

## Non-Catalog Model

# Frequency Mixer

Level 7 (LO Power +7 dBm)

# TFM-5+

### Important Note

This is a non-catalog model and can be manufactured on specific request.  
Pricing and delivery information can be supplied upon request.



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CASE STYLE : B02

| ELECTRICAL SPECIFICATIONS 50Ω @ +25°C |               |      |      |      |       |
|---------------------------------------|---------------|------|------|------|-------|
| Parameter                             |               | Min. | Typ. | Max. | Units |
| Frequency                             | LO (fL to fU) | 5    |      | 1500 | MHz   |
|                                       | RF (fL to fU) | 5    |      | 1500 | MHz   |
|                                       | IF            | 0    |      | 1000 | MHz   |
| Conversion Loss                       | mid band      |      | 6.3  | 8.5  | dB    |
|                                       | Total Range   |      |      | 9.5  | dB    |
| LO-RF Isolation                       | Low Range     | 45   | 60   |      | dB    |
|                                       | Mid Range     | 25   | 35   |      | dB    |
|                                       | Upper Range   | 25   | 30   |      | dB    |
| LO-IF Isolation                       | Low Range     | 40   | 60   |      | dB    |
|                                       | Mid Range     | 15   | 35   |      | dB    |
|                                       | Upper Range   | 14   | 25   |      | dB    |
| 1 dB Comp. Input Power                |               |      | +1   |      | dBm   |

Notes: Low Range = [fL to 10fL]  
mid band = [2fL to fU/2]

Mid Range = [10fL to fU/2]

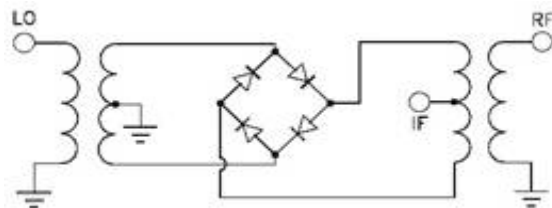
Upper Range = [fU/2 to fU]

Hermetically sealed

| MAXIMUM RATINGS       |                |
|-----------------------|----------------|
| Operating Temperature | -55°C to 100°C |
| Storage Temperature   | -55°C to 100°C |
| RF Power              | 50mW           |
| IF Current            | 40mA           |

| PIN CONNECTIONS |   |
|-----------------|---|
| LO              | 1 |
| RF              | 4 |
| IF              | 2 |
| GROUND          | 3 |

### Electrical Schematics



# Frequency Mixer

TFM-5+

## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>IF FIXED<br>@IF(OUT)=30MHz<br>(dB) |       |       |
|---------------------|-------------|-------------------------------------------------------|-------|-------|
|                     |             | @LO (dBm)                                             |       |       |
|                     |             | +4                                                    | +7    | +10   |
| 10.1                | 40.1        | 7.32                                                  | 7.04  | 6.50  |
| 90.4                | 120.4       | 7.44                                                  | 7.05  | 6.87  |
| 170.7               | 200.7       | 7.26                                                  | 6.94  | 6.77  |
| 251.0               | 281.0       | 7.17                                                  | 6.88  | 6.70  |
| 331.3               | 361.3       | 7.09                                                  | 6.80  | 6.64  |
| 411.5               | 441.5       | 7.09                                                  | 6.81  | 6.66  |
| 491.8               | 521.8       | 7.14                                                  | 6.85  | 6.68  |
| 552.0               | 582.0       | 7.15                                                  | 6.83  | 6.66  |
| 632.3               | 662.3       | 7.15                                                  | 6.83  | 6.64  |
| 692.5               | 722.5       | 7.18                                                  | 6.82  | 6.63  |
| 772.8               | 802.8       | 7.20                                                  | 6.85  | 6.62  |
| 833.0               | 863.0       | 7.31                                                  | 6.95  | 6.73  |
| 913.3               | 943.3       | 7.48                                                  | 7.06  | 6.79  |
| 973.6               | 1003.6      | 7.63                                                  | 7.11  | 6.81  |
| 1053.8              | 1083.8      | 7.82                                                  | 7.17  | 6.78  |
| 1114.1              | 1144.1      | 8.05                                                  | 7.27  | 6.83  |
| 1194.3              | 1224.3      | 8.30                                                  | 7.43  | 6.88  |
| 1254.6              | 1284.6      | 8.29                                                  | 7.45  | 6.89  |
| 1334.8              | 1364.8      | 8.23                                                  | 7.43  | 6.84  |
| 1395.1              | 1425.1      | 8.23                                                  | 7.43  | 6.83  |
| 1475.4              | 1505.4      | 8.23                                                  | 7.48  | 6.94  |
| 1535.6              | 1565.6      | 8.09                                                  | 7.44  | 6.93  |
| 1615.9              | 1645.9      | 8.18                                                  | 7.49  | 7.03  |
| 1676.1              | 1706.1      | 8.31                                                  | 7.71  | 7.21  |
| 1756.4              | 1786.4      | 8.07                                                  | 7.47  | 7.08  |
| 1816.6              | 1846.6      | 7.99                                                  | 7.44  | 7.14  |
| 1896.9              | 1926.9      | 7.98                                                  | 7.41  | 7.25  |
| 1957.1              | 1987.1      | 8.19                                                  | 7.45  | 7.33  |
| 2037.4              | 2067.4      | 8.47                                                  | 7.52  | 7.39  |
| 2097.6              | 2127.6      | 8.60                                                  | 7.44  | 7.25  |
| 2177.9              | 2207.9      | 9.27                                                  | 7.88  | 7.48  |
| 2238.1              | 2268.1      | 9.63                                                  | 8.32  | 7.85  |
| 2318.4              | 2348.4      | 9.64                                                  | 8.29  | 7.82  |
| 2378.6              | 2408.6      | 10.16                                                 | 8.52  | 7.98  |
| 2458.9              | 2488.9      | 10.93                                                 | 9.04  | 8.39  |
| 2519.1              | 2549.1      | 11.18                                                 | 9.23  | 8.57  |
| 2599.4              | 2629.4      | 11.76                                                 | 9.75  | 8.92  |
| 2659.6              | 2689.6      | 12.95                                                 | 10.33 | 9.26  |
| 2739.9              | 2769.9      | 14.63                                                 | 11.17 | 9.77  |
| 2800.1              | 2830.1      | 15.75                                                 | 11.80 | 10.13 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | IP3 INPUT<br>(dBm) |       |       |
|---------------------|-------------|--------------------|-------|-------|
|                     |             | @LO (dBm)          |       |       |
|                     |             | +4                 | +7    | +10   |
| 10.1                | 40.1        | 18.66              | 20.48 | 20.75 |
| 90.4                | 120.4       | 19.51              | 20.48 | 20.57 |
| 170.7               | 200.7       | 20.37              | 20.53 | 20.61 |
| 251.0               | 281.0       | 20.41              | 20.56 | 20.65 |
| 331.3               | 361.3       | 20.45              | 20.60 | 20.68 |
| 411.5               | 441.5       | 20.45              | 20.59 | 20.67 |
| 491.8               | 521.8       | 20.43              | 20.58 | 20.66 |
| 552.0               | 582.0       | 15.92              | 20.54 | 20.67 |
| 632.3               | 662.3       | 16.83              | 18.25 | 20.68 |
| 692.5               | 722.5       | 17.99              | 20.59 | 20.68 |
| 772.8               | 802.8       | 12.41              | 14.65 | 20.69 |
| 833.0               | 863.0       | 12.94              | 14.12 | 16.85 |
| 913.3               | 943.3       | 13.23              | 17.08 | 20.60 |
| 973.6               | 1003.6      | 13.08              | 17.32 | 20.59 |
| 1053.8              | 1083.8      | 12.04              | 20.41 | 16.80 |
| 1114.1              | 1144.1      | 10.21              | 18.14 | 16.29 |
| 1194.3              | 1224.3      | 9.37               | 13.36 | 13.63 |
| 1254.6              | 1284.6      | 8.86               | 10.95 | 11.21 |
| 1334.8              | 1364.8      | 7.31               | 8.36  | 8.63  |
| 1395.1              | 1425.1      | 6.44               | 7.16  | 7.49  |
| 1475.4              | 1505.4      | 6.22               | 6.45  | 6.11  |
| 1535.6              | 1565.6      | 6.02               | 5.68  | 4.84  |
| 1615.9              | 1645.9      | 5.75               | 5.29  | 6.22  |
| 1676.1              | 1706.1      | 5.72               | 5.99  | 9.55  |
| 1756.4              | 1786.4      | 5.88               | 8.64  | 11.42 |
| 1816.6              | 1846.6      | 6.33               | 9.97  | 11.95 |
| 1896.9              | 1926.9      | 6.26               | 9.53  | 11.96 |
| 1957.1              | 1987.1      | 6.22               | 9.43  | 11.84 |
| 2037.4              | 2067.4      | 6.74               | 9.87  | 12.22 |
| 2097.6              | 2127.6      | 6.52               | 10.29 | 12.10 |
| 2177.9              | 2207.9      | 5.74               | 10.45 | 12.38 |
| 2238.1              | 2268.1      | 5.95               | 10.74 | 12.65 |
| 2318.4              | 2348.4      | 5.95               | 10.66 | 12.77 |
| 2378.6              | 2408.6      | 5.96               | 10.36 | 13.08 |
| 2458.9              | 2488.9      | 5.96               | 10.33 | 13.24 |
| 2519.1              | 2549.1      | 6.54               | 10.72 | 13.58 |
| 2599.4              | 2629.4      | 6.86               | 10.78 | 13.42 |
| 2659.6              | 2689.6      | 6.46               | 10.61 | 13.25 |
| 2739.9              | 2769.9      | 6.25               | 10.73 | 12.86 |
| 2800.1              | 2830.1      | 3.98               | 10.62 | 10.94 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | COMPRESSION<br>@RF IN=+1dBm<br>(dB) |      |      |
|---------------------|-------------|-------------------------------------|------|------|
|                     |             | @LO (dBm)                           |      |      |
|                     |             | +4                                  | +7   | +10  |
| 10.1                | 40.1        | 0.56                                | 0.15 | 0.11 |
| 90.4                | 120.4       | 0.52                                | 0.32 | 0.22 |
| 170.7               | 200.7       | 0.58                                | 0.36 | 0.22 |
| 251.0               | 281.0       | 0.52                                | 0.30 | 0.19 |
| 331.3               | 361.3       | 0.47                                | 0.27 | 0.18 |
| 411.5               | 441.5       | 0.47                                | 0.29 | 0.20 |
| 491.8               | 521.8       | 0.53                                | 0.33 | 0.24 |
| 552.0               | 582.0       | 0.60                                | 0.39 | 0.27 |
| 632.3               | 662.3       | 0.63                                | 0.40 | 0.29 |
| 692.5               | 722.5       | 0.70                                | 0.48 | 0.34 |
| 772.8               | 802.8       | 0.82                                | 0.58 | 0.42 |
| 833.0               | 863.0       | 0.94                                | 0.67 | 0.51 |
| 913.3               | 943.3       | 1.10                                | 0.81 | 0.65 |
| 973.6               | 1003.6      | 1.17                                | 0.89 | 0.75 |
| 1053.8              | 1083.8      | 1.28                                | 1.10 | 0.96 |
| 1114.1              | 1144.1      | 1.24                                | 1.17 | 1.06 |
| 1194.3              | 1224.3      | 1.15                                | 1.16 | 1.12 |
| 1254.6              | 1284.6      | 1.21                                | 1.19 | 1.14 |
| 1334.8              | 1364.8      | 1.31                                | 1.22 | 1.19 |
| 1395.1              | 1425.1      | 1.45                                | 1.30 | 1.26 |
| 1475.4              | 1505.4      | 1.66                                | 1.39 | 1.31 |
| 1535.6              | 1565.6      | 1.73                                | 1.45 | 1.32 |
| 1615.9              | 1645.9      | 1.85                                | 1.48 | 1.30 |
| 1676.1              | 1706.1      | 1.97                                | 1.55 | 1.32 |
| 1756.4              | 1786.4      | 2.22                                | 1.67 | 1.36 |
| 1816.6              | 1846.6      | 2.19                                | 1.56 | 1.22 |
| 1896.9              | 1926.9      | 2.04                                | 1.36 | 1.01 |
| 1957.1              | 1987.1      | 1.95                                | 1.35 | 0.97 |
| 2037.4              | 2067.4      | 1.69                                | 1.24 | 0.86 |
| 2097.6              | 2127.6      | 1.69                                | 1.25 | 0.84 |
| 2177.9              | 2207.9      | 1.58                                | 1.18 | 0.76 |
| 2238.1              | 2268.1      | 1.51                                | 1.15 | 0.69 |
| 2318.4              | 2348.4      | 1.66                                | 1.13 | 0.69 |
| 2378.6              | 2408.6      | 1.74                                | 1.25 | 0.73 |
| 2458.9              | 2488.9      | 1.60                                | 1.22 | 0.71 |
| 2519.1              | 2549.1      | 1.49                                | 1.12 | 0.69 |
| 2599.4              | 2629.4      | 1.36                                | 1.12 | 0.70 |
| 2659.6              | 2689.6      | 1.00                                | 1.14 | 0.76 |
| 2739.9              | 2769.9      | 0.14                                | 1.04 | 0.85 |
| 2800.1              | 2830.1      | -0.47                               | 0.90 | 0.96 |



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TFM-5+

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# Frequency Mixer

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## Typical Performance Data

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=760.1MHz<br>(dB) |
|----------------------|-------------|-----------------------------------------------------------------|
|                      |             | @LO (dBm)                                                       |
|                      |             | +7                                                              |
| 750.0                | 10.1        | 6.92                                                            |
| 731.0                | 29.1        | 6.98                                                            |
| 712.1                | 48.0        | 6.86                                                            |
| 693.1                | 67.0        | 6.83                                                            |
| 674.1                | 86.0        | 6.78                                                            |
| 655.1                | 105.0       | 6.80                                                            |
| 636.2                | 123.9       | 6.73                                                            |
| 617.2                | 142.9       | 6.71                                                            |
| 598.2                | 161.9       | 6.69                                                            |
| 579.2                | 180.9       | 6.67                                                            |
| 560.3                | 199.8       | 6.65                                                            |
| 541.3                | 218.8       | 6.65                                                            |
| 522.3                | 237.8       | 6.69                                                            |
| 503.3                | 256.8       | 6.67                                                            |
| 484.4                | 275.7       | 6.65                                                            |
| 465.4                | 294.7       | 6.66                                                            |
| 446.4                | 313.7       | 6.65                                                            |
| 427.4                | 332.7       | 6.73                                                            |
| 408.5                | 351.6       | 6.67                                                            |
| 389.5                | 370.6       | 6.67                                                            |
| 370.5                | 389.6       | 6.71                                                            |
| 351.5                | 408.6       | 6.67                                                            |
| 332.6                | 427.5       | 6.76                                                            |
| 313.6                | 446.5       | 6.68                                                            |
| 294.6                | 465.5       | 6.76                                                            |
| 275.6                | 484.5       | 6.73                                                            |
| 256.7                | 503.4       | 6.74                                                            |
| 237.7                | 522.4       | 6.74                                                            |
| 218.7                | 541.4       | 6.75                                                            |
| 199.7                | 560.4       | 6.75                                                            |
| 180.8                | 579.3       | 6.78                                                            |
| 161.8                | 598.3       | 6.75                                                            |
| 142.8                | 617.3       | 6.77                                                            |
| 123.8                | 636.3       | 6.77                                                            |
| 104.9                | 655.2       | 6.80                                                            |
| 85.9                 | 674.2       | 6.82                                                            |
| 66.9                 | 693.2       | 6.78                                                            |
| 47.9                 | 712.2       | 6.80                                                            |
| 29.0                 | 731.1       | 6.81                                                            |
| 10.0                 | 750.1       | 6.97                                                            |

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=10.1MHz<br>(dB) |
|----------------------|-------------|----------------------------------------------------------------|
|                      |             | @LO (dBm)                                                      |
|                      |             | +7                                                             |
| 10.0                 | 20.1        | 7.14                                                           |
| 70.0                 | 80.1        | 6.83                                                           |
| 130.0                | 140.1       | 6.57                                                           |
| 190.0                | 200.1       | 7.19                                                           |
| 250.0                | 260.1       | 7.15                                                           |
| 310.0                | 320.1       | 7.22                                                           |
| 370.0                | 380.1       | 7.04                                                           |
| 430.0                | 440.1       | 6.96                                                           |
| 490.0                | 500.1       | 7.22                                                           |
| 550.0                | 560.1       | 7.19                                                           |
| 610.0                | 620.1       | 6.84                                                           |
| 670.0                | 680.1       | 7.37                                                           |
| 730.0                | 740.1       | 7.16                                                           |
| 790.0                | 800.1       | 7.15                                                           |
| 850.0                | 860.1       | 6.97                                                           |
| 910.0                | 920.1       | 7.43                                                           |
| 970.0                | 980.1       | 7.80                                                           |
| 1030.0               | 1040.1      | 7.93                                                           |
| 1090.0               | 1100.1      | 7.48                                                           |
| 1150.0               | 1160.1      | 7.46                                                           |
| 1210.0               | 1220.1      | 7.90                                                           |
| 1270.0               | 1280.1      | 7.56                                                           |
| 1330.0               | 1340.1      | 8.05                                                           |
| 1390.0               | 1400.1      | 7.79                                                           |
| 1430.0               | 1440.1      | 8.03                                                           |
| 1490.0               | 1500.1      | 7.91                                                           |
| 1530.0               | 1540.1      | 7.90                                                           |
| 1590.0               | 1600.1      | 8.18                                                           |
| 1630.0               | 1640.1      | 8.01                                                           |
| 1690.0               | 1700.1      | 7.86                                                           |
| 1730.0               | 1740.1      | 8.14                                                           |
| 1790.0               | 1800.1      | 8.14                                                           |
| 1830.0               | 1840.1      | 8.29                                                           |
| 1890.0               | 1900.1      | 8.65                                                           |
| 1930.0               | 1940.1      | 8.73                                                           |
| 1990.0               | 2000.1      | 9.19                                                           |
| 2030.0               | 2040.1      | 9.34                                                           |
| 2090.0               | 2100.1      | 9.84                                                           |
| 2130.0               | 2140.1      | 10.14                                                          |
| 2190.0               | 2200.1      | 10.67                                                          |

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=1510.1MHz<br>(dB) |
|----------------------|-------------|------------------------------------------------------------------|
|                      |             | @LO (dBm)                                                        |
|                      |             | +7                                                               |
| 1500.0               | 10.1        | 7.41                                                             |
| 1459.2               | 50.9        | 7.29                                                             |
| 1418.4               | 91.7        | 7.34                                                             |
| 1377.5               | 132.6       | 7.36                                                             |
| 1336.7               | 173.4       | 7.33                                                             |
| 1295.9               | 214.2       | 7.38                                                             |
| 1255.1               | 255.0       | 7.39                                                             |
| 1214.2               | 295.9       | 7.42                                                             |
| 1173.4               | 336.7       | 7.42                                                             |
| 1132.6               | 377.5       | 7.23                                                             |
| 1091.8               | 418.3       | 7.38                                                             |
| 1051.0               | 459.1       | 7.37                                                             |
| 1010.1               | 500.0       | 7.41                                                             |
| 969.3                | 540.8       | 7.42                                                             |
| 928.5                | 581.6       | 7.44                                                             |
| 887.7                | 622.4       | 7.37                                                             |
| 846.8                | 663.3       | 7.43                                                             |
| 806.0                | 704.1       | 7.43                                                             |
| 765.2                | 744.9       | 7.45                                                             |
| 724.4                | 785.7       | 7.45                                                             |
| 683.6                | 826.5       | 7.40                                                             |
| 642.7                | 867.4       | 7.40                                                             |
| 601.9                | 908.2       | 7.41                                                             |
| 561.1                | 949.0       | 7.40                                                             |
| 520.3                | 989.8       | 7.34                                                             |
| 479.5                | 1030.6      | 7.23                                                             |
| 438.6                | 1071.5      | 7.12                                                             |
| 397.8                | 1112.3      | 7.11                                                             |
| 357.0                | 1153.1      | 7.17                                                             |
| 316.2                | 1193.9      | 7.29                                                             |
| 275.3                | 1234.8      | 7.29                                                             |
| 254.9                | 1255.2      | 7.23                                                             |
| 214.1                | 1296.0      | 7.27                                                             |
| 193.7                | 1316.4      | 7.28                                                             |
| 152.9                | 1357.2      | 7.32                                                             |
| 132.5                | 1377.6      | 7.39                                                             |
| 91.6                 | 1418.5      | 7.42                                                             |
| 71.2                 | 1438.9      | 7.41                                                             |
| 30.4                 | 1479.7      | 7.47                                                             |
| 10.0                 | 1500.1      | 7.61                                                             |



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# Frequency Mixer

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## Typical Performance Data

| LO<br><br>(MHz) | LO-RF ISOLATION<br>(dB) |       |       | LO-IF ISOLATION<br>(dB) |       |       | RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|-----------------|-------------------------|-------|-------|-------------------------|-------|-------|---------------------|-------------|-------------------------|-------|-------|
|                 | @LO (dBm)               |       |       | @LO (dBm)               |       |       |                     |             | @LO (dBm)               |       |       |
|                 | +4                      | +7    | +10   | +4                      | +7    | +10   |                     |             | +4                      | +7    | +10   |
| 40.1            | 62.66                   | 63.10 | 63.08 | 43.94                   | 43.90 | 43.84 | 10.1                | 40.1        | 65.20                   | 67.18 | 65.34 |
| 120.4           | 54.66                   | 54.86 | 54.77 | 35.49                   | 35.82 | 36.00 | 90.4                | 120.4       | 50.57                   | 49.77 | 49.27 |
| 200.7           | 50.61                   | 50.83 | 50.99 | 32.16                   | 32.48 | 32.49 | 170.7               | 200.7       | 45.07                   | 44.38 | 43.93 |
| 281.0           | 47.93                   | 48.24 | 48.44 | 30.06                   | 30.26 | 30.18 | 251.0               | 281.0       | 42.21                   | 41.47 | 41.12 |
| 361.3           | 46.23                   | 46.66 | 46.97 | 28.35                   | 28.55 | 28.52 | 331.3               | 361.3       | 40.84                   | 40.13 | 39.79 |
| 441.5           | 44.80                   | 45.30 | 45.68 | 26.52                   | 26.91 | 27.12 | 411.5               | 441.5       | 39.63                   | 38.82 | 38.29 |
| 521.8           | 43.54                   | 44.27 | 44.86 | 24.89                   | 25.55 | 26.02 | 491.8               | 521.8       | 38.88                   | 38.00 | 37.42 |
| 582.0           | 42.69                   | 43.55 | 44.27 | 23.89                   | 24.77 | 25.39 | 552.0               | 582.0       | 39.55                   | 38.47 | 37.70 |
| 662.3           | 41.88                   | 42.52 | 43.23 | 22.69                   | 23.69 | 24.65 | 632.3               | 662.3       | 38.57                   | 37.32 | 36.61 |
| 722.5           | 41.71                   | 42.60 | 43.36 | 22.03                   | 23.11 | 24.10 | 692.5               | 722.5       | 37.69                   | 37.18 | 36.41 |
| 802.8           | 41.18                   | 42.10 | 42.87 | 21.15                   | 22.50 | 23.77 | 772.8               | 802.8       | 35.56                   | 35.79 | 35.96 |
| 863.0           | 41.06                   | 41.90 | 42.83 | 20.40                   | 21.81 | 23.27 | 833.0               | 863.0       | 36.16                   | 36.03 | 36.35 |
| 943.3           | 40.25                   | 41.04 | 41.77 | 19.72                   | 21.05 | 22.48 | 913.3               | 943.3       | 34.61                   | 34.42 | 33.89 |
| 1003.6          | 39.78                   | 40.62 | 41.42 | 19.56                   | 21.04 | 22.52 | 973.6               | 1003.6      | 32.35                   | 32.07 | 31.71 |
| 1083.8          | 39.89                   | 41.09 | 42.10 | 18.92                   | 20.57 | 22.23 | 1053.8              | 1083.8      | 29.47                   | 29.30 | 28.84 |
| 1144.1          | 39.82                   | 41.69 | 43.25 | 18.43                   | 20.11 | 21.89 | 1114.1              | 1144.1      | 27.31                   | 27.28 | 26.93 |
| 1224.3          | 40.14                   | 42.54 | 45.30 | 18.18                   | 19.88 | 21.68 | 1194.3              | 1224.3      | 25.65                   | 25.54 | 25.50 |
| 1284.6          | 40.78                   | 43.53 | 46.83 | 17.86                   | 19.52 | 21.09 | 1254.6              | 1284.6      | 24.56                   | 24.46 | 24.38 |
| 1364.8          | 42.26                   | 46.38 | 51.78 | 17.60                   | 19.24 | 20.54 | 1334.8              | 1364.8      | 23.63                   | 23.59 | 23.78 |
| 1425.1          | 44.09                   | 50.30 | 60.72 | 17.43                   | 18.97 | 20.02 | 1395.1              | 1425.1      | 23.28                   | 23.16 | 23.39 |
| 1505.4          | 44.61                   | 51.14 | 53.28 | 17.11                   | 18.59 | 19.52 | 1475.4              | 1505.4      | 23.11                   | 22.71 | 22.77 |
| 1565.6          | 41.16                   | 46.29 | 57.61 | 17.58                   | 19.00 | 19.53 | 1535.6              | 1565.6      | 22.31                   | 21.92 | 21.93 |
| 1645.9          | 45.08                   | 53.76 | 59.81 | 16.82                   | 17.85 | 18.13 | 1615.9              | 1645.9      | 24.47                   | 23.67 | 23.62 |
| 1706.1          | 44.63                   | 50.88 | 61.24 | 16.04                   | 16.96 | 16.94 | 1676.1              | 1706.1      | 24.82                   | 24.14 | 23.96 |
| 1786.4          | 44.51                   | 49.24 | 54.31 | 14.99                   | 15.37 | 15.12 | 1756.4              | 1786.4      | 25.74                   | 25.18 | 25.36 |
| 1846.6          | 44.97                   | 50.10 | 53.99 | 14.17                   | 14.20 | 14.01 | 1816.6              | 1846.6      | 26.64                   | 26.72 | 27.22 |
| 1926.9          | 47.83                   | 53.86 | 52.78 | 13.05                   | 13.02 | 12.58 | 1896.9              | 1926.9      | 26.95                   | 28.61 | 29.22 |
| 1987.1          | 49.85                   | 55.01 | 50.95 | 12.15                   | 12.09 | 11.82 | 1957.1              | 1987.1      | 26.89                   | 29.16 | 30.50 |
| 2067.4          | 48.85                   | 50.16 | 47.20 | 11.29                   | 11.00 | 10.96 | 2037.4              | 2067.4      | 27.12                   | 29.49 | 31.23 |
| 2127.6          | 46.02                   | 46.36 | 44.06 | 11.04                   | 10.66 | 10.50 | 2097.6              | 2127.6      | 27.53                   | 29.65 | 31.06 |
| 2207.9          | 43.30                   | 43.13 | 41.25 | 10.61                   | 10.13 | 9.77  | 2177.9              | 2207.9      | 27.70                   | 28.96 | 30.34 |
| 2268.1          | 41.50                   | 41.05 | 39.81 | 10.05                   | 9.75  | 9.35  | 2238.1              | 2268.1      | 27.79                   | 28.54 | 29.47 |
| 2348.4          | 38.63                   | 38.01 | 37.44 | 9.66                    | 9.44  | 9.17  | 2318.4              | 2348.4      | 27.21                   | 27.45 | 27.97 |
| 2408.6          | 36.69                   | 35.92 | 35.75 | 9.42                    | 9.06  | 8.98  | 2378.6              | 2408.6      | 26.34                   | 26.59 | 26.91 |
| 2488.9          | 34.57                   | 34.10 | 34.05 | 9.06                    | 8.72  | 8.67  | 2458.9              | 2488.9      | 25.05                   | 25.63 | 25.90 |
| 2549.1          | 33.24                   | 33.06 | 33.35 | 9.05                    | 8.72  | 8.81  | 2519.1              | 2549.1      | 24.06                   | 24.96 | 25.26 |
| 2629.4          | 31.32                   | 31.69 | 32.08 | 8.69                    | 8.70  | 8.58  | 2599.4              | 2629.4      | 22.77                   | 23.94 | 24.49 |
| 2689.6          | 30.09                   | 30.63 | 31.14 | 8.47                    | 8.58  | 8.48  | 2659.6              | 2689.6      | 21.56                   | 22.88 | 23.65 |
| 2769.9          | 28.70                   | 29.34 | 30.04 | 8.27                    | 8.51  | 8.49  | 2739.9              | 2769.9      | 20.41                   | 21.62 | 22.42 |
| 2830.1          | 27.61                   | 28.23 | 29.04 | 8.16                    | 8.47  | 8.56  | 2800.1              | 2830.1      | 19.63                   | 20.63 | 21.38 |

# Frequency Mixer

TFM-5+

## 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=1500MHz<br>(:1) |      |      |
|---------------------|-------------|-----------------|------|------|-------------|-----------------|------|------|----------------------|--------------------------------|------|------|
|                     |             | @LO (dBm)       |      |      |             | @LO (dBm)       |      |      |                      | @LO (dBm)                      |      |      |
|                     |             | +4              | +7   | +10  |             | +4              | +7   | +10  |                      | +4                             | +7   | +10  |
| 10.1                | 40.1        | 1.49            | 1.59 | 1.74 | 40.1        | 2.09            | 3.11 | 4.55 | 10.0                 | 1.73                           | 1.44 | 1.21 |
| 90.4                | 120.4       | 1.25            | 1.33 | 1.41 | 120.4       | 1.89            | 2.64 | 3.60 | 50.5                 | 1.75                           | 1.46 | 1.22 |
| 170.7               | 200.7       | 1.25            | 1.33 | 1.39 | 200.7       | 1.81            | 2.49 | 3.34 | 91.1                 | 1.77                           | 1.48 | 1.24 |
| 251.0               | 281.0       | 1.27            | 1.34 | 1.40 | 281.0       | 1.88            | 2.57 | 3.40 | 131.6                | 1.77                           | 1.48 | 1.25 |
| 331.3               | 361.3       | 1.31            | 1.38 | 1.42 | 361.3       | 1.95            | 2.68 | 3.54 | 172.2                | 1.80                           | 1.51 | 1.29 |
| 411.5               | 441.5       | 1.33            | 1.39 | 1.45 | 441.5       | 1.93            | 2.60 | 3.37 | 212.7                | 1.78                           | 1.50 | 1.28 |
| 491.8               | 521.8       | 1.33            | 1.39 | 1.44 | 521.8       | 1.93            | 2.58 | 3.34 | 253.3                | 1.82                           | 1.53 | 1.31 |
| 552.0               | 582.0       | 1.32            | 1.38 | 1.43 | 582.0       | 1.92            | 2.52 | 3.22 | 293.8                | 1.80                           | 1.51 | 1.30 |
| 632.3               | 662.3       | 1.32            | 1.37 | 1.41 | 662.3       | 1.94            | 2.50 | 3.14 | 334.4                | 1.82                           | 1.53 | 1.32 |
| 692.5               | 722.5       | 1.33            | 1.38 | 1.42 | 722.5       | 1.98            | 2.51 | 3.11 | 374.9                | 1.86                           | 1.57 | 1.35 |
| 772.8               | 802.8       | 1.33            | 1.36 | 1.39 | 802.8       | 1.99            | 2.49 | 3.04 | 415.5                | 1.87                           | 1.58 | 1.36 |
| 833.0               | 863.0       | 1.32            | 1.33 | 1.35 | 863.0       | 1.99            | 2.45 | 2.96 | 456.0                | 1.94                           | 1.64 | 1.41 |
| 913.3               | 943.3       | 1.35            | 1.35 | 1.35 | 943.3       | 2.01            | 2.43 | 2.90 | 496.6                | 1.94                           | 1.64 | 1.41 |
| 973.6               | 1003.6      | 1.39            | 1.37 | 1.37 | 1003.6      | 2.02            | 2.42 | 2.86 | 537.1                | 2.05                           | 1.73 | 1.49 |
| 1053.8              | 1083.8      | 1.49            | 1.46 | 1.45 | 1083.8      | 2.04            | 2.41 | 2.82 | 577.7                | 2.05                           | 1.74 | 1.50 |
| 1114.1              | 1144.1      | 1.62            | 1.56 | 1.54 | 1144.1      | 2.06            | 2.42 | 2.82 | 618.2                | 2.09                           | 1.77 | 1.52 |
| 1194.3              | 1224.3      | 1.81            | 1.73 | 1.69 | 1224.3      | 2.07            | 2.42 | 2.79 | 658.8                | 2.13                           | 1.81 | 1.56 |
| 1254.6              | 1284.6      | 1.93            | 1.86 | 1.81 | 1284.6      | 2.08            | 2.41 | 2.78 | 699.3                | 2.14                           | 1.81 | 1.56 |
| 1334.8              | 1364.8      | 2.10            | 2.02 | 1.96 | 1364.8      | 2.11            | 2.42 | 2.77 | 739.9                | 2.20                           | 1.87 | 1.61 |
| 1395.1              | 1425.1      | 2.24            | 2.14 | 2.07 | 1425.1      | 2.12            | 2.40 | 2.73 | 780.4                | 2.16                           | 1.84 | 1.58 |
| 1475.4              | 1505.4      | 2.40            | 2.31 | 2.23 | 1505.4      | 2.15            | 2.41 | 2.74 | 821.0                | 2.20                           | 1.88 | 1.61 |
| 1535.6              | 1565.6      | 2.43            | 2.36 | 2.29 | 1565.6      | 2.18            | 2.44 | 2.74 | 861.5                | 2.19                           | 1.88 | 1.61 |
| 1615.9              | 1645.9      | 2.57            | 2.50 | 2.42 | 1645.9      | 2.23            | 2.44 | 2.74 | 902.1                | 2.19                           | 1.88 | 1.60 |
| 1676.1              | 1706.1      | 2.69            | 2.63 | 2.55 | 1706.1      | 2.25            | 2.43 | 2.71 | 942.6                | 2.22                           | 1.91 | 1.64 |
| 1756.4              | 1786.4      | 2.72            | 2.72 | 2.69 | 1786.4      | 2.30            | 2.45 | 2.72 | 983.2                | 2.17                           | 1.87 | 1.60 |
| 1816.6              | 1846.6      | 2.69            | 2.77 | 2.79 | 1846.6      | 2.35            | 2.49 | 2.75 | 1023.7               | 2.20                           | 1.91 | 1.64 |
| 1896.9              | 1926.9      | 2.67            | 2.78 | 2.89 | 1926.9      | 2.44            | 2.54 | 2.77 | 1064.2               | 2.15                           | 1.87 | 1.61 |
| 1957.1              | 1987.1      | 2.76            | 2.80 | 2.93 | 1987.1      | 2.54            | 2.59 | 2.78 | 1104.8               | 2.18                           | 1.91 | 1.65 |
| 2037.4              | 2067.4      | 2.89            | 2.86 | 2.98 | 2067.4      | 2.66            | 2.67 | 2.82 | 1145.3               | 2.11                           | 1.85 | 1.60 |
| 2097.6              | 2127.6      | 3.00            | 2.92 | 3.00 | 2127.6      | 2.74            | 2.73 | 2.88 | 1185.9               | 2.09                           | 1.83 | 1.60 |
| 2177.9              | 2207.9      | 3.22            | 3.05 | 3.08 | 2207.9      | 2.84            | 2.80 | 2.91 | 1226.4               | 2.06                           | 1.82 | 1.59 |
| 2238.1              | 2268.1      | 3.40            | 3.20 | 3.20 | 2268.1      | 2.89            | 2.85 | 2.92 | 1246.7               | 1.98                           | 1.74 | 1.53 |
| 2318.4              | 2348.4      | 3.58            | 3.36 | 3.34 | 2348.4      | 2.98            | 2.92 | 3.00 | 1287.3               | 1.94                           | 1.72 | 1.51 |
| 2378.6              | 2408.6      | 3.76            | 3.46 | 3.40 | 2408.6      | 3.04            | 2.95 | 3.03 | 1307.5               | 1.94                           | 1.72 | 1.52 |
| 2458.9              | 2488.9      | 4.15            | 3.73 | 3.62 | 2488.9      | 3.09            | 3.03 | 3.02 | 1348.1               | 1.83                           | 1.63 | 1.44 |
| 2519.1              | 2549.1      | 4.36            | 3.92 | 3.80 | 2549.1      | 3.21            | 3.14 | 3.17 | 1368.4               | 1.83                           | 1.62 | 1.44 |
| 2599.4              | 2629.4      | 4.62            | 4.20 | 4.05 | 2629.4      | 3.32            | 3.22 | 3.21 | 1408.9               | 1.79                           | 1.60 | 1.42 |
| 2659.6              | 2689.6      | 5.10            | 4.50 | 4.32 | 2689.6      | 3.38            | 3.27 | 3.20 | 1429.2               | 1.71                           | 1.52 | 1.36 |
| 2739.9              | 2769.9      | 5.77            | 4.88 | 4.67 | 2769.9      | 3.48            | 3.41 | 3.35 | 1469.7               | 1.64                           | 1.45 | 1.29 |
| 2800.1              | 2830.1      | 6.13            | 5.10 | 4.88 | 2830.1      | 3.58            | 3.52 | 3.47 | 1490.0               | 1.65                           | 1.48 | 1.33 |



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IF/RF MICROWAVE COMPONENTS



REV. X1

TFM-5+

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## Harmonics Tables

RF HARMONICS ORDER

| (-dBm) |     |     |     |     |     |     |     |     |     |     |     |     |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -   | -   | +5  | 24  | 19  | 31  | 6   | 33  | 13  | 37  | 32  | 60  |
| 1      | -   | 32  | +0  | 42  | 13  | 33  | 38  | 48  | 32  | 54  | 39  | 57  |
| 2      | 88  | >69 | 51  | 65  | 60  | 66  | 61  | >69 | 45  | 67  | 48  | 67  |
| 3      | >90 | >69 | >69 | >69 | 66  | >69 | 62  | >69 | >69 | >69 | 68  | >69 |
| 4      | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 5      | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 6      | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 7      | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 8      | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 9      | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 10     | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| RF CAL | 0   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

## LO HARMONICS ORDER

Test conditions: RF IN: 750 MHz; -14.00 dBm.  
 LO IN: 780 MHz; +7.00 dBm  
 IF OUT: 30 MHz; -21.02 dBm

RF HARMONICS ORDER

| (-dBm) |     |     |     |     |     |     |     |     |     |     |     |     |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -   | -   | 5   | 34  | 29  | 43  | 18  | 46  | 27  | 53  | 44  | 75  |
| 1      | -   | 32  | +0  | 41  | 13  | 35  | 38  | 53  | 34  | 57  | 44  | 65  |
| 2      | 68  | 69  | 41  | 60  | 48  | 57  | 50  | 63  | 37  | 63  | 41  | 62  |
| 3      | >90 | 57  | 49  | 56  | 52  | 57  | 47  | 54  | 62  | 69  | 50  | 73  |
| 4      | >90 | >79 | 72  | 73  | 68  | 75  | 60  | >79 | 63  | >79 | 57  | 72  |
| 5      | >90 | >79 | >79 | 79  | 62  | 73  | 58  | 71  | 58  | 72  | 69  | >79 |
| 6      | >90 | >79 | >79 | >79 | 75  | >79 | 73  | >79 | 71  | >79 | 75  | >79 |
| 7      | >90 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 |
| 8      | >90 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 |
| 9      | >90 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 |
| 10     | >90 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 |
| RF CAL | 0   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

## LO HARMONICS ORDER

Test conditions: RF IN: 750 MHz; -4.00 dBm.  
 LO IN: 780 MHz; +7.00 dBm  
 IF OUT: 30 MHz; -10.96 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 Harmonic level of the RF input signal to the mixer.



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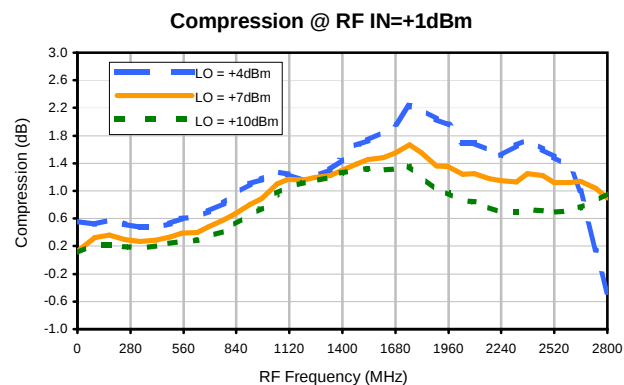
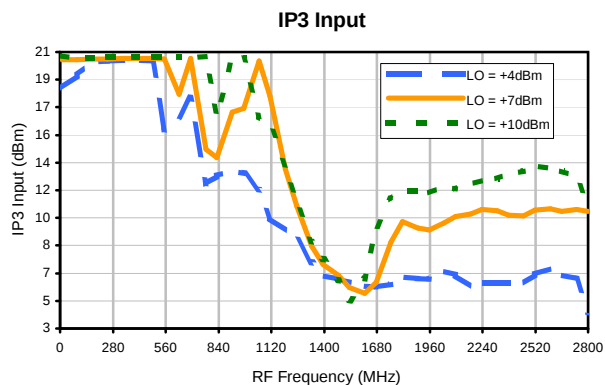
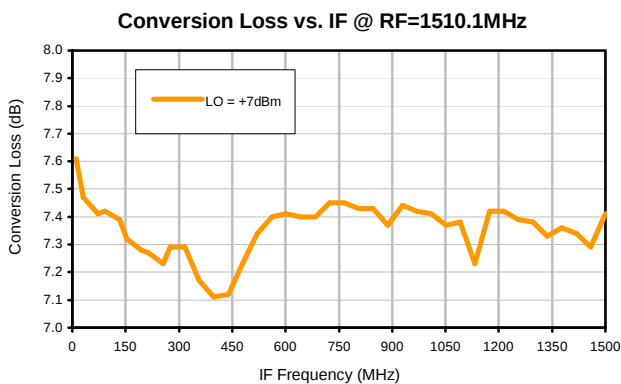
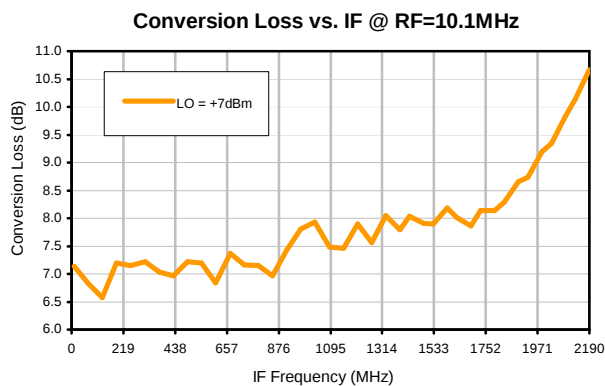
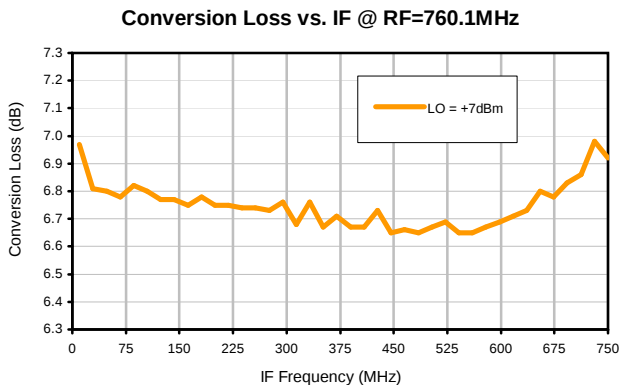
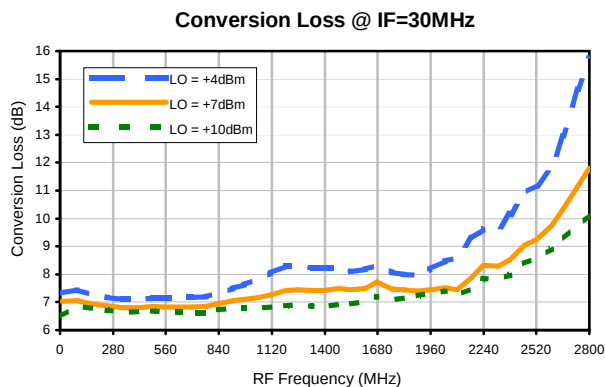
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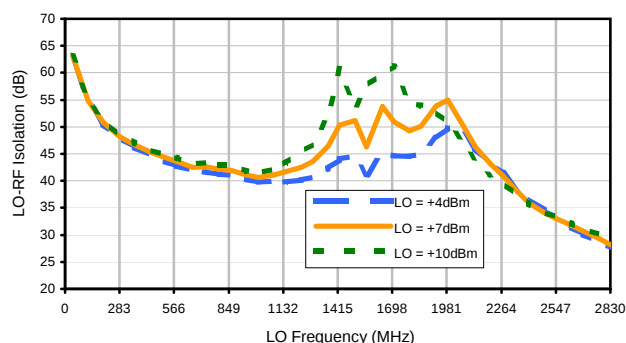
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## Typical Performance Curves

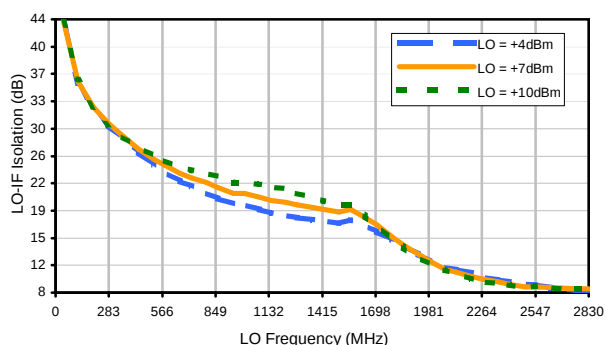


## Typical Performance Curves

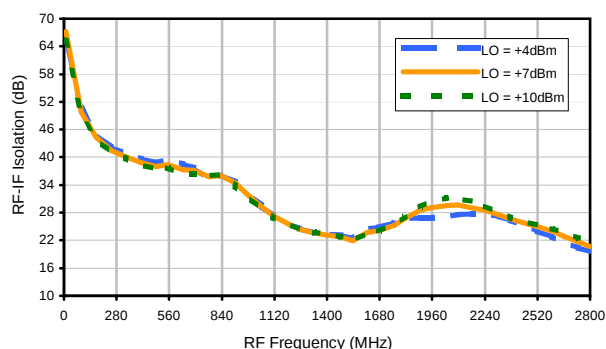
LO-RF Isolation



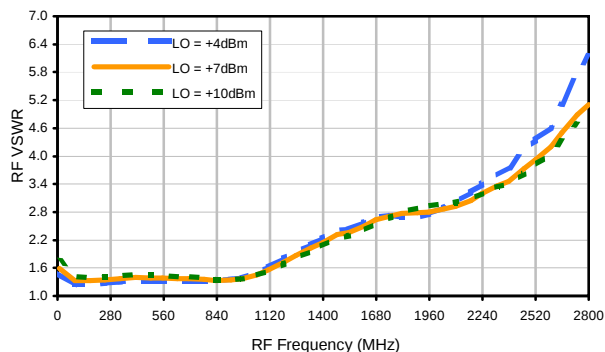
LO-IF Isolation



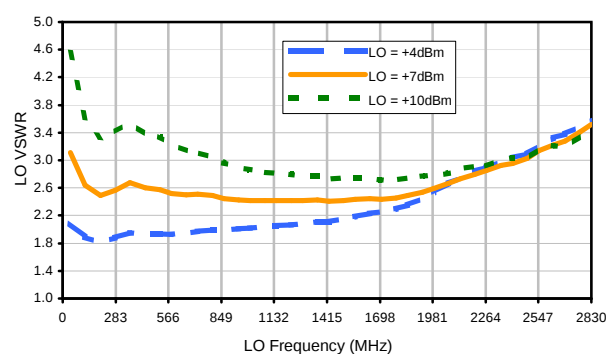
RF-IF Isolation



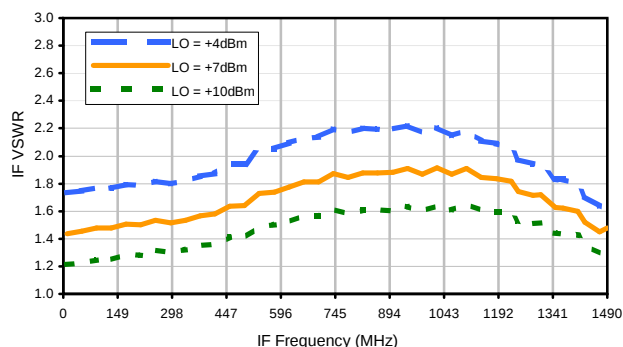
RF VSWR



LO VSWR



IF VSWR



## Harmonics Tables

RF HARMONICS ORDER

|        | (-dBm) |     |     |     |     |     |     |     |     |     |     |     |
|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -   | +5  | 24  | 19  | 31  | 6   | 33  | 13  | 37  | 32  | 60  |
| 1      | -      | 32  | +0  | 42  | 13  | 33  | 38  | 48  | 32  | 54  | 39  | 57  |
| 2      | 88     | >69 | 51  | 65  | 60  | 66  | 61  | >69 | 45  | 67  | 48  | 67  |
| 3      | >90    | >69 | >69 | >69 | 66  | >69 | 62  | >69 | >69 | >69 | 68  | >69 |
| 4      | >90    | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 5      | >90    | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 6      | >90    | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 7      | >90    | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 8      | >90    | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 9      | >90    | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 10     | >90    | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

### LO HARMONICS ORDER

Test conditions: RF IN: 750 MHz; -14.00 dBm.  
LO IN: 780 MHz; +7.00 dBm  
IF OUT: 30 MHz; -21.02 dBm

RF HARMONICS ORDER

|        | (-dBm) |     |     |     |     |     |     |     |     |     |     |     |
|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -   | 5   | 34  | 29  | 43  | 18  | 46  | 27  | 53  | 44  | 75  |
| 1      | -      | 32  | +0  | 41  | 13  | 35  | 38  | 53  | 34  | 57  | 44  | 65  |
| 2      | 68     | 69  | 41  | 60  | 48  | 57  | 50  | 63  | 37  | 63  | 41  | 62  |
| 3      | >90    | 57  | 49  | 56  | 52  | 57  | 47  | 54  | 62  | 69  | 50  | 73  |
| 4      | >90    | >79 | 72  | 73  | 68  | 75  | 60  | >79 | 63  | >79 | 57  | 72  |
| 5      | >90    | >79 | >79 | 79  | 62  | 73  | 58  | 71  | 58  | 72  | 69  | >79 |
| 6      | >90    | >79 | >79 | >79 | 75  | >79 | 73  | >79 | 71  | >79 | 75  | >79 |
| 7      | >90    | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 |
| 8      | >90    | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 |
| 9      | >90    | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 |
| 10     | >90    | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 |
| RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

### LO HARMONICS ORDER

Test conditions: RF IN: 750 MHz; -4.00 dBm.  
LO IN: 780 MHz; +7.00 dBm  
IF OUT: 30 MHz; -10.96 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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The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

IF/RF MICROWAVE COMPONENTS

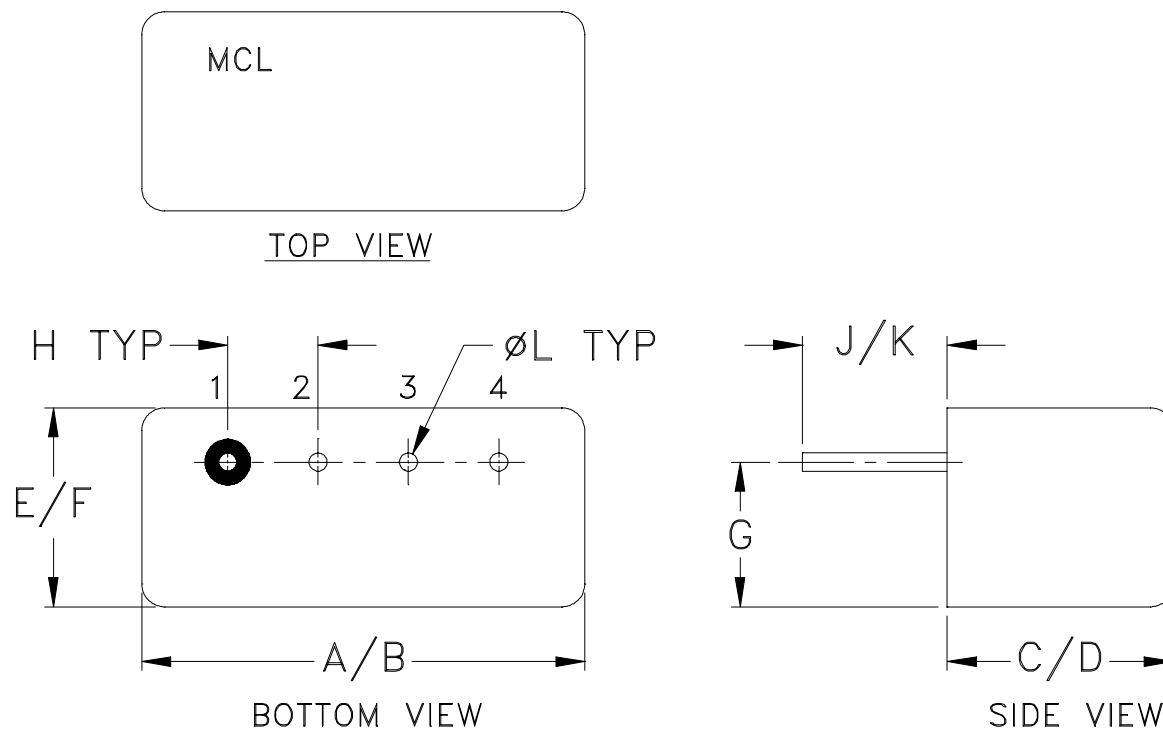


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B02

B13

## Outline Dimensions



| CASE# | A               | B               | C              | D               | E              | F              | G             | H              | J             | K             | L             | WT,<br>GRAM |
|-------|-----------------|-----------------|----------------|-----------------|----------------|----------------|---------------|----------------|---------------|---------------|---------------|-------------|
| B02   | .480<br>(12.19) | .500<br>(12.70) | .240<br>(6.10) | .255<br>(6.48)  | .210<br>(5.33) | .230<br>(5.84) | .16<br>(4.06) | .100<br>(2.54) | .14<br>(3.56) | .20<br>(5.08) | .020<br>(.51) | 1.9         |
| B13   |                 |                 | .390<br>(9.91) | .405<br>(10.29) |                |                |               |                |               |               |               | 2.3         |

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .03$ ; 3 Pl.  $\pm .015$

### Notes:

- Header material: C.R.S.  
Pin material: #52 alloy.  
Cover material: Cupro-Nickel.
- Pin finish: Electro Tin-Silver.
- Tolerance on pin diameter  $\pm .005$  inch.
- Glass meniscus 0.015 inch max.
- Blue bead indicates Pin 1. Pin numbers do not appear on unit, for reference only.



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

| Specification                  | Test/Inspection Condition                                                                                                                                       | Reference/Spec                                                                                       |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Operating Temperature          | -55° to 100° C<br>Ambient Environment                                                                                                                           | Individual Model Data Sheet                                                                          |
| Storage Temperature            | -55° to 100° C<br>Ambient Environment                                                                                                                           | Individual Model Data Sheet                                                                          |
| Thermal Shock                  | -55° to 100°C, 100 cycles                                                                                                                                       | MIL-STD-202, Method 107, Condition A-3, except +100°C                                                |
| 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                                                                 |
| Moisture Resistance            | 10 cycles, 24 hours per cycle                                                                                                                                   | MIL-STD-202, Method 106, Condition A, except 50°C and end point electrical test done within 12 hours |
| Solderability                  | 10X Magnification                                                                                                                                               | J-STD-002, 95% Coverage                                                                              |
| Resistance to Solder Heat      | 260°C for 10 seconds                                                                                                                                            | MIL-STD-202, Method 210, Condition B                                                                 |
| 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                                                                              |
| Terminal Strength              | 4 1/2 Pound Pull                                                                                                                                                | MIL-STD-202, Method 211, Condition A                                                                 |



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| Specification       | Test/Inspection Condition | Reference/Spec                       |
|---------------------|---------------------------|--------------------------------------|
| Gross Leak          | 125°C Bubble Test         | MIL-STD-202, Method 112, Condition D |
| Barometric Pressure | 100,000 Feet              | MIL-STD-202, Method 105, Condition D |