

Engineering Development Model

Frequency Mixer

TUF-ED12599/1

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 : NNN150

ELECTRICAL SPECIFICATIONS 50Ω @ +25°C					
Parameter		Min.	Typ.	Max.	Units
Frequency	LO (f _L to f _U)	40		1600	MHz
	RF (f _L to f _U)	40		1600	MHz
	IF	10		500	MHz
Conversion Loss	mid band		6.6		dB
	Total Range		7.4		dB
LO-RF Isolation	Low Range		73		dB
	Mid Range		53		dB
	Upper Range		48		dB
LO-IF Isolation	Low Range		36		dB
	Mid Range		27		dB
	Upper Range		21		dB
Input IP3			+21		dBm
1 dB Compression			+14		dBm

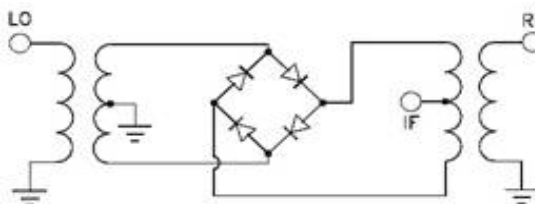
Note: Low Range = [f_L to 10f_L]
mid band = [2f_L to f_U/2]

Mid Range = [10f_L to f_U/2]

Upper Range = [f_U/2 to f_U]

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

Electrical Schematics



PIN CONNECTIONS	
LO	4
RF	1
IF	2
GROUND	3
CASE GROUND	3

Mini-Circuits
ISO 9001 ISO 14001 AS 9100 CERTIFIED

P.O. Box 350188, Brooklyn, New York 11235-0000 (718) 934-4500 Fax (718) 332-4851 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

IF/RF MICROWAVE COMPONENTS

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Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)			RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)			RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+14dBm (dB)		
		@LO (dBm)					@LO (dBm)					@LO (dBm)		
		+14	+17	+20			+14	+17	+20			+14	+17	+20
40.10	10.10	7.81	6.71	6.17	40.10	10.10	20.64	24.17	28.19	40.10	10.10	0.49	0.27	0.21
100.10	70.10	7.36	6.41	6.00	100.10	70.10	22.48	25.74	29.11	100.10	70.10	1.07	0.49	0.28
160.10	130.10	7.44	6.37	5.92	160.10	130.10	22.13	25.67	29.91	160.10	130.10	0.87	0.44	0.27
220.10	190.10	7.40	6.37	5.99	220.10	190.10	23.55	28.11	22.58	220.10	190.10	1.06	0.48	0.22
280.10	250.10	7.39	6.45	6.08	280.10	250.10	22.91	21.66	21.50	280.10	250.10	0.99	0.41	0.19
330.10	300.10	7.31	6.47	6.10	330.10	300.10	22.76	20.16	21.27	330.10	300.10	1.10	0.39	0.20
390.10	360.10	7.36	6.57	6.21	390.10	360.10	18.81	19.68	21.74	390.10	360.10	1.24	0.43	0.23
440.10	410.10	7.40	6.60	6.13	440.10	410.10	18.43	19.54	24.48	440.10	410.10	1.14	0.46	0.30
500.10	470.10	7.65	6.76	6.38	500.10	470.10	17.39	19.84	21.58	500.10	470.10	1.19	0.61	0.35
550.10	520.10	7.92	6.91	6.48	550.10	520.10	16.51	20.81	24.29	550.10	520.10	1.04	0.65	0.38
610.10	580.10	8.36	7.31	6.55	610.10	580.10	16.30	18.28	24.90	610.10	580.10	0.92	0.55	0.57
660.10	630.10	8.59	7.55	6.90	660.10	630.10	16.68	18.04	20.20	660.10	630.10	1.03	0.59	0.49
720.10	690.10	9.16	7.89	7.26	720.10	690.10	17.92	19.87	21.59	720.10	690.10	0.62	0.41	0.30
770.10	740.10	9.53	7.93	7.20	770.10	740.10	18.00	21.53	23.41	770.10	740.10	0.40	0.53	0.48
830.10	800.10	10.21	7.89	6.91	830.10	800.10	16.13	22.97	30.43	830.10	800.10	-0.31	0.72	0.79
880.10	850.10	10.54	7.97	6.89	880.10	850.10	15.31	23.13	27.34	880.10	850.10	-0.75	0.69	0.82
940.10	910.10	10.23	8.47	7.10	940.10	910.10	16.92	20.68	24.10	940.10	910.10	-0.56	0.17	0.66
990.10	960.10	9.78	8.71	7.44	990.10	960.10	18.76	19.59	22.09	990.10	960.10	-0.27	-0.11	0.41
1050.10	1020.10	9.29	8.45	7.65	1050.10	1020.10	19.47	20.60	20.76	1050.10	1020.10	0.11	0.05	0.20
1100.10	1070.10	9.16	8.37	7.76	1100.10	1070.10	18.93	20.43	20.30	1100.10	1070.10	0.16	0.06	0.11
1160.10	1130.10	8.79	8.18	7.61	1160.10	1130.10	19.75	19.37	19.82	1160.10	1130.10	0.39	0.13	0.21
1210.10	1180.10	8.69	8.15	7.63	1210.10	1180.10	20.31	19.20	18.75	1210.10	1180.10	0.51	0.18	0.26
1270.10	1240.10	8.47	7.89	7.40	1270.10	1240.10	20.14	19.04	21.31	1270.10	1240.10	0.67	0.37	0.40
1320.10	1290.10	8.48	7.77	7.13	1320.10	1290.10	19.67	21.99	24.50	1320.10	1290.10	0.83	0.57	0.56
1380.10	1350.10	8.26	7.35	6.75	1380.10	1350.10	21.77	22.18	25.07	1380.10	1350.10	0.98	0.77	0.54
1430.10	1400.10	8.19	7.06	6.58	1430.10	1400.10	22.55	21.02	24.68	1430.10	1400.10	1.14	0.88	0.45
1490.10	1460.10	7.85	6.88	6.59	1490.10	1460.10	20.99	23.71	27.03	1490.10	1460.10	1.35	0.79	0.32
1540.10	1510.10	7.71	6.77	6.49	1540.10	1510.10	19.49	23.86	27.85	1540.10	1510.10	1.68	0.78	0.33
1600.10	1570.10	7.57	6.85	6.59	1600.10	1570.10	19.30	25.33	28.63	1600.10	1570.10	1.76	0.64	0.28
1650.10	1620.10	7.62	6.81	6.56	1650.10	1620.10	18.91	26.85	29.22	1650.10	1620.10	1.90	0.70	0.27
1710.10	1680.10	7.92	6.93	6.63	1710.10	1680.10	18.28	26.27	30.72	1710.10	1680.10	1.85	0.70	0.25
1760.10	1730.10	8.34	7.03	6.70	1760.10	1730.10	18.80	25.92	29.12	1760.10	1730.10	1.63	0.75	0.27
1820.10	1790.10	9.31	7.22	6.77	1820.10	1790.10	20.45	24.32	26.83	1820.10	1790.10	1.03	0.85	0.28
1870.10	1840.10	9.93	7.53	7.00	1870.10	1840.10	27.38	24.14	26.16	1870.10	1840.10	0.58	0.72	0.24
1930.10	1900.10	11.17	7.80	6.95	1930.10	1900.10	20.88	24.63	27.02	1930.10	1900.10	-0.21	0.74	0.35
1980.10	1950.10	11.74	8.32	7.20	1980.10	1950.10	19.95	24.68	26.54	1980.10	1950.10	-0.59	0.44	0.27
2040.10	2010.10	13.12	8.79	7.27	2040.10	2010.10	15.18	23.48	23.60	2040.10	2010.10	-1.49	0.26	0.36
2090.10	2060.10	14.73	9.37	7.46	2090.10	2060.10	12.48	21.39	21.20	2090.10	2060.10	-2.62	-0.01	0.37
2150.10	2120.10	16.36	9.88	7.83	2150.10	2120.10	10.47	21.70	22.20	2150.10	2120.10	-3.62	-0.09	0.29
2200.10	2170.10	19.00	10.34	8.02	2200.10	2170.10	7.55	22.90	27.46	2200.10	2170.10	-5.64	0.03	0.23

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Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=350.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=150.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=550.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+17			+17			+17
340.00	10.10	6.50	10.00	160.10	6.78	540.00	10.10	6.64
325.33	24.77	6.47	50.00	200.10	6.41	530.00	20.10	6.51
310.67	39.43	6.46	90.00	240.10	6.34	520.00	30.10	6.62
296.00	54.10	6.45	130.00	280.10	6.35	510.00	40.10	6.67
281.33	68.77	6.48	170.00	320.10	6.39	500.00	50.10	6.66
266.67	83.43	6.53	210.00	360.10	6.35	490.00	60.10	6.59
252.00	98.10	6.46	250.00	400.10	6.29	480.00	70.10	6.62
237.33	112.77	6.41	290.00	440.10	6.28	470.00	80.10	6.84
222.67	127.43	6.36	330.00	480.10	6.28	460.00	90.10	6.70
208.00	142.10	6.29	370.00	520.10	6.29	450.00	100.10	6.63
193.33	156.77	6.27	410.00	560.10	6.29	440.00	110.10	6.60
178.67	171.43	6.14	450.00	600.10	6.32	430.00	120.10	6.63
164.00	186.10	6.25	490.00	640.10	6.42	410.00	140.10	6.45
142.00	208.10	6.26	530.00	680.10	6.48	400.00	150.10	6.52
127.33	222.77	6.32	570.00	720.10	6.46	380.00	170.10	6.59
105.33	244.77	6.32	610.00	760.10	6.59	370.00	180.10	6.64
90.67	259.43	6.22	650.00	800.10	6.57	350.00	200.10	6.61
68.67	281.43	6.25	690.00	840.10	6.61	340.00	210.10	6.61
54.00	296.10	6.42	730.00	880.10	6.88	320.00	230.10	6.62
32.00	318.10	6.51	770.00	920.10	7.05	310.00	240.10	6.55
17.33	332.77	6.53	810.00	960.10	7.32	290.00	260.10	6.60
42.39	392.49	6.44	850.00	1000.10	7.51	280.00	270.10	6.54
107.17	457.27	6.43	890.00	1040.10	7.73	260.00	290.10	6.65
204.35	554.45	6.42	930.00	1080.10	8.06	250.00	300.10	6.74
269.13	619.23	6.45	970.00	1120.10	8.36	230.00	320.10	6.79
366.30	716.40	6.69	1010.00	1160.10	8.61	220.00	330.10	6.82
431.09	781.19	6.70	1050.00	1200.10	8.96	200.00	350.10	6.80
528.26	878.36	7.10	1070.00	1220.10	9.15	190.00	360.10	6.74
593.04	943.14	7.61	1110.00	1260.10	9.31	170.00	380.10	6.78
690.22	1040.32	8.18	1130.00	1280.10	9.45	160.00	390.10	6.72
755.00	1105.10	8.77	1170.00	1320.10	9.41	140.00	410.10	6.82
852.17	1202.27	9.48	1190.00	1340.10	9.33	130.00	420.10	6.95
916.96	1267.06	9.60	1230.00	1380.10	9.45	110.00	440.10	6.82
1014.13	1364.23	9.01	1250.00	1400.10	9.53	100.00	450.10	6.85
1078.91	1429.01	8.59	1290.00	1440.10	9.57	80.00	470.10	6.97
1176.09	1526.19	8.57	1310.00	1460.10	9.70	70.00	480.10	6.84
1240.87	1590.97	8.87	1350.00	1500.10	10.03	50.00	500.10	6.88
1338.04	1688.14	9.41	1370.00	1520.10	10.11	40.00	510.10	6.84
1402.83	1752.93	9.79	1410.00	1560.10	10.48	20.00	530.10	6.78
1500.00	1850.10	11.04	1430.00	1580.10	10.76	10.00	540.10	7.24

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Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)			RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)					@LO (dBm)		
	+14	+17	+20	+14	+17	+20			+14	+17	+20
10.10	71.45	80.72	77.63	54.38	55.20	56.04	40.10	10.1	51.22	51.11	51.28
70.10	90.00	86.94	87.24	39.01	40.97	43.05	100.10	70.1	43.42	43.49	43.55
130.10	81.24	78.95	77.89	34.47	36.98	39.66	160.10	130.1	39.73	39.86	39.92
190.10	74.85	77.48	79.14	31.68	34.39	37.50	220.10	190.1	37.33	37.51	37.70
250.10	70.10	72.78	75.69	29.88	33.13	36.09	280.10	250.1	35.75	35.86	36.15
300.10	67.46	68.29	68.25	28.89	32.09	34.77	330.10	300.1	34.74	34.81	34.71
360.10	65.20	65.31	65.01	28.00	31.05	33.58	390.10	360.1	33.40	33.13	33.23
410.10	62.70	61.43	59.48	27.12	30.27	32.91	440.10	410.1	32.01	31.65	31.88
470.10	58.21	57.51	57.30	26.26	29.05	31.47	500.10	470.1	30.60	30.36	30.39
520.10	55.05	54.88	55.14	25.40	28.45	30.88	550.10	520.1	29.94	29.79	29.75
580.10	52.92	52.94	52.61	24.49	27.14	30.13	610.10	580.1	29.43	29.01	28.83
630.10	51.42	52.84	53.12	24.36	26.49	29.01	660.10	630.1	28.87	28.57	28.28
690.10	50.11	51.13	50.91	24.23	26.21	28.27	720.10	690.1	27.72	27.31	27.19
740.10	48.56	49.75	49.82	24.26	26.14	27.91	770.10	740.1	27.30	27.10	26.92
800.10	47.60	48.86	48.90	23.94	25.77	26.50	830.10	800.1	27.86	27.65	27.61
850.10	47.32	47.45	47.37	23.43	25.07	25.48	880.10	850.1	29.32	28.74	28.87
910.10	47.26	46.78	46.56	22.86	24.15	24.47	940.10	910.1	32.84	31.62	31.82
960.10	48.73	47.53	46.51	22.81	23.78	23.91	990.10	960.1	37.11	35.77	34.57
1020.10	50.83	48.72	47.73	22.63	23.21	23.19	1050.10	1020.1	45.98	40.95	38.60
1070.10	52.00	50.46	49.24	22.57	22.85	22.65	1100.10	1070.1	42.92	39.80	37.46
1130.10	51.15	50.71	50.35	22.47	22.41	21.95	1160.10	1130.1	37.02	34.60	33.09
1180.10	49.40	49.18	49.49	22.49	22.17	21.55	1210.10	1180.1	34.05	32.33	30.89
1240.10	48.61	48.91	49.80	22.53	21.72	20.57	1270.10	1240.1	31.54	29.94	28.89
1290.10	46.88	47.53	47.85	22.51	21.05	18.88	1320.10	1290.1	29.82	28.75	28.48
1350.10	46.71	47.63	47.84	21.73	19.08	17.23	1380.10	1350.1	28.38	27.51	27.04
1400.10	47.55	49.04	49.04	20.37	17.76	16.47	1430.10	1400.1	27.22	26.60	26.28
1460.10	49.36	51.23	51.59	18.49	16.71	15.68	1490.10	1460.1	26.41	26.12	26.05
1510.10	50.42	50.17	47.98	17.73	16.22	15.14	1540.10	1510.1	26.06	26.29	26.31
1570.10	47.42	47.47	45.91	16.60	15.43	14.56	1600.10	1570.1	25.67	26.52	26.93
1620.10	46.72	47.72	46.56	15.93	14.99	14.12	1650.10	1620.1	25.15	26.37	27.20
1680.10	46.07	47.02	46.04	14.94	14.31	13.65	1710.10	1680.1	24.65	25.89	26.95
1730.10	45.85	46.29	45.78	14.19	13.76	13.25	1760.10	1730.1	24.24	25.62	26.53
1790.10	46.64	47.11	45.27	13.39	13.20	12.87	1820.10	1790.1	23.58	25.41	26.29
1840.10	46.13	48.68	47.35	12.80	12.74	12.49	1870.10	1840.1	23.45	25.27	26.27
1900.10	46.21	51.63	52.07	12.17	12.22	12.15	1930.10	1900.1	23.25	25.03	26.08
1950.10	46.55	52.19	52.96	11.67	11.85	11.85	1980.10	1950.1	23.58	25.20	26.12
2010.10	46.02	52.60	56.59	11.14	11.40	11.68	2040.10	2010.1	23.97	25.83	26.74
2060.10	45.64	54.95	58.93	10.84	11.08	11.45	2090.10	2060.1	24.46	26.45	27.55
2120.10	45.90	57.76	55.98	10.53	10.77	11.18	2150.10	2120.1	25.50	27.66	28.83
2170.10	44.81	55.00	51.83	10.23	10.48	10.77	2200.10	2170.1	26.55	28.63	30.02

Frequency Mixer

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Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=550MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+14	+17	+20		+14	+17	+20		+14	+17	+20
40.10	10.1	1.45	1.29	1.24	10.10	1.36	2.67	9.79	10.00	2.00	1.54	1.28
100.10	70.1	1.42	1.21	1.09	70.10	1.07	1.73	2.88	20.00	2.01	1.54	1.28
160.10	130.1	1.43	1.20	1.07	130.10	1.03	1.63	2.49	30.00	2.00	1.53	1.27
220.10	190.1	1.45	1.23	1.11	190.10	1.05	1.54	2.27	40.00	1.99	1.52	1.26
280.10	250.1	1.51	1.26	1.15	250.10	1.08	1.57	2.31	50.00	2.01	1.54	1.28
330.10	300.1	1.51	1.27	1.18	300.10	1.13	1.56	2.25	60.00	2.02	1.54	1.28
390.10	360.1	1.52	1.31	1.24	360.10	1.17	1.60	2.30	70.00	2.02	1.54	1.28
440.10	410.1	1.56	1.36	1.28	410.10	1.20	1.61	2.28	80.00	2.03	1.56	1.30
500.10	470.1	1.64	1.46	1.39	470.10	1.29	1.68	2.33	90.00	2.03	1.55	1.29
550.10	520.1	1.74	1.55	1.48	520.10	1.35	1.74	2.38	100.00	2.01	1.53	1.27
610.10	580.1	1.94	1.75	1.63	580.10	1.41	1.79	2.41	110.00	2.02	1.54	1.27
660.10	630.1	2.15	1.98	1.86	630.10	1.49	1.87	2.51	120.00	2.03	1.55	1.28
720.10	690.1	2.45	2.24	2.13	690.10	1.59	1.91	2.50	140.00	2.02	1.54	1.28
770.10	740.1	2.76	2.48	2.33	740.10	1.67	1.96	2.50	150.00	2.05	1.57	1.30
830.10	800.1	3.14	2.68	2.45	800.10	1.78	2.05	2.54	170.00	2.04	1.55	1.28
880.10	850.1	3.44	2.90	2.63	850.10	1.86	2.18	2.64	180.00	2.02	1.54	1.28
940.10	910.1	3.61	3.22	2.86	910.10	1.92	2.30	2.80	200.00	2.03	1.54	1.28
990.10	960.1	3.60	3.38	3.04	960.10	1.99	2.34	2.86	210.00	2.04	1.55	1.29
1050.10	1020.1	3.58	3.41	3.19	1020.10	2.09	2.40	2.91	230.00	2.07	1.58	1.31
1100.10	1070.1	3.49	3.31	3.15	1070.10	2.16	2.42	2.89	240.00	2.06	1.56	1.29
1160.10	1130.1	3.48	3.34	3.17	1130.10	2.25	2.45	2.89	260.00	2.07	1.57	1.30
1210.10	1180.1	3.44	3.30	3.13	1180.10	2.31	2.44	2.81	270.00	2.05	1.55	1.28
1270.10	1240.1	3.36	3.16	2.94	1240.10	2.39	2.42	2.75	290.00	2.07	1.57	1.30
1320.10	1290.1	3.32	3.03	2.78	1290.10	2.43	2.35	2.62	300.00	2.07	1.58	1.31
1380.10	1350.1	3.13	2.75	2.55	1350.10	2.48	2.34	2.61	320.00	2.08	1.58	1.31
1430.10	1400.1	3.08	2.65	2.48	1400.10	2.59	2.37	2.64	330.00	2.09	1.59	1.32
1490.10	1460.1	2.82	2.47	2.35	1460.10	2.79	2.56	2.78	350.00	2.07	1.57	1.30
1540.10	1510.1	2.76	2.40	2.27	1510.10	3.18	2.78	2.89	360.00	2.11	1.60	1.33
1600.10	1570.1	2.60	2.33	2.19	1570.10	3.60	3.02	3.03	380.00	2.06	1.57	1.30
1650.10	1620.1	2.59	2.26	2.12	1620.10	4.24	3.29	3.18	390.00	2.09	1.60	1.33
1710.10	1680.1	2.66	2.27	2.10	1680.10	4.80	3.54	3.26	410.00	2.07	1.57	1.30
1760.10	1730.1	2.72	2.25	2.07	1730.10	5.39	3.82	3.42	420.00	2.08	1.58	1.31
1820.10	1790.1	3.00	2.35	2.13	1790.10	6.07	4.13	3.52	440.00	2.09	1.59	1.31
1870.10	1840.1	3.03	2.35	2.10	1840.10	6.26	4.33	3.65	450.00	2.08	1.58	1.31
1930.10	1900.1	3.33	2.46	2.15	1900.10	6.89	4.73	3.78	470.00	2.09	1.60	1.32
1980.10	1950.1	3.27	2.47	2.15	1950.10	6.83	4.80	3.87	480.00	2.05	1.56	1.29
2040.10	2010.1	3.47	2.53	2.15	2010.10	7.31	5.16	4.01	500.00	2.09	1.59	1.32
2090.10	2060.1	3.60	2.58	2.12	2060.10	7.34	5.31	4.16	510.00	2.03	1.55	1.28
2150.10	2120.1	3.56	2.52	2.05	2120.10	7.28	5.54	4.43	530.00	2.08	1.59	1.31
2200.10	2170.1	3.79	2.57	2.13	2170.10	7.20	5.85	4.54	540.00	2.01	1.54	1.28

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	7	33	14	38	17	47	29	45	31	49
1	-	27	+0	44	14	39	31	40	40	45	30	54
2	67	67	49	72	52	77	51	70	55	71	58	80
3	>90	74	48	75	46	75	46	72	50	68	68	74
4	>90	>82	75	>82	75	>82	73	>82	70	>82	76	>82
5	>90	>82	>82	>82	>82	>82	>82	>82	81	>82	79	>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: 380.1 MHz; -1.00 dBm.
LO IN: 350.1 MHz; +17.00 dBm
IF OUT: 30 MHz; -7.51 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	18	43	27	49	31	60	47	66	46	67
1	-	27	+0	46	14	41	37	46	52	52	42	59
2	47	58	43	63	44	83	40	67	46	78	65	70
3	70	57	38	69	35	63	34	63	38	59	54	64
4	>90	92	65	84	69	79	66	75	58	78	61	75
5	>90	77	55	80	47	76	45	82	46	68	51	65
6	>90	89	81	88	83	89	70	89	62	88	58	80
7	>90	82	75	85	68	90	61	83	62	81	60	78
8	>90	>93	>93	>93	>93	>93	83	>93	74	>93	73	>93
9	>90	>93	78	>93	83	>93	78	>93	71	>93	69	>93
10	>90	>93	85	>93	88	>93	91	>93	88	>93	79	>93
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

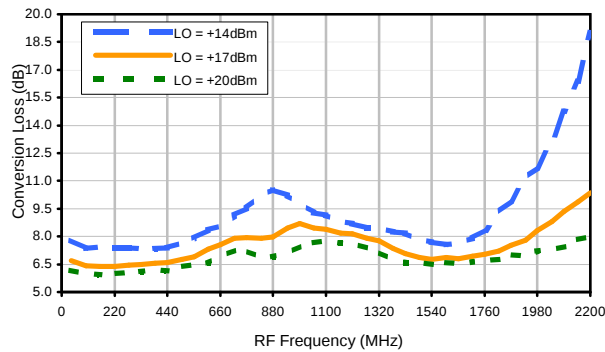
LO HARMONICS ORDER

Test conditions: RF IN: 380.1 MHz; 9.00 dBm.
LO IN: 350.1 MHz; +17.00 dBm
IF OUT: 30 MHz; 2.56 dBm

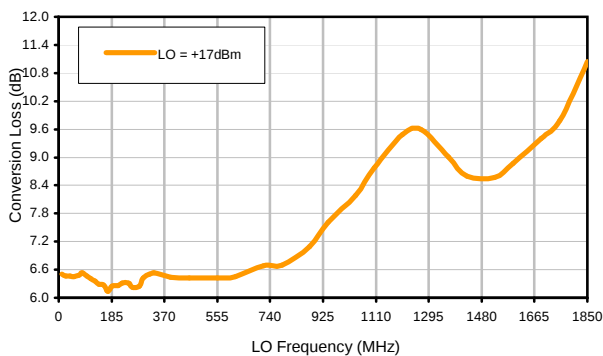
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

Typical Performance Curves

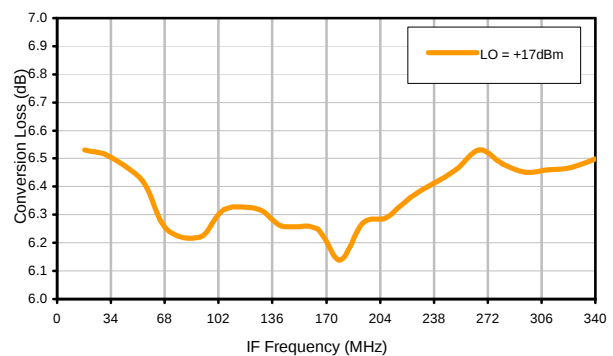
Conversion Loss @ IF=30MHz



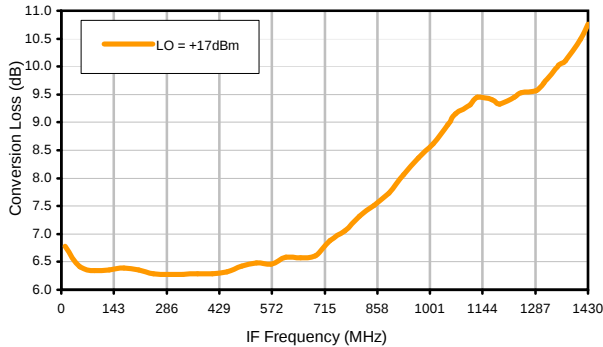
Conversion Loss vs. LO @ RF=350.1MHz



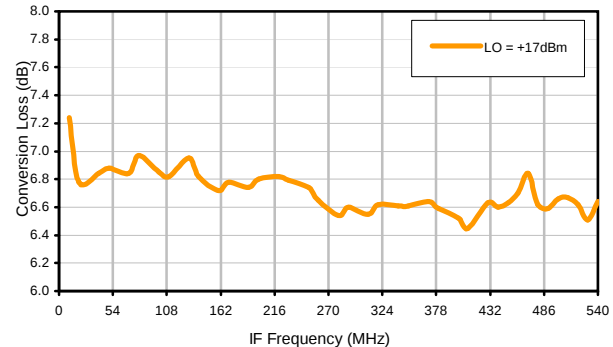
Conversion Loss vs. IF @ RF=350.1MHz



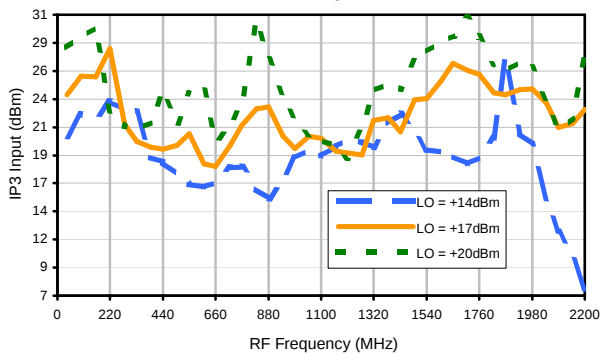
Conversion Loss vs. IF @ RF=150.1MHz



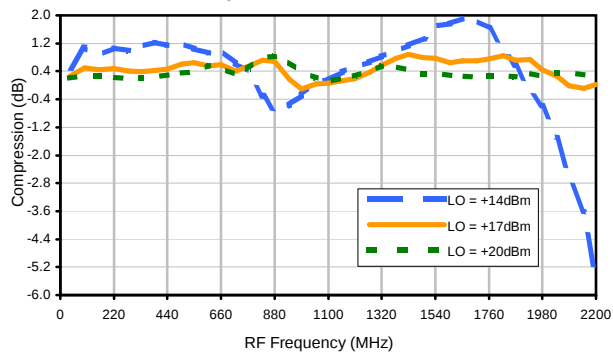
Conversion Loss vs. IF @ RF=550.1MHz



IP3 Input



Compression @ RF IN=+14dBm

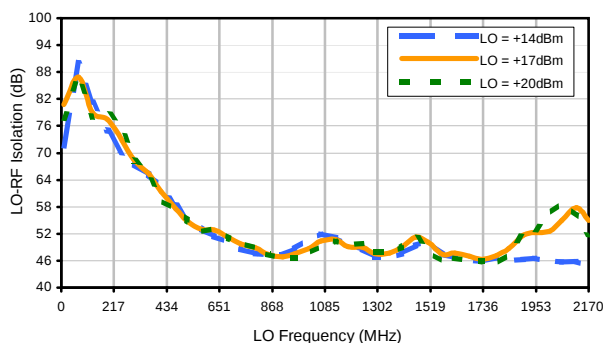


Frequency Mixer

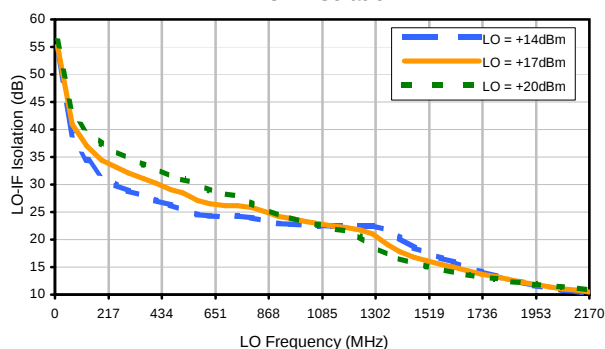
Typical Performance Curves

TUF-ED12599/1

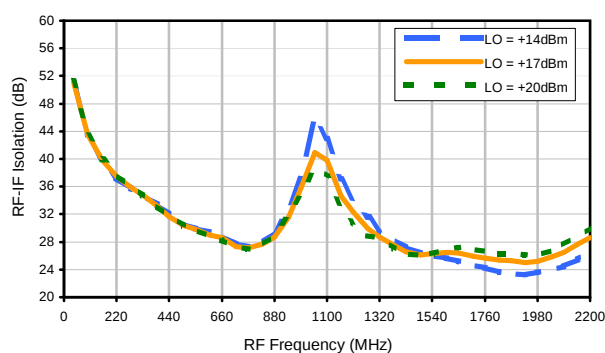
LO-RF Isolation



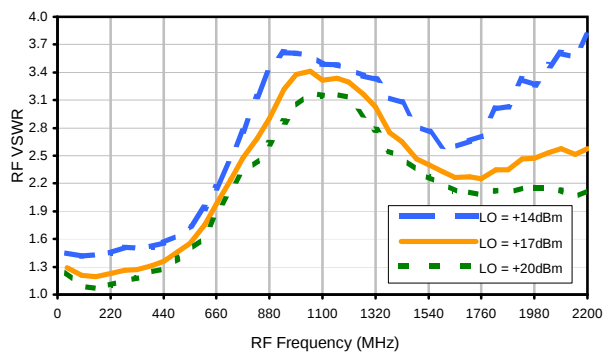
LO-IF Isolation



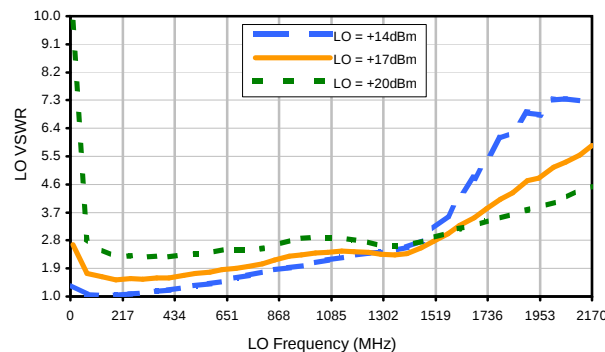
RF-IF Isolation



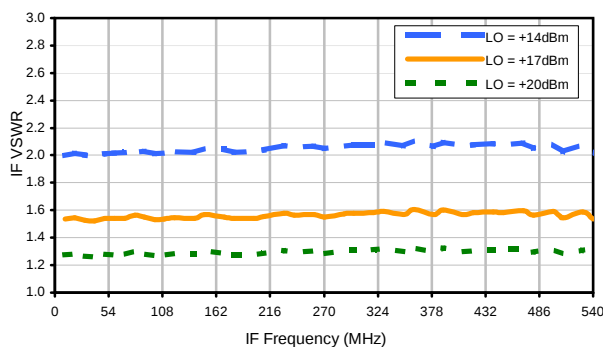
RF VSWR



LO VSWR



IF VSWR



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RF/IF MICROWAVE COMPONENTS

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TUF-ED12599/1
08/11/2010
Page 2 of 3

Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	7	33	14	38	17	47	29	45	31	49
1	-	27	+0	44	14	39	31	40	40	45	30	54
2	67	67	49	72	52	77	51	70	55	71	58	80
3	>90	74	48	75	46	75	46	72	50	68	68	74
4	>90	>82	75	>82	75	>82	73	>82	70	>82	76	>82
5	>90	>82	>82	>82	>82	>82	>82	>82	81	>82	79	>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: 380.1 MHz; -1.00 dBm.
LO IN: 350.1 MHz; +17.00 dBm
IF OUT: 30 MHz; -7.51 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	18	43	27	49	31	60	47	66	46	67
1	-	27	+0	46	14	41	37	46	52	52	42	59
2	47	58	43	63	44	83	40	67	46	78	65	70
3	70	57	38	69	35	63	34	63	38	59	54	64
4	>90	92	65	84	69	79	66	75	58	78	61	75
5	>90	77	55	80	47	76	45	82	46	68	51	65
6	>90	89	81	88	83	89	70	89	62	88	58	80
7	>90	82	75	85	68	90	61	83	62	81	60	78
8	>90	>93	>93	>93	>93	>93	83	>93	74	>93	73	>93
9	>90	>93	78	>93	83	>93	78	>93	71	>93	69	>93
10	>90	>93	85	>93	88	>93	91	>93	88	>93	79	>93
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

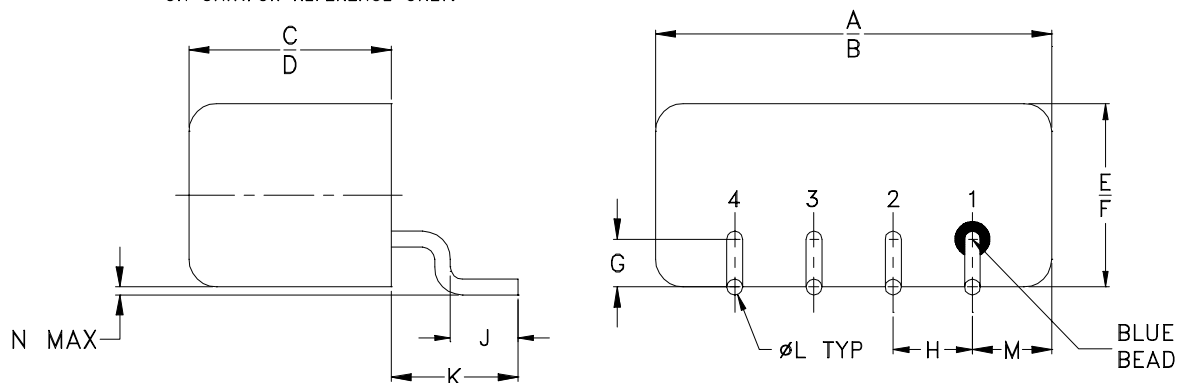
Test conditions: RF IN: 380.1 MHz; 9.00 dBm.
LO IN: 350.1 MHz; +17.00 dBm
IF OUT: 30 MHz; 2.56 dBm

- 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.

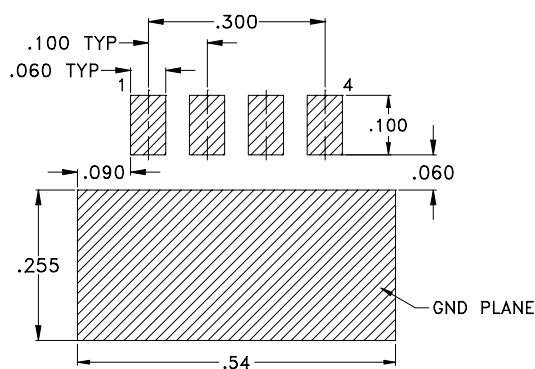
Outline Dimensions

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.



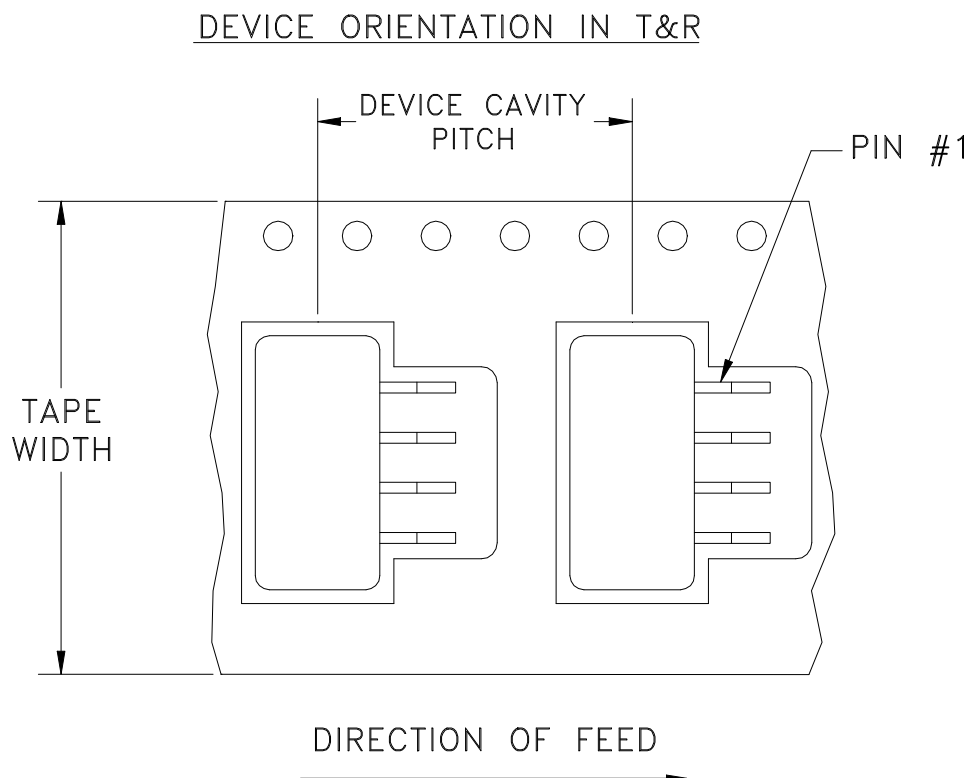
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Tape & Reel Packaging TR-F9



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.

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



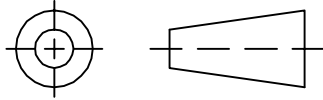
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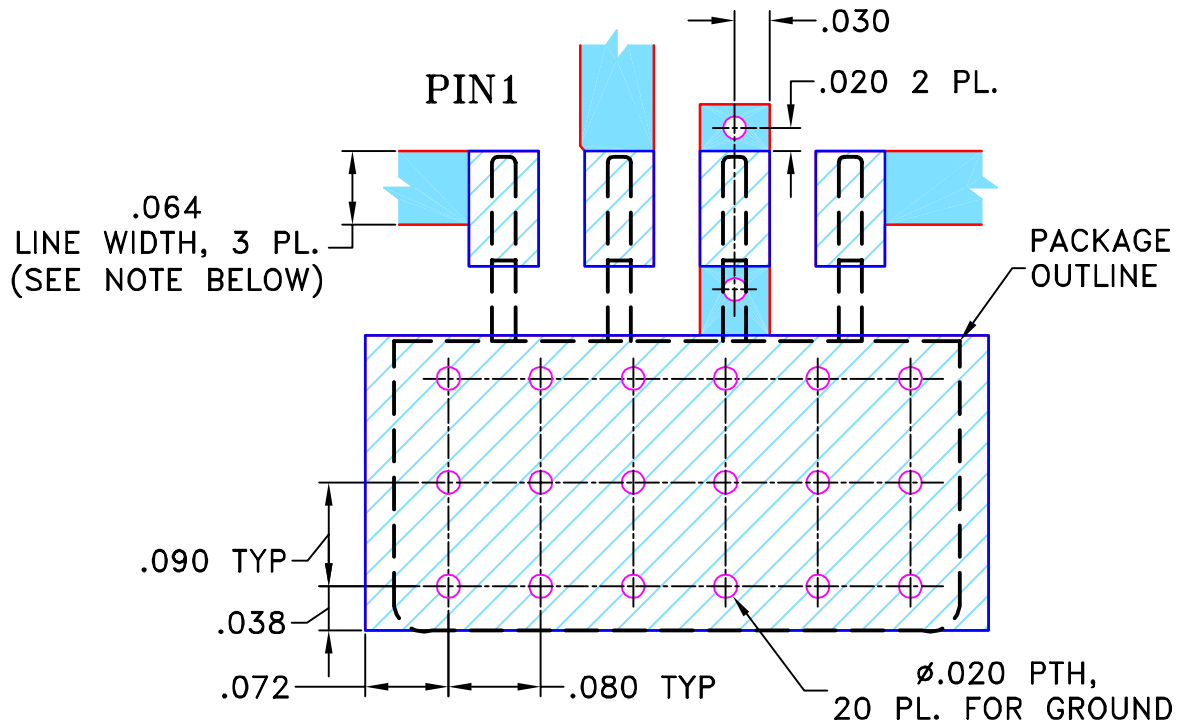
THIRD ANGLE PROJECTION



REVISIONS

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

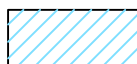
SUGGESTED MOUNTING CONFIGURATION
FOR NNN150 CASE STYLE, "z"/"cm" PIN CONNECTIONS.



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

DRAWN

GF

04/11/03

TOLERANCES ON:

CHECKED

AV

04/15/03

2 PL DECIMALS $\pm$

APPROVED

DJ

04/15/03

3 PL DECIMALS $\pm$.005ANGLES $\pm$ FRACTIONS $\pm$
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ASHEETA1.DWG REV:A DATE:01/12/95



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

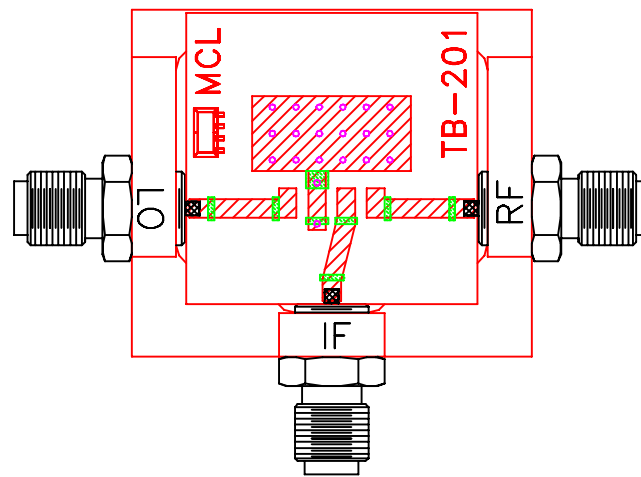
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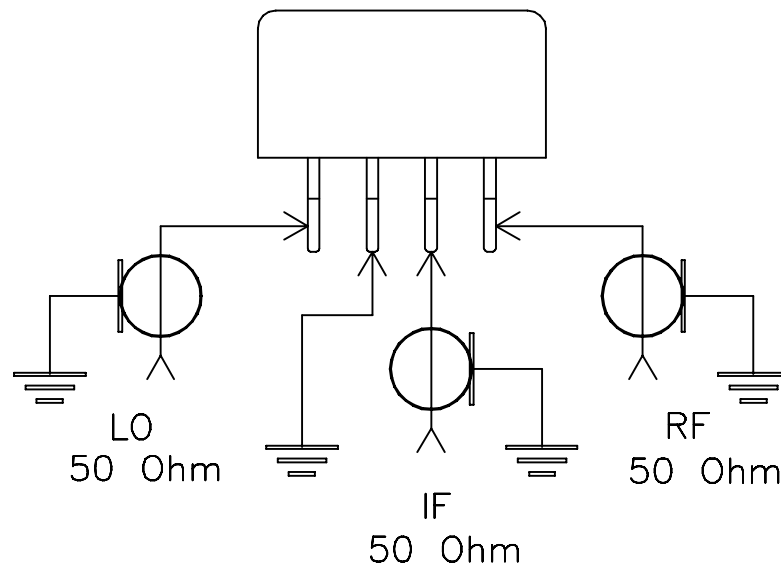
SCALE: 6:1

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.

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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 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
HAST	130°C, 85% RH, 96 hours	JESD22-A110
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 Eutectic Process: 225°C peak Pb-Free Process, 245°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
Vibration (High Frequency)	20g peak, 20-2000 Hz, 4 times in each of three axes (total 12)	MIL-STD-883, Method 2007.3, Condition A
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