

# Frequency Mixer

## Level 7 (LO Power +7 dBm) 750 to 2400 MHz

## TFM-2400+



Generic photo used for illustration purposes only

CASE STYLE: B13

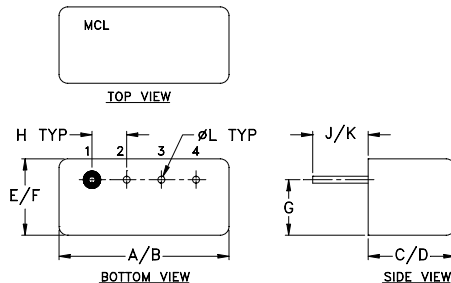
### Maximum Ratings

|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| Operating Temperature                                           | -55°C to 100°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          | 2 |
| GROUND      | 3 |
| CASE GROUND | 3 |

### Outline Drawing



### Outline Dimensions (inch/mm)

| A     | B     | C    | D     | E    | F     |
|-------|-------|------|-------|------|-------|
| .480  | .500  | .390 | .405  | .210 | .230  |
| 12.19 | 12.70 | 9.91 | 10.29 | 5.33 | 5.84  |
| G     | H     | J    | K     | L    | wt    |
| .16   | .100  | .14  | .20   | .020 | grams |
| 4.06  | 2.54  | 3.56 | 5.08  | 0.51 | 2.3   |

### Features

- low conversion loss, 6.65 dB typ.
- wideband, 700 to 2400 MHz
- rugged welded construction
- hermetically sealed

### Applications

- base station
- cellular
- DCS, PCS
- communications systems

### Electrical Specifications

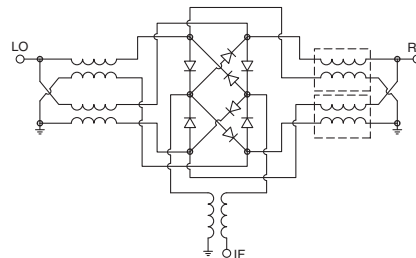
| FREQUENCY (MHz) |        | CONVERSION LOSS (dB) |          |      | LO-RF ISOLATION (dB) |      | LO-IF ISOLATION (dB) |      |
|-----------------|--------|----------------------|----------|------|----------------------|------|----------------------|------|
| LO/RF           | IF     | $\bar{X}$            | $\sigma$ | Max. | Typ.                 | Min. | Typ.                 | Min. |
| $f_L - f_U$     |        |                      |          |      |                      |      |                      |      |
| 750-2400        | DC-400 | 6.65                 | 0.20     | 9.0  | 30                   | 20   | 30                   | 10   |

1 dB COMP.: +1 dBm typ.

### Typical Performance Data

| Frequency (MHz) |         | Conversion Loss (dB) | Isolation L-R (dB) | Isolation L-I (dB) | VSWR RF Port (:1) | VSWR LO Port (:1) |
|-----------------|---------|----------------------|--------------------|--------------------|-------------------|-------------------|
| RF              | LO      | LO +7dBm             | LO +7dBm           | LO +7dBm           | LO +7dBm          | LO +7dBm          |
| 500.00          | 530.00  | 5.45                 | 54.10              | 25.42              | 1.90              | 2.44              |
| 650.00          | 680.00  | 5.24                 | 46.72              | 24.17              | 1.19              | 2.42              |
| 800.00          | 830.00  | 5.18                 | 50.53              | 24.04              | 1.21              | 2.60              |
| 950.00          | 980.00  | 5.34                 | 39.92              | 22.92              | 1.56              | 2.84              |
| 1000.00         | 1030.00 | 5.61                 | 38.68              | 21.93              | 1.74              | 2.92              |
| 1100.00         | 1070.00 | 6.52                 | 35.67              | 19.02              | 1.90              | 2.94              |
| 1150.00         | 1120.00 | 6.54                 | 35.25              | 17.69              | 2.78              | 2.95              |
| 1250.00         | 1220.00 | 6.21                 | 35.47              | 16.09              | 3.17              | 2.82              |
| 1350.00         | 1320.00 | 6.10                 | 38.09              | 15.24              | 3.20              | 2.88              |
| 1500.00         | 1470.00 | 6.10                 | 40.51              | 17.24              | 3.59              | 3.05              |
| 1650.00         | 1620.00 | 6.97                 | 39.61              | 20.00              | 3.82              | 3.00              |
| 1750.00         | 1720.00 | 7.73                 | 40.56              | 21.79              | 4.92              | 2.60              |
| 1800.00         | 1770.00 | 7.87                 | 41.20              | 23.27              | 5.75              | 2.00              |
| 1950.00         | 1920.00 | 7.91                 | 37.08              | 25.03              | 6.73              | 1.71              |
| 2000.00         | 1970.00 | 7.83                 | 36.28              | 24.82              | 6.63              | 1.59              |
| 2150.00         | 2120.00 | 7.95                 | 34.61              | 21.63              | 7.22              | 1.54              |
| 2300.00         | 2270.00 | 8.12                 | 34.07              | 19.31              | 7.66              | 1.68              |
| 2400.00         | 2370.00 | 8.32                 | 33.85              | 18.30              | 8.43              | 2.03              |
| 2450.00         | 2420.00 | 7.93                 | 33.63              | 17.81              | 8.60              | 2.45              |
| 2500.00         | 2470.00 | 7.98                 | 34.92              | 18.95              | 8.16              | 2.65              |

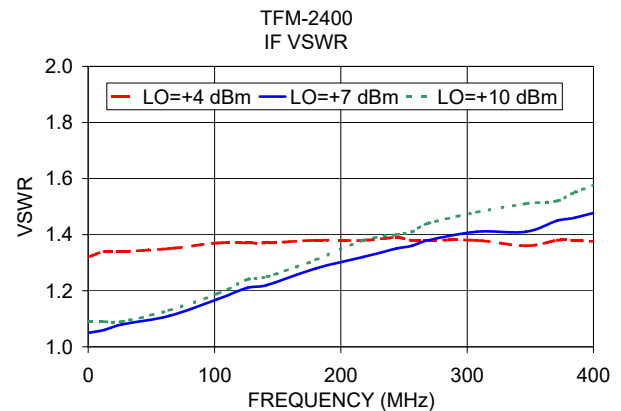
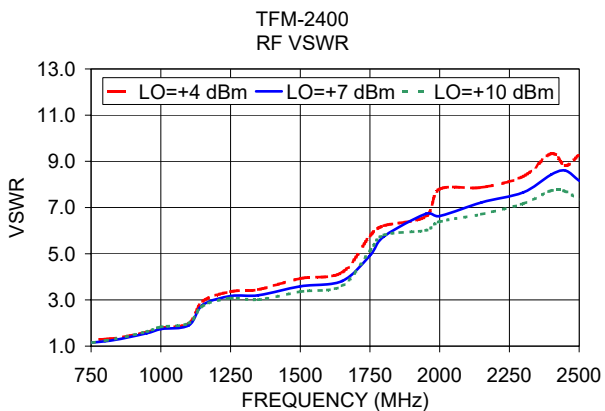
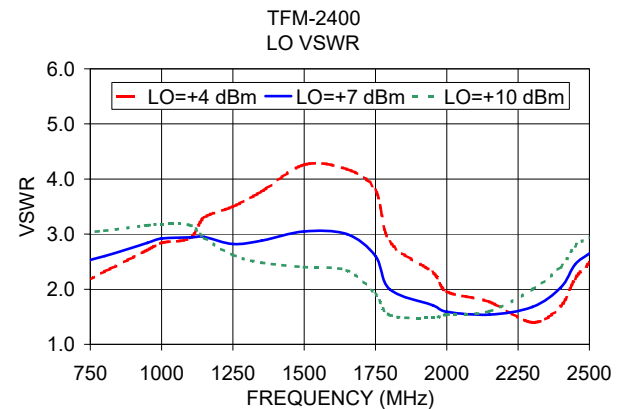
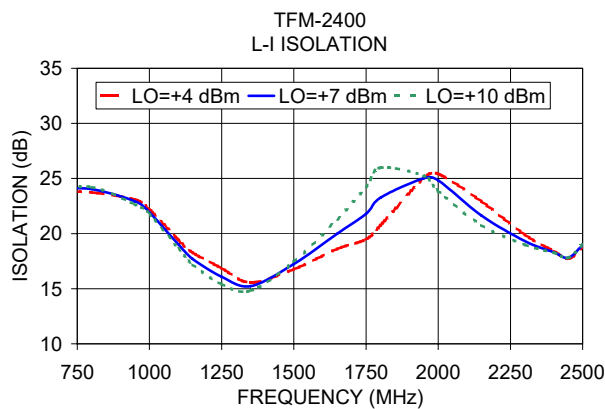
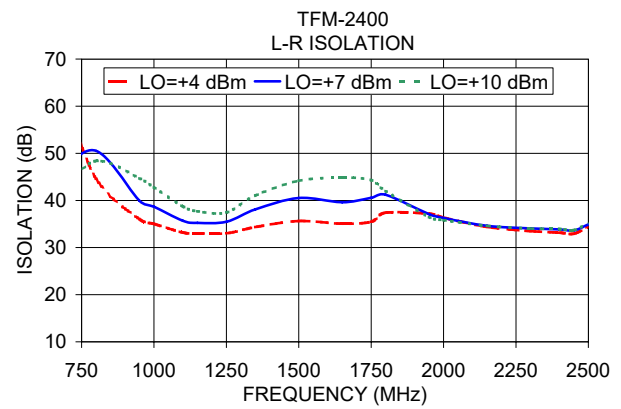
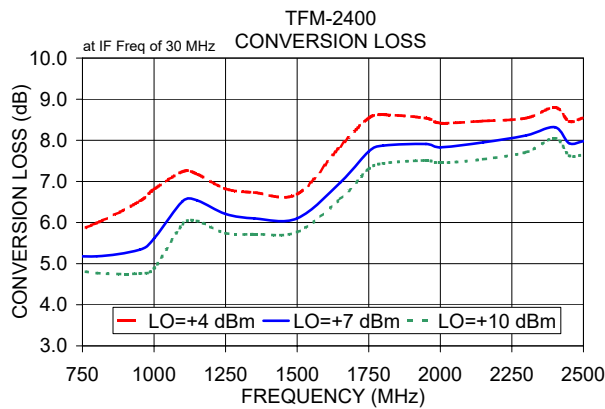
### Electrical Schematic



### Notes

- 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.
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# Frequency Mixer

# TFM-2400+

## 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  |
| 150.0               | 180.0       | 15.25                                                 | 10.20 | 8.07 |
| 250.0               | 280.0       | 8.12                                                  | 6.56  | 6.01 |
| 350.0               | 380.0       | 6.48                                                  | 5.75  | 5.39 |
| 450.0               | 480.0       | 5.98                                                  | 5.40  | 5.09 |
| 550.0               | 580.0       | 5.91                                                  | 5.41  | 5.10 |
| 650.0               | 680.0       | 5.87                                                  | 5.38  | 5.09 |
| 750.0               | 780.0       | 6.09                                                  | 5.55  | 5.24 |
| 850.0               | 880.0       | 6.80                                                  | 6.11  | 5.66 |
| 970.0               | 1000.0      | 7.01                                                  | 6.47  | 6.08 |
| 1070.0              | 1100.0      | 6.90                                                  | 6.47  | 6.15 |
| 1190.0              | 1220.0      | 6.67                                                  | 6.28  | 6.04 |
| 1290.0              | 1320.0      | 6.58                                                  | 6.22  | 5.99 |
| 1410.0              | 1440.0      | 6.44                                                  | 6.13  | 5.94 |
| 1510.0              | 1540.0      | 6.19                                                  | 5.90  | 5.76 |
| 1630.0              | 1660.0      | 6.16                                                  | 5.76  | 5.57 |
| 1730.0              | 1760.0      | 7.19                                                  | 6.52  | 6.15 |
| 1850.0              | 1880.0      | 7.19                                                  | 6.50  | 6.14 |
| 1950.0              | 1980.0      | 6.99                                                  | 6.27  | 5.94 |
| 2070.0              | 2100.0      | 6.81                                                  | 6.18  | 5.82 |
| 2170.0              | 2200.0      | 6.59                                                  | 6.05  | 5.72 |
| 2290.0              | 2320.0      | 6.30                                                  | 5.82  | 5.53 |
| 2390.0              | 2420.0      | 6.21                                                  | 5.78  | 5.50 |
| 2510.0              | 2540.0      | 6.27                                                  | 5.86  | 5.62 |
| 2610.0              | 2640.0      | 6.30                                                  | 5.91  | 5.68 |
| 2730.0              | 2760.0      | 6.36                                                  | 5.97  | 5.74 |
| 2830.0              | 2860.0      | 6.49                                                  | 6.08  | 5.84 |
| 2950.0              | 2980.0      | 6.58                                                  | 6.22  | 6.00 |
| 3050.0              | 3080.0      | 6.77                                                  | 6.43  | 6.24 |
| 3170.0              | 3200.0      | 7.25                                                  | 6.91  | 6.73 |
| 3270.0              | 3300.0      | 7.61                                                  | 7.29  | 7.15 |
| 3390.0              | 3420.0      | 8.09                                                  | 7.70  | 7.53 |
| 3490.0              | 3520.0      | 8.34                                                  | 7.89  | 7.67 |
| 3610.0              | 3640.0      | 8.41                                                  | 7.96  | 7.72 |
| 3710.0              | 3740.0      | 8.63                                                  | 8.12  | 7.85 |
| 3830.0              | 3860.0      | 8.96                                                  | 8.27  | 7.97 |
| 3930.0              | 3960.0      | 9.27                                                  | 8.39  | 8.05 |
| 4050.0              | 4080.0      | 9.84                                                  | 8.70  | 8.27 |
| 4150.0              | 4180.0      | 10.27                                                 | 8.91  | 8.39 |
| 4270.0              | 4300.0      | 10.77                                                 | 9.00  | 8.40 |
| 4370.0              | 4400.0      | 11.40                                                 | 9.21  | 8.42 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | IP3 INPUT<br>(dBm) |       |       |
|---------------------|-------------|--------------------|-------|-------|
|                     |             | @LO (dBm)          |       |       |
|                     |             | +4                 | +7    | +10   |
| 150.0               | 180.0       | -0.71              | 6.23  | 14.97 |
| 250.0               | 280.0       | 7.14               | 10.76 | 17.46 |
| 350.0               | 380.0       | 7.75               | 12.48 | 18.22 |
| 450.0               | 480.0       | 10.26              | 17.52 | 16.66 |
| 550.0               | 580.0       | 12.17              | 17.02 | 14.84 |
| 650.0               | 680.0       | 13.35              | 18.80 | 14.68 |
| 750.0               | 780.0       | 15.70              | 21.22 | 17.84 |
| 850.0               | 880.0       | 11.29              | 14.30 | 15.14 |
| 970.0               | 1000.0      | 8.31               | 9.43  | 10.50 |
| 1070.0              | 1100.0      | 7.94               | 8.56  | 9.44  |
| 1190.0              | 1220.0      | 8.80               | 9.65  | 10.17 |
| 1290.0              | 1320.0      | 8.61               | 9.75  | 10.87 |
| 1410.0              | 1440.0      | 9.73               | 9.93  | 10.72 |
| 1510.0              | 1540.0      | 11.02              | 11.76 | 11.60 |
| 1630.0              | 1660.0      | 13.46              | 15.82 | 16.94 |
| 1730.0              | 1760.0      | 17.39              | 19.15 | 17.45 |
| 1850.0              | 1880.0      | 8.62               | 10.10 | 11.13 |
| 1950.0              | 1980.0      | 7.59               | 9.05  | 10.55 |
| 2070.0              | 2100.0      | 7.36               | 8.40  | 9.86  |
| 2170.0              | 2200.0      | 7.23               | 8.03  | 9.21  |
| 2290.0              | 2320.0      | 6.98               | 7.68  | 8.75  |
| 2390.0              | 2420.0      | 6.80               | 7.22  | 8.05  |
| 2510.0              | 2540.0      | 6.94               | 7.43  | 8.10  |
| 2610.0              | 2640.0      | 7.39               | 7.91  | 8.39  |
| 2730.0              | 2760.0      | 8.05               | 8.69  | 9.22  |
| 2830.0              | 2860.0      | 8.62               | 9.01  | 9.82  |
| 2950.0              | 2980.0      | 9.77               | 9.55  | 9.90  |
| 3050.0              | 3080.0      | 10.53              | 10.57 | 10.84 |
| 3170.0              | 3200.0      | 11.04              | 12.56 | 13.67 |
| 3270.0              | 3300.0      | 11.67              | 13.97 | 15.07 |
| 3390.0              | 3420.0      | 11.68              | 13.78 | 16.30 |
| 3490.0              | 3520.0      | 11.75              | 12.47 | 14.77 |
| 3610.0              | 3640.0      | 12.41              | 12.71 | 13.11 |
| 3710.0              | 3740.0      | 12.23              | 14.46 | 13.20 |
| 3830.0              | 3860.0      | 11.81              | 14.64 | 15.69 |
| 3930.0              | 3960.0      | 11.53              | 14.74 | 16.25 |
| 4050.0              | 4080.0      | 12.30              | 15.48 | 17.14 |
| 4150.0              | 4180.0      | 12.10              | 14.95 | 17.20 |
| 4270.0              | 4300.0      | 10.69              | 13.65 | 15.35 |
| 4370.0              | 4400.0      | 9.85               | 12.35 | 14.59 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | COMPRESSION<br>@RF IN=+1dBm<br>(dB) |       |      |
|---------------------|-------------|-------------------------------------|-------|------|
|                     |             | @LO (dBm)                           |       |      |
|                     |             | +4                                  | +7    | +10  |
| 150.0               | 180.0       | -2.57                               | -0.22 | 0.21 |
| 250.0               | 280.0       | 1.44                                | 1.18  | 0.84 |
| 350.0               | 380.0       | 2.03                                | 1.53  | 1.22 |
| 450.0               | 480.0       | 2.30                                | 1.84  | 1.56 |
| 550.0               | 580.0       | 2.33                                | 1.93  | 1.65 |
| 650.0               | 680.0       | 2.38                                | 2.01  | 1.72 |
| 750.0               | 780.0       | 2.35                                | 2.06  | 1.79 |
| 850.0               | 880.0       | 1.97                                | 1.81  | 1.67 |
| 970.0               | 1000.0      | 1.79                                | 1.58  | 1.42 |
| 1070.0              | 1100.0      | 1.85                                | 1.56  | 1.35 |
| 1190.0              | 1220.0      | 1.67                                | 1.40  | 1.17 |
| 1290.0              | 1320.0      | 1.50                                | 1.24  | 1.05 |
| 1410.0              | 1440.0      | 1.21                                | 0.92  | 0.75 |
| 1510.0              | 1540.0      | 1.04                                | 0.71  | 0.53 |
| 1630.0              | 1660.0      | 1.36                                | 0.97  | 0.72 |
| 1730.0              | 1760.0      | 1.34                                | 1.15  | 0.98 |
| 1850.0              | 1880.0      | 1.34                                | 1.18  | 1.00 |
| 1950.0              | 1980.0      | 1.37                                | 1.24  | 1.06 |
| 2070.0              | 2100.0      | 1.33                                | 1.15  | 0.99 |
| 2170.0              | 2200.0      | 1.40                                | 1.15  | 0.98 |
| 2290.0              | 2320.0      | 1.61                                | 1.33  | 1.13 |
| 2390.0              | 2420.0      | 1.68                                | 1.36  | 1.13 |
| 2510.0              | 2540.0      | 1.68                                | 1.34  | 1.08 |
| 2610.0              | 2640.0      | 1.57                                | 1.25  | 1.02 |
| 2730.0              | 2760.0      | 1.45                                | 1.16  | 0.96 |
| 2830.0              | 2860.0      | 1.35                                | 1.05  | 0.88 |
| 2950.0              | 2980.0      | 1.37                                | 1.04  | 0.86 |
| 3050.0              | 3080.0      | 1.30                                | 0.98  | 0.83 |
| 3170.0              | 3200.0      | 1.14                                | 0.82  | 0.68 |
| 3270.0              | 3300.0      | 0.98                                | 0.64  | 0.54 |
| 3390.0              | 3420.0      | 0.77                                | 0.44  | 0.37 |
| 3490.0              | 3520.0      | 0.75                                | 0.40  | 0.30 |
| 3610.0              | 3640.0      | 0.85                                | 0.44  | 0.30 |
| 3710.0              | 3740.0      | 0.91                                | 0.47  | 0.30 |
| 3830.0              | 3860.0      | 1.01                                | 0.50  | 0.34 |
| 3930.0              | 3960.0      | 1.03                                | 0.53  | 0.34 |
| 4050.0              | 4080.0      | 0.90                                | 0.50  | 0.33 |
| 4150.0              | 4180.0      | 0.78                                | 0.50  | 0.32 |
| 4270.0              | 4300.0      | 0.69                                | 0.52  | 0.33 |
| 4370.0              | 4400.0      | 0.55                                | 0.63  | 0.37 |

# Frequency Mixer

# TFM-2400+

## Typical Performance Data

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=1575MHz<br>(dB) |
|----------------------|-------------|----------------------------------------------------------------|
|                      |             | @LO (dBm)                                                      |
|                      |             | +7                                                             |
| 1390.0               | 185.0       | 10.94                                                          |
| 1316.4               | 258.6       | 9.15                                                           |
| 1242.8               | 332.2       | 8.63                                                           |
| 1169.2               | 405.8       | 8.19                                                           |
| 1095.6               | 479.4       | 8.13                                                           |
| 1022.0               | 553.0       | 8.26                                                           |
| 948.4                | 626.6       | 8.20                                                           |
| 874.8                | 700.2       | 7.70                                                           |
| 801.2                | 773.8       | 6.80                                                           |
| 727.6                | 847.4       | 6.30                                                           |
| 654.0                | 921.0       | 6.47                                                           |
| 580.4                | 994.6       | 6.59                                                           |
| 506.8                | 1068.2      | 6.52                                                           |
| 433.2                | 1141.8      | 6.29                                                           |
| 359.6                | 1215.4      | 6.21                                                           |
| 286.0                | 1289.0      | 6.12                                                           |
| 212.4                | 1362.6      | 6.00                                                           |
| 138.8                | 1436.2      | 5.90                                                           |
| 65.2                 | 1509.8      | 5.83                                                           |
| 10.0                 | 1585.0      | 6.15                                                           |
| 97.5                 | 1672.5      | 5.60                                                           |
| 184.9                | 1759.9      | 5.97                                                           |
| 272.4                | 1847.4      | 6.60                                                           |
| 359.9                | 1934.9      | 6.91                                                           |
| 447.3                | 2022.3      | 7.06                                                           |
| 534.8                | 2109.8      | 7.18                                                           |
| 622.3                | 2197.3      | 7.32                                                           |
| 709.7                | 2284.7      | 7.39                                                           |
| 797.2                | 2372.2      | 7.47                                                           |
| 884.7                | 2459.7      | 7.57                                                           |
| 972.1                | 2547.1      | 7.66                                                           |
| 1037.7               | 2612.7      | 7.77                                                           |
| 1125.2               | 2700.2      | 7.89                                                           |
| 1190.8               | 2765.8      | 7.95                                                           |
| 1278.3               | 2853.3      | 8.17                                                           |
| 1343.9               | 2918.9      | 8.43                                                           |
| 1431.3               | 3006.3      | 8.80                                                           |
| 1496.9               | 3071.9      | 9.36                                                           |
| 1584.4               | 3159.4      | 9.91                                                           |
| 1650.0               | 3225.0      | 10.52                                                          |

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=739.9MHz<br>(dB) |
|----------------------|-------------|-----------------------------------------------------------------|
|                      |             | @LO (dBm)                                                       |
|                      |             | +7                                                              |
| 10.1                 | 750.0       | 5.90                                                            |
| 50.6                 | 790.5       | 5.55                                                            |
| 91.0                 | 830.9       | 5.42                                                            |
| 131.5                | 871.4       | 5.49                                                            |
| 171.9                | 911.8       | 5.64                                                            |
| 212.4                | 952.3       | 5.79                                                            |
| 252.9                | 992.8       | 5.86                                                            |
| 293.3                | 1033.2      | 5.92                                                            |
| 333.8                | 1073.7      | 5.96                                                            |
| 374.2                | 1114.1      | 5.95                                                            |
| 414.7                | 1154.6      | 5.95                                                            |
| 455.2                | 1195.1      | 6.05                                                            |
| 495.6                | 1235.5      | 6.12                                                            |
| 536.1                | 1276.0      | 6.18                                                            |
| 576.5                | 1316.4      | 6.16                                                            |
| 617.0                | 1356.9      | 6.05                                                            |
| 657.5                | 1397.4      | 5.98                                                            |
| 697.9                | 1437.8      | 6.02                                                            |
| 738.4                | 1478.3      | 6.10                                                            |
| 778.8                | 1518.7      | 6.12                                                            |
| 819.3                | 1559.2      | 6.18                                                            |
| 859.8                | 1599.7      | 6.23                                                            |
| 900.2                | 1640.1      | 6.28                                                            |
| 960.9                | 1700.8      | 6.34                                                            |
| 1001.4               | 1741.3      | 6.37                                                            |
| 1062.1               | 1802.0      | 6.42                                                            |
| 1102.5               | 1842.4      | 6.46                                                            |
| 1163.2               | 1903.1      | 6.50                                                            |
| 1203.7               | 1943.6      | 6.54                                                            |
| 1264.4               | 2004.3      | 6.61                                                            |
| 1304.8               | 2044.7      | 6.67                                                            |
| 1365.5               | 2105.4      | 6.81                                                            |
| 1406.0               | 2145.9      | 6.94                                                            |
| 1466.7               | 2206.6      | 7.30                                                            |
| 1507.1               | 2247.0      | 7.59                                                            |
| 1567.8               | 2307.7      | 7.92                                                            |
| 1608.3               | 2348.2      | 8.26                                                            |
| 1669.0               | 2408.9      | 8.85                                                            |
| 1709.4               | 2449.3      | 9.37                                                            |
| 1770.1               | 2510.0      | 10.35                                                           |

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=2410.1MHz<br>(dB) |
|----------------------|-------------|------------------------------------------------------------------|
|                      |             | @LO (dBm)                                                        |
|                      |             | +7                                                               |
| 1770.1               | 640.0       | 10.65                                                            |
| 1729.6               | 680.5       | 9.98                                                             |
| 1689.2               | 720.9       | 9.49                                                             |
| 1648.7               | 761.4       | 9.04                                                             |
| 1608.3               | 801.8       | 8.70                                                             |
| 1567.8               | 842.3       | 8.35                                                             |
| 1527.3               | 882.8       | 8.26                                                             |
| 1486.9               | 923.2       | 8.28                                                             |
| 1446.4               | 963.7       | 8.11                                                             |
| 1406.0               | 1004.1      | 8.06                                                             |
| 1365.5               | 1044.6      | 8.06                                                             |
| 1325.0               | 1085.1      | 8.02                                                             |
| 1284.6               | 1125.5      | 7.80                                                             |
| 1244.1               | 1166.0      | 7.33                                                             |
| 1203.7               | 1206.4      | 6.85                                                             |
| 1163.2               | 1246.9      | 6.62                                                             |
| 1122.7               | 1287.4      | 6.63                                                             |
| 1082.3               | 1327.8      | 6.67                                                             |
| 1041.8               | 1368.3      | 6.72                                                             |
| 1001.4               | 1408.7      | 6.72                                                             |
| 960.9                | 1449.2      | 6.69                                                             |
| 920.4                | 1489.7      | 6.64                                                             |
| 880.0                | 1530.1      | 6.55                                                             |
| 819.3                | 1590.8      | 6.44                                                             |
| 778.8                | 1631.3      | 6.36                                                             |
| 718.1                | 1692.0      | 6.32                                                             |
| 677.7                | 1732.4      | 6.30                                                             |
| 617.0                | 1793.1      | 6.29                                                             |
| 576.5                | 1833.6      | 6.28                                                             |
| 515.8                | 1894.3      | 6.13                                                             |
| 475.4                | 1934.7      | 5.92                                                             |
| 414.7                | 1995.4      | 5.76                                                             |
| 374.2                | 2035.9      | 5.77                                                             |
| 313.5                | 2096.6      | 5.76                                                             |
| 273.1                | 2137.0      | 5.77                                                             |
| 212.4                | 2197.7      | 5.76                                                             |
| 171.9                | 2238.2      | 5.77                                                             |
| 111.2                | 2298.9      | 5.80                                                             |
| 70.8                 | 2339.3      | 5.82                                                             |
| 10.1                 | 2400.0      | 6.03                                                             |

## 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   |
| 180.0       | 25.22                   | 26.03 | 27.77 | 35.42                   | 32.45 | 30.94 |
| 280.0       | 24.75                   | 27.07 | 29.48 | 29.55                   | 29.25 | 30.14 |
| 380.0       | 26.41                   | 28.86 | 31.32 | 28.48                   | 29.52 | 30.43 |
| 480.0       | 27.65                   | 30.25 | 32.87 | 29.23                   | 30.14 | 30.53 |
| 580.0       | 29.01                   | 31.68 | 34.36 | 30.13                   | 30.57 | 30.55 |
| 680.0       | 29.97                   | 32.82 | 35.76 | 30.08                   | 30.26 | 30.14 |
| 780.0       | 30.64                   | 33.47 | 36.44 | 28.57                   | 28.73 | 28.76 |
| 880.0       | 30.95                   | 33.41 | 35.92 | 26.42                   | 26.62 | 26.67 |
| 1000.0      | 31.92                   | 34.42 | 36.88 | 23.72                   | 24.00 | 24.13 |
| 1100.0      | 31.92                   | 34.39 | 36.84 | 21.55                   | 21.83 | 21.95 |
| 1220.0      | 32.21                   | 34.53 | 36.84 | 19.42                   | 19.52 | 19.68 |
| 1320.0      | 32.24                   | 34.51 | 36.59 | 17.90                   | 17.98 | 18.02 |
| 1440.0      | 31.79                   | 33.97 | 35.97 | 16.25                   | 16.32 | 16.46 |
| 1540.0      | 34.13                   | 36.45 | 38.49 | 15.77                   | 15.87 | 15.84 |
| 1660.0      | 31.70                   | 33.47 | 34.93 | 14.81                   | 14.97 | 14.99 |
| 1760.0      | 30.86                   | 32.30 | 33.62 | 14.53                   | 14.62 | 14.79 |
| 1880.0      | 31.70                   | 33.17 | 34.30 | 14.33                   | 14.48 | 14.58 |
| 1980.0      | 32.09                   | 33.40 | 34.49 | 14.51                   | 14.57 | 14.71 |
| 2100.0      | 32.71                   | 33.74 | 34.51 | 14.97                   | 15.06 | 15.19 |
| 2200.0      | 33.18                   | 34.35 | 34.87 | 15.46                   | 15.61 | 15.75 |
| 2320.0      | 33.56                   | 35.00 | 35.68 | 16.22                   | 16.35 | 16.48 |
| 2420.0      | 34.00                   | 35.64 | 36.50 | 17.05                   | 17.21 | 17.29 |
| 2540.0      | 34.53                   | 36.42 | 37.48 | 18.10                   | 18.14 | 18.12 |
| 2640.0      | 34.86                   | 37.11 | 38.56 | 19.04                   | 19.07 | 18.99 |
| 2760.0      | 35.30                   | 38.16 | 40.34 | 20.18                   | 19.99 | 19.94 |
| 2860.0      | 34.68                   | 37.67 | 40.35 | 21.15                   | 20.83 | 20.51 |
| 2980.0      | 33.96                   | 36.54 | 38.71 | 22.22                   | 21.67 | 21.29 |
| 3080.0      | 34.08                   | 36.94 | 39.11 | 22.70                   | 22.10 | 21.80 |
| 3200.0      | 35.14                   | 39.76 | 42.93 | 23.47                   | 23.01 | 22.95 |
| 3300.0      | 35.75                   | 42.72 | 60.45 | 24.31                   | 24.08 | 24.06 |
| 3420.0      | 33.86                   | 36.87 | 39.24 | 24.45                   | 23.76 | 23.28 |
| 3520.0      | 31.82                   | 33.02 | 33.87 | 23.44                   | 22.41 | 21.65 |
| 3640.0      | 30.00                   | 30.48 | 30.66 | 21.39                   | 20.55 | 19.76 |
| 3740.0      | 28.88                   | 29.04 | 29.06 | 19.79                   | 19.04 | 18.42 |
| 3860.0      | 27.53                   | 27.41 | 27.33 | 17.98                   | 17.37 | 16.83 |
| 3960.0      | 26.41                   | 26.09 | 26.05 | 16.61                   | 16.04 | 15.67 |
| 4080.0      | 24.94                   | 24.54 | 24.47 | 14.92                   | 14.59 | 14.36 |
| 4180.0      | 23.97                   | 23.62 | 23.45 | 13.86                   | 13.73 | 13.50 |
| 4300.0      | 22.87                   | 22.60 | 22.55 | 12.89                   | 12.84 | 12.82 |
| 4400.0      | 21.88                   | 21.97 | 21.75 | 12.18                   | 12.40 | 12.30 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | +4                      | +7    | +10   |
| 150.0               | 180.0       | 39.93                   | 42.92 | 44.52 |
| 250.0               | 280.0       | 42.82                   | 46.14 | 52.05 |
| 350.0               | 380.0       | 49.46                   | 50.85 | 46.85 |
| 450.0               | 480.0       | 44.42                   | 42.04 | 40.73 |
| 550.0               | 580.0       | 37.18                   | 35.57 | 35.00 |
| 650.0               | 680.0       | 34.87                   | 33.47 | 32.45 |
| 750.0               | 780.0       | 32.50                   | 31.29 | 30.48 |
| 850.0               | 880.0       | 30.03                   | 29.86 | 29.68 |
| 970.0               | 1000.0      | 28.10                   | 27.96 | 27.79 |
| 1070.0              | 1100.0      | 28.45                   | 28.06 | 27.85 |
| 1190.0              | 1220.0      | 30.76                   | 30.15 | 29.62 |
| 1290.0              | 1320.0      | 30.86                   | 30.07 | 29.52 |
| 1410.0              | 1440.0      | 30.42                   | 29.64 | 29.07 |
| 1510.0              | 1540.0      | 26.50                   | 25.94 | 25.49 |
| 1630.0              | 1660.0      | 32.53                   | 32.18 | 32.04 |
| 1730.0              | 1760.0      | 41.72                   | 40.85 | 39.59 |
| 1850.0              | 1880.0      | 32.08                   | 32.11 | 31.93 |
| 1950.0              | 1980.0      | 30.86                   | 30.92 | 30.62 |
| 2070.0              | 2100.0      | 30.51                   | 30.44 | 30.26 |
| 2170.0              | 2200.0      | 30.75                   | 30.53 | 30.33 |
| 2290.0              | 2320.0      | 30.95                   | 30.64 | 30.36 |
| 2390.0              | 2420.0      | 31.07                   | 30.63 | 30.32 |
| 2510.0              | 2540.0      | 30.62                   | 30.26 | 29.90 |
| 2610.0              | 2640.0      | 30.35                   | 30.02 | 29.60 |
| 2730.0              | 2760.0      | 29.66                   | 29.28 | 28.94 |
| 2830.0              | 2860.0      | 29.06                   | 28.54 | 28.17 |
| 2950.0              | 2980.0      | 28.40                   | 27.70 | 27.12 |
| 3050.0              | 3080.0      | 27.73                   | 26.88 | 26.19 |
| 3170.0              | 3200.0      | 26.86                   | 25.89 | 25.08 |
| 3270.0              | 3300.0      | 26.92                   | 26.00 | 25.42 |
| 3390.0              | 3420.0      | 29.65                   | 28.92 | 28.43 |
| 3490.0              | 3520.0      | 33.67                   | 33.00 | 32.29 |
| 3610.0              | 3640.0      | 36.36                   | 35.29 | 34.45 |
| 3710.0              | 3740.0      | 35.24                   | 34.37 | 33.64 |
| 3830.0              | 3860.0      | 33.16                   | 32.30 | 31.96 |
| 3930.0              | 3960.0      | 31.66                   | 31.00 | 30.69 |
| 4050.0              | 4080.0      | 29.75                   | 29.20 | 28.97 |
| 4150.0              | 4180.0      | 28.55                   | 28.23 | 28.02 |
| 4270.0              | 4300.0      | 27.33                   | 27.07 | 26.90 |
| 4370.0              | 4400.0      | 26.84                   | 26.75 | 26.62 |

# Frequency Mixer

TFM-2400+

## 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=2400MHz<br>(:1) |      |  |
|---------------------|-------------|-----------------|------|------|-------------|-----------------|------|------|--------|----------------------|--------------------------------|------|--|
|                     |             | @LO (dBm)       |      |      |             | @LO (dBm)       |      |      |        |                      | @LO (dBm)                      |      |  |
|                     |             | +4              | +7   | +10  |             | +4              | +7   | +10  | +4     |                      | +7                             | +10  |  |
| 150.0               | 180.0       | 10.96           | 6.68 | 5.16 | 180.0       | 10.69           | 9.38 | 7.76 | 10.0   | 1.29                 | 1.09                           | 1.05 |  |
| 250.0               | 280.0       | 3.22            | 2.62 | 2.45 | 280.0       | 4.87            | 4.39 | 4.59 | 70.0   | 1.29                 | 1.11                           | 1.08 |  |
| 350.0               | 380.0       | 1.96            | 1.76 | 1.67 | 380.0       | 2.91            | 3.15 | 3.76 | 130.0  | 1.28                 | 1.10                           | 1.09 |  |
| 450.0               | 480.0       | 1.65            | 1.48 | 1.39 | 480.0       | 2.22            | 2.70 | 3.38 | 190.0  | 1.31                 | 1.16                           | 1.14 |  |
| 550.0               | 580.0       | 1.72            | 1.56 | 1.46 | 580.0       | 1.94            | 2.48 | 3.12 | 250.0  | 1.29                 | 1.17                           | 1.19 |  |
| 650.0               | 680.0       | 1.96            | 1.78 | 1.67 | 680.0       | 1.81            | 2.34 | 2.89 | 310.0  | 1.30                 | 1.17                           | 1.20 |  |
| 750.0               | 780.0       | 2.37            | 2.15 | 2.01 | 780.0       | 1.75            | 2.21 | 2.69 | 370.0  | 1.33                 | 1.25                           | 1.28 |  |
| 850.0               | 880.0       | 3.11            | 2.86 | 2.67 | 880.0       | 1.72            | 2.10 | 2.50 | 430.0  | 1.30                 | 1.24                           | 1.31 |  |
| 970.0               | 1000.0      | 3.76            | 3.52 | 3.35 | 1000.0      | 1.73            | 1.99 | 2.30 | 490.0  | 1.29                 | 1.23                           | 1.29 |  |
| 1070.0              | 1100.0      | 3.83            | 3.65 | 3.49 | 1100.0      | 1.74            | 1.90 | 2.14 | 550.0  | 1.30                 | 1.28                           | 1.36 |  |
| 1190.0              | 1220.0      | 3.63            | 3.47 | 3.34 | 1220.0      | 1.75            | 1.81 | 1.97 | 610.0  | 1.24                 | 1.25                           | 1.36 |  |
| 1290.0              | 1320.0      | 3.43            | 3.28 | 3.17 | 1320.0      | 1.74            | 1.73 | 1.84 | 670.0  | 1.23                 | 1.25                           | 1.36 |  |
| 1410.0              | 1440.0      | 3.08            | 2.93 | 2.82 | 1440.0      | 1.70            | 1.63 | 1.71 | 730.0  | 1.22                 | 1.31                           | 1.46 |  |
| 1510.0              | 1540.0      | 2.59            | 2.41 | 2.30 | 1540.0      | 1.65            | 1.54 | 1.61 | 790.0  | 1.19                 | 1.31                           | 1.47 |  |
| 1630.0              | 1660.0      | 2.50            | 2.23 | 2.05 | 1660.0      | 1.59            | 1.45 | 1.51 | 850.0  | 1.21                 | 1.35                           | 1.51 |  |
| 1730.0              | 1760.0      | 3.37            | 3.06 | 2.85 | 1760.0      | 1.54            | 1.39 | 1.46 | 910.0  | 1.24                 | 1.41                           | 1.60 |  |
| 1850.0              | 1880.0      | 3.47            | 3.16 | 2.95 | 1880.0      | 1.48            | 1.32 | 1.41 | 970.0  | 1.23                 | 1.40                           | 1.59 |  |
| 1950.0              | 1980.0      | 3.16            | 2.84 | 2.64 | 1980.0      | 1.43            | 1.30 | 1.41 | 1030.0 | 1.24                 | 1.42                           | 1.62 |  |
| 2070.0              | 2100.0      | 2.84            | 2.58 | 2.40 | 2100.0      | 1.37            | 1.29 | 1.43 | 1090.0 | 1.28                 | 1.47                           | 1.66 |  |
| 2170.0              | 2200.0      | 2.58            | 2.38 | 2.23 | 2200.0      | 1.33            | 1.28 | 1.45 | 1150.0 | 1.29                 | 1.48                           | 1.66 |  |
| 2290.0              | 2320.0      | 2.35            | 2.18 | 2.05 | 2320.0      | 1.30            | 1.27 | 1.45 | 1210.0 | 1.35                 | 1.54                           | 1.72 |  |
| 2390.0              | 2420.0      | 2.21            | 2.07 | 1.97 | 2420.0      | 1.27            | 1.26 | 1.45 | 1270.0 | 1.41                 | 1.59                           | 1.76 |  |
| 2510.0              | 2540.0      | 2.08            | 1.97 | 1.90 | 2540.0      | 1.23            | 1.25 | 1.45 | 1330.0 | 1.46                 | 1.62                           | 1.78 |  |
| 2610.0              | 2640.0      | 2.05            | 1.97 | 1.92 | 2640.0      | 1.19            | 1.24 | 1.45 | 1390.0 | 1.53                 | 1.68                           | 1.82 |  |
| 2730.0              | 2760.0      | 2.08            | 2.03 | 2.01 | 2760.0      | 1.15            | 1.24 | 1.46 | 1450.0 | 1.54                 | 1.66                           | 1.77 |  |
| 2830.0              | 2860.0      | 2.23            | 2.18 | 2.15 | 2860.0      | 1.13            | 1.27 | 1.49 | 1510.0 | 1.59                 | 1.70                           | 1.79 |  |
| 2950.0              | 2980.0      | 2.46            | 2.42 | 2.40 | 2980.0      | 1.13            | 1.32 | 1.55 | 1570.0 | 1.61                 | 1.71                           | 1.81 |  |
| 3050.0              | 3080.0      | 2.65            | 2.61 | 2.59 | 3080.0      | 1.17            | 1.39 | 1.62 | 1630.0 | 1.53                 | 1.62                           | 1.70 |  |
| 3170.0              | 3200.0      | 3.01            | 2.97 | 2.95 | 3200.0      | 1.26            | 1.49 | 1.73 | 1690.0 | 1.53                 | 1.61                           | 1.68 |  |
| 3270.0              | 3300.0      | 3.26            | 3.24 | 3.24 | 3300.0      | 1.37            | 1.59 | 1.83 | 1750.0 | 1.52                 | 1.59                           | 1.64 |  |
| 3390.0              | 3420.0      | 3.58            | 3.55 | 3.55 | 3420.0      | 1.56            | 1.74 | 1.98 | 1810.0 | 1.53                 | 1.59                           | 1.63 |  |
| 3490.0              | 3520.0      | 3.71            | 3.65 | 3.63 | 3520.0      | 1.70            | 1.86 | 2.07 | 1870.0 | 1.60                 | 1.65                           | 1.69 |  |
| 3610.0              | 3640.0      | 3.91            | 3.80 | 3.76 | 3640.0      | 1.86            | 1.96 | 2.13 | 1930.0 | 1.70                 | 1.74                           | 1.76 |  |
| 3710.0              | 3740.0      | 4.06            | 3.90 | 3.80 | 3740.0      | 1.97            | 2.03 | 2.17 | 1990.0 | 1.82                 | 1.85                           | 1.87 |  |
| 3830.0              | 3860.0      | 4.24            | 4.00 | 3.87 | 3860.0      | 2.08            | 2.07 | 2.15 | 2050.0 | 1.99                 | 2.01                           | 2.03 |  |
| 3930.0              | 3960.0      | 4.31            | 4.00 | 3.85 | 3960.0      | 2.11            | 2.04 | 2.09 | 2110.0 | 2.17                 | 2.19                           | 2.19 |  |
| 4050.0              | 4080.0      | 4.41            | 4.01 | 3.82 | 4080.0      | 2.07            | 1.95 | 1.95 | 2150.0 | 2.29                 | 2.30                           | 2.31 |  |
| 4150.0              | 4180.0      | 4.52            | 4.04 | 3.84 | 4180.0      | 1.99            | 1.84 | 1.80 | 2210.0 | 2.50                 | 2.51                           | 2.52 |  |
| 4270.0              | 4300.0      | 4.41            | 3.88 | 3.66 | 4300.0      | 1.84            | 1.69 | 1.62 | 2250.0 | 2.64                 | 2.65                           | 2.65 |  |
| 4370.0              | 4400.0      | 4.45            | 3.85 | 3.58 | 4400.0      | 1.66            | 1.53 | 1.45 | 2310.0 | 2.85                 | 2.86                           | 2.86 |  |

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TFM-2400+  
101011  
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## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | +11 | 22  | 14  | 50  | 27  | 41  | 31  | 37  | 44  | 59  |
| 1  | -      | 23     | +0  | 41  | 23  | 43  | 41  | 54  | 48  | 45  | 42  | 64  |
| 2  | 85     | >70    | 50  | 65  | 49  | >70 | 62  | >70 | 62  | 63  | 61  | 62  |
| 3  | >90    | >70    | >70 | >70 | 63  | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 4  | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 5  | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 6  | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 7  | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 8  | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 9  | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 10 | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

## LO HARMONICS ORDER

Test conditions:

RF IN: 1575 MHz; -14.00 dBm.

LO IN: 1605 MHz; +7.00 dBm

IF OUT: 30 MHz; -20.19 dBm

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | +2  | 32  | 25  | 55  | 40  | 61  | 47  | 59  | 67  | 74  |
| 1  | -      | 23     | +0  | 49  | 23  | 45  | 42  | 55  | 52  | 51  | 50  | 73  |
| 2  | 65     | >80    | 46  | 56  | 44  | 68  | 54  | 71  | 54  | 61  | 59  | 60  |
| 3  | >90    | 72     | 52  | 49  | 41  | 66  | 54  | 64  | 64  | 75  | 65  | 62  |
| 4  | >90    | >80    | 77  | >80 | 58  | 75  | 60  | 79  | 75  | 79  | 70  | 71  |
| 5  | >90    | >80    | >80 | >80 | >80 | 75  | 75  | 74  | >80 | >80 | >80 | >80 |
| 6  | >90    | >80    | >80 | >80 | >80 | >80 | 73  | >80 | 75  | >80 | >80 | >80 |
| 7  | >90    | >80    | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
| 8  | >90    | >80    | >80 | >80 | >80 | >80 | >80 | >80 | 78  | >80 | >80 | >80 |
| 9  | >90    | >80    | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
| 10 | >90    | >80    | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

## LO HARMONICS ORDER

Test conditions:

RF IN: 1575 MHz; -4.00 dBm.

LO IN: 1605 MHz; +7.00 dBm

IF OUT: 30 MHz; -10.26 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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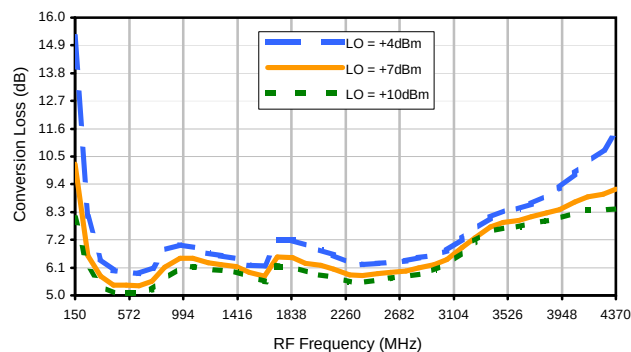
The Design Engineers Search Engine finds the model you need, instantly • For detailed performance specs &amp; shopping online see

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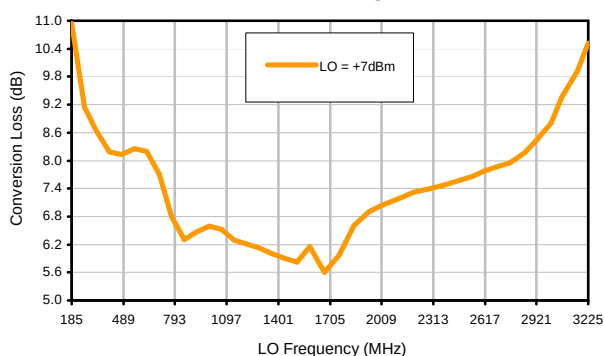


## Typical Performance Curves

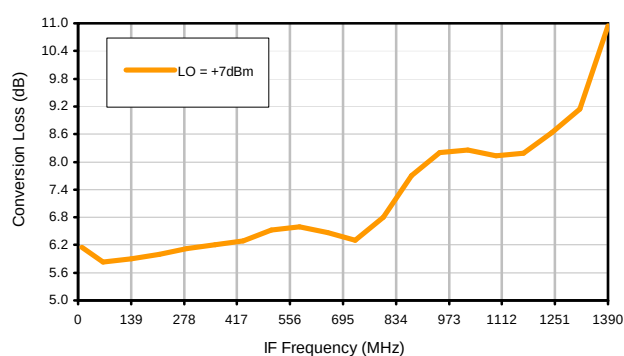
Conversion Loss @ IF=30MHz



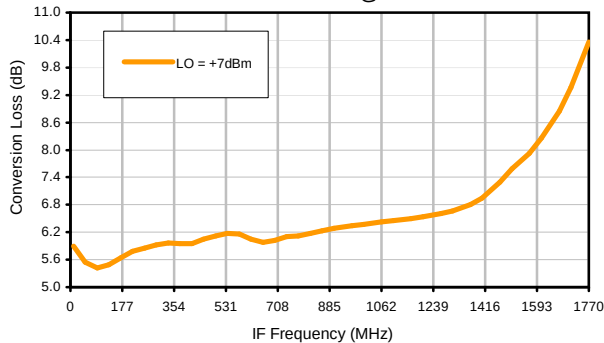
Conversion Loss vs. LO @ RF=1575MHz



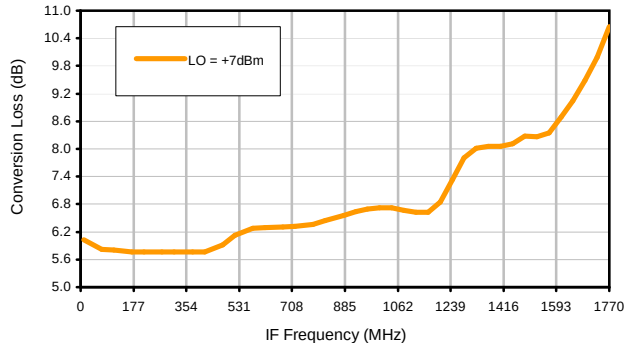
Conversion Loss vs. IF @ RF=1575MHz



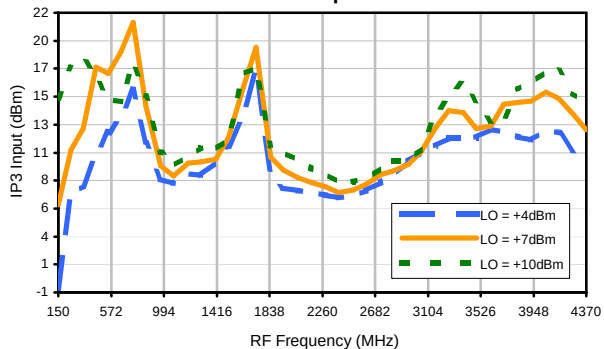
Conversion Loss vs. IF @ RF=739.9MHz



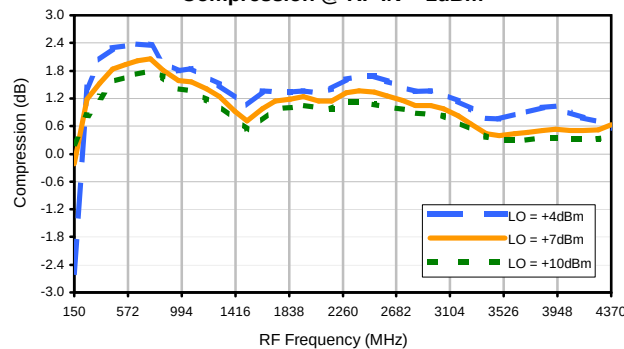
Conversion Loss vs. IF @ RF=2410.1MHz



IP3 Input



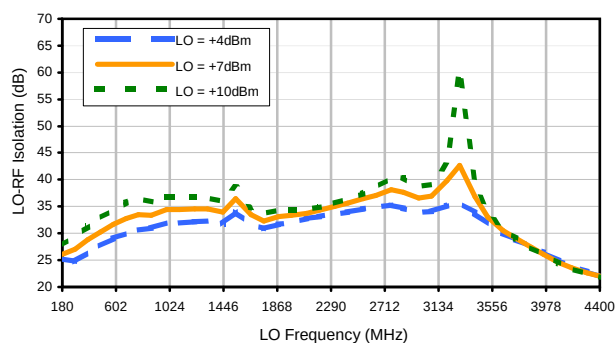
Compression @ RF IN=+1dBm



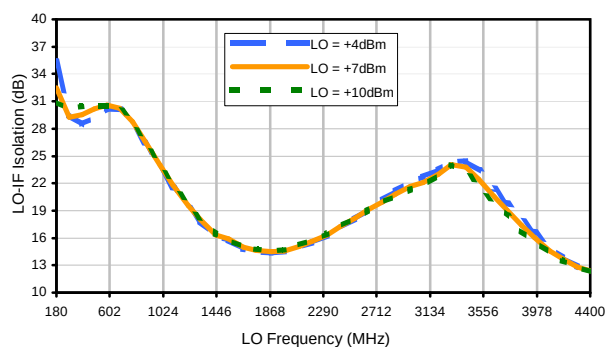


## Typical Performance Curves

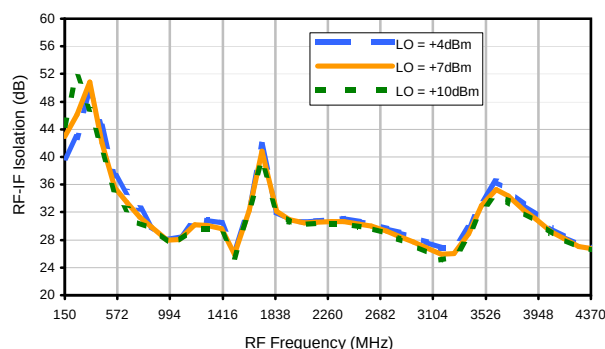
LO-RF Isolation



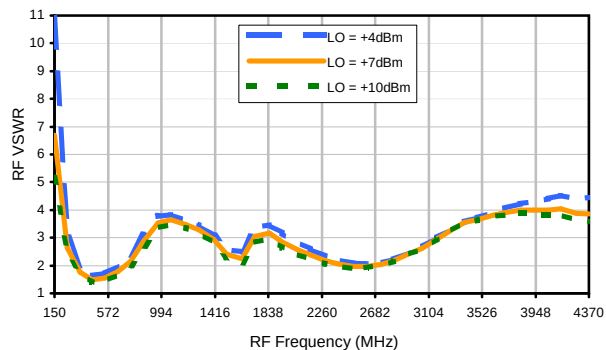
LO-IF Isolation



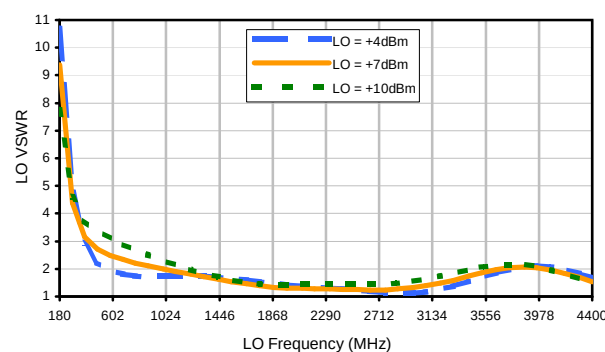
RF-IF Isolation



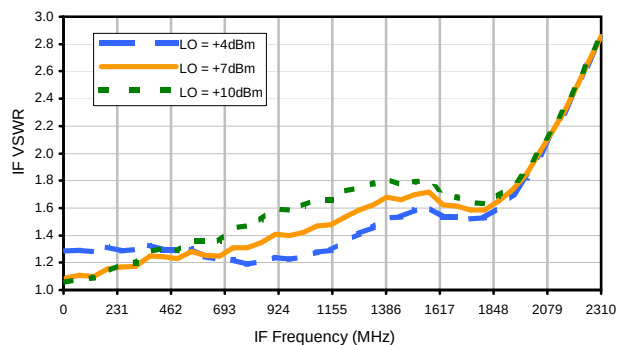
RF VSWR



LO VSWR



IF VSWR



## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | +11 | 22  | 14  | 50  | 27  | 41  | 31  | 37  | 44  | 59  |
| 1  | -      | 23     | +0  | 41  | 23  | 43  | 41  | 54  | 48  | 45  | 42  | 64  |
| 2  | 85     | >70    | 50  | 65  | 49  | >70 | 62  | >70 | 62  | 63  | 61  | 62  |
| 3  | >90    | >70    | >70 | >70 | 63  | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 4  | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 5  | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 6  | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 7  | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 8  | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 9  | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
| 10 | >90    | >70    | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 | >70 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions: RF IN: 1575 MHz; -14.00 dBm.  
LO IN: 1605 MHz; +7.00 dBm  
IF OUT: 30 MHz; -20.19 dBm

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | +2  | 32  | 25  | 55  | 40  | 61  | 47  | 59  | 67  | 74  |
| 1  | -      | 23     | +0  | 49  | 23  | 45  | 42  | 55  | 52  | 51  | 50  | 73  |
| 2  | 65     | >80    | 46  | 56  | 44  | 68  | 54  | 71  | 54  | 61  | 59  | 60  |
| 3  | >90    | 72     | 52  | 49  | 41  | 66  | 54  | 64  | 64  | 75  | 65  | 62  |
| 4  | >90    | >80    | 77  | >80 | 58  | 75  | 60  | 79  | 75  | 79  | 70  | 71  |
| 5  | >90    | >80    | >80 | >80 | >80 | 75  | 75  | 74  | >80 | >80 | >80 | >80 |
| 6  | >90    | >80    | >80 | >80 | >80 | >80 | 73  | >80 | 75  | >80 | >80 | >80 |
| 7  | >90    | >80    | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
| 8  | >90    | >80    | >80 | >80 | >80 | >80 | >80 | >80 | 78  | >80 | >80 | >80 |
| 9  | >90    | >80    | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
| 10 | >90    | >80    | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions: RF IN: 1575 MHz; -4.00 dBm.  
LO IN: 1605 MHz; +7.00 dBm  
IF OUT: 30 MHz; -10.26 dBm

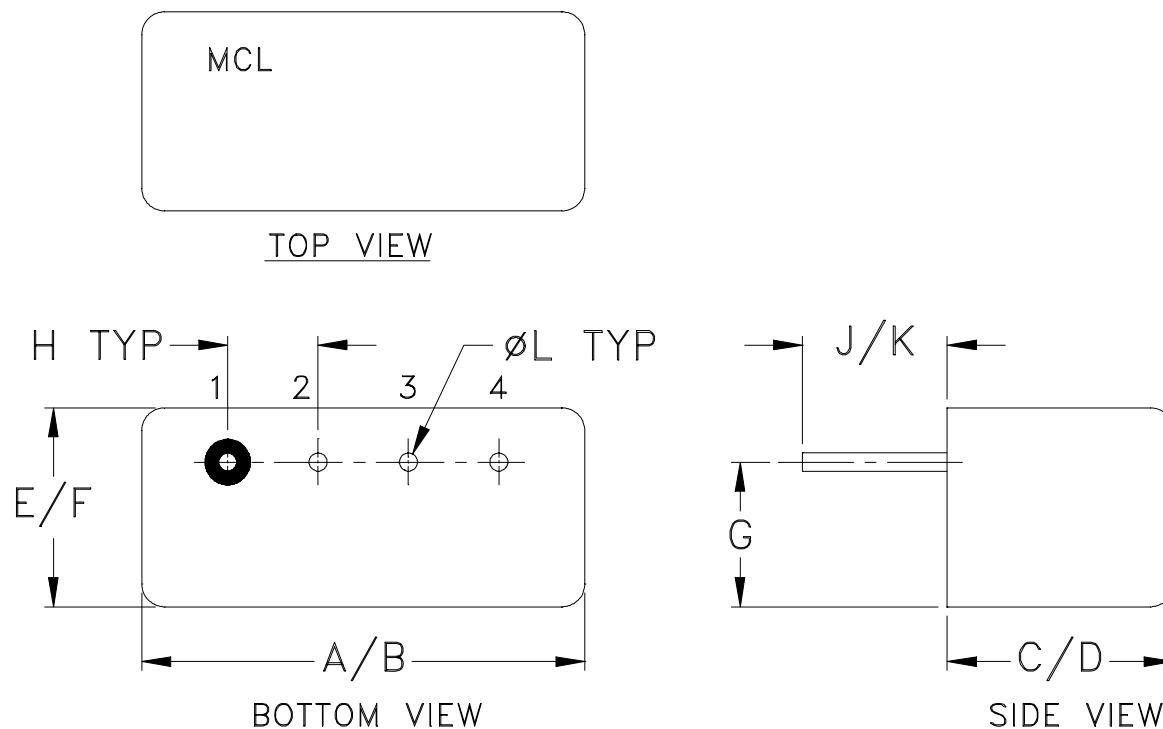
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.  
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.  
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

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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                                                                 |



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                       |
|---------------------|---------------------------|--------------------------------------|
| 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 |