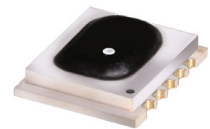


# Frequency Mixer WIDE BAND

## MCA1T-60LH+

Level 10 (LO Power+10 dBm) 1700 to 6000 MHz



CASE STYLE: DZ885-2

### Maximum Ratings

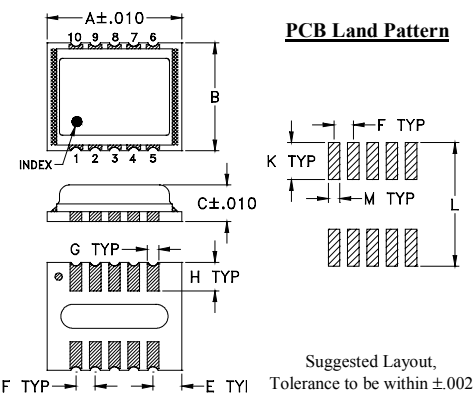
Operating Temperature	-40°C to 85°C
Storage Temperature	-40°C to 85°C
RF Power	50 mW
IF Current	40 mA

Permanent damage may occur if any of these limits are exceeded.

### Pin Connections

LO	10
RF	5
IF	3
GROUND	1,2,4,6,7,8,9

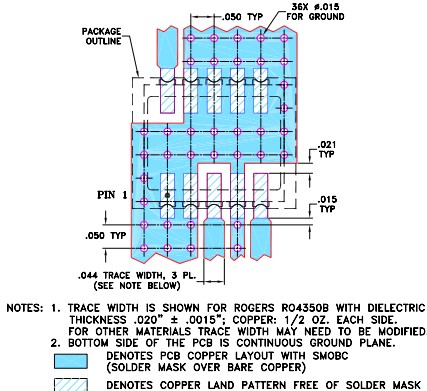
### Outline Drawing



### Outline Dimensions (inch/mm)

A	B	C	E	F	G
.350	.280	.095	.075	.050	.030
8.89	7.11	2.41	1.91	1.27	0.76
H	K	L	M	wt	
.074	.096	.321	.030	grams	
1.88	2.44	8.15	0.76	0.21	

### Demo Board MCL P/N: TB-493+ Suggested PCB Layout (PL-288)



### Notes

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 C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)

### Features

- wide bandwidth, 1700 to 6000 MHz
- useable to 8000 MHz
- low conversion loss, 6.2 dB typ.
- IF, DC to 2000 MHz
- LTCC double balanced mixer
- aqueous washable
- low cost
- low profile, 0.095"
- protected by US Patent 7,027,795 & 8,749,989

### Applications

- PCN
- defense & weather radar
- WCDMA
- defense communications

### Electrical Specifications (T<sub>AMB</sub> = -40°C to 85°C)

FREQUENCY (MHz)		CONVERSION LOSS (dB)			LO-RF ISOLATION (dB)		LO-IF ISOLATION (dB)		IP3 at center band (dBm)
LO/RF f <sub>c</sub> -f <sub>u</sub>	IF	$\bar{X}$	$\sigma$	Max.	Typ.	Min.	Typ.	Min.	Typ.
1700-4400	DC-2000	6.6	0.1	7.9*	35	23	17	—	13
4400-6000	DC-2000	6.0	0.1	8.3*	27	20	21	—	11

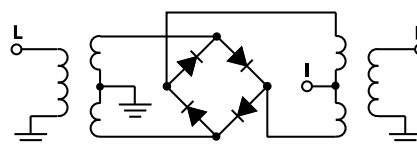
1 dB COMPR. +5 dBm typ.

\*Conversion loss at 30 MHz IF, increases with IF frequency. See Graphs

### Typical Performance Data

Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)
RF	LO	LO +10dBm	LO +10dBm	LO +10dBm	LO +10dBm	LO +10dBm
1700.00	1730.00	6.12	31.11	17.21	2.04	3.80
1900.00	1930.00	5.58	41.49	18.61	2.25	2.23
2100.00	2130.00	5.56	36.04	17.55	2.45	1.85
2500.00	2530.00	5.57	34.25	17.48	2.19	1.72
2700.00	2730.00	5.54	36.00	18.36	2.22	1.90
2900.00	2930.00	5.92	40.21	18.81	3.68	2.18
3100.00	3130.00	6.80	36.38	18.44	5.02	2.63
3300.00	3330.00	6.75	35.64	17.41	3.64	2.73
3500.00	3530.00	6.51	34.52	14.61	4.06	3.26
3700.00	3730.00	6.81	34.43	12.04	3.26	3.62
3900.00	3930.00	6.24	35.17	14.87	2.71	3.93
4100.00	4130.00	6.49	37.36	15.93	2.04	2.62
4300.00	4330.00	6.05	37.95	18.73	1.83	2.45
4500.00	4530.00	5.97	34.27	19.90	1.93	2.66
4700.00	4730.00	5.76	32.31	21.16	1.47	2.76
4900.00	4930.00	6.58	34.11	22.13	2.70	1.96
5100.00	5130.00	5.50	29.13	22.12	1.90	1.35
5300.00	5330.00	5.92	27.47	22.67	2.24	1.37
5700.00	5730.00	5.76	26.99	17.82	1.75	2.61
6000.00	6030.00	6.73	26.82	11.81	2.14	6.10

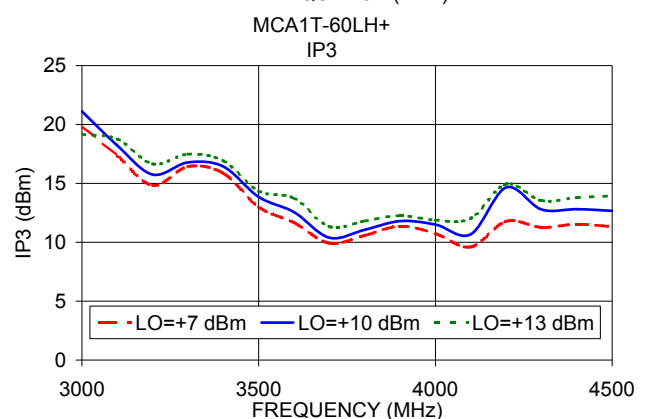
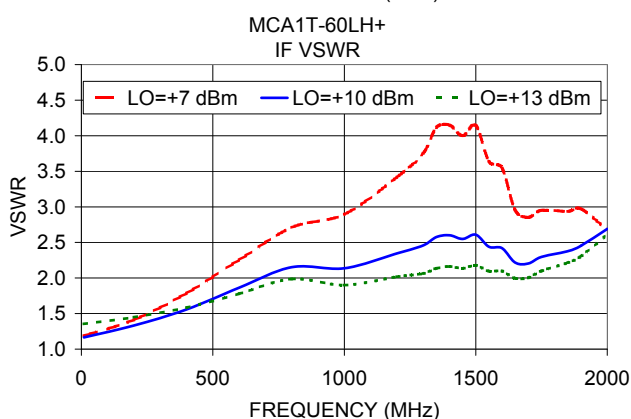
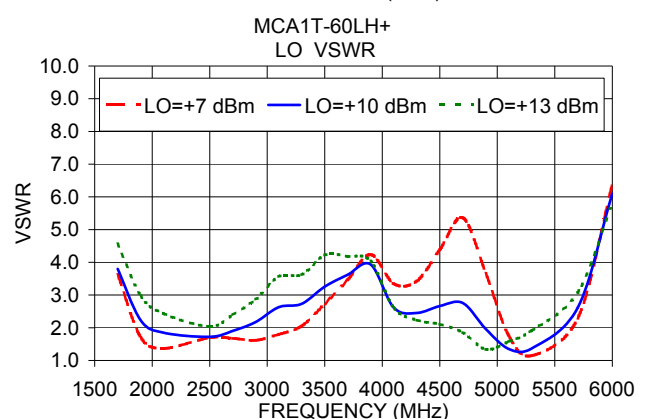
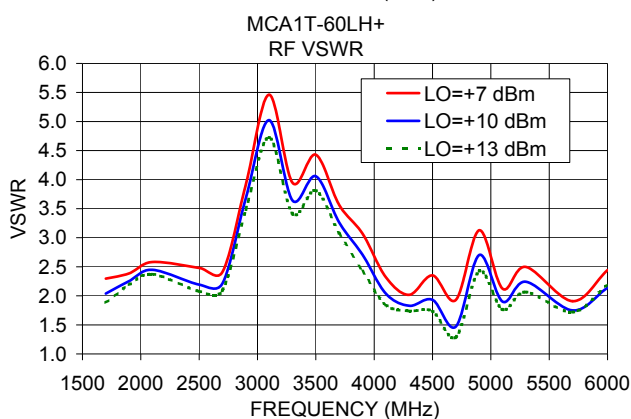
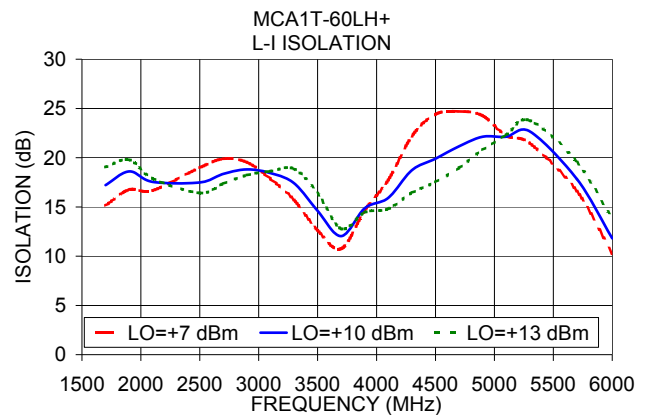
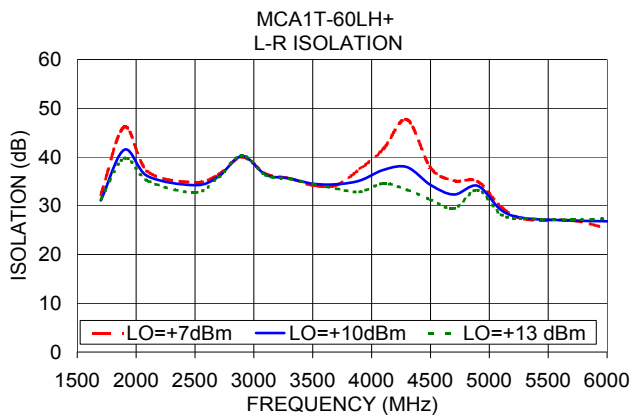
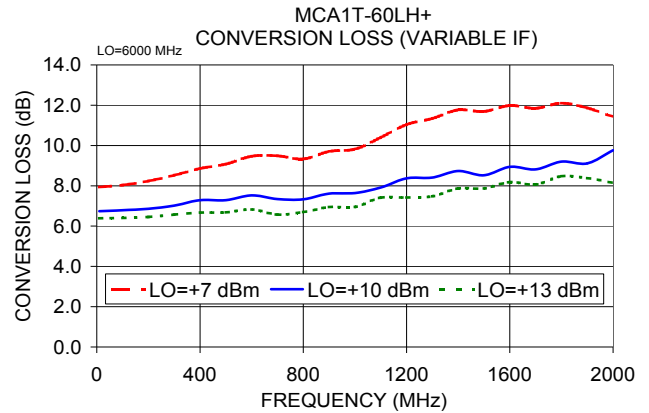
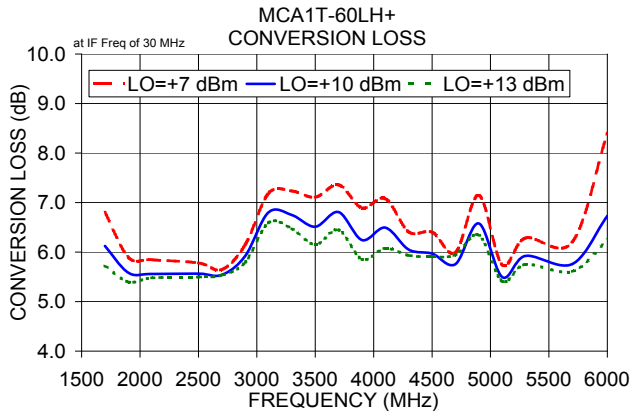
### Electrical Schematic



# NON-CATALOG

## Performance Charts

## MCA1T-60LH+



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# Frequency Mixer

# MCA1T-60LH+

## Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)		
		@LO (dBm)		
		+7	+10	+13
1500.1	1530.1	10.09	8.57	9.05
1700.1	1730.1	7.33	6.56	6.10
1900.1	1930.1	5.91	5.58	5.39
2100.1	2130.1	5.65	5.40	5.28
2300.1	2330.1	5.46	5.20	5.10
2500.1	2530.1	5.51	5.38	5.34
2700.1	2730.1	5.55	5.44	5.42
2900.1	2930.1	6.17	5.90	5.72
3100.1	3130.1	7.17	6.73	6.50
3300.1	3330.1	7.56	7.09	6.79
3500.1	3530.1	7.95	7.33	6.98
3680.1	3710.1	8.04	7.43	7.05
3880.1	3910.1	8.08	7.24	6.72
4060.1	4090.1	8.36	7.55	7.14
4260.1	4290.1	7.32	6.55	6.34
4440.1	4470.1	6.80	5.94	5.81
4640.1	4670.1	6.89	6.08	6.02
4820.1	4850.1	7.24	6.36	6.07
5020.1	5050.1	6.02	5.62	5.50
5200.1	5230.1	5.81	5.55	5.47
5400.1	5430.1	6.09	5.69	5.48
5580.1	5610.1	6.19	5.68	5.42
5780.1	5810.1	7.24	6.41	5.98
5960.1	5990.1	9.88	7.30	6.58
6160.1	6190.1	9.31	7.87	7.08
6340.1	6370.1	8.69	7.24	6.56
6540.1	6570.1	13.35	11.38	9.88
6720.1	6750.1	9.45	7.65	6.98
6920.1	6950.1	9.00	7.76	7.16
7100.1	7130.1	11.86	8.73	7.87
7300.1	7330.1	13.56	8.60	7.91
7480.1	7510.1	12.26	8.60	7.90
7680.1	7710.1	10.01	8.37	7.88
7860.1	7890.1	9.68	8.72	8.23
8060.1	8090.1	9.13	8.57	8.22
8240.1	8270.1	8.41	7.94	7.62
8440.1	8470.1	7.65	7.22	6.94
8620.1	8650.1	9.54	8.30	7.70
8820.1	8850.1	15.43	11.11	9.84
9000.1	9030.1	21.38	14.69	11.19

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+7	+10	+13
1500.1	1530.1	2.89	7.26	5.82
1700.1	1730.1	11.95	12.45	11.84
1900.1	1930.1	13.47	12.90	12.77
2100.1	2130.1	13.08	11.99	11.51
2300.1	2330.1	14.83	13.46	13.97
2500.1	2530.1	12.72	13.12	17.02
2700.1	2730.1	18.89	22.32	25.05
2900.1	2930.1	23.79	22.11	20.42
3100.1	3130.1	18.72	18.60	19.35
3300.1	3330.1	19.49	19.62	20.11
3500.1	3530.1	13.21	14.88	16.19
3680.1	3710.1	14.01	13.33	13.70
3880.1	3910.1	12.20	13.18	13.89
4060.1	4090.1	9.72	11.44	12.37
4260.1	4290.1	9.45	13.61	15.30
4440.1	4470.1	8.67	11.03	12.97
4640.1	4670.1	18.58	22.92	18.21
4820.1	4850.1	11.24	11.95	12.48
5020.1	5050.1	9.90	11.94	13.00
5200.1	5230.1	14.44	15.27	15.52
5400.1	5430.1	11.48	13.47	14.57
5580.1	5610.1	9.77	12.02	14.22
5780.1	5810.1	5.42	7.61	9.67
5960.1	5990.1	8.28	8.77	10.98
6160.1	6190.1	0.57	2.22	5.27
6340.1	6370.1	1.34	2.99	3.77
6540.1	6570.1	8.22	7.56	8.51
6720.1	6750.1	14.78	15.48	15.41
6920.1	6950.1	16.99	13.96	15.15
7100.1	7130.1	7.40	19.77	16.90
7300.1	7330.1	3.51	16.19	19.65
7480.1	7510.1	6.21	14.76	18.63
7680.1	7710.1	13.20	13.83	17.01
7860.1	7890.1	12.50	14.31	17.72
8060.1	8090.1	12.47	14.30	18.85
8240.1	8270.1	13.82	16.43	18.94
8440.1	8470.1	11.78	14.83	14.63
8620.1	8650.1	4.03	8.25	11.81
8820.1	8850.1	6.67	4.33	8.59
9000.1	9030.1	0.42	8.82	6.55

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+10dBm (dB)		
		@LO (dBm)		
		+7	+10	+13
1500.1	1530.1	4.93	4.80	5.73
1700.1	1730.1	5.85	5.38	4.86
1900.1	1930.1	5.96	5.36	4.86
2100.1	2130.1	5.64	5.17	4.75
2300.1	2330.1	5.07	4.61	4.21
2500.1	2530.1	4.35	3.60	3.10
2700.1	2730.1	4.65	3.81	3.43
2900.1	2930.1	4.96	4.49	4.09
3100.1	3130.1	4.45	3.94	3.62
3300.1	3330.1	3.99	3.62	3.36
3500.1	3530.1	3.89	3.53	3.25
3680.1	3710.1	3.85	3.43	3.12
3880.1	3910.1	4.63	3.71	3.39
4060.1	4090.1	5.27	3.90	3.44
4260.1	4290.1	5.66	4.57	3.67
4440.1	4470.1	4.99	4.02	3.18
4640.1	4670.1	4.88	3.83	3.00
4820.1	4850.1	4.91	4.34	3.83
5020.1	5050.1	5.15	4.38	3.93
5200.1	5230.1	5.07	4.41	3.88
5400.1	5430.1	5.52	5.12	4.69
5580.1	5610.1	5.70	5.25	4.86
5780.1	5810.1	5.76	4.92	4.47
5960.1	5990.1	5.22	5.38	4.40
6160.1	6190.1	7.88	7.14	5.74
6340.1	6370.1	14.25	13.15	11.32
6540.1	6570.1	4.15	3.99	3.70
6720.1	6750.1	4.25	3.75	3.40
6920.1	6950.1	4.05	3.26	2.75
7100.1	7130.1	2.56	2.99	2.34
7300.1	7330.1	1.66	3.06	2.36
7480.1	7510.1	2.60	3.49	2.57
7680.1	7710.1	4.23	3.69	2.72
7860.1	7890.1	5.04	3.96	3.07
8060.1	8090.1	5.17	4.05	3.46
8240.1	8270.1	5.50	4.32	3.65
8440.1	8470.1	6.58	5.26	4.40
8620.1	8650.1	9.01	8.01	6.53
8820.1	8850.1	7.93	8.92	7.96
9000.1	9030.1	3.80	5.96	6.21

# Frequency Mixer

# MCA1T-60LH+

## Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=3850MHz (dB)
		@LO (dBm)
		+10
2149.9	1700.1	9.84
2029.9	1820.1	9.13
1909.9	1940.1	8.66
1809.9	2040.1	9.06
1689.9	2160.1	9.50
1589.9	2260.1	9.41
1469.9	2380.1	10.31
1369.9	2480.1	10.64
1249.9	2600.1	9.67
1149.9	2700.1	9.72
1030.0	2820.0	9.72
930.0	2920.0	9.39
810.0	3040.0	8.69
710.0	3140.0	8.32
590.0	3260.0	7.57
490.0	3360.0	7.32
370.0	3480.0	7.06
270.0	3580.0	6.88
150.0	3700.0	6.97
50.0	3800.0	7.02
70.0	3920.0	7.30
170.0	4020.0	7.68
290.0	4140.0	8.00
390.0	4240.0	7.52
510.0	4360.0	7.58
610.0	4460.0	7.58
730.0	4580.0	7.77
830.0	4680.0	8.05
950.0	4800.0	8.01
1050.0	4900.0	8.27
1170.1	5020.1	8.32
1270.1	5120.1	8.54
1390.1	5240.1	8.39
1490.1	5340.1	8.81
1610.1	5460.1	9.01
1710.1	5560.1	9.64
1830.1	5680.1	10.56
1930.1	5780.1	10.85
2050.1	5900.1	11.00
2150.1	6000.1	11.92

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1690MHz (dB)
		@LO (dBm)
		+10
10.1	1700.1	7.20
90.1	1780.1	6.43
170.1	1860.1	6.16
250.1	1940.1	5.95
330.1	2020.1	5.92
410.1	2100.1	5.77
490.1	2180.1	5.81
570.1	2260.1	5.84
650.1	2340.1	5.83
710.1	2400.1	5.83
790.1	2480.1	6.05
850.1	2540.1	6.17
930.1	2620.1	6.37
990.1	2680.1	6.35
1070.1	2760.1	6.56
1130.1	2820.1	6.41
1210.1	2900.1	6.27
1270.1	2960.1	6.22
1350.1	3040.1	6.24
1410.1	3100.1	6.38
1490.1	3180.1	6.68
1550.1	3240.1	6.80
1630.1	3320.1	6.91
1690.1	3380.1	7.42
1770.1	3460.1	7.75
1830.1	3520.1	7.78
1910.1	3600.1	7.83
1970.1	3660.1	8.18
2050.1	3740.1	8.17
2110.1	3800.1	8.07
2190.1	3880.1	8.36
2250.1	3940.1	8.42
2330.1	4020.1	8.74
2390.1	4080.1	9.21
2470.1	4160.1	9.41
2530.1	4220.1	9.45
2610.1	4300.1	9.71
2670.1	4360.1	9.84
2750.1	4440.1	10.45
2810.1	4500.1	11.30

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=6010.1MHz (dB)
		@LO (dBm)
		+10
2710.0	3300.1	10.59
2650.0	3360.1	10.18
2590.0	3420.1	10.09
2530.0	3480.1	9.72
2450.0	3560.1	9.79
2390.0	3620.1	9.93
2310.0	3700.1	9.87
2250.0	3760.1	9.87
2170.0	3840.1	9.81
2110.0	3900.1	9.59
2030.0	3980.1	9.65
1970.0	4040.1	9.68
1890.0	4120.1	9.49
1830.0	4180.1	9.06
1750.0	4260.1	8.79
1690.0	4320.1	8.84
1610.0	4400.1	8.83
1550.0	4460.1	9.04
1470.0	4540.1	9.03
1410.0	4600.1	8.92
1330.0	4680.1	8.52
1270.0	4740.1	8.23
1190.0	4820.1	7.67
1130.0	4880.1	7.35
1050.0	4960.1	7.24
990.0	5020.1	6.93
910.0	5100.1	6.73
850.0	5160.1	6.58
770.0	5240.1	6.49
710.0	5300.1	6.54
630.0	5380.1	6.70
570.0	5440.1	6.76
490.0	5520.1	6.44
430.0	5580.1	6.35
350.0	5660.1	6.26
290.0	5720.1	6.44
210.0	5800.1	6.66
150.0	5860.1	7.01
70.0	5940.1	7.25
10.0	6000.1	7.72

# Frequency Mixer

# MCA1T-60LH+

## 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)		
	+7	+10	+13	+7	+10	+13			+7	+10	+13
1530.1	42.54	33.23	32.17	15.57	17.41	19.19	1500.1	1530.1	14.32	11.27	13.84
1730.1	31.51	30.22	29.62	15.88	18.14	20.10	1700.1	1730.1	12.64	11.34	10.66
1930.1	38.37	36.84	35.92	17.80	19.97	20.99	1900.1	1930.1	18.39	17.30	16.40
2130.1	39.75	38.02	35.51	17.08	18.09	18.04	2100.1	2130.1	21.01	21.89	22.26
2330.1	34.03	32.75	31.78	18.22	17.29	16.55	2300.1	2330.1	24.06	22.25	20.97
2530.1	32.95	32.28	31.02	17.68	16.38	15.38	2500.1	2530.1	20.31	18.59	17.69
2730.1	37.44	35.77	34.65	18.69	17.07	16.12	2700.1	2730.1	17.57	16.96	16.59
2930.1	38.82	38.90	38.73	18.46	17.65	17.00	2900.1	2930.1	19.74	19.33	19.00
3130.1	35.80	35.49	35.45	17.17	17.40	17.57	3100.1	3130.1	23.32	22.77	22.40
3330.1	37.94	37.88	37.76	15.58	17.19	18.54	3300.1	3330.1	23.15	23.04	22.87
3530.1	36.85	37.35	37.32	13.65	15.65	17.54	3500.1	3530.1	26.25	26.28	26.36
3710.1	36.92	38.30	36.69	12.36	13.90	15.02	3680.1	3710.1	28.05	27.11	26.51
3910.1	36.07	36.60	35.68	14.20	14.59	14.57	3880.1	3910.1	17.95	17.30	16.87
4090.1	39.64	38.60	37.19	17.90	16.42	15.59	4060.1	4090.1	16.00	15.43	15.08
4290.1	42.57	43.17	39.99	22.52	19.67	17.94	4260.1	4290.1	16.15	15.27	14.83
4470.1	44.96	44.61	37.25	29.17	23.11	20.09	4440.1	4470.1	16.81	16.15	15.70
4670.1	43.11	42.91	35.68	29.65	24.64	21.60	4640.1	4670.1	17.96	17.46	17.02
4850.1	35.64	37.27	36.11	28.33	25.33	23.57	4820.1	4850.1	18.39	18.03	17.74
5050.1	30.02	29.87	28.24	26.07	25.77	25.37	5020.1	5050.1	17.20	16.83	16.72
5230.1	26.63	27.12	26.76	23.78	24.31	24.48	5200.1	5230.1	15.81	15.05	14.66
5430.1	24.52	25.49	26.11	22.93	24.53	25.86	5400.1	5430.1	17.70	17.13	16.73
5610.1	25.07	25.62	25.82	20.50	22.09	23.65	5580.1	5610.1	23.04	22.52	22.07
5810.1	24.92	25.82	26.12	12.70	14.59	16.91	5780.1	5810.1	28.69	25.87	24.29
5990.1	25.87	26.94	27.59	12.25	14.14	16.22	5960.1	5990.1	23.12	22.72	21.81
6190.1	24.99	26.35	28.29	12.08	14.03	15.91	6160.1	6190.1	21.83	24.02	23.99
6370.1	23.15	24.52	26.01	10.81	12.34	13.75	6340.1	6370.1	21.28	23.10	23.98
6570.1	20.61	20.81	21.19	7.72	8.46	9.26	6540.1	6570.1	19.71	19.73	18.31
6750.1	20.91	21.20	21.40	8.85	10.57	12.44	6720.1	6750.1	16.10	16.39	16.71
6950.1	25.86	24.45	22.98	13.90	15.70	17.29	6920.1	6950.1	15.05	15.61	16.06
7130.1	28.33	26.37	23.69	18.43	19.90	21.08	7100.1	7130.1	14.16	14.80	15.11
7330.1	30.70	27.91	25.44	23.47	24.30	24.96	7300.1	7330.1	12.15	13.44	13.78
7510.1	28.96	27.70	25.97	27.30	28.00	27.16	7480.1	7510.1	10.82	11.54	11.76
7710.1	25.91	25.89	25.86	31.73	30.85	27.67	7680.1	7710.1	9.39	9.72	9.90
7890.1	23.27	23.72	24.15	34.57	30.35	26.57	7860.1	7890.1	8.20	8.42	8.57
8090.1	20.71	21.32	22.22	30.07	24.65	22.51	8060.1	8090.1	8.03	8.17	8.38
8270.1	19.03	20.31	21.41	21.91	19.78	18.56	8240.1	8270.1	10.16	10.27	10.47
8470.1	19.62	21.26	22.67	16.68	15.14	14.45	8440.1	8470.1	15.13	15.20	15.27
8650.1	26.80	31.34	33.52	16.41	15.58	15.02	8620.1	8650.1	20.49	21.38	21.65
8850.1	33.66	29.54	27.67	17.38	16.72	16.30	8820.1	8850.1	22.90	25.73	26.12
9030.1	29.91	29.45	28.74	16.05	15.94	15.17	9000.1	9030.1	19.70	19.84	20.23

# Frequency Mixer

# MCA1T-60LH+

## Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR @LO=6000MHz (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+7	+10	+13		+7	+10	+13		+7	+10	+13
1500.1	1530.1	2.75	2.12	2.25	1530.1	7.80	6.71	7.53	10.1	1.80	1.11	1.08
1700.1	1730.1	2.18	1.93	1.78	1730.1	3.87	4.06	4.68	90.1	1.83	1.18	1.15
1900.1	1930.1	2.23	2.10	2.02	1930.1	2.02	2.61	3.40	170.1	1.90	1.30	1.26
2100.1	2130.1	2.28	2.13	2.05	2130.1	1.57	2.13	2.77	250.1	1.98	1.41	1.37
2300.1	2330.1	2.20	2.00	1.89	2330.1	1.30	1.72	2.25	330.1	2.13	1.54	1.51
2500.1	2530.1	1.92	1.73	1.65	2530.1	1.46	1.69	2.12	410.1	2.34	1.72	1.69
2700.1	2730.1	1.86	1.73	1.66	2730.1	1.36	1.67	2.18	490.1	2.54	1.90	1.88
2900.1	2930.1	2.87	2.69	2.54	2930.1	1.37	1.87	2.48	570.1	2.74	2.04	2.02
3100.1	3130.1	3.73	3.51	3.35	3130.1	1.57	2.20	2.93	650.1	2.92	2.18	2.13
3300.1	3330.1	3.90	3.67	3.49	3330.1	1.96	2.64	3.42	730.1	3.09	2.30	2.21
3500.1	3530.1	4.12	3.89	3.71	3530.1	2.53	3.13	3.86	810.1	3.28	2.39	2.27
3680.1	3710.1	4.11	3.73	3.42	3710.1	3.14	3.52	4.09	890.1	3.54	2.51	2.33
3880.1	3910.1	3.91	3.45	3.07	3910.1	4.13	4.10	4.37	970.1	3.80	2.59	2.32
4060.1	4090.1	3.77	3.34	3.09	4090.1	4.56	3.95	4.07	1050.1	4.13	2.66	2.31
4260.1	4290.1	2.84	2.30	2.10	4290.1	5.65	3.91	3.62	1130.1	4.41	2.73	2.27
4440.1	4470.1	2.61	1.94	1.68	4470.1	7.76	4.38	3.37	1210.1	4.61	2.79	2.25
4640.1	4670.1	2.26	1.82	1.69	4670.1	7.11	3.73	2.55	1290.1	4.68	2.83	2.22
4820.1	4850.1	2.39	2.00	1.79	4850.1	5.12	2.72	1.76	1370.1	4.69	2.90	2.26
5020.1	5050.1	1.59	1.35	1.21	5050.1	2.93	1.83	1.46	1450.1	4.78	2.99	2.33
5200.1	5230.1	1.27	1.12	1.03	5230.1	1.70	1.56	1.86	1530.1	4.82	3.08	2.42
5400.1	5430.1	1.49	1.38	1.29	5430.1	1.39	1.94	2.57	1610.1	4.63	3.07	2.43
5580.1	5610.1	1.59	1.50	1.45	5610.1	2.17	2.63	3.26	1690.1	4.55	3.09	2.49
5780.1	5810.1	1.91	1.86	1.88	5810.1	4.00	4.03	4.46	1770.1	4.69	3.24	2.66
5960.1	5990.1	2.14	2.13	2.19	5990.1	7.02	6.73	6.39	1850.1	4.78	3.35	2.82
6160.1	6190.1	2.93	2.59	2.42	6190.1	7.87	8.86	9.23	1930.1	4.69	3.37	2.95
6340.1	6370.1	2.84	2.46	2.29	6370.1	6.49	7.14	7.90	2010.1	4.55	3.38	3.06
6540.1	6570.1	2.92	2.47	2.27	6570.1	3.18	3.30	3.57	2090.1	4.52	3.50	3.29
6720.1	6750.1	2.89	2.73	2.63	6750.1	2.13	2.03	2.08	2170.1	4.57	3.72	3.62
6920.1	6950.1	2.93	2.66	2.47	6950.1	5.41	3.66	2.57	2250.1	4.54	3.90	3.94
7100.1	7130.1	3.17	2.62	2.34	7130.1	8.43	5.39	3.45	2310.1	4.40	3.97	4.09
7300.1	7330.1	3.86	2.94	2.67	7330.1	10.25	6.56	4.38	2390.1	4.48	4.32	4.53
7480.1	7510.1	3.78	3.01	2.74	7510.1	10.37	6.71	5.12	2450.1	4.47	4.47	4.75
7680.1	7710.1	2.96	2.65	2.48	7710.1	8.27	6.07	5.58	2530.1	4.41	4.62	4.96
7860.1	7890.1	2.35	2.22	2.12	7890.1	5.99	5.33	5.44	2590.1	4.56	4.95	5.34
8060.1	8090.1	1.98	1.91	1.85	8090.1	4.20	4.42	4.82	2670.1	4.50	5.02	5.44
8240.1	8270.1	1.89	1.81	1.72	8270.1	3.11	3.50	3.90	2730.1	4.39	5.02	5.47
8440.1	8470.1	1.58	1.48	1.39	8470.1	1.60	1.77	1.90	2810.1	4.53	5.33	5.85
8620.1	8650.1	1.37	1.26	1.18	8650.1	2.40	2.29	2.21	2870.1	4.70	5.54	6.03
8820.1	8850.1	1.50	1.37	1.37	8850.1	4.01	3.87	3.79	2950.1	4.95	5.85	6.35
9000.1	9030.1	2.33	2.16	2.07	9030.1	4.68	4.53	4.40	3010.1	5.52	6.56	7.08

## Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+3	38	32	53	34	61	---	---	---	---
1	-	10	+0	27	20	45	35	56	55	---	---	---
2	64	37	38	39	35	44	57	50	51	72	---	---
3	>90	48	37	49	41	43	48	56	58	59	64	---
4	>90	64	70	62	54	60	52	60	77	60	71	74
5	>90	80	75	>83	59	73	51	66	55	>83	62	67
6	>90	>83	73	80	>83	>83	73	>83	72	81	>83	70
7	---	---	>83	>83	>83	>83	70	>83	68	70	73	>83
8	---	---	---	>83	>83	>83	>83	>83	79	>83	77	77
9	---	---	---	---	>83	>83	>83	>83	>83	>83	76	81
10	---	---	---	---	---	>83	>83	>83	>83	>83	>83	>83
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

Test conditions: RF IN: 3850 MHz; 0.00 dBm.  
 LO IN: 3880 MHz; +10.00 dBm  
 IF OUT: 30 MHz; -7.23 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+13	30	20	33	19	55	---	---	---	---
1	-	11	+0	24	21	44	34	46	46	---	---	---
2	84	48	46	49	42	51	64	53	55	69	---	---
3	>90	68	58	68	58	61	60	73	64	68	72	---
4	>90	>73	>73	>73	>73	>73	>73	>73	>73	>73	>73	>73
5	>90	>73	>73	>73	>73	>73	>73	>73	>73	>73	>73	>73
6	>90	>73	>73	>73	>73	>73	>73	>73	>73	>73	>73	>73
7	---	---	>73	>73	>73	>73	>73	>73	>73	>73	>73	>73
8	---	---	---	>73	>73	>73	>73	>73	>73	>73	>73	>73
9	---	---	---	---	>73	>73	>73	>73	>73	>73	>73	>73
10	---	---	---	---	---	>73	>73	>73	>73	>73	>73	>73
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

### LO HARMONICS ORDER

Test conditions: RF IN: 3850 MHz; -10.00 dBm.  
 LO IN: 3880 MHz; +10.00 dBm  
 IF OUT: 30 MHz; -17.17 dBm

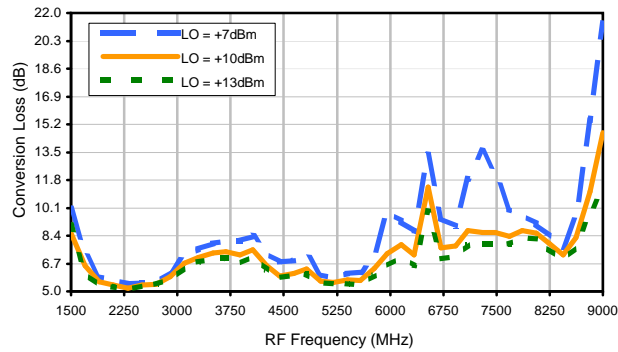
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.  
 2. + entry denotes harmonics are in (dBc) above IF OUTPUT.  
 3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

# Frequency Mixer

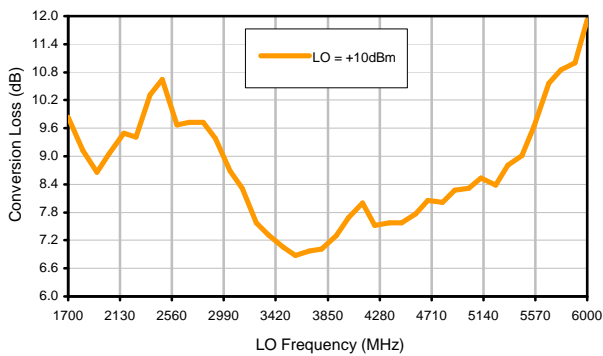
# MCA1T-60LH+

## Typical Performance Curves

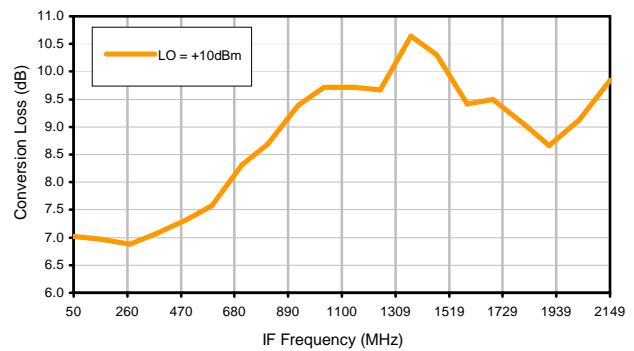
Conversion Loss @ IF=30MHz



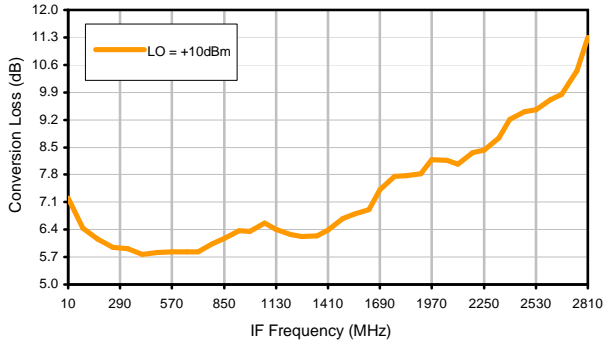
Conversion Loss vs. LO @ RF=3850MHz



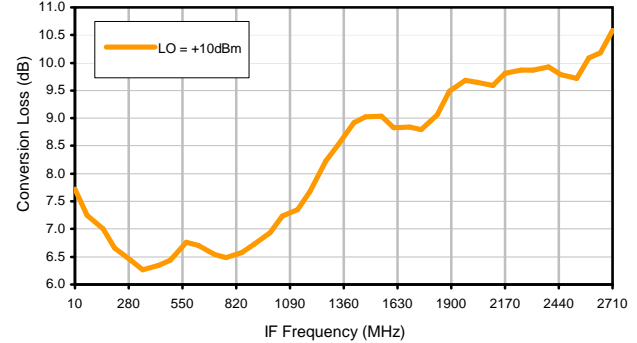
Conversion Loss vs. IF @ RF=3850MHz



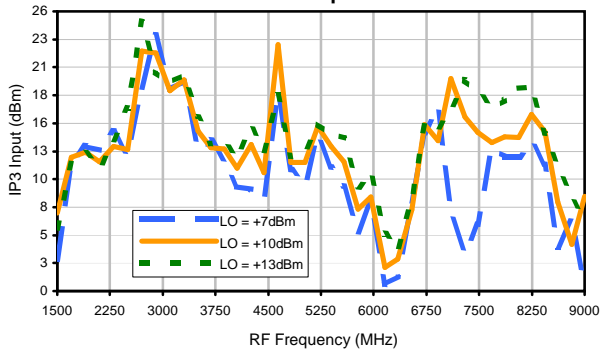
Conversion Loss vs. IF @ RF=1690MHz



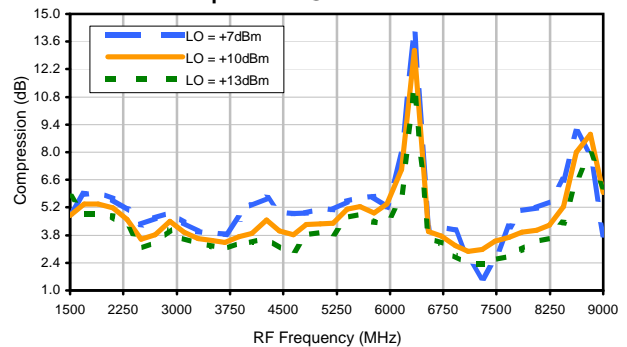
Conversion Loss vs. IF @ RF=6010.1MHz



IP3 Input

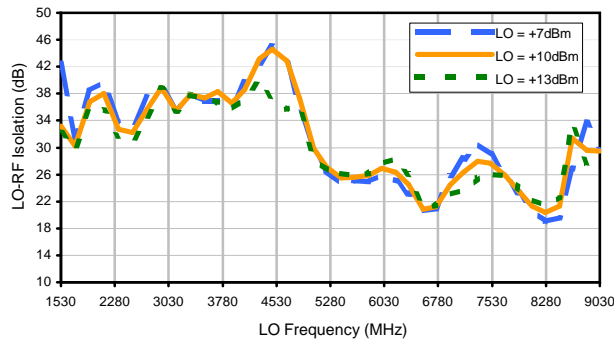


Compression @ RF IN=+10dBm

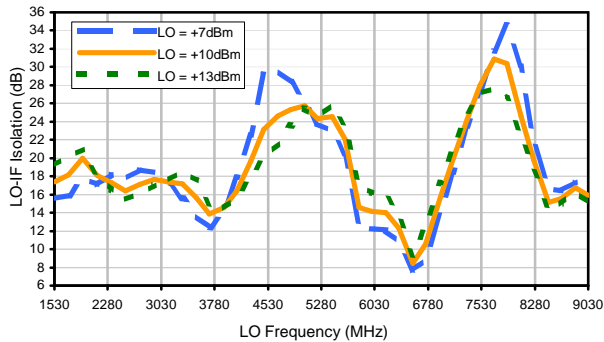


## Typical Performance Curves

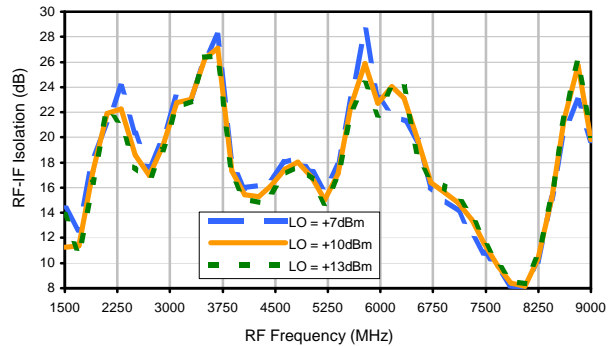
LO-RF Isolation



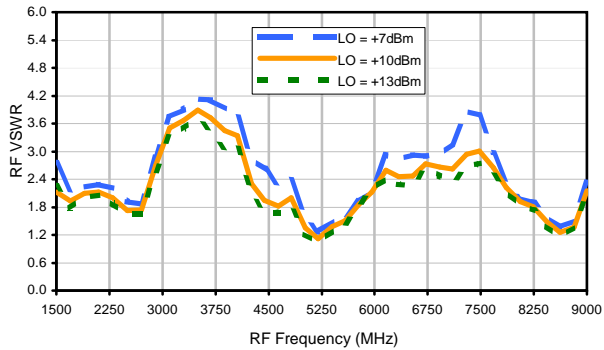
LO-IF Isolation



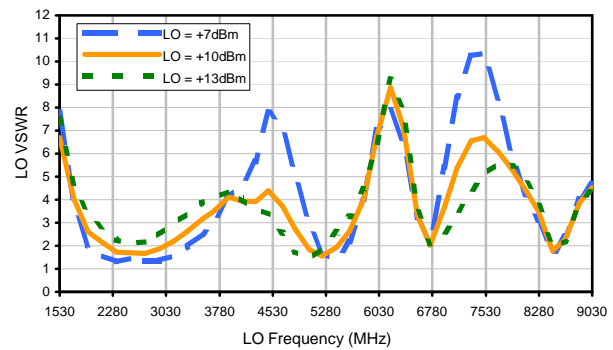
RF-IF Isolation



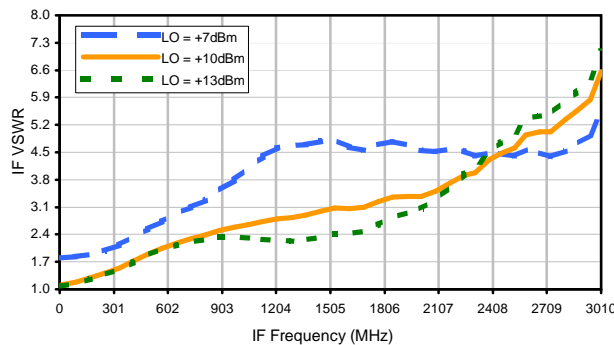
RF VSWR



LO VSWR



IF VSWR



## Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	+3	38	32	53	34	61	---	---	---	---
1	-	10	+0	27	20	45	35	56	55	---	---	---
2	64	37	38	39	35	44	57	50	51	72	---	---
3	>90	48	37	49	41	43	48	56	58	59	64	---
4	>90	64	70	62	54	60	52	60	77	60	71	74
5	>90	80	75	>83	59	73	51	66	55	>83	62	67
6	>90	>83	73	80	>83	>83	73	>83	72	81	>83	70
7	---	---	>83	>83	>83	>83	70	>83	68	70	73	>83
8	---	---	---	>83	>83	>83	>83	>83	79	>83	77	77
9	---	---	---	---	>83	>83	>83	>83	>83	>83	76	81
10	---	---	---	---	---	>83	>83	>83	>83	>83	>83	>83
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

Test conditions: RF IN: 3850 MHz; 0.00 dBm.  
 LO IN: 3880 MHz; +10.00 dBm  
 IF OUT: 30 MHz; -7.23 dBm

RF HARMONICS ORDER

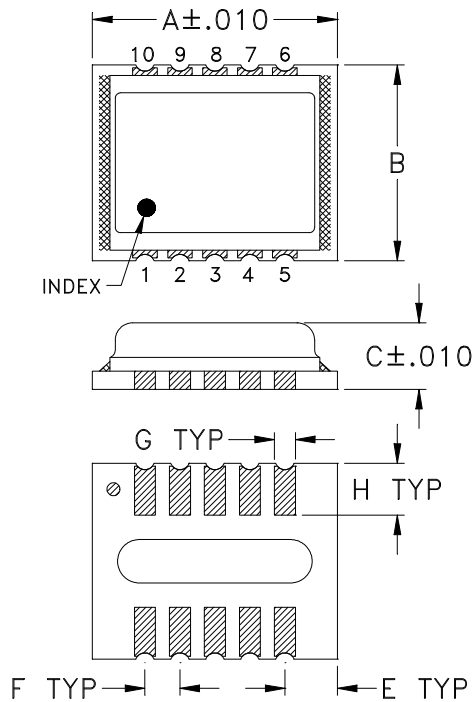
	(-dBm)	(-dBc)										
0	-	-	+13	30	20	33	19	55	---	---	---	---
1	-	11	+0	24	21	44	34	46	46	---	---	---
2	84	48	46	49	42	51	64	53	55	69	---	---
3	>90	68	58	68	58	61	60	73	64	68	72	---
4	>90	>73	>73	>73	>73	>73	>73	>73	>73	>73	>73	>73
5	>90	>73	>73	>73	>73	>73	>73	>73	>73	>73	>73	>73
6	>90	>73	>73	>73	>73	>73	>73	>73	>73	>73	>73	>73
7	---	---	>73	>73	>73	>73	>73	>73	>73	>73	>73	>73
8	---	---	---	>73	>73	>73	>73	>73	>73	>73	>73	>73
9	---	---	---	---	>73	>73	>73	>73	>73	>73	>73	>73
10	---	---	---	---	---	>73	>73	>73	>73	>73	>73	>73
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

### LO HARMONICS ORDER

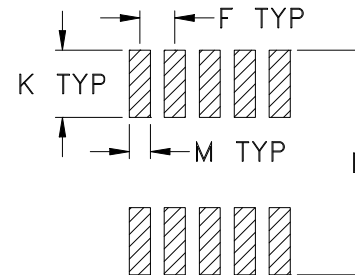
Test conditions: RF IN: 3850 MHz; -10.00 dBm.  
 LO IN: 3880 MHz; +10.00 dBm  
 IF OUT: 30 MHz; -17.17 dBm

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

### Outline Dimensions



### PCB Land Pattern



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

CASE#	A	B	C	D	E	F	G	H	J	K	L	M	WT. GRAMS
DZ885-2	.350 (8.89)	.280 (7.11)	.095 (2.41)	-- --	.075 (1.91)	.050 (1.27)	.030 (0.76)	.074 (1.88)	-- --	.096 (2.44)	.321 (8.15)	.030 (0.76)	0.21

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

#### Notes:

- Case material: Plastic encapsulation on Ceramic base, mounted on PCB carrier board.
- Termination finish:  
For RoHS Case Styles: 3-5  $\mu$  inch (.08-.13 microns) Gold over 120-240  $\mu$  inch (3.05-6.10 microns) Nickel plate.  
All models, (+) suffix.

**Mini-Circuits**

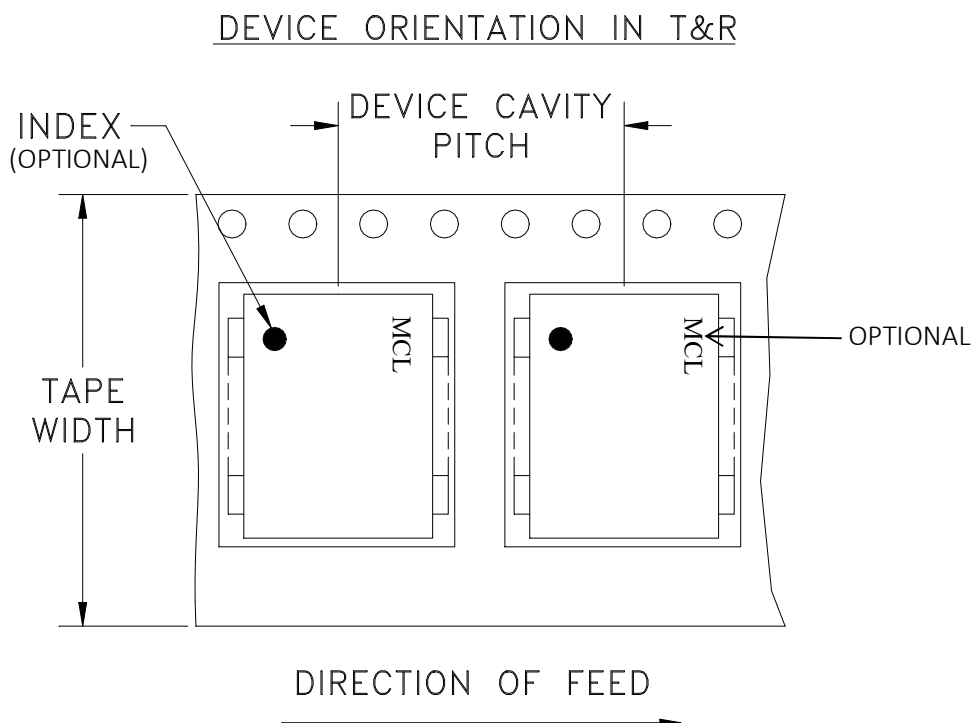
INTERNET <http://www.minicircuits.com>

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# Tape & Reel Packaging TR-F34



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
16	12	7	Small quantity standard (see note)	20
				50
			Standard	100
				200
		13	Standard	500
				1000

Note: Availability of small reel quantity varies by model.  
Refer to pricing and availability on individual model dashboard.

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](http://www.minicircuits.com/pages/pdfs/tape.pdf)



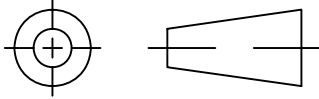
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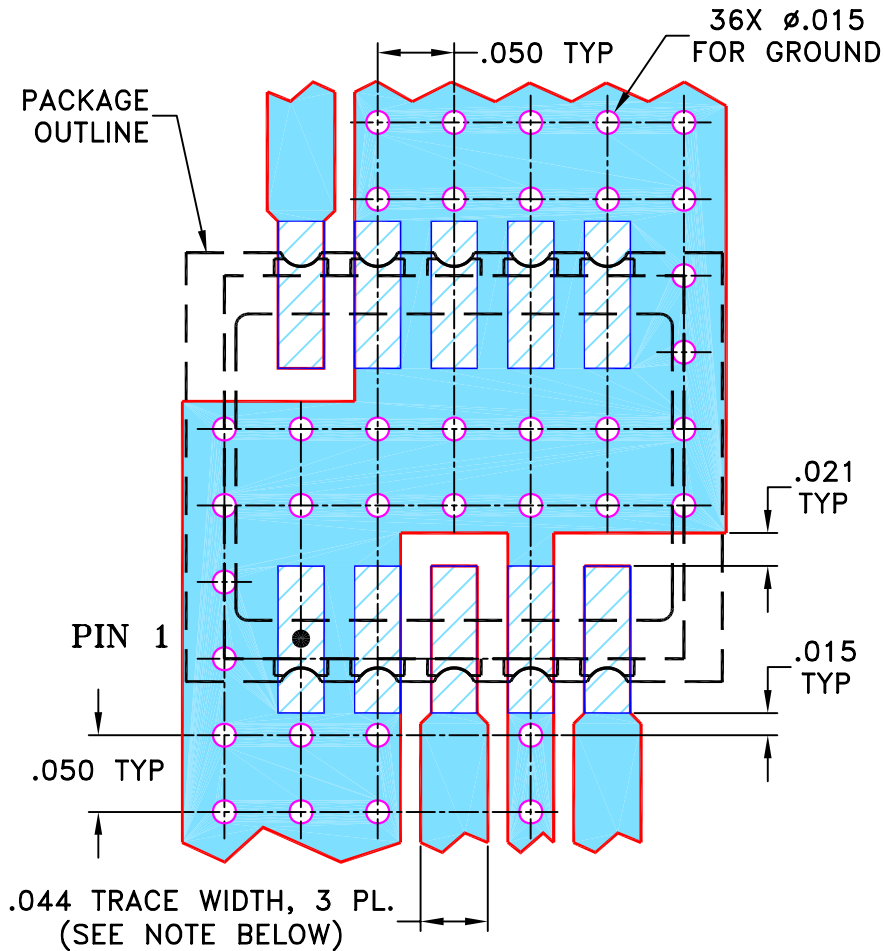
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M119455	NEW RELEASE	09/08/08	AV	DJ

SUGGESTED MOUNTING CONFIGURATION FOR  
 DZ885-2/DZ1383-2 CASE STYLES  
 "10MX01" PIN CODE



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .020" ± .0015"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.  
 2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.



DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)



DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN AV	09/05/08
TOLERANCES ON:	CHECKED MMG	09/08/08
2 PL DECIMALS ±	APPROVED DJ	09/08/08
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		



Mini-Circuits®

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 Brooklyn NY 11235

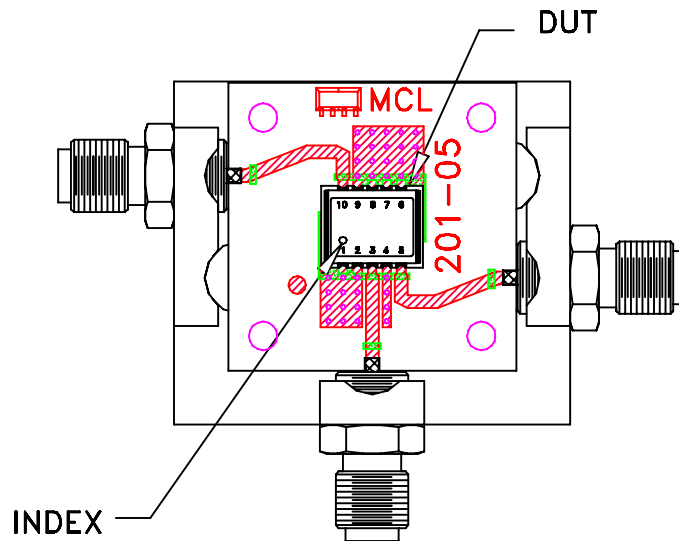
PL, 10MX01, DZ885-2/DZ1383-2, TB-493

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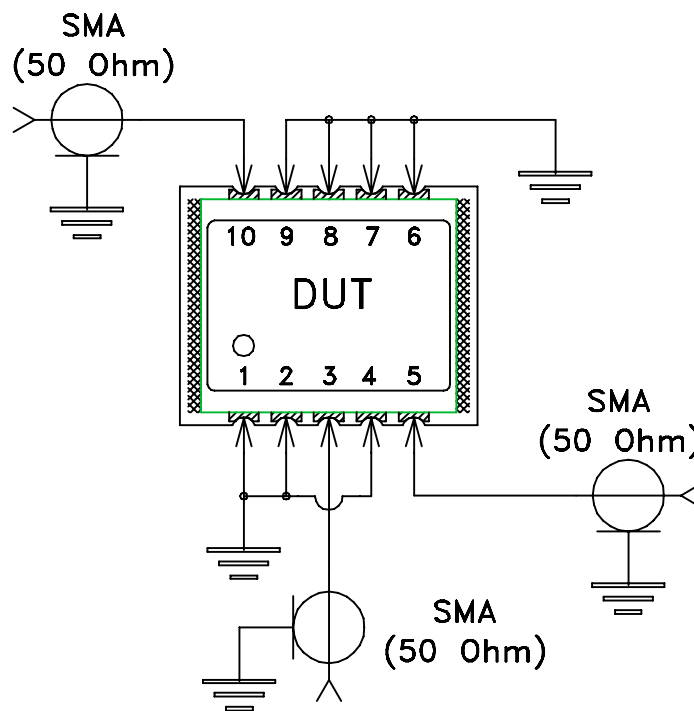
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-288	OR
FILE:	98PL288	SCALE: 8:1	SHEET: 1 OF 1

# Evaluation Board and Circuit

For Pin Connections refer to Data Sheet of the DUT




TB-493+



Schematic Diagram

## Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: R04350 or equivalent,  
Dielectric Constant=3.5, Thickness=.020 inch.

 Mini-Circuits®

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85° C Case Temperature	Individual Model Data Sheet
Storage Temperature	-40° to 85° C Ambient Environment	Individual Model Data Sheet
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JESD22-A102-C, Condition C
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: 250°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, 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