1669.3	9.49	9.26	9.06
1700.1	1730.1	10.13	9.94	9.80

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+14	+17	+20
100.1	130.1	16.06	26.04	29.77
140.6	170.6	20.49	27.07	22.62
181.1	211.1	24.82	21.79	21.45
221.6	251.6	22.64	20.37	22.42
262.1	292.1	20.75	20.28	23.30
302.6	332.6	19.76	21.21	24.82
343.1	373.1	19.58	22.13	26.42
383.6	413.6	19.69	22.51	24.22
424.2	454.2	21.36	27.34	35.76
464.7	494.7	22.84	28.33	37.02
505.2	535.2	23.84	34.73	26.30
545.7	575.7	26.16	24.13	28.06
586.2	616.2	29.68	23.17	21.42
626.7	656.7	28.19	28.63	26.65
667.2	697.2	26.48	27.37	25.86
707.7	737.7	22.63	24.34	25.74
748.2	778.2	21.08	29.15	23.01
788.7	818.7	21.03	24.79	26.22
829.2	859.2	21.86	24.96	31.14
869.7	899.7	14.95	19.80	28.55
910.2	940.2	14.19	14.03	18.35
950.7	980.7	13.21	12.87	16.19
991.2	1021.2	12.92	12.11	12.83
1031.7	1061.7	13.01	12.33	12.10
1072.3	1102.3	13.18	13.10	13.16
1112.8	1142.8	13.34	14.01	15.36
1153.3	1183.3	13.81	15.33	17.59
1193.8	1223.8	14.37	15.77	18.35
1234.3	1264.3	14.82	16.34	24.49
1274.8	1304.8	14.64	19.26	26.38
1315.3	1345.3	15.27	24.18	25.63
1355.8	1385.8	18.22	24.40	24.79
1396.3	1426.3	22.27	23.99	23.87
1436.8	1466.8	22.58	23.16	23.23
1477.3	1507.3	21.75	22.08	22.50
1517.8	1547.8	20.72	21.27	22.30
1558.3	1588.3	20.42	21.38	23.03
1598.8	1628.8	21.42	22.32	25.01
1639.3	1669.3	25.24	25.29	28.73
1700.1	1730.1	26.01	30.88	30.84

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+14dBm (dB)		
		@LO (dBm)		
		+14	+17	+20
100.1	130.1	-2.36	-0.22	-0.10
140.6	170.6	-0.68	-0.11	-0.10
181.1	211.1	0.11	0.00	-0.06
221.6	251.6	0.15	0.05	-0.02
262.1	292.1	0.34	0.14	0.02
302.6	332.6	0.45	0.16	0.06
343.1	373.1	0.49	0.21	0.08
383.6	413.6	0.54	0.22	0.13
424.2	454.2	0.70	0.29	0.18
464.7	494.7	0.72	0.36	0.25
505.2	535.2	0.75	0.43	0.30
545.7	575.7	0.69	0.42	0.36
586.2	616.2	0.79	0.47	0.38
626.7	656.7	0.93	0.56	0.46
667.2	697.2	1.12	0.72	0.61
707.7	737.7	1.27	0.84	0.71
748.2	778.2	1.50	1.02	0.84
788.7	818.7	1.53	1.09	0.76
829.2	859.2	1.48	1.24	0.85
869.7	899.7	1.55	1.20	0.94
910.2	940.2	1.65	1.21	0.97
950.7	980.7	1.64	1.21	1.01
991.2	1021.2	1.67	1.26	0.90
1031.7	1061.7	1.60	1.27	0.95
1072.3	1102.3	1.52	1.23	0.98
1112.8	1142.8	1.38	1.04	0.81
1153.3	1183.3	0.97	0.66	0.55
1193.8	1223.8	0.61	0.41	0.66
1234.3	1264.3	0.35	0.54	1.14
1274.8	1304.8	0.33	1.07	1.28
1315.3	1345.3	0.79	1.61	1.40
1355.8	1385.8	1.32	1.57	1.32
1396.3	1426.3	1.95	1.70	1.49
1436.8	1466.8	1.90	1.56	1.42
1477.3	1507.3	1.48	1.27	1.22
1517.8	1547.8	1.02	0.96	1.00
1558.3	1588.3	0.43	0.44	0.57
1598.8	1628.8	0.31	0.27	0.33
1639.3	1669.3	0.32	0.19	0.24
1700.1	1730.1	0.25	0.16	0.20

Frequency Mixer

TUF-860HSM

Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=925.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=800.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1050.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+17			+17			+17
125.0	800.1	5.62	10.0	810.1	5.06	250.0	800.1	6.12
118.9	806.2	5.62	16.2	816.3	5.10	243.8	806.3	6.12
112.9	812.2	5.62	22.3	822.4	5.08	237.7	812.4	6.11
106.8	818.3	5.61	28.5	828.6	5.07	231.5	818.6	6.10
100.8	824.3	5.61	34.6	834.7	5.06	225.4	824.7	6.10
94.7	830.4	5.61	40.8	840.9	5.06	219.2	830.9	6.08
88.7	836.4	5.61	46.9	847.0	5.05	213.1	837.0	6.09
82.6	842.5	5.61	53.1	853.2	5.06	206.9	843.2	6.09
76.6	848.5	5.61	59.2	859.3	5.07	200.8	849.3	6.09
70.5	854.6	5.62	65.4	865.5	5.09	194.6	855.5	6.11
64.5	860.6	5.62	71.5	871.6	5.12	188.5	861.6	6.11
58.4	866.7	5.63	77.7	877.8	5.15	182.3	867.8	6.13
52.4	872.7	5.65	83.8	883.9	5.18	176.2	873.9	6.17
46.3	878.8	5.67	90.0	890.1	5.21	170.0	880.1	6.20
40.3	884.8	5.70	96.2	896.3	5.24	163.8	886.3	6.24
34.2	890.9	5.74	102.3	902.4	5.28	157.7	892.4	6.30
28.2	896.9	5.79	108.5	908.6	5.31	151.5	898.6	6.38
22.1	903.0	5.84	114.6	914.7	5.33	145.4	904.7	6.43
16.1	909.0	5.86	120.8	920.9	5.33	139.2	910.9	6.48
10.0	915.1	5.87	126.9	927.0	5.35	133.1	917.0	6.52
10.0	935.1	5.85	133.1	933.2	5.37	126.9	923.2	6.54
16.1	941.2	5.88	139.2	939.3	5.38	120.8	929.3	6.54
22.1	947.2	5.87	145.4	945.5	5.39	114.6	935.5	6.55
28.2	953.3	5.87	151.5	951.6	5.39	108.5	941.6	6.54
34.2	959.3	5.87	157.7	957.8	5.40	102.3	947.8	6.55
40.3	965.4	5.89	163.8	963.9	5.42	96.2	953.9	6.56
46.3	971.4	5.92	170.0	970.1	5.46	90.0	960.1	6.57
52.4	977.5	5.95	176.2	976.3	5.51	83.8	966.3	6.60
58.4	983.5	5.97	182.3	982.4	5.53	77.7	972.4	6.62
64.5	989.6	5.99	188.5	988.6	5.54	71.5	978.6	6.65
70.5	995.6	6.00	194.6	994.7	5.55	65.4	984.7	6.67
76.6	1001.7	6.00	200.8	1000.9	5.56	59.2	990.9	6.69
82.6	1007.7	6.00	206.9	1007.0	5.57	53.1	997.0	6.71
88.7	1013.8	5.98	213.1	1013.2	5.55	46.9	1003.2	6.71
94.7	1019.8	5.96	219.2	1019.3	5.54	40.8	1009.3	6.70
100.8	1025.9	5.95	225.4	1025.5	5.53	34.6	1015.5	6.70
106.8	1031.9	5.94	231.5	1031.6	5.54	28.5	1021.6	6.70
112.9	1038.0	5.96	237.7	1037.8	5.58	22.3	1027.8	6.71
118.9	1044.0	5.97	243.8	1043.9	5.61	16.2	1033.9	6.71
125.0	1050.1	6.00	250.0	1050.1	5.64	10.0	1040.1	6.67

REV. X2
TUF-860HSM
100818
Page 2 of 5



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS 9100 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

TUF-860HSM

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+14	+17	+20	+14	+17	+20
100.1	54.82	54.90	55.63	55.65	55.19	58.44
140.6	55.79	55.50	54.86	50.10	53.14	59.93
181.1	55.50	53.44	52.86	47.00	51.44	55.84
221.6	50.81	50.62	50.84	45.79	49.54	53.21
262.1	47.52	48.19	48.92	43.90	46.65	50.19
302.6	45.04	46.73	48.15	41.97	44.37	48.82
343.1	43.56	44.96	45.74	40.50	43.26	46.86
383.6	42.57	44.38	45.27	38.50	41.01	44.54
424.2	41.59	44.59	46.62	37.42	40.73	44.30
464.7	40.37	42.85	44.55	36.05	39.50	43.01
505.2	39.13	41.38	43.15	35.09	37.91	40.92
545.7	37.99	39.10	40.59	34.68	36.34	38.83
586.2	37.93	38.69	39.28	34.42	36.79	37.99
626.7	37.89	39.32	40.36	33.69	36.92	39.53
667.2	38.09	39.64	40.73	32.81	36.12	39.39
707.7	38.87	39.59	39.99	31.88	34.92	37.88
748.2	41.16	40.66	40.15	31.27	33.65	36.27
788.7	45.13	43.67	42.05	30.79	32.43	35.34
829.2	42.97	42.60	40.12	30.15	31.49	33.79
869.7	36.42	39.57	38.09	29.96	30.89	32.77
910.2	34.17	35.54	35.11	30.72	29.97	32.01
950.7	33.69	34.00	33.19	30.59	30.28	31.31
991.2	32.90	32.95	32.18	31.87	31.88	30.88
1031.7	32.57	32.42	31.49	31.32	32.61	32.32
1072.3	32.45	32.48	31.59	30.86	33.06	33.76
1112.8	32.28	32.57	31.63	30.57	33.09	34.35
1153.3	32.28	32.79	31.75	29.97	32.35	34.03
1193.8	32.29	33.14	32.17	29.38	31.22	32.49
1234.3	31.89	32.96	33.34	29.00	30.22	29.81
1274.8	31.51	33.06	35.13	28.72	28.77	26.34
1315.3	31.12	33.37	33.96	28.26	26.17	24.84
1355.8	30.77	32.38	32.21	27.30	23.72	24.19
1396.3	30.49	31.56	31.68	25.51	23.25	24.02
1436.8	29.82	30.86	31.21	23.64	23.16	23.84
1477.3	29.39	30.36	30.16	23.36	23.31	23.44
1517.8	29.32	30.23	29.87	23.72	23.51	23.17
1558.3	29.40	30.14	29.27	24.76	24.06	23.11
1598.8	29.53	30.31	30.22	25.02	23.58	22.68
1639.3	29.25	29.52	29.21	23.59	22.16	21.40
1700.1	29.80	29.69	29.36	23.47	22.31	21.24

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+14	+17	+20
100.1	130.1	32.94	32.85	32.44
140.6	170.6	27.85	28.00	28.01
181.1	211.1	24.69	24.93	24.93
221.6	251.6	22.47	22.68	22.67
262.1	292.1	20.96	21.38	21.50
302.6	332.6	20.00	20.10	20.36
343.1	373.1	19.57	19.66	19.60
383.6	413.6	19.19	19.65	19.70
424.2	454.2	18.83	19.53	20.04
464.7	494.7	18.45	19.36	20.09
505.2	535.2	18.68	19.34	19.88
545.7	575.7	19.18	19.34	19.30
586.2	616.2	20.09	19.87	19.59
626.7	656.7	21.50	21.13	20.79
667.2	697.2	23.68	23.51	23.38
707.7	737.7	25.46	26.86	28.77
748.2	778.2	23.12	24.49	25.33
788.7	818.7	19.84	19.55	19.45
829.2	859.2	17.91	16.91	16.60
869.7	899.7	16.53	15.61	15.01
910.2	940.2	15.39	14.61	13.74
950.7	980.7	14.90	14.01	12.93
991.2	1021.2	14.26	13.69	12.41
1031.7	1061.7	13.59	13.18	12.29
1072.3	1102.3	13.09	12.72	12.13
1112.8	1142.8	12.67	12.29	11.87
1153.3	1183.3	12.33	11.95	11.50
1193.8	1223.8	12.15	11.64	10.85
1234.3	1264.3	12.03	11.49	11.08
1274.8	1304.8	11.70	11.43	11.44
1315.3	1345.3	11.40	11.57	11.65
1355.8	1385.8	11.13	11.64	11.73
1396.3	1426.3	10.94	11.50	11.60
1436.8	1466.8	10.95	11.36	11.42
1477.3	1507.3	10.81	11.11	11.08
1517.8	1547.8	10.46	10.62	10.55
1558.3	1588.3	10.03	10.15	10.00
1598.8	1628.8	9.48	9.46	9.24
1639.3	1669.3	8.86	8.65	8.36
1700.1	1730.1	8.08	7.67	7.33

Frequency Mixer

TUF-860HSM

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=1050.1MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+14	+17	+20		+14	+17	+20		+14	+17	+20
100.1	130.1	22.87	14.03	11.93	100.1	57.91	28.03	9.79	10.0	3.70	3.33	2.78
140.6	170.6	10.75	7.83	7.00	140.6	19.98	6.61	4.52	16.2	3.82	3.34	2.88
181.1	211.1	6.19	5.22	4.79	181.1	7.94	3.80	3.40	22.3	3.74	3.34	2.86
221.6	251.6	4.66	3.98	3.67	221.6	4.01	2.80	3.03	28.5	3.58	3.18	2.73
262.1	292.1	3.62	3.16	2.96	262.1	2.85	2.30	2.75	34.6	3.51	3.15	2.71
302.6	332.6	2.96	2.67	2.51	302.6	2.18	2.02	2.61	40.8	3.43	3.09	2.69
343.1	373.1	2.61	2.34	2.24	343.1	1.88	1.90	2.58	46.9	3.39	3.05	2.66
383.6	413.6	2.28	2.07	1.98	383.6	1.57	1.74	2.47	53.1	3.34	3.00	2.63
424.2	454.2	2.05	1.88	1.82	424.2	1.43	1.71	2.48	59.2	3.34	2.98	2.63
464.7	494.7	1.89	1.76	1.72	464.7	1.28	1.66	2.44	65.4	3.33	2.99	2.62
505.2	535.2	1.76	1.68	1.66	505.2	1.14	1.61	2.41	71.5	3.34	2.99	2.63
545.7	575.7	1.66	1.59	1.58	545.7	1.07	1.60	2.39	77.7	3.35	3.01	2.64
586.2	616.2	1.55	1.50	1.49	586.2	1.02	1.60	2.37	83.8	3.39	3.05	2.67
626.7	656.7	1.46	1.42	1.42	626.7	1.05	1.62	2.40	90.0	3.42	3.08	2.69
667.2	697.2	1.39	1.36	1.36	667.2	1.13	1.61	2.37	96.2	3.47	3.11	2.72
707.7	737.7	1.31	1.30	1.33	707.7	1.20	1.60	2.35	102.3	3.52	3.16	2.76
748.2	778.2	1.27	1.34	1.46	748.2	1.29	1.59	2.30	108.5	3.54	3.18	2.77
788.7	818.7	1.28	1.41	1.49	788.7	1.39	1.57	2.26	114.6	3.56	3.20	2.78
829.2	859.2	1.27	1.41	1.49	829.2	1.52	1.66	2.31	120.8	3.56	3.20	2.78
869.7	899.7	1.31	1.38	1.47	869.7	1.56	1.79	2.37	126.9	3.54	3.19	2.78
910.2	940.2	1.38	1.40	1.43	910.2	1.53	1.86	2.45	133.1	3.52	3.16	2.76
950.7	980.7	1.43	1.42	1.40	950.7	1.56	1.86	2.49	139.2	3.51	3.16	2.77
991.2	1021.2	1.49	1.47	1.41	991.2	1.52	1.84	2.49	145.4	3.48	3.14	2.75
1031.7	1061.7	1.54	1.51	1.46	1031.7	1.53	1.82	2.49	151.5	3.48	3.14	2.76
1072.3	1102.3	1.59	1.54	1.48	1072.3	1.55	1.80	2.44	157.7	3.48	3.14	2.76
1112.8	1142.8	1.66	1.58	1.50	1112.8	1.55	1.76	2.39	163.8	3.49	3.15	2.77
1153.3	1183.3	1.77	1.66	1.53	1153.3	1.54	1.72	2.34	170.0	3.50	3.16	2.78
1193.8	1223.8	1.87	1.71	1.49	1193.8	1.52	1.65	2.25	176.2	3.50	3.17	2.80
1234.3	1264.3	1.94	1.70	1.44	1234.3	1.50	1.58	2.17	182.3	3.54	3.19	2.81
1274.8	1304.8	1.97	1.65	1.49	1274.8	1.47	1.50	2.08	188.5	3.54	3.19	2.82
1315.3	1345.3	1.95	1.64	1.58	1315.3	1.44	1.42	2.01	194.6	3.55	3.20	2.82
1355.8	1385.8	1.91	1.74	1.70	1355.8	1.42	1.38	2.00	200.8	3.55	3.20	2.82
1396.3	1426.3	1.95	1.87	1.83	1396.3	1.43	1.39	1.99	206.9	3.58	3.22	2.84
1436.8	1466.8	2.11	2.05	2.01	1436.8	1.52	1.45	2.02	213.1	3.57	3.22	2.84
1477.3	1507.3	2.30	2.24	2.18	1477.3	1.65	1.52	2.04	219.2	3.58	3.24	2.85
1517.8	1547.8	2.47	2.41	2.33	1517.8	1.79	1.60	2.07	225.4	3.58	3.24	2.86
1558.3	1588.3	2.59	2.55	2.47	1558.3	1.94	1.72	2.16	231.5	3.60	3.25	2.88
1598.8	1628.8	2.66	2.65	2.61	1598.8	1.90	1.71	2.15	237.7	3.61	3.27	2.89
1639.3	1669.3	2.75	2.73	2.71	1639.3	1.78	1.64	2.14	243.8	3.60	3.26	2.89
1700.1	1730.1	2.88	2.83	2.80	1700.1	1.97	1.79	2.23	250.0	3.60	3.26	2.90

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	8	24	9	19	22	44	36	65	35	43
1	-	9	+0	16	15	26	31	26	48	44	49	42
2	93	37	35	38	35	43	40	43	59	50	58	55
3	>100	73	35	37	36	35	42	48	45	46	57	72
4	>100	64	62	51	64	51	59	55	58	59	63	65
5	>100	73	72	69	57	52	60	49	66	69	62	68
6	>100	77	68	77	75	61	72	61	66	66	73	70
7	>100	>93	82	77	82	78	69	66	73	62	69	86
8	>100	>93	>93	86	84	>93	85	71	73	73	71	78
9	>100	>93	>93	>93	91	85	>93	87	76	80	77	78
10	>100	>93	>93	>93	>93	92	>93	>93	90	83	82	84
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 920.1 MHz; -1.00 dBm.
LO IN: 950.01 MHz; +17.00 dBm
IF OUT: 29.91 MHz; -7.02 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	17	41	21	30	32	48	45	53	49	62
1	-	9	+0	20	16	37	45	32	43	48	51	45
2	77	42	34	52	35	41	43	55	41	59	62	76
3	>100	47	28	31	30	31	41	46	56	42	55	57
4	>100	54	53	49	47	51	44	47	58	58	51	67
5	>100	64	50	52	41	39	43	39	55	59	56	52
6	>100	62	57	67	63	55	59	54	52	51	64	71
7	>100	67	63	73	60	55	54	45	61	46	63	68
8	>100	82	83	71	62	71	73	58	65	57	60	57
9	>100	73	73	73	66	65	67	60	58	53	65	55
10	>100	78	83	83	84	87	66	73	82	62	65	61
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 920.1 MHz; 9.00 dBm.
LO IN: 950.01 MHz; +17.00 dBm
IF OUT: 29.91 MHz; 2.81 dBm

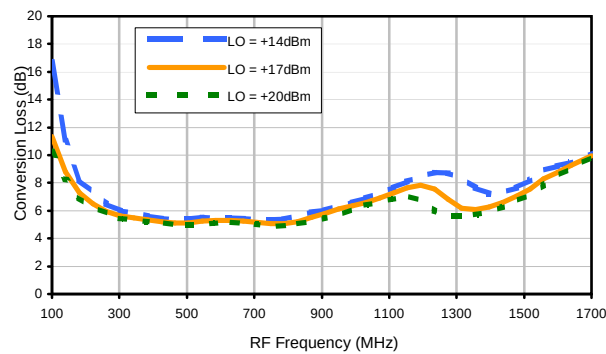
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

REV. X2
TUF-860HSM
100818
Page 5 of 5

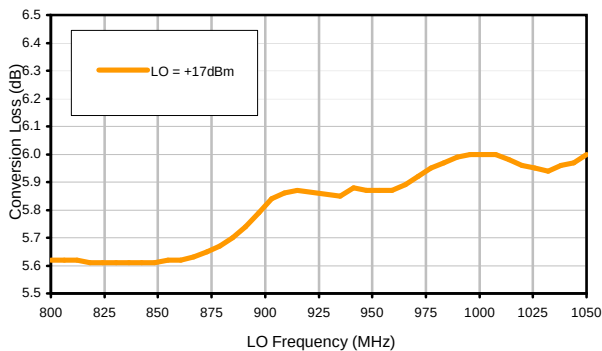


Typical Performance Curves

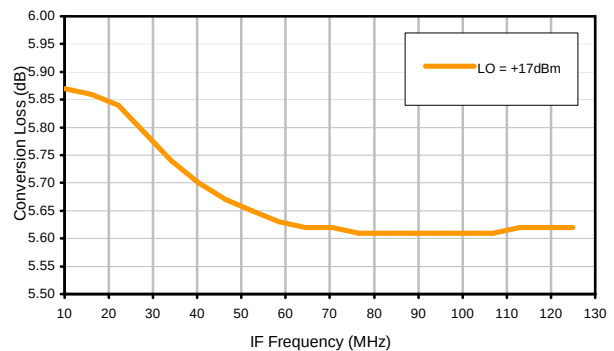
Conversion Loss @ IF=30MHz



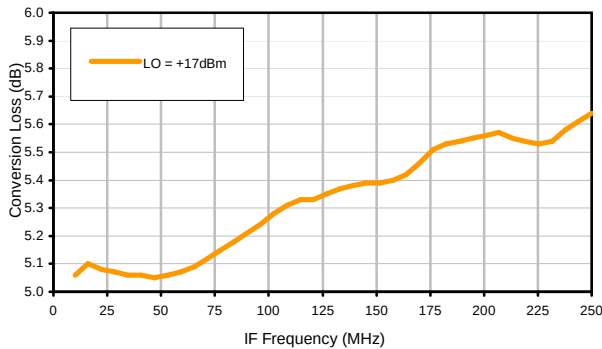
Conversion Loss vs. LO @ RF=925.1MHz



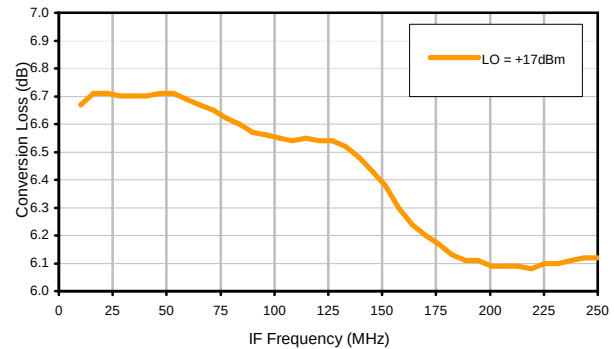
Conversion Loss vs. IF @ RF=925.1MHz



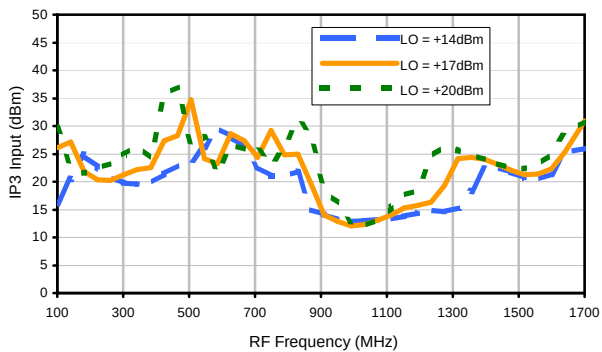
Conversion Loss vs. IF @ RF=800.1MHz



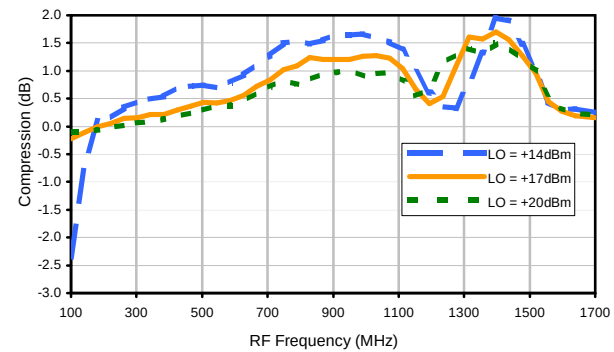
Conversion Loss vs. IF @ RF=1050.1MHz



IP3 Input

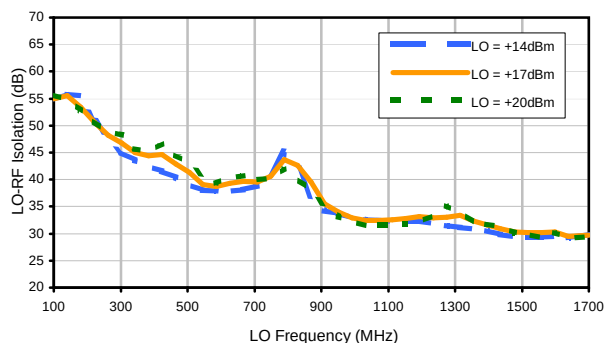


Compression @ RF IN=+14dBm

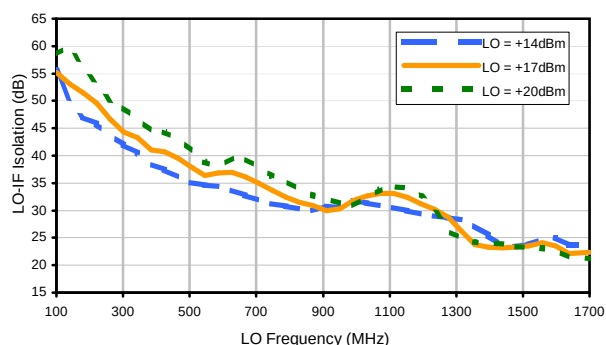


Typical Performance Curves

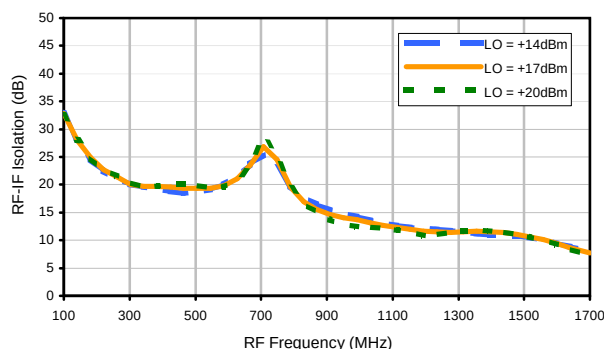
LO-RF Isolation



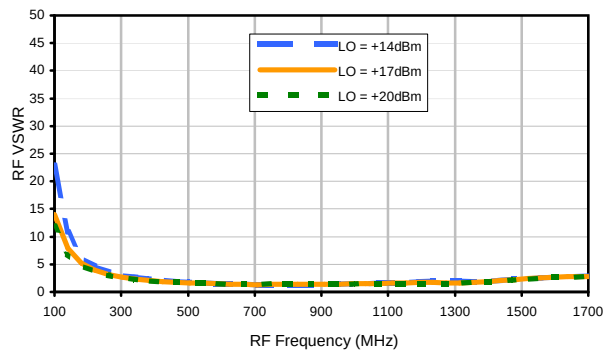
LO-IF Isolation



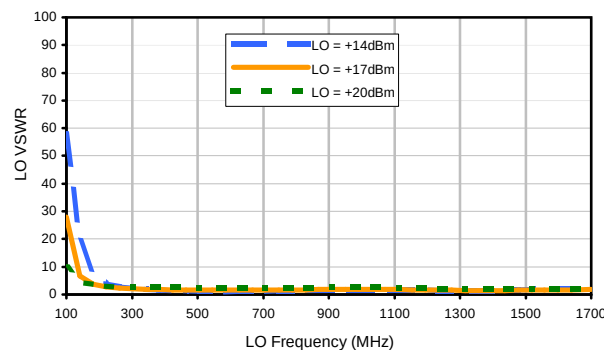
RF-IF Isolation



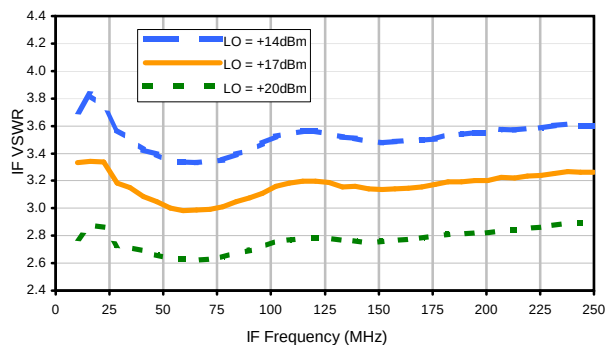
RF VSWR



LO VSWR



IF VSWR



Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	8	24	9	19	22	44	36	65	35	43
1	-	9	+0	16	15	26	31	26	48	44	49	42
2	93	37	35	38	35	43	40	43	59	50	58	55
3	>100	73	35	37	36	35	42	48	45	46	57	72
4	>100	64	62	51	64	51	59	55	58	59	63	65
5	>100	73	72	69	57	52	60	49	66	69	62	68
6	>100	77	68	77	75	61	72	61	66	66	73	70
7	>100	>93	82	77	82	78	69	66	73	62	69	86
8	>100	>93	>93	86	84	>93	85	71	73	73	71	78
9	>100	>93	>93	>93	91	85	>93	87	76	80	77	78
10	>100	>93	>93	>93	>93	92	>93	>93	90	83	82	84
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 920.1 MHz; -1.00 dBm.
LO IN: 950.01 MHz; +17.00 dBm
IF OUT: 29.91 MHz; -7.02 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	17	41	21	30	32	48	45	53	49	62
1	-	9	+0	20	16	37	45	32	43	48	51	45
2	77	42	34	52	35	41	43	55	41	59	62	76
3	>100	47	28	31	30	31	41	46	56	42	55	57
4	>100	54	53	49	47	51	44	47	58	58	51	67
5	>100	64	50	52	41	39	43	39	55	59	56	52
6	>100	62	57	67	63	55	59	54	52	51	64	71
7	>100	67	63	73	60	55	54	45	61	46	63	68
8	>100	82	83	71	62	71	73	58	65	57	60	57
9	>100	73	73	73	66	65	67	60	58	53	65	55
10	>100	78	83	83	84	87	66	73	82	62	65	61
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions: RF IN: 920.1 MHz; 9.00 dBm.
LO IN: 950.01 MHz; +17.00 dBm
IF OUT: 29.91 MHz; 2.81 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.

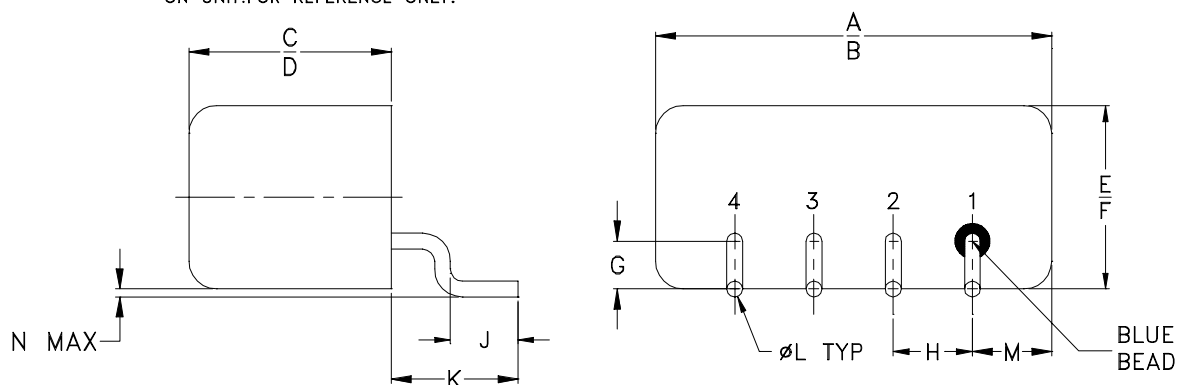
REV. X2
TUF-860HSM
100818
Page 3 of 3



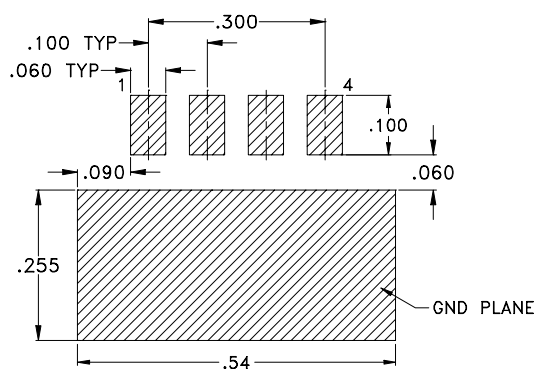
Outline Dimensions

NNN150

NOTE: BLUE BEAD INDICATES PIN #1.
PIN NUMBERS DO NOT APPEAR
ON UNIT.FOR REFERENCE ONLY.



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	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. $\pm .03$; 3 Pl. $\pm .015$

Notes:

- Header material C.R.S. Pin material #52 alloy.
- Finish: Electro-Tin, hot-oil flowed or electro-Tin-Silver.
- Cover material: Cupro-Nickel.
- Pin's meniscus 0.015 inch max.
- Special Tolerances: Pin diameter $\pm .005$ inch.



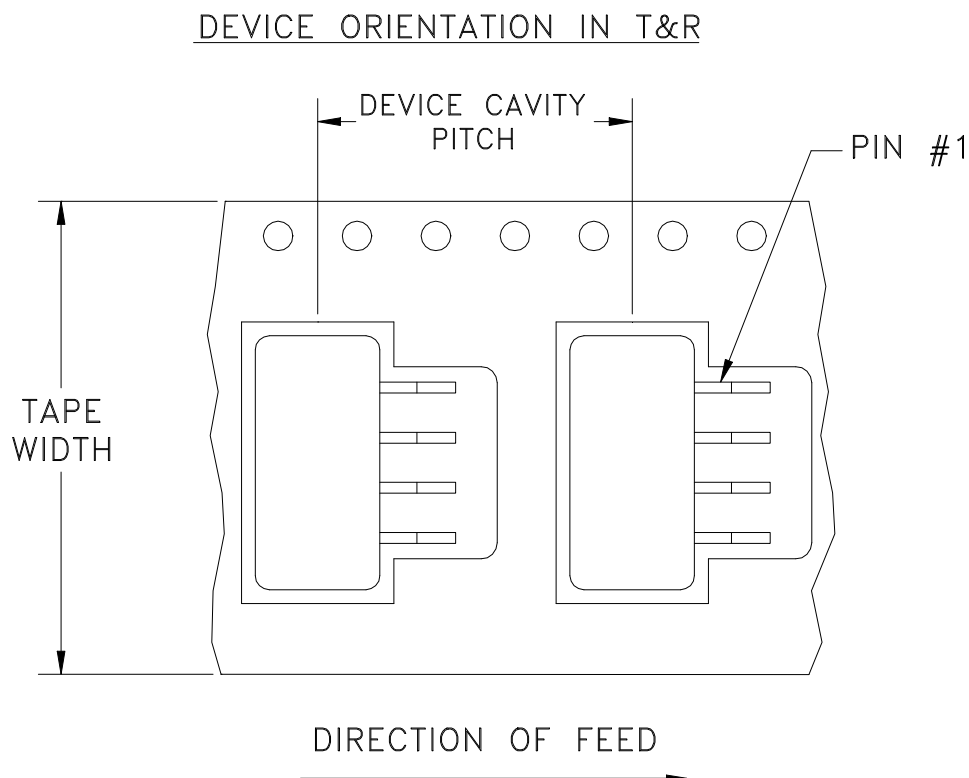
INTERNET <http://www.minicircuits.com>

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

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

Mini-Circuits ISO 9001 & ISO 14001 Certified

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.

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



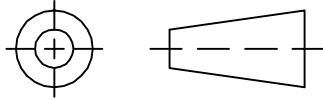
INTERNET <http://www.minicircuits.com>

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

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

Mini-Circuits ISO 9001 & ISO 14001 Certified

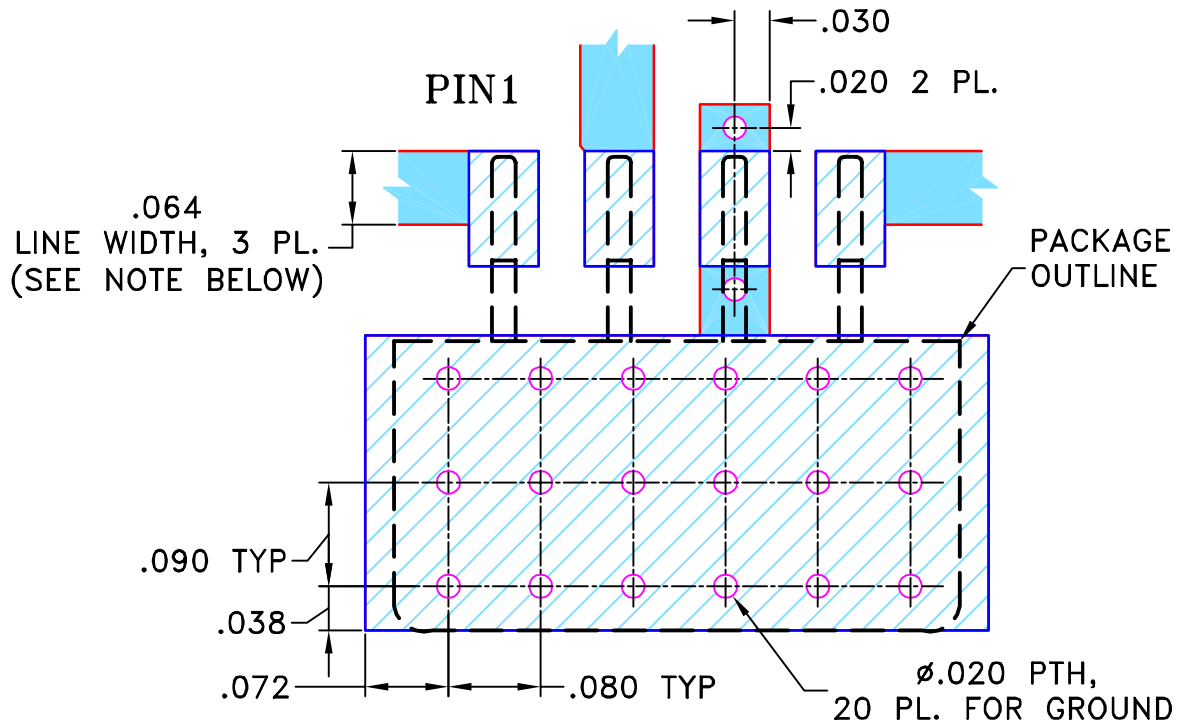
THIRD ANGLE PROJECTION



REVISIONS

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

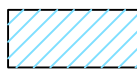
**SUGGESTED MOUNTING CONFIGURATION
FOR NNN150 CASE STYLE, "z"/"cm" PIN CONNECTIONS.**



NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B 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

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



Mini-Circuits® 13 Neptune Avenue
Brooklyn NY 11235

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

SIZE
A

CODE IDENT
15542

DRAWING NO:
98-PL-081

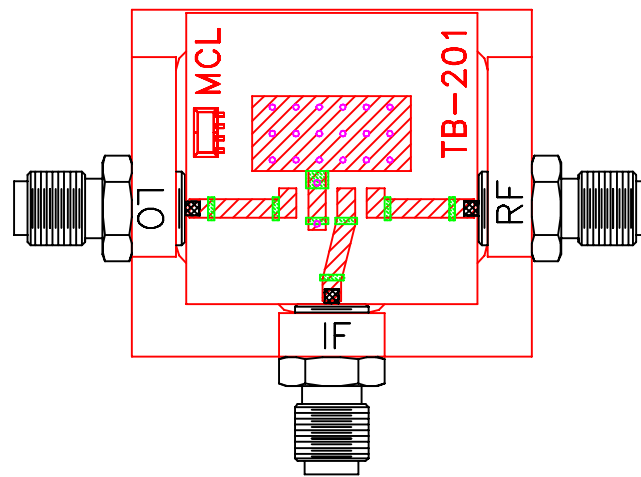
REV:
A

FILE: 98PL081

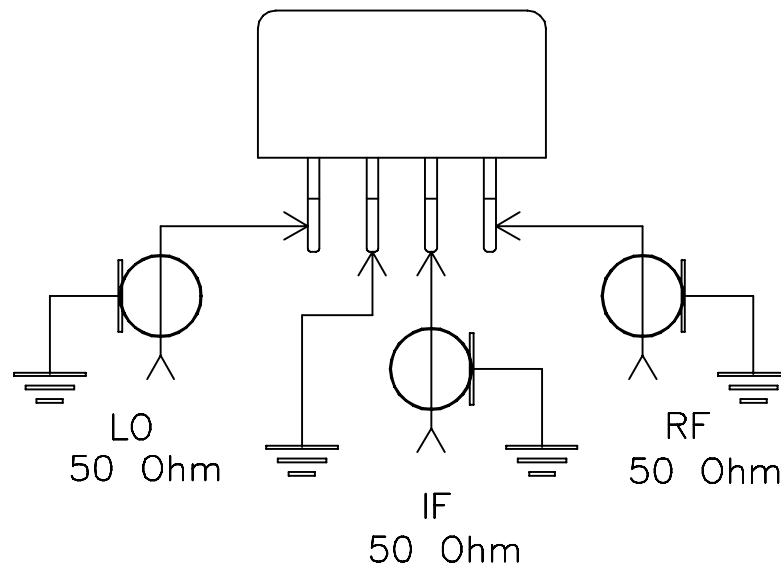
SCALE: 6:1

SHEET: 1 OF 1

Evaluation Board and Circuit



TB-201



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.030 inch.

 **Mini-Circuits®**