

# Surface Mount Frequency Mixer

Level 7 (LO Power +7 dBm) 0.5 to 500 MHz

RMS-1+



Generic photo used for illustration purposes only

CASE STYLE: TT240

## Maximum Ratings

|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| Operating Temperature                                           | -40°C to 85°C  |
| Storage Temperature                                             | -55°C to 100°C |
| RF Power                                                        | 50mW           |
| IF Current                                                      | 40mA           |
| Permanent damage may occur if any of these limits are exceeded. |                |

## Pin Connections

|        |       |
|--------|-------|
| LO     | 1     |
| RF     | 4     |
| IF     | 5     |
| GROUND | 2,3,6 |

## Features

- excellent L-R isolation, 33 dB typ.
- conversion loss, 5.94 dB typ.
- small size, 0.25"x0.31"x0.2"

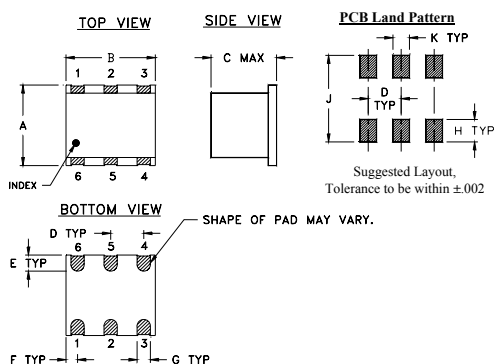
## Applications

- HF & VHF communications
- broadcast receivers

+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

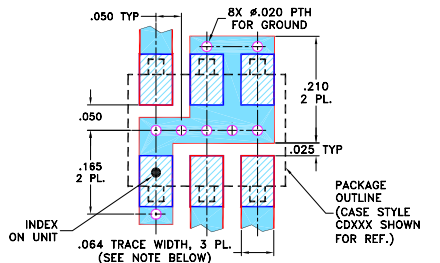
## Outline Drawing



## Outline Dimensions (inch)

|      |      |      |      |      |       |
|------|------|------|------|------|-------|
| A    | B    | C    | D    | E    | F     |
| .250 | .31  | .20  | .100 | .050 | .055  |
| 6.35 | 7.87 | 5.08 | 2.54 | 1.27 | 1.40  |
| G    | H    | J    | K    |      | wt    |
| .040 | .070 | .270 | .050 |      | grams |
| 1.02 | 1.78 | 6.86 | 1.27 |      | 0.50  |

Demo Board MCL P/N: TB-03  
Suggested PCB Layout (PL-052)



## Notes

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
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## Electrical Specifications

| FREQUENCY<br>(MHz) |        | CONVERSION LOSS<br>(dB) |          |      |                        | LO-RF ISOLATION<br>(dB) |      |      |      |      |      | LO-IF ISOLATION<br>(dB) |      |      |      |      |      | IP3<br>at center<br>band<br>(dBm) |      |      |
|--------------------|--------|-------------------------|----------|------|------------------------|-------------------------|------|------|------|------|------|-------------------------|------|------|------|------|------|-----------------------------------|------|------|
| LO/RF              | IF     | $\bar{X}$               | $\sigma$ | Max. | Total<br>Range<br>Max. | L                       |      | M    |      | U    |      | L                       |      | M    |      | U    |      |                                   |      |      |
| $f_L$ - $f_U$      |        |                         |          |      |                        | Typ.                    | Min. | Typ. | Min. | Typ. | Min. | Typ.                    | Min. | Typ. | Min. | Typ. | Min. |                                   | Typ. | Min. |
| 0.5-500            | DC-500 |                         |          |      |                        | 5.94                    | .05  | 7.0  | 8.5  | 56   | 50   | 33                      | 25   | 27   | 20   | 55   | 45   |                                   | 30   | 23   |

1 dB COMP: +1 dBm typ.  
For phase detection, DC output positive with in-phase RF & LO.

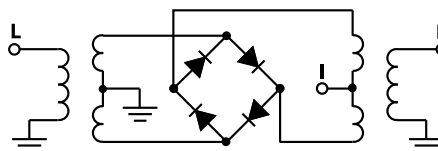
L = low range [ $f_L$  to  $10 f_L$ ]  
m = mid band [ $2f_L$  to  $f_U/2$ ]

M = mid range [ $10 f_L$  to  $f_U/2$ ]  
U = upper range [ $f_U/2$  to  $f_U$ ]

## Typical Performance Data

| Frequency<br>(MHz) |        | Conversion<br>Loss<br>(dB) | Isolation<br>L-R<br>(dB) | Isolation<br>L-I<br>(dB) | VSWR<br>RF Port<br>(:1) | VSWR<br>LO Port<br>(:1) |
|--------------------|--------|----------------------------|--------------------------|--------------------------|-------------------------|-------------------------|
| RF                 | LO     | LO<br>+7dBm                | LO<br>+7dBm              | LO<br>+7dBm              | LO<br>+7dBm             | LO<br>+7dBm             |
| 0.50               | 30.50  | 7.45                       | 89.00                    | 64.40                    | 1.11                    | 2.27                    |
| 1.00               | 31.00  | 6.68                       | 82.65                    | 64.35                    | 1.05                    | 2.27                    |
| 2.00               | 32.00  | 6.15                       | 76.59                    | 63.49                    | 1.02                    | 2.43                    |
| 5.00               | 35.00  | 5.84                       | 68.78                    | 59.68                    | 1.01                    | 2.52                    |
| 10.00              | 40.00  | 5.78                       | 63.45                    | 55.38                    | 1.01                    | 2.50                    |
| 20.00              | 50.00  | 5.84                       | 56.92                    | 48.99                    | 1.02                    | 2.50                    |
| 50.00              | 80.00  | 5.84                       | 48.06                    | 40.83                    | 1.03                    | 2.48                    |
| 67.10              | 97.10  | 5.78                       | 47.33                    | 39.62                    | 1.04                    | 2.43                    |
| 100.00             | 70.00  | 5.74                       | 45.42                    | 36.85                    | 1.04                    | 2.40                    |
| 117.05             | 87.05  | 5.71                       | 45.23                    | 36.32                    | 1.07                    | 2.38                    |
| 150.35             | 120.35 | 5.73                       | 44.09                    | 34.84                    | 1.09                    | 2.29                    |
| 200.00             | 170.00 | 5.78                       | 41.97                    | 32.90                    | 1.11                    | 2.29                    |
| 216.95             | 186.95 | 5.84                       | 40.74                    | 32.23                    | 1.13                    | 2.25                    |
| 250.00             | 220.00 | 5.91                       | 38.62                    | 30.58                    | 1.17                    | 2.28                    |
| 283.55             | 253.55 | 5.81                       | 36.99                    | 29.19                    | 1.19                    | 2.30                    |
| 333.50             | 303.50 | 5.81                       | 34.17                    | 26.96                    | 1.22                    | 2.23                    |
| 383.45             | 353.45 | 6.03                       | 31.17                    | 25.64                    | 1.28                    | 2.29                    |
| 433.40             | 403.40 | 6.34                       | 29.18                    | 23.85                    | 1.31                    | 2.24                    |
| 466.70             | 436.70 | 6.56                       | 27.71                    | 22.78                    | 1.37                    | 2.34                    |
| 500.00             | 470.00 | 6.82                       | 27.09                    | 22.32                    | 1.43                    | 2.31                    |

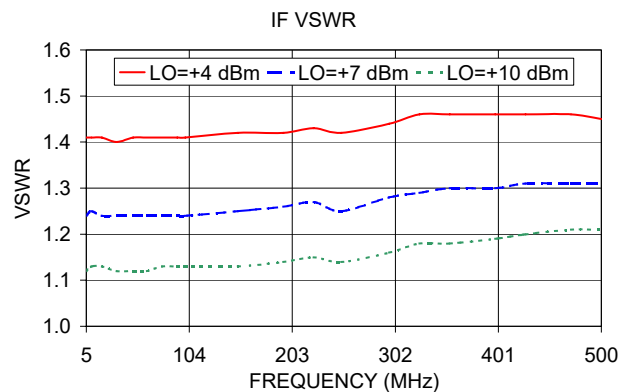
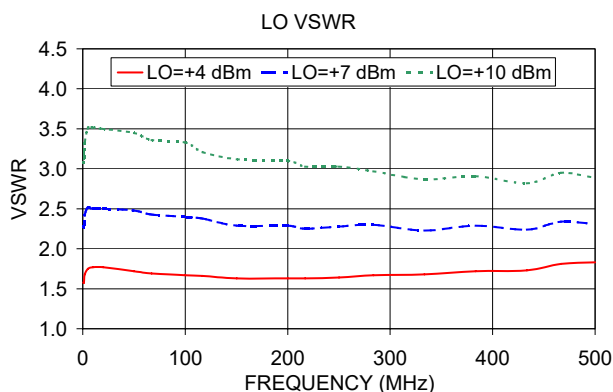
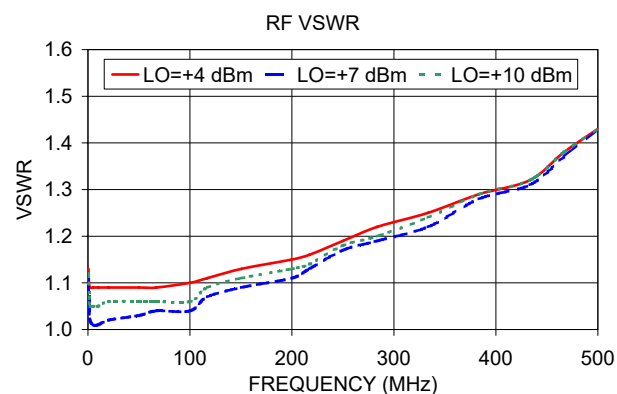
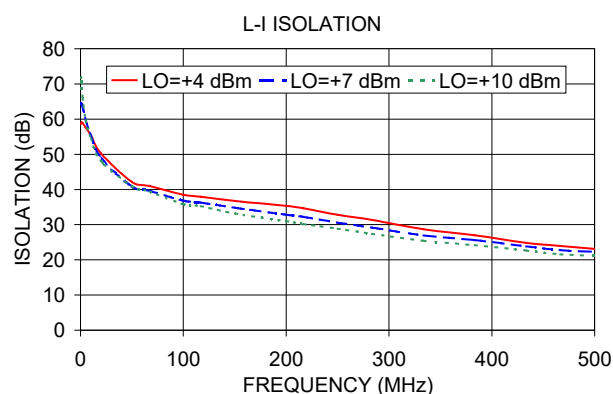
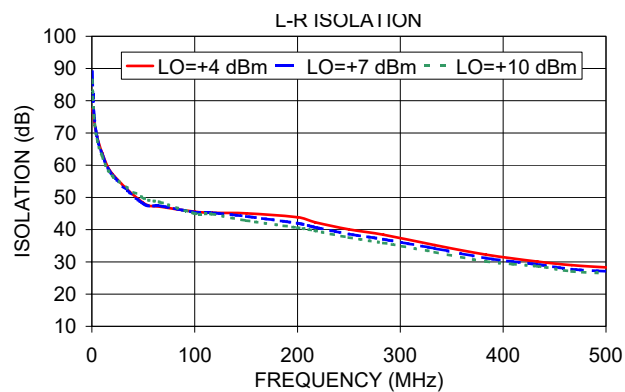
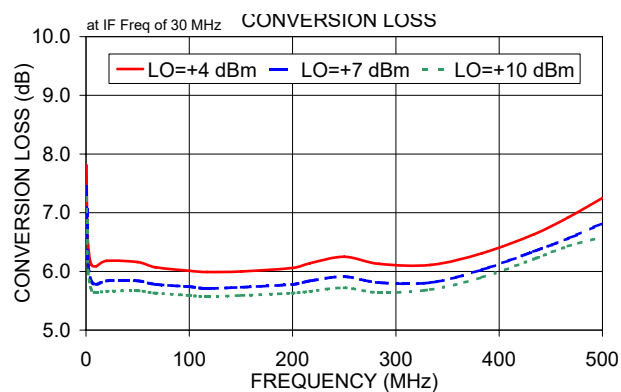
## Electrical Schematic



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## Notes

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# Frequency Mixer

**RMS-1+**

## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>IF FIXED<br>@IF(OUT)=30MHz<br>(dB) |       |       | RF<br>(IN)<br>(MHz) | LO<br>(MHz) | IP3 INPUT<br>(dBm) |       |       | RF<br>(IN)<br>(MHz) | LO<br>(MHz) | COMPRESSION<br>@RF IN=+1dBm<br>(dB) |      |      |
|---------------------|-------------|-------------------------------------------------------|-------|-------|---------------------|-------------|--------------------|-------|-------|---------------------|-------------|-------------------------------------|------|------|
|                     |             | @LO (dBm)                                             |       |       |                     |             | @LO (dBm)          |       |       |                     |             | @LO (dBm)                           |      |      |
|                     |             |                                                       |       |       |                     |             |                    |       |       |                     |             |                                     |      |      |
| +4                  | +7          | +10                                                   | +4    | +7    | +10                 | +4          | +7                 | +10   | +4    | +7                  | +10         |                                     |      |      |
| 0.5                 | 30.5        | 7.81                                                  | 7.45  | 7.25  | 10.1                | 40.1        | 20.53              | 21.83 | 21.00 | 10.1                | 40.1        | 1.36                                | 0.93 | 0.71 |
| 1.0                 | 31.0        | 7.02                                                  | 6.68  | 6.52  | 50.4                | 80.4        | 20.48              | 21.74 | 27.51 | 50.4                | 80.4        | 1.32                                | 1.01 | 0.72 |
| 2.0                 | 32.0        | 6.45                                                  | 6.15  | 6.00  | 90.8                | 120.8       | 25.27              | 21.86 | 19.85 | 90.8                | 120.8       | 1.25                                | 0.97 | 0.73 |
| 5.0                 | 35.0        | 6.12                                                  | 5.84  | 5.69  | 110.9               | 140.9       | 19.89              | 25.12 | 23.32 | 110.9               | 140.9       | 1.36                                | 0.97 | 0.72 |
| 10.0                | 40.0        | 6.09                                                  | 5.78  | 5.64  | 151.3               | 181.3       | 23.71              | 21.85 | 32.79 | 151.3               | 181.3       | 1.23                                | 0.87 | 0.62 |
| 50.4                | 80.4        | 6.23                                                  | 5.88  | 5.70  | 171.5               | 201.5       | 19.46              | 23.17 | 21.57 | 171.5               | 201.5       | 1.18                                | 0.85 | 0.74 |
| 90.8                | 120.8       | 6.25                                                  | 5.92  | 5.79  | 211.8               | 241.8       | 18.15              | 24.18 | 19.84 | 211.8               | 241.8       | 1.10                                | 0.88 | 0.72 |
| 110.9               | 140.9       | 6.29                                                  | 5.94  | 5.83  | 232.0               | 262.0       | 22.36              | 21.16 | 27.56 | 232.0               | 262.0       | 1.21                                | 0.96 | 0.79 |
| 151.3               | 181.3       | 6.32                                                  | 6.00  | 5.86  | 272.3               | 302.3       | 18.30              | 22.26 | 25.84 | 272.3               | 302.3       | 1.26                                | 0.96 | 0.73 |
| 171.5               | 201.5       | 6.29                                                  | 6.02  | 5.89  | 292.5               | 322.5       | 16.64              | 20.23 | 21.98 | 292.5               | 322.5       | 1.18                                | 0.92 | 0.73 |
| 211.8               | 241.8       | 6.29                                                  | 6.03  | 5.91  | 332.8               | 362.8       | 20.46              | 19.16 | 20.27 | 332.8               | 362.8       | 1.26                                | 0.88 | 0.72 |
| 232.0               | 262.0       | 6.33                                                  | 6.03  | 5.91  | 353.0               | 383.0       | 18.50              | 24.41 | 19.41 | 353.0               | 383.0       | 1.27                                | 0.91 | 0.71 |
| 272.3               | 302.3       | 6.34                                                  | 6.09  | 5.95  | 393.3               | 423.3       | 20.77              | 18.32 | 19.43 | 393.3               | 423.3       | 1.28                                | 0.98 | 0.74 |
| 292.5               | 322.5       | 6.37                                                  | 6.09  | 5.95  | 413.5               | 443.5       | 18.51              | 20.44 | 30.14 | 413.5               | 443.5       | 1.33                                | 0.97 | 0.79 |
| 332.8               | 362.8       | 6.41                                                  | 6.12  | 5.96  | 453.8               | 483.8       | 18.06              | 18.50 | 24.26 | 453.8               | 483.8       | 1.42                                | 1.12 | 0.86 |
| 353.0               | 383.0       | 6.41                                                  | 6.11  | 5.98  | 474.0               | 504.0       | 14.46              | 16.41 | 19.76 | 474.0               | 504.0       | 1.39                                | 1.15 | 0.95 |
| 413.5               | 443.5       | 6.45                                                  | 6.15  | 5.99  | 514.3               | 544.3       | 12.98              | 13.47 | 16.05 | 514.3               | 544.3       | 1.38                                | 1.04 | 0.96 |
| 453.8               | 483.8       | 6.58                                                  | 6.23  | 6.06  | 534.5               | 564.5       | 13.02              | 13.05 | 15.61 | 534.5               | 564.5       | 1.45                                | 1.09 | 0.87 |
| 474.0               | 504.0       | 6.61                                                  | 6.28  | 6.10  | 574.8               | 604.8       | 12.82              | 14.05 | 16.56 | 574.8               | 604.8       | 1.58                                | 1.20 | 1.02 |
| 514.3               | 544.3       | 6.66                                                  | 6.33  | 6.13  | 595.0               | 625.0       | 13.45              | 15.30 | 19.28 | 595.0               | 625.0       | 1.58                                | 1.24 | 1.00 |
| 534.5               | 564.5       | 6.66                                                  | 6.37  | 6.17  | 635.4               | 665.4       | 14.17              | 16.69 | 21.70 | 635.4               | 665.4       | 1.87                                | 1.49 | 1.26 |
| 574.8               | 604.8       | 6.75                                                  | 6.36  | 6.18  | 655.5               | 685.5       | 13.73              | 20.58 | 20.48 | 655.5               | 685.5       | 1.63                                | 1.43 | 1.18 |
| 595.0               | 625.0       | 6.78                                                  | 6.39  | 6.17  | 695.9               | 725.9       | 13.12              | 20.05 | 18.71 | 695.9               | 725.9       | 1.64                                | 1.44 | 1.13 |
| 635.4               | 665.4       | 6.94                                                  | 6.44  | 6.19  | 716.0               | 746.0       | 12.37              | 23.51 | 21.77 | 716.0               | 746.0       | 1.62                                | 1.42 | 1.23 |
| 695.9               | 725.9       | 7.21                                                  | 6.63  | 6.29  | 756.4               | 786.4       | 12.14              | 18.16 | 18.07 | 756.4               | 786.4       | 1.60                                | 1.40 | 1.18 |
| 716.0               | 746.0       | 7.30                                                  | 6.72  | 6.37  | 776.5               | 806.5       | 11.78              | 16.34 | 16.96 | 776.5               | 806.5       | 1.59                                | 1.40 | 1.14 |
| 756.4               | 786.4       | 7.54                                                  | 6.98  | 6.57  | 816.9               | 846.9       | 13.69              | 16.42 | 15.22 | 816.9               | 846.9       | 1.58                                | 1.31 | 1.14 |
| 776.5               | 806.5       | 7.68                                                  | 7.11  | 6.72  | 837.0               | 867.0       | 13.57              | 19.89 | 15.67 | 837.0               | 867.0       | 1.44                                | 1.20 | 0.95 |
| 816.9               | 846.9       | 7.87                                                  | 7.34  | 6.94  | 877.4               | 907.4       | 18.50              | 19.50 | 17.75 | 877.4               | 907.4       | 1.28                                | 1.12 | 0.79 |
| 877.4               | 907.4       | 8.07                                                  | 7.66  | 7.35  | 897.6               | 927.6       | 17.27              | 18.62 | 18.04 | 897.6               | 927.6       | 1.34                                | 1.02 | 0.79 |
| 897.6               | 927.6       | 8.08                                                  | 7.71  | 7.49  | 937.9               | 967.9       | 14.51              | 16.20 | 17.30 | 937.9               | 967.9       | 1.29                                | 1.09 | 0.76 |
| 937.9               | 967.9       | 8.30                                                  | 7.96  | 7.73  | 958.1               | 988.1       | 13.42              | 13.90 | 15.19 | 958.1               | 988.1       | 1.19                                | 0.86 | 0.84 |
| 958.1               | 988.1       | 8.38                                                  | 8.06  | 7.85  | 998.4               | 1028.4      | 11.92              | 14.03 | 15.03 | 998.4               | 1028.4      | 1.16                                | 0.93 | 0.74 |
| 998.4               | 1028.4      | 8.52                                                  | 8.19  | 8.06  | 1018.6              | 1048.6      | 11.74              | 12.92 | 14.62 | 1018.6              | 1048.6      | 1.15                                | 0.85 | 0.75 |
| 1018.6              | 1048.6      | 8.60                                                  | 8.30  | 8.19  | 1058.9              | 1088.9      | 11.46              | 11.84 | 13.70 | 1058.9              | 1088.9      | 1.04                                | 0.76 | 0.61 |
| 1058.9              | 1088.9      | 8.81                                                  | 8.56  | 8.51  | 1079.1              | 1109.1      | 11.10              | 12.02 | 14.98 | 1079.1              | 1109.1      | 1.03                                | 0.69 | 0.56 |
| 1079.1              | 1109.1      | 8.94                                                  | 8.75  | 8.70  | 1119.4              | 1149.4      | 11.20              | 11.88 | 14.39 | 1119.4              | 1149.4      | 1.03                                | 0.79 | 0.70 |
| 1119.4              | 1149.4      | 9.29                                                  | 9.13  | 9.06  | 1139.6              | 1169.6      | 11.63              | 12.47 | 12.77 | 1139.6              | 1169.6      | 0.89                                | 0.73 | 0.62 |
| 1179.9              | 1209.9      | 10.07                                                 | 9.85  | 9.79  | 1179.9              | 1209.9      | 11.02              | 12.65 | 13.41 | 1179.9              | 1209.9      | 0.92                                | 0.58 | 0.52 |
| 1200.1              | 1230.1      | 10.29                                                 | 10.10 | 10.08 | 1200.1              | 1230.1      | 10.76              | 12.74 | 12.35 | 1200.1              | 1230.1      | 0.85                                | 0.46 | 0.56 |

REV. X2

RMS-1+

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# Frequency Mixer

**RMS-1+**

## Typical Performance Data

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=250.1MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=10.1MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=500.1MHz<br>(dB) |
|----------------------|-------------|-----------------------------------------------------------------|----------------------|-------------|----------------------------------------------------------------|----------------------|-------------|-----------------------------------------------------------------|
|                      |             | @LO (dBm)                                                       |                      |             | @LO (dBm)                                                      |                      |             | @LO (dBm)                                                       |
|                      |             | +7                                                              |                      |             | +7                                                             |                      |             | +7                                                              |
| 240.0                | 10.1        | 6.01                                                            | 10.0                 | 20.1        | 5.81                                                           | 490.0                | 10.1        | 6.29                                                            |
| 234.1                | 16.0        | 5.99                                                            | 22.3                 | 32.4        | 5.62                                                           | 477.7                | 22.4        | 6.27                                                            |
| 228.2                | 21.9        | 5.98                                                            | 34.6                 | 44.7        | 5.61                                                           | 465.4                | 34.7        | 6.25                                                            |
| 222.3                | 27.8        | 5.97                                                            | 46.9                 | 57.0        | 5.61                                                           | 453.1                | 47.0        | 6.24                                                            |
| 216.4                | 33.7        | 5.97                                                            | 59.2                 | 69.3        | 5.59                                                           | 440.8                | 59.3        | 6.25                                                            |
| 210.5                | 39.6        | 6.02                                                            | 71.5                 | 81.6        | 5.59                                                           | 428.5                | 71.6        | 6.21                                                            |
| 204.6                | 45.5        | 6.01                                                            | 83.8                 | 93.9        | 5.61                                                           | 416.2                | 83.9        | 6.17                                                            |
| 198.7                | 51.4        | 5.99                                                            | 96.2                 | 106.3       | 5.63                                                           | 403.8                | 96.3        | 6.15                                                            |
| 192.8                | 57.3        | 5.98                                                            | 108.5                | 118.6       | 5.64                                                           | 391.5                | 108.6       | 6.14                                                            |
| 186.9                | 63.2        | 5.96                                                            | 120.8                | 130.9       | 5.62                                                           | 379.2                | 120.9       | 6.15                                                            |
| 181.0                | 69.1        | 5.97                                                            | 133.1                | 143.2       | 5.61                                                           | 366.9                | 133.2       | 6.13                                                            |
| 175.1                | 75.0        | 5.98                                                            | 145.4                | 155.5       | 5.67                                                           | 354.6                | 145.5       | 6.12                                                            |
| 169.2                | 80.9        | 5.95                                                            | 157.7                | 167.8       | 5.67                                                           | 342.3                | 157.8       | 6.13                                                            |
| 163.3                | 86.8        | 5.94                                                            | 170.0                | 180.1       | 5.64                                                           | 330.0                | 170.1       | 6.12                                                            |
| 157.4                | 92.7        | 5.95                                                            | 182.3                | 192.4       | 5.67                                                           | 317.7                | 182.4       | 6.13                                                            |
| 151.5                | 98.6        | 5.94                                                            | 194.6                | 204.7       | 5.69                                                           | 305.4                | 194.7       | 6.13                                                            |
| 145.6                | 104.5       | 5.94                                                            | 206.9                | 217.0       | 5.68                                                           | 293.1                | 207.0       | 6.12                                                            |
| 139.7                | 110.4       | 5.93                                                            | 219.2                | 229.3       | 5.68                                                           | 280.8                | 219.3       | 6.12                                                            |
| 133.8                | 116.3       | 5.92                                                            | 231.5                | 241.6       | 5.73                                                           | 268.5                | 231.6       | 6.12                                                            |
| 127.9                | 122.2       | 5.94                                                            | 243.8                | 253.9       | 5.76                                                           | 256.2                | 243.9       | 6.14                                                            |
| 122.1                | 128.0       | 5.93                                                            | 256.2                | 266.3       | 5.74                                                           | 243.8                | 256.3       | 6.10                                                            |
| 116.2                | 133.9       | 5.93                                                            | 268.5                | 278.6       | 5.79                                                           | 231.5                | 268.6       | 6.05                                                            |
| 110.3                | 139.8       | 5.92                                                            | 280.8                | 290.9       | 5.81                                                           | 219.2                | 280.9       | 6.04                                                            |
| 104.4                | 145.7       | 5.94                                                            | 293.1                | 303.2       | 5.83                                                           | 206.9                | 293.2       | 6.13                                                            |
| 98.5                 | 151.6       | 5.93                                                            | 305.4                | 315.5       | 5.82                                                           | 194.6                | 305.5       | 6.13                                                            |
| 92.6                 | 157.5       | 5.94                                                            | 317.7                | 327.8       | 5.84                                                           | 182.3                | 317.8       | 6.13                                                            |
| 86.7                 | 163.4       | 5.95                                                            | 330.0                | 340.1       | 5.83                                                           | 170.0                | 330.1       | 6.13                                                            |
| 80.8                 | 169.3       | 5.92                                                            | 342.3                | 352.4       | 5.84                                                           | 157.7                | 342.4       | 6.10                                                            |
| 74.9                 | 175.2       | 5.93                                                            | 354.6                | 364.7       | 5.86                                                           | 145.4                | 354.7       | 6.16                                                            |
| 69.0                 | 181.1       | 5.92                                                            | 366.9                | 377.0       | 5.92                                                           | 133.1                | 367.0       | 6.15                                                            |
| 63.1                 | 187.0       | 5.76                                                            | 379.2                | 389.3       | 5.93                                                           | 120.8                | 379.3       | 6.16                                                            |
| 57.2                 | 192.9       | 5.83                                                            | 391.5                | 401.6       | 5.88                                                           | 108.5                | 391.6       | 6.14                                                            |
| 51.3                 | 198.8       | 5.89                                                            | 403.8                | 413.9       | 5.88                                                           | 96.2                 | 403.9       | 6.16                                                            |
| 45.4                 | 204.7       | 6.26                                                            | 416.2                | 426.3       | 5.97                                                           | 83.8                 | 416.3       | 6.13                                                            |
| 39.5                 | 210.6       | 5.97                                                            | 428.5                | 438.6       | 6.02                                                           | 71.5                 | 428.6       | 6.16                                                            |
| 33.6                 | 216.5       | 5.98                                                            | 440.8                | 450.9       | 5.99                                                           | 59.2                 | 440.9       | 6.16                                                            |
| 27.7                 | 222.4       | 5.94                                                            | 453.1                | 463.2       | 6.03                                                           | 46.9                 | 453.2       | 6.16                                                            |
| 21.8                 | 228.3       | 6.00                                                            | 465.4                | 475.5       | 6.04                                                           | 34.6                 | 465.5       | 6.22                                                            |
| 15.9                 | 234.2       | 5.94                                                            | 477.7                | 487.8       | 6.04                                                           | 22.3                 | 477.8       | 6.26                                                            |
| 10.0                 | 240.1       | 6.08                                                            | 490.0                | 500.1       | 6.07                                                           | 10.0                 | 490.1       | 6.40                                                            |

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## Typical Performance Data

| LO<br>(MHz) | LO-RF ISOLATION<br>(dB) |       |       | LO-IF ISOLATION<br>(dB) |       |       |
|-------------|-------------------------|-------|-------|-------------------------|-------|-------|
|             | @LO (dBm)               |       |       | @LO (dBm)               |       |       |
|             | +4                      | +7    | +10   | +4                      | +7    | +10   |
| 0.5         | 77.47                   | 89.00 | 86.40 | 58.57                   | 64.40 | 71.90 |
| 1.0         | 76.77                   | 82.65 | 81.16 | 59.07                   | 64.35 | 70.66 |
| 2.0         | 74.40                   | 76.59 | 75.41 | 58.90                   | 63.49 | 66.01 |
| 5.0         | 68.98                   | 68.78 | 67.98 | 57.58                   | 59.68 | 59.61 |
| 10.0        | 63.87                   | 63.45 | 62.82 | 55.47                   | 55.38 | 54.46 |
| 50.4        | 58.21                   | 58.82 | 59.02 | 56.01                   | 56.22 | 56.20 |
| 90.8        | 53.78                   | 53.92 | 54.38 | 51.72                   | 51.59 | 51.00 |
| 110.9       | 51.97                   | 52.41 | 52.64 | 50.63                   | 50.08 | 49.83 |
| 151.3       | 49.18                   | 49.78 | 50.10 | 48.22                   | 47.43 | 47.12 |
| 171.5       | 48.26                   | 48.78 | 49.03 | 47.18                   | 46.71 | 46.16 |
| 211.8       | 46.62                   | 47.07 | 47.36 | 45.63                   | 44.87 | 44.25 |
| 232.0       | 45.83                   | 46.38 | 46.65 | 44.79                   | 43.85 | 43.18 |
| 272.3       | 44.56                   | 45.04 | 45.33 | 43.25                   | 42.09 | 41.28 |
| 292.5       | 44.11                   | 44.62 | 44.92 | 42.68                   | 41.53 | 40.65 |
| 332.8       | 43.38                   | 43.98 | 44.33 | 40.85                   | 39.68 | 38.82 |
| 353.0       | 42.80                   | 43.36 | 43.67 | 39.63                   | 38.58 | 37.77 |
| 413.5       | 40.75                   | 41.45 | 41.90 | 36.41                   | 35.40 | 34.86 |
| 453.8       | 39.77                   | 40.45 | 40.92 | 34.78                   | 33.64 | 32.93 |
| 474.0       | 39.30                   | 39.99 | 40.49 | 34.34                   | 33.14 | 32.30 |
| 514.3       | 39.15                   | 39.71 | 40.07 | 33.17                   | 32.04 | 31.16 |
| 534.5       | 38.94                   | 39.29 | 39.41 | 32.56                   | 31.47 | 30.61 |
| 574.8       | 38.83                   | 38.99 | 38.86 | 31.12                   | 30.12 | 29.32 |
| 595.0       | 38.95                   | 39.09 | 38.95 | 30.24                   | 29.22 | 28.38 |
| 635.4       | 38.52                   | 38.40 | 37.93 | 28.45                   | 27.48 | 26.65 |
| 695.9       | 37.50                   | 37.41 | 36.88 | 26.28                   | 25.41 | 24.62 |
| 716.0       | 36.82                   | 36.69 | 36.12 | 25.53                   | 24.72 | 23.90 |
| 756.4       | 36.33                   | 36.41 | 36.01 | 24.28                   | 23.64 | 22.86 |
| 776.5       | 35.96                   | 36.18 | 35.97 | 23.65                   | 23.05 | 22.26 |
| 816.9       | 35.29                   | 35.57 | 35.58 | 22.35                   | 21.90 | 21.19 |
| 877.4       | 35.00                   | 35.39 | 35.61 | 20.83                   | 20.56 | 19.96 |
| 897.6       | 34.99                   | 35.44 | 35.72 | 20.14                   | 19.94 | 19.37 |
| 937.9       | 35.56                   | 36.26 | 36.53 | 19.20                   | 19.03 | 18.43 |
| 958.1       | 36.44                   | 37.31 | 37.30 | 18.65                   | 18.46 | 17.84 |
| 998.4       | 38.97                   | 39.93 | 38.40 | 17.66                   | 17.46 | 16.76 |
| 1018.6      | 41.32                   | 40.42 | 37.37 | 17.06                   | 16.83 | 16.13 |
| 1058.9      | 50.05                   | 40.48 | 35.76 | 16.27                   | 16.02 | 15.34 |
| 1079.1      | 62.01                   | 39.57 | 34.74 | 15.71                   | 15.52 | 14.88 |
| 1119.4      | 41.05                   | 34.95 | 31.62 | 14.86                   | 14.63 | 14.05 |
| 1179.9      | 32.65                   | 29.99 | 27.84 | 13.73                   | 13.57 | 13.05 |
| 1200.1      | 30.68                   | 28.41 | 26.56 | 13.36                   | 13.19 | 12.68 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | +4                      | +7    | +10   |
| 10.1                | 40.1        | 39.03                   | 39.94 | 33.82 |
| 50.4                | 80.4        | 38.01                   | 38.96 | 36.84 |
| 90.8                | 120.8       | 32.02                   | 32.30 | 32.90 |
| 110.9               | 140.9       | 31.08                   | 31.56 | 31.42 |
| 151.3               | 181.3       | 28.78                   | 29.16 | 29.55 |
| 171.5               | 201.5       | 28.02                   | 28.42 | 28.86 |
| 211.8               | 241.8       | 27.20                   | 27.61 | 27.75 |
| 232.0               | 262.0       | 26.75                   | 27.29 | 27.54 |
| 272.3               | 302.3       | 26.46                   | 26.94 | 27.56 |
| 292.5               | 322.5       | 26.41                   | 27.13 | 27.63 |
| 332.8               | 362.8       | 26.37                   | 26.99 | 27.58 |
| 353.0               | 383.0       | 26.55                   | 27.21 | 27.88 |
| 393.3               | 423.3       | 27.43                   | 28.25 | 29.01 |
| 413.5               | 443.5       | 27.69                   | 28.69 | 29.49 |
| 453.8               | 483.8       | 27.53                   | 28.46 | 29.02 |
| 474.0               | 504.0       | 26.56                   | 27.11 | 27.56 |
| 514.3               | 544.3       | 24.05                   | 24.16 | 24.18 |
| 534.5               | 564.5       | 22.81                   | 22.77 | 22.74 |
| 574.8               | 604.8       | 20.78                   | 20.58 | 20.36 |
| 595.0               | 625.0       | 20.01                   | 19.76 | 19.55 |
| 635.4               | 665.4       | 18.87                   | 18.61 | 18.43 |
| 655.5               | 685.5       | 18.43                   | 18.18 | 18.01 |
| 695.9               | 725.9       | 17.87                   | 17.67 | 17.55 |
| 716.0               | 746.0       | 17.66                   | 17.49 | 17.38 |
| 756.4               | 786.4       | 17.27                   | 17.11 | 17.01 |
| 776.5               | 806.5       | 17.09                   | 16.97 | 16.88 |
| 816.9               | 846.9       | 16.60                   | 16.52 | 16.48 |
| 837.0               | 867.0       | 16.35                   | 16.29 | 16.28 |
| 877.4               | 907.4       | 15.78                   | 15.79 | 15.80 |
| 897.6               | 927.6       | 15.46                   | 15.47 | 15.48 |
| 937.9               | 967.9       | 14.82                   | 14.80 | 14.73 |
| 958.1               | 988.1       | 14.44                   | 14.37 | 14.27 |
| 998.4               | 1028.4      | 13.65                   | 13.50 | 13.32 |
| 1018.6              | 1048.6      | 13.24                   | 13.07 | 12.85 |
| 1058.9              | 1088.9      | 12.42                   | 12.17 | 11.90 |
| 1079.1              | 1109.1      | 11.92                   | 11.67 | 11.38 |
| 1119.4              | 1149.4      | 11.02                   | 10.73 | 10.43 |
| 1139.6              | 1169.6      | 10.57                   | 10.29 | 10.00 |
| 1179.9              | 1209.9      | 9.69                    | 9.39  | 9.11  |
| 1200.1              | 1230.1      | 9.30                    | 9.00  | 8.74  |

# Frequency Mixer

**RMS-1+**

## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF VSWR<br>(:1) |      |      | LO<br>(MHz) | LO VSWR<br>(:1) |      |      | IF<br>(OUT)<br>(MHz) | IF VSWR<br>@LO=500.1MHz<br>(:1) |      |      |
|---------------------|-------------|-----------------|------|------|-------------|-----------------|------|------|----------------------|---------------------------------|------|------|
|                     |             | @LO (dBm)       |      |      |             | @LO (dBm)       |      |      |                      | @LO (dBm)                       |      |      |
|                     |             | +4              | +7   | +10  |             | +4              | +7   | +10  |                      | +4                              | +7   | +10  |
| 5.0                 | 35.0        | 1.13            | 1.11 | 1.12 | 35.0        | 1.58            | 2.27 | 3.21 | 5.0                  | 1.41                            | 1.24 | 1.12 |
| 10.0                | 40.0        | 1.10            | 1.05 | 1.07 | 40.0        | 1.57            | 2.27 | 3.08 | 10.0                 | 1.41                            | 1.25 | 1.13 |
| 50.4                | 80.4        | 1.03            | 1.07 | 1.15 | 50.4        | 1.83            | 2.63 | 3.67 | 22.4                 | 1.72                            | 1.50 | 1.40 |
| 90.8                | 120.8       | 1.04            | 1.07 | 1.11 | 90.8        | 1.82            | 2.59 | 3.59 | 34.7                 | 1.51                            | 1.41 | 1.30 |
| 110.9               | 140.9       | 1.02            | 1.08 | 1.13 | 110.9       | 1.78            | 2.54 | 3.46 | 47.0                 | 1.56                            | 1.37 | 1.22 |
| 151.3               | 181.3       | 1.05            | 1.08 | 1.13 | 151.3       | 1.82            | 2.60 | 3.58 | 59.3                 | 1.52                            | 1.32 | 1.17 |
| 171.5               | 201.5       | 1.01            | 1.07 | 1.11 | 171.5       | 1.83            | 2.60 | 3.58 | 71.6                 | 1.51                            | 1.33 | 1.19 |
| 211.8               | 241.8       | 1.09            | 1.14 | 1.19 | 211.8       | 1.83            | 2.57 | 3.50 | 83.9                 | 1.56                            | 1.36 | 1.23 |
| 232.0               | 262.0       | 1.09            | 1.14 | 1.18 | 232.0       | 1.88            | 2.65 | 3.61 | 96.3                 | 1.53                            | 1.37 | 1.24 |
| 272.3               | 302.3       | 1.09            | 1.14 | 1.17 | 272.3       | 1.91            | 2.68 | 3.65 | 108.6                | 1.56                            | 1.39 | 1.26 |
| 292.5               | 322.5       | 1.12            | 1.16 | 1.20 | 292.5       | 1.90            | 2.64 | 3.56 | 120.9                | 1.55                            | 1.39 | 1.26 |
| 332.8               | 362.8       | 1.12            | 1.16 | 1.21 | 332.8       | 1.95            | 2.71 | 3.64 | 133.2                | 1.59                            | 1.39 | 1.26 |
| 353.0               | 383.0       | 1.12            | 1.16 | 1.20 | 353.0       | 1.99            | 2.76 | 3.71 | 145.5                | 1.57                            | 1.39 | 1.25 |
| 393.3               | 423.3       | 1.18            | 1.21 | 1.25 | 393.3       | 1.98            | 2.71 | 3.60 | 157.8                | 1.59                            | 1.39 | 1.25 |
| 413.5               | 443.5       | 1.16            | 1.21 | 1.25 | 413.5       | 2.05            | 2.80 | 3.73 | 170.1                | 1.58                            | 1.41 | 1.26 |
| 453.8               | 483.8       | 1.18            | 1.23 | 1.28 | 453.8       | 2.14            | 2.90 | 3.83 | 182.4                | 1.60                            | 1.42 | 1.27 |
| 474.0               | 504.0       | 1.21            | 1.25 | 1.30 | 474.0       | 2.13            | 2.86 | 3.77 | 194.7                | 1.60                            | 1.44 | 1.29 |
| 514.3               | 544.3       | 1.20            | 1.24 | 1.28 | 514.3       | 2.15            | 2.89 | 3.79 | 207.0                | 1.60                            | 1.42 | 1.29 |
| 534.5               | 564.5       | 1.23            | 1.28 | 1.33 | 534.5       | 2.17            | 2.91 | 3.80 | 219.3                | 1.58                            | 1.40 | 1.27 |
| 574.8               | 604.8       | 1.29            | 1.32 | 1.36 | 574.8       | 2.20            | 2.90 | 3.76 | 231.6                | 1.57                            | 1.39 | 1.27 |
| 595.0               | 625.0       | 1.29            | 1.33 | 1.37 | 595.0       | 2.27            | 2.98 | 3.86 | 243.9                | 1.56                            | 1.39 | 1.26 |
| 635.4               | 665.4       | 1.39            | 1.43 | 1.47 | 635.4       | 2.36            | 3.07 | 3.93 | 256.3                | 1.57                            | 1.40 | 1.27 |
| 655.5               | 685.5       | 1.46            | 1.48 | 1.52 | 655.5       | 2.38            | 3.07 | 3.90 | 268.6                | 1.59                            | 1.42 | 1.27 |
| 695.9               | 725.9       | 1.57            | 1.58 | 1.62 | 695.9       | 2.45            | 3.14 | 3.95 | 280.9                | 1.58                            | 1.42 | 1.28 |
| 716.0               | 746.0       | 1.68            | 1.70 | 1.73 | 716.0       | 2.46            | 3.15 | 3.95 | 293.2                | 1.59                            | 1.42 | 1.30 |
| 756.4               | 786.4       | 1.89            | 1.88 | 1.88 | 756.4       | 2.54            | 3.23 | 4.02 | 305.5                | 1.58                            | 1.42 | 1.31 |
| 776.5               | 806.5       | 1.96            | 1.95 | 1.95 | 776.5       | 2.58            | 3.27 | 4.08 | 317.8                | 1.59                            | 1.42 | 1.29 |
| 816.9               | 846.9       | 2.21            | 2.20 | 2.21 | 816.9       | 2.63            | 3.33 | 4.13 | 330.1                | 1.57                            | 1.41 | 1.29 |
| 837.0               | 867.0       | 2.30            | 2.29 | 2.28 | 837.0       | 2.68            | 3.37 | 4.16 | 342.4                | 1.57                            | 1.42 | 1.29 |
| 877.4               | 907.4       | 2.44            | 2.44 | 2.44 | 877.4       | 2.69            | 3.36 | 4.12 | 354.7                | 1.57                            | 1.41 | 1.30 |
| 897.6               | 927.6       | 2.59            | 2.60 | 2.61 | 897.6       | 2.68            | 3.32 | 4.08 | 367.0                | 1.58                            | 1.42 | 1.31 |
| 937.9               | 967.9       | 2.73            | 2.73 | 2.73 | 937.9       | 2.74            | 3.37 | 4.11 | 379.3                | 1.58                            | 1.42 | 1.32 |
| 958.1               | 988.1       | 2.84            | 2.83 | 2.84 | 958.1       | 2.76            | 3.38 | 4.10 | 391.6                | 1.58                            | 1.43 | 1.33 |
| 998.4               | 1028.4      | 3.10            | 3.11 | 3.13 | 998.4       | 2.76            | 3.35 | 4.02 | 403.9                | 1.59                            | 1.44 | 1.34 |
| 1018.6              | 1048.6      | 3.17            | 3.17 | 3.16 | 1018.6      | 2.80            | 3.38 | 4.05 | 416.3                | 1.58                            | 1.44 | 1.33 |
| 1058.9              | 1088.9      | 3.45            | 3.45 | 3.45 | 1058.9      | 2.81            | 3.34 | 3.96 | 428.6                | 1.58                            | 1.44 | 1.34 |
| 1079.1              | 1109.1      | 3.61            | 3.60 | 3.60 | 1079.1      | 2.78            | 3.28 | 3.86 | 440.9                | 1.58                            | 1.45 | 1.35 |
| 1119.4              | 1149.4      | 3.69            | 3.67 | 3.65 | 1119.4      | 2.84            | 3.31 | 3.87 | 453.2                | 1.60                            | 1.46 | 1.36 |
| 1139.6              | 1169.6      | 3.97            | 3.95 | 3.91 | 1139.6      | 2.88            | 3.34 | 3.88 | 465.5                | 1.61                            | 1.47 | 1.38 |
| 1179.9              | 1209.9      | 3.82            | 3.79 | 3.76 | 1179.9      | 2.86            | 3.26 | 3.75 | 477.8                | 1.61                            | 1.49 | 1.39 |
| 1200.1              | 1230.1      | 3.73            | 3.70 | 3.65 | 1200.1      | 2.91            | 3.29 | 3.76 | 490.1                | 1.62                            | 1.49 | 1.41 |

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## Harmonics Tables

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |    |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|
| 0      | -      | -      | 15  | 24  | 18  | 36  | 16  | 40  | 22  | 45  | 25 | 40  |
| 1      | -      | 21     | +0  | 30  | 12  | 36  | 18  | 41  | 32  | 47  | 40 | 43  |
| 2      | 103    | 72     | 51  | 80  | 51  | 71  | 51  | 76  | 52  | 73  | 62 | 71  |
| 3      | 108    | 71     | 76  | 73  | 69  | 76  | 61  | 81  | 68  | 81  | 69 | 78  |
| 4      | 109    | 98     | 86  | 109 | 82  | 86  | 85  | 93  | 87  | 104 | 88 | 101 |
| 5      | 125    | 99     | 108 | 99  | 99  | 87  | 100 | 102 | 89  | 99  | 93 | 100 |
| 6      | 111    | 99     | 105 | 93  | 101 | 98  | 76  | 87  | 94  | 99  | 96 | 106 |
| 7      | 114    | 105    | 107 | 115 | 107 | 103 | 113 | 79  | 92  | 99  | 97 | 103 |
| 8      | 122    | 110    | 107 | 99  | 105 | 103 | 93  | 101 | 79  | 90  | 93 | 105 |
| 9      | 120    | 110    | 101 | 107 | 99  | 100 | 111 | 102 | 91  | 66  | 86 | 94  |
| 10     | 130    | 100    | 112 | 108 | 114 | 103 | 102 | 98  | 102 | 95  | 72 | 92  |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10 |     |

### LO HARMONICS ORDER

Test conditions: RF IN: 250.1 MHz; -14.00 dBm.  
LO IN: 280.01 MHz; +7.00 dBm  
IF OUT: 29.91 MHz; -20.03 dBm

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |    |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|
| 0      | -      | -      | 24  | 34  | 31  | 47  | 28  | 52  | 34  | 55  | 38 | 52  |
| 1      | -      | 21     | +0  | 31  | 12  | 37  | 19  | 43  | 32  | 52  | 41 | 49  |
| 2      | 101    | 76     | 45  | 69  | 46  | 69  | 46  | 68  | 48  | 66  | 55 | 76  |
| 3      | 108    | 52     | 51  | 54  | 55  | 62  | 48  | 59  | 46  | 64  | 55 | 65  |
| 4      | 105    | 77     | 64  | 74  | 62  | 77  | 62  | 76  | 59  | 85  | 62 | 80  |
| 5      | 112    | 76     | 64  | 66  | 58  | 68  | 56  | 67  | 54  | 78  | 56 | 71  |
| 6      | 113    | 88     | 80  | 90  | 80  | 96  | 81  | 93  | 88  | 94  | 83 | 90  |
| 7      | 121    | 98     | 77  | 105 | 72  | 85  | 77  | 84  | 81  | 81  | 78 | 83  |
| 8      | 128    | 102    | 93  | 102 | 92  | 98  | 100 | 103 | 88  | 108 | 94 | 104 |
| 9      | 118    | 96     | 97  | 100 | 87  | 95  | 83  | 94  | 86  | 68  | 89 | 99  |
| 10     | 116    | 118    | 107 | 114 | 105 | 106 | 107 | 102 | 104 | 99  | 93 | 99  |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10 |     |

### LO HARMONICS ORDER

Test conditions: RF IN: 250.1 MHz; -4.00 dBm.  
LO IN: 280.01 MHz; +7.00 dBm  
IF OUT: 29.91 MHz; -10.12 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.

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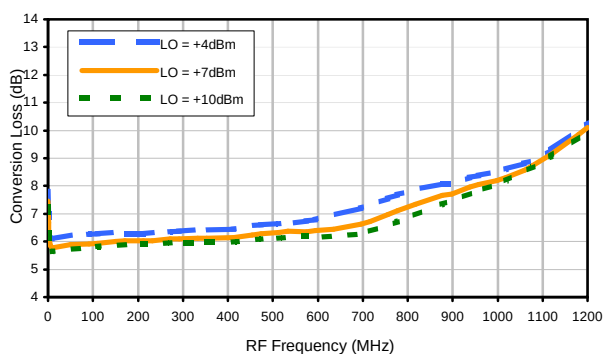
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# Frequency Mixer

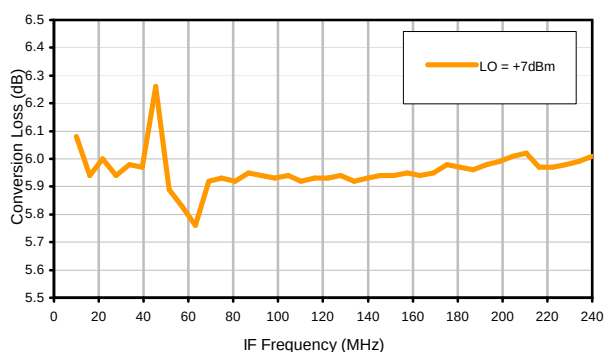
RMS-1+

## Typical Performance Curves

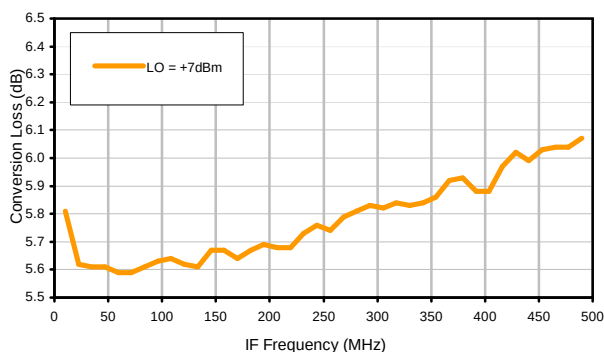
Conversion Loss @ IF=30MHz



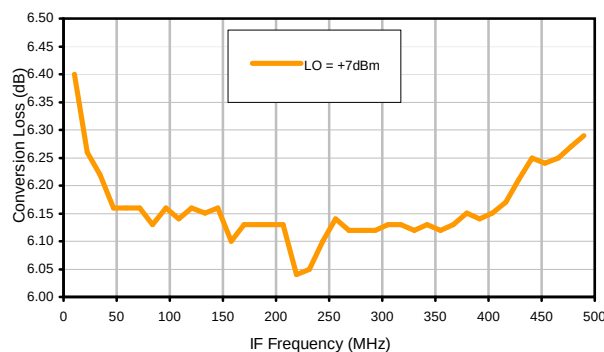
Conversion Loss vs. IF @ RF=250.1MHz



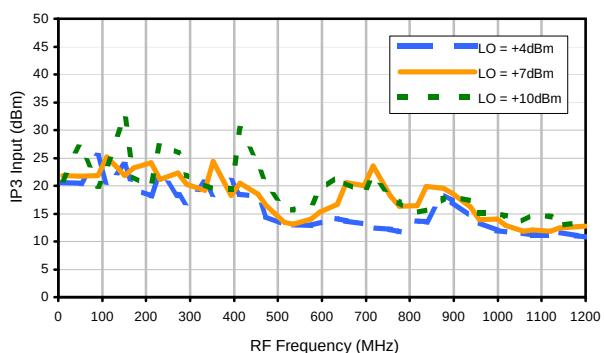
Conversion Loss vs. IF @ RF=10.1MHz



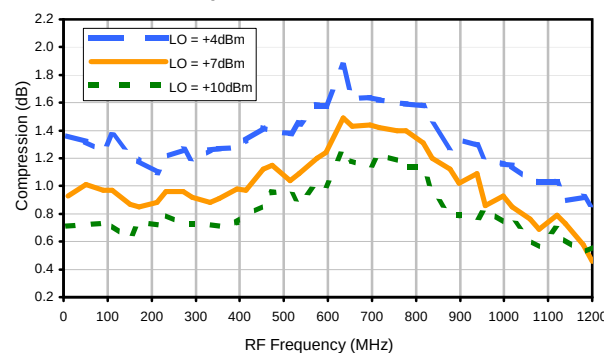
Conversion Loss vs. IF @ RF=500.1MHz



IP3 Input



Compression @ RF IN=+1dBm



REV. X2

RMS-1+

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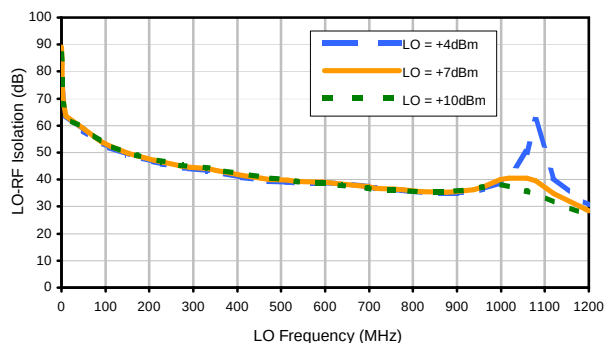
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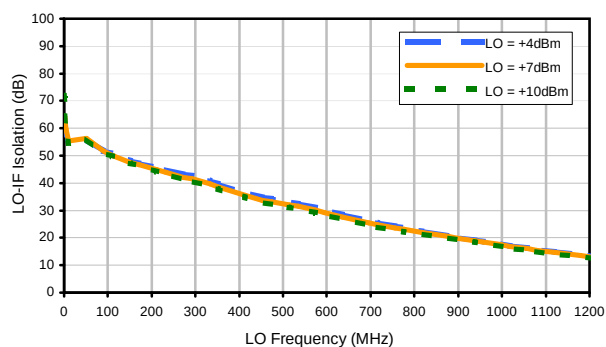


## Typical Performance Curves

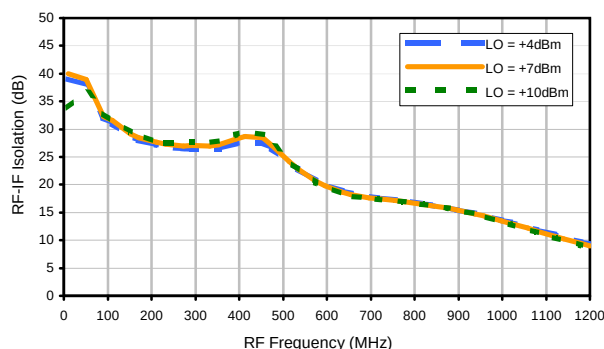
LO-RF Isolation



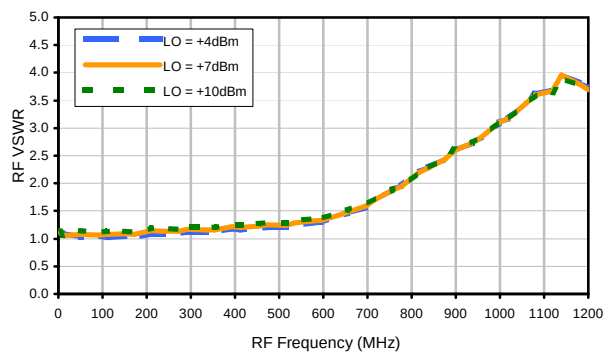
LO-IF Isolation



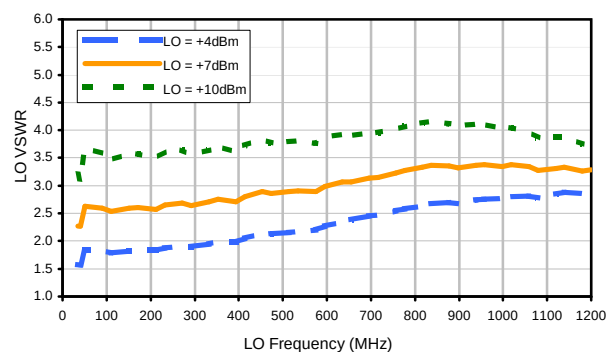
RF-IF Isolation



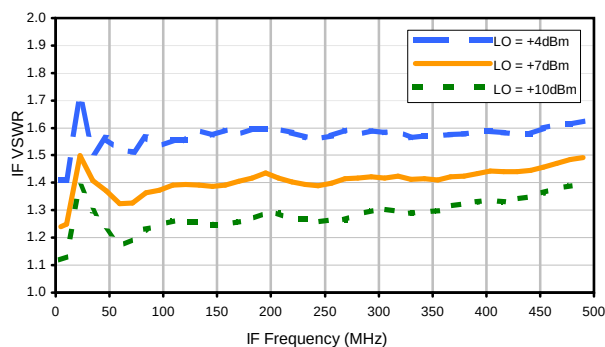
RF VSWR



LO VSWR



IF VSWR



REV. X2

RMS-1+

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## Harmonics Tables

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |    |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|
| 0      | -      | -      | 15  | 24  | 18  | 36  | 16  | 40  | 22  | 45  | 25 | 40  |
| 1      | -      | 21     | +0  | 30  | 12  | 36  | 18  | 41  | 32  | 47  | 40 | 43  |
| 2      | 103    | 72     | 51  | 80  | 51  | 71  | 51  | 76  | 52  | 73  | 62 | 71  |
| 3      | 108    | 71     | 76  | 73  | 69  | 76  | 61  | 81  | 68  | 81  | 69 | 78  |
| 4      | 109    | 98     | 86  | 109 | 82  | 86  | 85  | 93  | 87  | 104 | 88 | 101 |
| 5      | 125    | 99     | 108 | 99  | 99  | 87  | 100 | 102 | 89  | 99  | 93 | 100 |
| 6      | 111    | 99     | 105 | 93  | 101 | 98  | 76  | 87  | 94  | 99  | 96 | 106 |
| 7      | 114    | 105    | 107 | 115 | 107 | 103 | 113 | 79  | 92  | 99  | 97 | 103 |
| 8      | 122    | 110    | 107 | 99  | 105 | 103 | 93  | 101 | 79  | 90  | 93 | 105 |
| 9      | 120    | 110    | 101 | 107 | 99  | 100 | 111 | 102 | 91  | 66  | 86 | 94  |
| 10     | 130    | 100    | 112 | 108 | 114 | 103 | 102 | 98  | 102 | 95  | 72 | 92  |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10 |     |

### LO HARMONICS ORDER

Test conditions: RF IN: 250.1 MHz; -14.00 dBm.  
LO IN: 280.01 MHz; +7.00 dBm  
IF OUT: 29.91 MHz; -20.03 dBm

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |    |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|
| 0      | -      | -      | 24  | 34  | 31  | 47  | 28  | 52  | 34  | 55  | 38 | 52  |
| 1      | -      | 21     | +0  | 31  | 12  | 37  | 19  | 43  | 32  | 52  | 41 | 49  |
| 2      | 101    | 76     | 45  | 69  | 46  | 69  | 46  | 68  | 48  | 66  | 55 | 76  |
| 3      | 108    | 52     | 51  | 54  | 55  | 62  | 48  | 59  | 46  | 64  | 55 | 65  |
| 4      | 105    | 77     | 64  | 74  | 62  | 77  | 62  | 76  | 59  | 85  | 62 | 80  |
| 5      | 112    | 76     | 64  | 66  | 58  | 68  | 56  | 67  | 54  | 78  | 56 | 71  |
| 6      | 113    | 88     | 80  | 90  | 80  | 96  | 81  | 93  | 88  | 94  | 83 | 90  |
| 7      | 121    | 98     | 77  | 105 | 72  | 85  | 77  | 84  | 81  | 81  | 78 | 83  |
| 8      | 128    | 102    | 93  | 102 | 92  | 98  | 100 | 103 | 88  | 108 | 94 | 104 |
| 9      | 118    | 96     | 97  | 100 | 87  | 95  | 83  | 94  | 86  | 68  | 89 | 99  |
| 10     | 116    | 118    | 107 | 114 | 105 | 106 | 107 | 102 | 104 | 99  | 93 | 99  |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10 |     |

### LO HARMONICS ORDER

Test conditions: RF IN: 250.1 MHz; -4.00 dBm.  
LO IN: 280.01 MHz; +7.00 dBm  
IF OUT: 29.91 MHz; -10.12 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  
RMS-1+  
100817  
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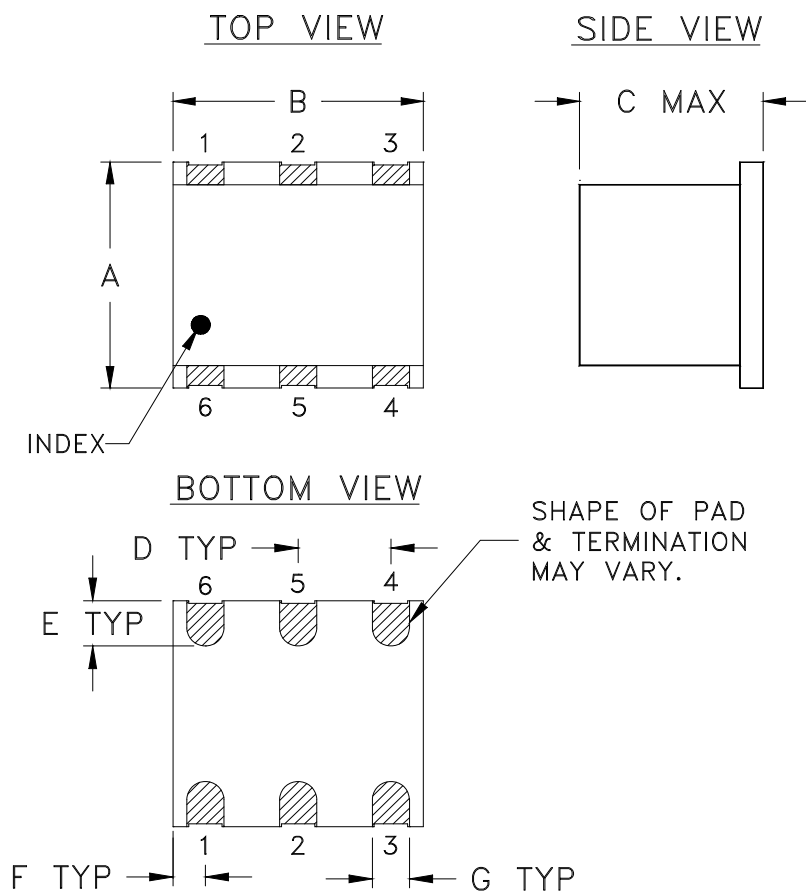
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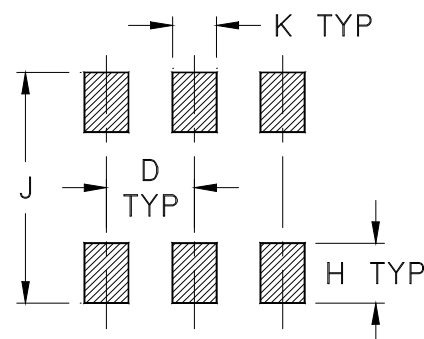
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### Outline Dimensions



### PCB Land Pattern



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

| CASE # | A              | B             | C             | D              | E              | F              | G              | H              | J              | K              | WT. GRAM |
|--------|----------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------|
| TT240  | .250<br>(6.35) | .31<br>(7.87) | .20<br>(5.08) | .100<br>(2.54) | .050<br>(1.27) | .055<br>(1.40) | .040<br>(1.02) | .070<br>(1.78) | .270<br>(6.86) | .050<br>(1.27) | .50      |

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

### Notes:

- Case material: Ceramic.
- Termination finish:
  - For RoHS Case Styles: 2-10 $\mu$  inch (.05-.25 microns) Gold plate over 100-300  $\mu$  inch (2.54-7.62 microns) Nickel plate. All models, (+) suffix.
  - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.



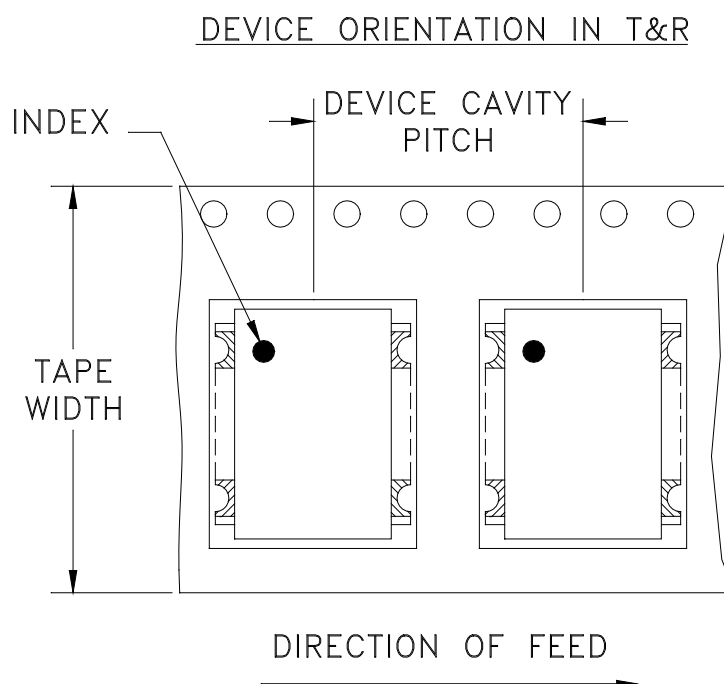
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RF/IF MICROWAVE COMPONENTS

# *Tape & Reel Packaging TR-F2*



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel<br>See note |
|----------------|-------------------------|-------------------|------------------------------|
| 16             | 12                      | 7                 | 10                           |
|                |                         |                   | 20                           |
|                |                         |                   | 50                           |
|                |                         |                   | 100                          |
|                |                         |                   | 200                          |
|                |                         | 13                | 500                          |
|                |                         |                   | 1000                         |

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)



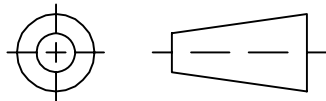
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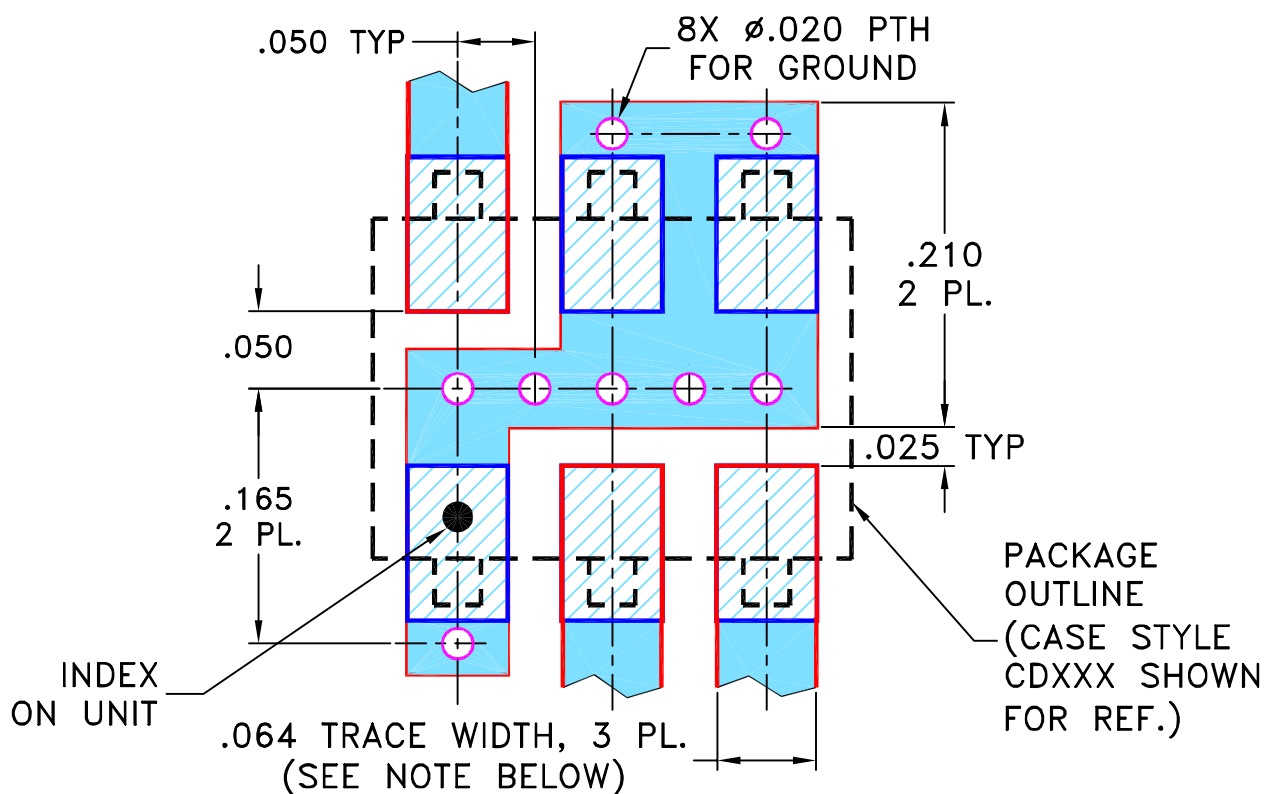
## THIRD ANGLE PROJECTION



## REVISIONS

| REV | ECN No. | DESCRIPTION                                          | DATE     | DR  | AUTH |
|-----|---------|------------------------------------------------------|----------|-----|------|
| A   | M101143 | ADDED "gk" PIN CONNECTION, TT100 CASE STYLE & NOTE 2 | 10/10/05 | MMG | DJ   |
| B   | M102713 | ADDED "...WITH SMOBC"                                | 01/17/06 | MMG | IL   |
| C   | M108637 | REMOVED "PIN 1", ADDED INDEX ON UNIT                 | 12/01/06 | MYG | FL   |

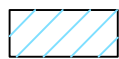
**SUGGESTED MOUNTING CONFIGURATION**  
**FOR BH292, CD541/542/636/637, TT100/240 CASE**  
**STYLES, "gk", "ht", "hu", "nd", "w" PIN CONNECTIONS**



- NOTES:** 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. 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

DIMENSIONS ARE IN INCHES

TOLERANCES ON:  
 2 PL DECIMALS  $\pm$   
 3 PL DECIMALS  $\pm$  .005  
 ANGLES  $\pm$   
 FRACTIONS  $\pm$

INITIALS

DATE

DRAWN

MMG

07/17/02

CHECKED

WL

08/02/02

APPROVED

DJ

08/05/02



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13 Neptune Avenue  
 Brooklyn NY 11235

PL, gk/ht/hu/nd/w, BH292,  
 CD541/542/636/637, TT100/240, TB-03

SIZE

CODE IDENT

DRAWING NO:

REV:

A

15542

98-PL-052

C

FILE: 98PL052

SCALE:

8:1

SHEET:

1 OF 1

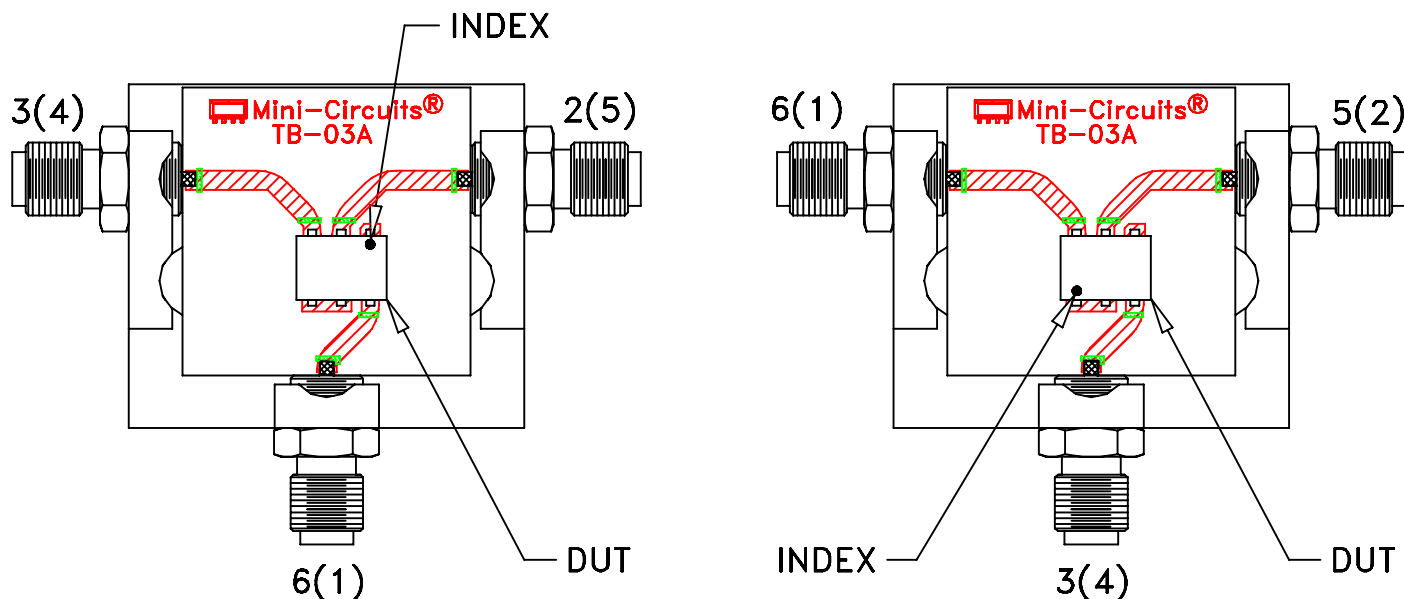
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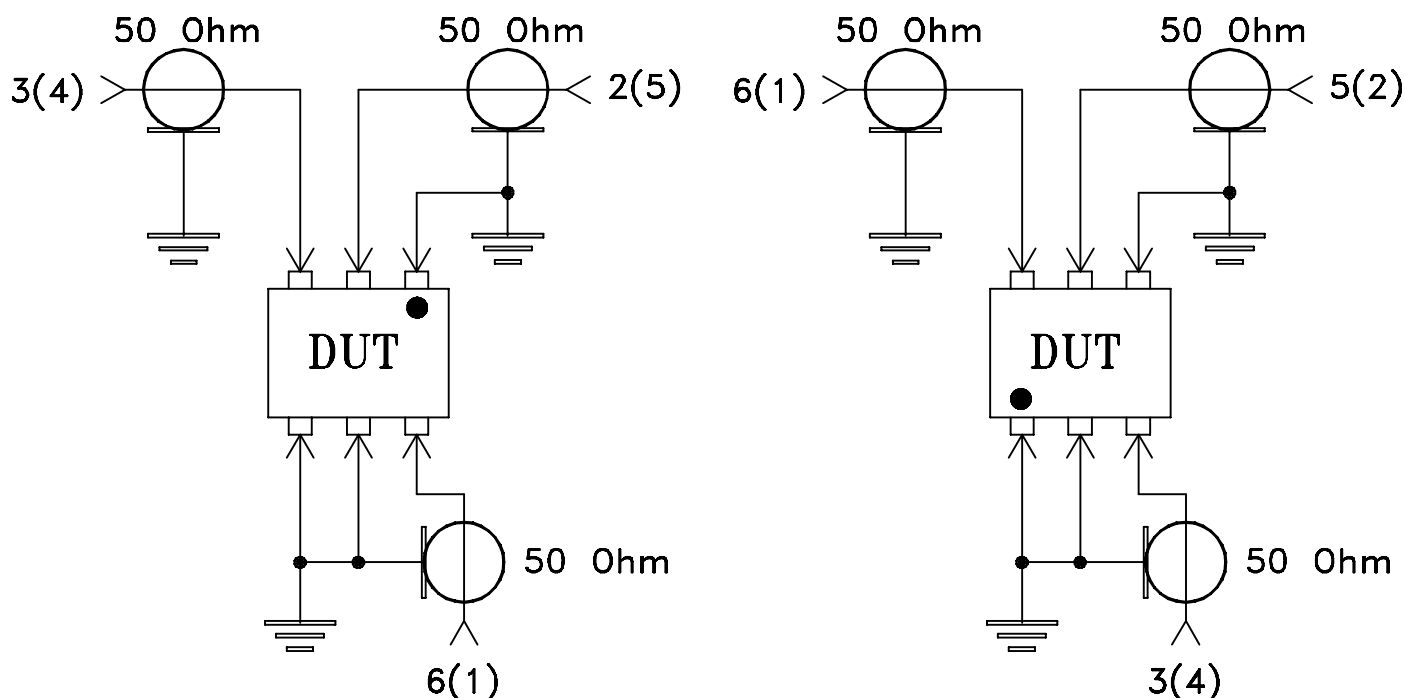
ASHEETA1.DWG REV:A DATE:01/12/95

# Evaluation Board and Circuit

For Pin Connections and DUT Orientation Refer to  
Data Sheet of the DUT



TB-03



Schematic Diagram

## Notes:

1. 50 Ohm 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          | -40° to 85°C<br>Ambient Environment                                                                                                                             | Individual Model Data Sheet                                                                          |
| Storage Temperature            | -55° to 100° C<br>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<br>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;<br>distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C | MIL-STD-202, Method 215                                                                              |