

# Frequency Mixer

Level 7 (LO Power +7 dBm) 1 to 2000 MHz

TFM-11+



Generic photo used for illustration purposes only

CASE STYLE: B13

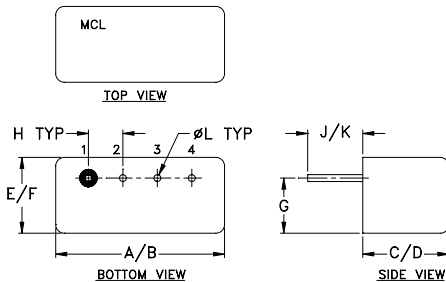
## Maximum Ratings

|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| 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          | 4 |
| RF          | 1 |
| 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, 7.16 dB typ.
- wideband, 1 to 2000 MHz
- rugged welded construction
- hermetically sealed

## Applications

- cellular
- PCS
- instrumentation

## Electrical Specifications

| FREQUENCY<br>(MHz) |       | CONVERSION LOSS<br>(dB) |          |      |                        | LO-RF ISOLATION<br>(dB) |      |      |      |      |      | LO-IF ISOLATION<br>(dB) |      |      |      |      |      |
|--------------------|-------|-------------------------|----------|------|------------------------|-------------------------|------|------|------|------|------|-------------------------|------|------|------|------|------|
| LO/RF              | IF    | Mid-Band<br>m           |          |      | Total<br>Range<br>Max. | L                       |      | M    |      | U    |      | L                       |      | M    |      | U    |      |
| $f_L$ - $f_U$      |       | $\bar{X}$               | $\sigma$ | Max. |                        | Typ.                    | Min. | Typ. | Min. | Typ. | Min. | Typ.                    | Min. | Typ. | Min. | Typ. | Min. |
| 1-2000             | 5-600 | 7.16                    | 0.07     | 8.5  | 9.0                    | 50                      | 45   | 35   | 25   | 25   | 20   | 45                      | 40   | 27   | 20   | 25   | 20   |

1 dB COMP.: +1 dBm typ.

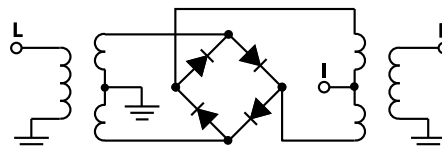
L = low range [ $f_L$  to  $10 f_L$ ]  
m = mid band [ $2f_L$  to  $f_U/2$ ]

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

## Typical Performance Data

| Frequency (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          |
| 1.00            | 31.00   | 6.05                 | 60.95              | 56.30              | 2.34              | 2.51              |
| 5.00            | 35.00   | 5.78                 | 61.86              | 55.70              | 2.49              | 2.42              |
| 20.00           | 50.00   | 5.81                 | 61.93              | 55.12              | 2.44              | 2.46              |
| 50.00           | 80.00   | 5.94                 | 60.22              | 54.24              | 2.54              | 2.19              |
| 100.00          | 70.00   | 5.92                 | 56.59              | 50.92              | 2.88              | 2.23              |
| 200.00          | 170.00  | 6.50                 | 48.94              | 44.33              | 3.21              | 2.18              |
| 267.53          | 237.53  | 6.52                 | 45.81              | 41.60              | 3.60              | 1.98              |
| 400.80          | 370.80  | 6.74                 | 42.38              | 38.67              | 3.74              | 1.88              |
| 500.00          | 470.00  | 6.83                 | 41.61              | 36.88              | 3.84              | 1.82              |
| 600.70          | 570.70  | 7.03                 | 40.10              | 36.28              | 3.52              | 1.69              |
| 733.96          | 704.29  | 7.24                 | 39.39              | 34.20              | 3.24              | 1.51              |
| 867.23          | 837.52  | 7.09                 | 39.07              | 31.66              | 3.00              | 1.37              |
| 1000.00         | 969.69  | 7.12                 | 36.76              | 29.17              | 2.77              | 1.24              |
| 1067.10         | 1037.50 | 6.97                 | 35.43              | 28.56              | 2.54              | 1.14              |
| 1200.40         | 1170.40 | 6.77                 | 33.71              | 27.07              | 2.23              | 1.13              |
| 1333.70         | 1303.60 | 6.72                 | 32.82              | 25.51              | 2.13              | 1.39              |
| 1466.90         | 1436.90 | 6.80                 | 33.13              | 24.22              | 2.16              | 1.67              |
| 1600.20         | 1570.50 | 6.93                 | 32.34              | 23.42              | 2.27              | 2.36              |
| 1733.50         | 1703.70 | 6.92                 | 29.41              | 27.19              | 2.54              | 2.01              |
| 2000.00         | 1970.30 | 6.99                 | 30.47              | 25.17              | 2.89              | 1.93              |

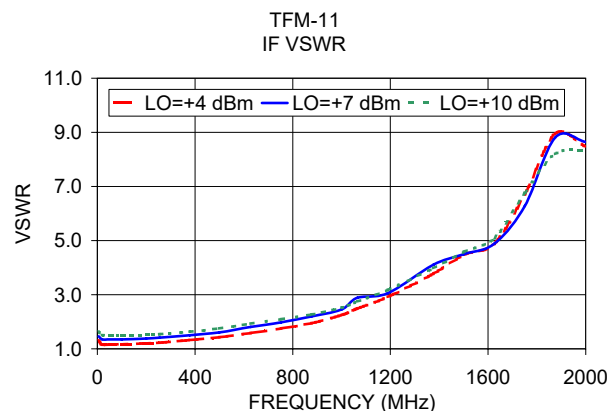
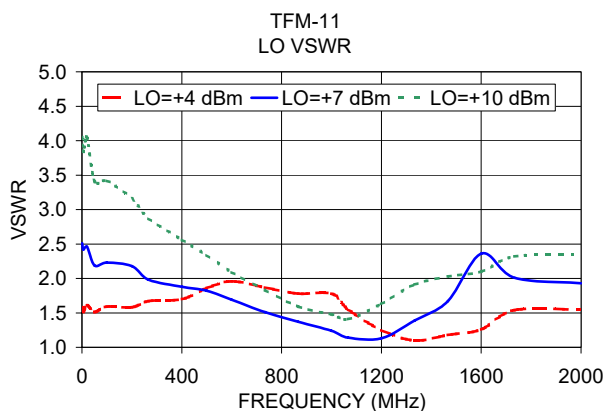
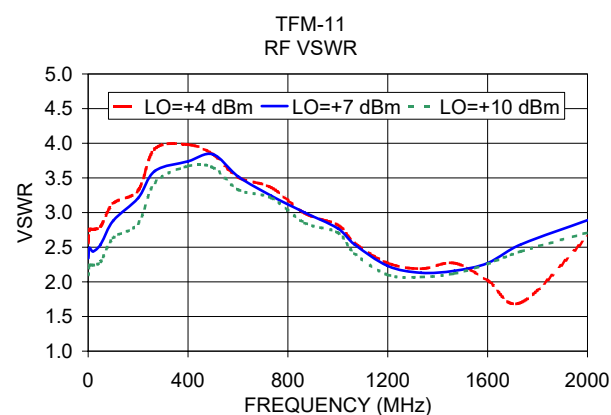
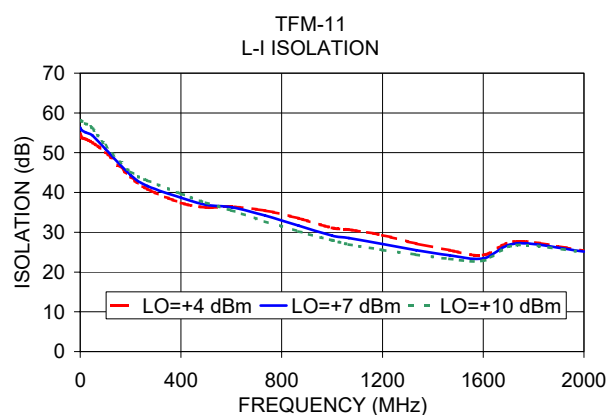
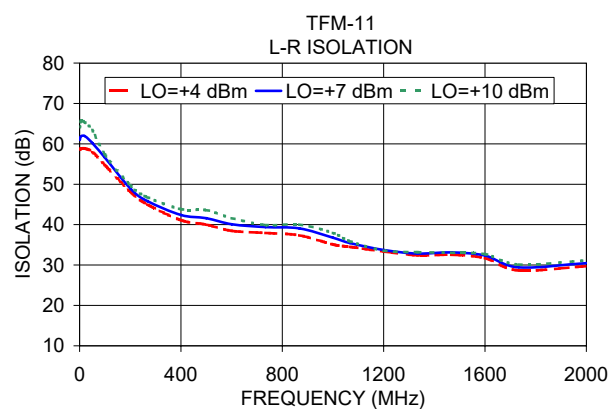
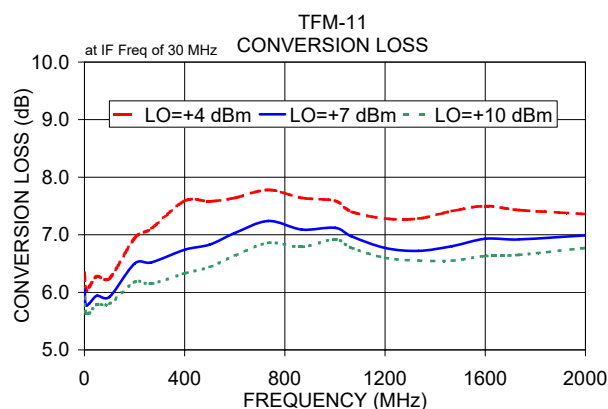
## Electrical Schematic



## Notes

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## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>IF FIXED<br>@IF(OUT)=30MHz<br>(dB) |      |      | RF<br>(IN)<br>(MHz) | LO<br>(MHz) | IP3 INPUT<br>(dBm) |       |       | RF<br>(IN)<br>(MHz) | LO<br>(MHz) | COMPRESSION<br>@RF IN=+1dBm<br>(dB) |      |      |
|---------------------|-------------|-------------------------------------------------------|------|------|---------------------|-------------|--------------------|-------|-------|---------------------|-------------|-------------------------------------|------|------|
|                     |             | @LO (dBm)                                             |      |      |                     |             | @LO (dBm)          |       |       |                     |             | @LO (dBm)                           |      |      |
|                     |             |                                                       |      |      |                     |             |                    |       |       |                     |             |                                     |      |      |
| +4                  | +7          | +10                                                   | +4   | +7   | +10                 | +4          | +7                 | +10   | +4    | +7                  | +10         |                                     |      |      |
| 10.1                | 40.1        | 5.65                                                  | 5.40 | 5.18 | 10.1                | 40.1        | 16.33              | 15.87 | 15.32 | 10.1                | 40.1        | 1.38                                | 1.01 | 0.63 |
| 90.4                | 120.4       | 5.99                                                  | 5.79 | 5.64 | 90.4                | 120.4       | 9.34               | 8.72  | 9.91  | 90.4                | 120.4       | 1.31                                | 1.05 | 0.74 |
| 170.6               | 200.6       | 6.25                                                  | 5.95 | 5.75 | 170.6               | 200.6       | 7.24               | 8.87  | 11.47 | 170.6               | 200.6       | 1.37                                | 1.08 | 0.92 |
| 250.9               | 280.9       | 6.67                                                  | 6.24 | 5.96 | 250.9               | 280.9       | 6.69               | 9.24  | 12.50 | 250.9               | 280.9       | 1.39                                | 1.14 | 0.93 |
| 331.1               | 361.1       | 6.94                                                  | 6.45 | 6.13 | 331.1               | 361.1       | 8.25               | 11.63 | 15.25 | 331.1               | 361.1       | 1.40                                | 1.22 | 1.02 |
| 411.4               | 441.4       | 7.16                                                  | 6.60 | 6.27 | 411.4               | 441.4       | 10.55              | 14.10 | 15.53 | 411.4               | 441.4       | 1.43                                | 1.22 | 1.01 |
| 491.6               | 521.6       | 7.44                                                  | 6.80 | 6.42 | 491.6               | 521.6       | 10.58              | 12.56 | 13.52 | 491.6               | 521.6       | 1.35                                | 1.20 | 1.03 |
| 571.9               | 601.9       | 7.50                                                  | 6.87 | 6.51 | 571.9               | 601.9       | 10.08              | 11.35 | 12.24 | 571.9               | 601.9       | 1.33                                | 1.19 | 1.01 |
| 652.1               | 682.1       | 7.65                                                  | 7.04 | 6.68 | 652.1               | 682.1       | 9.44               | 10.75 | 11.65 | 652.1               | 682.1       | 1.23                                | 1.11 | 0.94 |
| 732.4               | 762.4       | 7.64                                                  | 7.12 | 6.79 | 732.4               | 762.4       | 9.24               | 10.31 | 11.41 | 732.4               | 762.4       | 1.18                                | 1.00 | 0.85 |
| 812.6               | 842.6       | 7.64                                                  | 7.12 | 6.82 | 812.6               | 842.6       | 8.67               | 9.98  | 11.34 | 812.6               | 842.6       | 1.11                                | 0.93 | 0.75 |
| 892.9               | 922.9       | 7.51                                                  | 7.06 | 6.77 | 892.9               | 922.9       | 8.92               | 10.21 | 10.91 | 892.9               | 922.9       | 0.97                                | 0.78 | 0.62 |
| 973.1               | 1003.1      | 7.59                                                  | 7.13 | 6.84 | 973.1               | 1003.1      | 7.84               | 8.86  | 10.08 | 973.1               | 1003.1      | 1.02                                | 0.83 | 0.67 |
| 1053.4              | 1083.4      | 7.36                                                  | 6.99 | 6.75 | 1053.4              | 1083.4      | 7.89               | 8.65  | 9.57  | 1053.4              | 1083.4      | 1.07                                | 0.86 | 0.68 |
| 1133.6              | 1163.6      | 7.14                                                  | 6.84 | 6.64 | 1133.6              | 1163.6      | 8.24               | 9.18  | 10.04 | 1133.6              | 1163.6      | 1.01                                | 0.80 | 0.64 |
| 1213.9              | 1243.9      | 7.00                                                  | 6.73 | 6.57 | 1213.9              | 1243.9      | 8.94               | 8.98  | 9.55  | 1213.9              | 1243.9      | 0.90                                | 0.69 | 0.56 |
| 1294.1              | 1324.1      | 6.95                                                  | 6.68 | 6.53 | 1294.1              | 1324.1      | 9.43               | 10.23 | 10.55 | 1294.1              | 1324.1      | 0.81                                | 0.61 | 0.48 |
| 1374.4              | 1404.4      | 6.85                                                  | 6.57 | 6.43 | 1374.4              | 1404.4      | 10.01              | 11.37 | 11.87 | 1374.4              | 1404.4      | 0.71                                | 0.53 | 0.41 |
| 1454.6              | 1484.6      | 6.83                                                  | 6.56 | 6.42 | 1454.6              | 1484.6      | 9.84               | 11.27 | 12.81 | 1454.6              | 1484.6      | 0.72                                | 0.49 | 0.38 |
| 1534.9              | 1564.9      | 6.86                                                  | 6.58 | 6.43 | 1534.9              | 1564.9      | 10.77              | 11.20 | 12.47 | 1534.9              | 1564.9      | 0.73                                | 0.51 | 0.37 |
| 1615.1              | 1645.1      | 7.02                                                  | 6.70 | 6.53 | 1615.1              | 1645.1      | 11.59              | 13.06 | 13.49 | 1615.1              | 1645.1      | 0.73                                | 0.53 | 0.38 |
| 1695.4              | 1725.4      | 7.28                                                  | 6.87 | 6.67 | 1695.4              | 1725.4      | 11.30              | 11.56 | 12.83 | 1695.4              | 1725.4      | 0.70                                | 0.52 | 0.40 |
| 1775.6              | 1805.6      | 7.51                                                  | 7.05 | 6.79 | 1775.6              | 1805.6      | 12.30              | 12.22 | 12.29 | 1775.6              | 1805.6      | 0.71                                | 0.55 | 0.43 |
| 1855.9              | 1885.9      | 7.67                                                  | 7.19 | 6.91 | 1855.9              | 1885.9      | 10.31              | 11.08 | 12.23 | 1855.9              | 1885.9      | 0.70                                | 0.55 | 0.43 |
| 1936.1              | 1966.1      | 7.70                                                  | 7.22 | 6.94 | 1936.1              | 1966.1      | 9.40               | 9.62  | 11.04 | 1936.1              | 1966.1      | 0.70                                | 0.58 | 0.46 |
| 2016.4              | 2046.4      | 7.76                                                  | 7.30 | 7.02 | 2016.4              | 2046.4      | 9.57               | 9.46  | 10.59 | 2016.4              | 2046.4      | 0.70                                | 0.57 | 0.49 |
| 2096.6              | 2126.6      | 7.77                                                  | 7.34 | 7.06 | 2096.6              | 2126.6      | 9.22               | 10.13 | 10.70 | 2096.6              | 2126.6      | 0.77                                | 0.61 | 0.51 |
| 2176.9              | 2206.9      | 7.81                                                  | 7.40 | 7.13 | 2176.9              | 2206.9      | 8.65               | 9.60  | 10.52 | 2176.9              | 2206.9      | 0.73                                | 0.57 | 0.46 |
| 2257.1              | 2287.1      | 7.97                                                  | 7.61 | 7.37 | 2257.1              | 2287.1      | 9.02               | 9.64  | 10.36 | 2257.1              | 2287.1      | 0.65                                | 0.49 | 0.39 |
| 2337.4              | 2367.4      | 7.98                                                  | 7.63 | 7.44 | 2337.4              | 2367.4      | 9.67               | 10.47 | 11.11 | 2337.4              | 2367.4      | 0.59                                | 0.44 | 0.35 |
| 2417.6              | 2447.6      | 8.18                                                  | 7.84 | 7.65 | 2417.6              | 2447.6      | 10.18              | 11.20 | 12.27 | 2417.6              | 2447.6      | 0.48                                | 0.36 | 0.29 |
| 2497.9              | 2527.9      | 8.28                                                  | 7.95 | 7.78 | 2497.9              | 2527.9      | 11.35              | 12.30 | 13.99 | 2497.9              | 2527.9      | 0.48                                | 0.35 | 0.28 |
| 2578.2              | 2608.2      | 8.53                                                  | 8.21 | 8.02 | 2578.2              | 2608.2      | 11.73              | 13.14 | 13.88 | 2578.2              | 2608.2      | 0.38                                | 0.28 | 0.23 |
| 2658.4              | 2688.4      | 8.66                                                  | 8.36 | 8.18 | 2658.4              | 2688.4      | 10.74              | 12.52 | 13.47 | 2658.4              | 2688.4      | 0.36                                | 0.27 | 0.21 |
| 2738.7              | 2768.7      | 8.74                                                  | 8.42 | 8.25 | 2738.7              | 2768.7      | 10.01              | 12.23 | 13.77 | 2738.7              | 2768.7      | 0.33                                | 0.24 | 0.20 |
| 2839.0              | 2869.0      | 9.11                                                  | 8.73 | 8.56 | 2839.0              | 2869.0      | 10.00              | 11.65 | 14.61 | 2839.0              | 2869.0      | 0.29                                | 0.21 | 0.18 |
| 2919.2              | 2949.2      | 9.25                                                  | 8.83 | 8.67 | 2919.2              | 2949.2      | 13.30              | 12.29 | 14.24 | 2919.2              | 2949.2      | 0.27                                | 0.19 | 0.15 |
| 3019.5              | 3049.5      | 9.51                                                  | 9.11 | 8.91 | 3019.5              | 3049.5      | 15.88              | 14.17 | 15.43 | 3019.5              | 3049.5      | 0.27                                | 0.20 | 0.15 |
| 3099.8              | 3129.8      | 9.72                                                  | 9.30 | 9.06 | 3099.8              | 3129.8      | 16.61              | 14.63 | 16.39 | 3099.8              | 3129.8      | 0.23                                | 0.17 | 0.14 |
| 3200.1              | 3230.1      | 10.20                                                 | 9.77 | 9.51 | 3200.1              | 3230.1      | 18.90              | 15.35 | 16.17 | 3200.1              | 3230.1      | 0.21                                | 0.15 | 0.12 |

# Frequency Mixer

# TFM-11+

## Typical Performance Data

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=1010.1MHz<br>(dB) |
|----------------------|-------------|------------------------------------------------------------------|
|                      |             | @LO (dBm)                                                        |
|                      |             | +7                                                               |
| 1000.0               | 10.1        | 10.62                                                            |
| 979.8                | 30.3        | 10.55                                                            |
| 959.6                | 50.5        | 10.40                                                            |
| 939.4                | 70.7        | 10.33                                                            |
| 919.2                | 90.9        | 10.29                                                            |
| 899.0                | 111.1       | 10.15                                                            |
| 878.8                | 131.3       | 10.01                                                            |
| 858.6                | 151.5       | 9.90                                                             |
| 838.4                | 171.7       | 9.76                                                             |
| 818.2                | 191.9       | 9.70                                                             |
| 798.0                | 212.1       | 9.57                                                             |
| 777.8                | 232.3       | 9.44                                                             |
| 757.6                | 252.5       | 9.25                                                             |
| 737.3                | 272.8       | 9.25                                                             |
| 717.1                | 293.0       | 9.18                                                             |
| 696.9                | 313.2       | 9.18                                                             |
| 676.7                | 333.4       | 8.96                                                             |
| 656.5                | 353.6       | 8.90                                                             |
| 636.3                | 373.8       | 8.85                                                             |
| 616.1                | 394.0       | 8.68                                                             |
| 575.7                | 434.4       | 8.51                                                             |
| 555.5                | 454.6       | 8.44                                                             |
| 515.1                | 495.0       | 8.44                                                             |
| 494.9                | 515.2       | 8.43                                                             |
| 454.5                | 555.6       | 8.33                                                             |
| 434.3                | 575.8       | 8.25                                                             |
| 393.9                | 616.2       | 8.03                                                             |
| 373.7                | 636.4       | 7.94                                                             |
| 333.3                | 676.8       | 7.83                                                             |
| 313.1                | 697.0       | 7.80                                                             |
| 272.7                | 737.4       | 7.65                                                             |
| 252.4                | 757.7       | 7.58                                                             |
| 212.0                | 798.1       | 7.43                                                             |
| 191.8                | 818.3       | 7.33                                                             |
| 151.4                | 858.7       | 7.32                                                             |
| 131.2                | 878.9       | 7.31                                                             |
| 90.8                 | 919.3       | 7.31                                                             |
| 70.6                 | 939.5       | 7.29                                                             |
| 30.2                 | 979.9       | 7.15                                                             |
| 10.0                 | 1000.1      | 7.16                                                             |

| 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        | 5.58                                                           |
| 50.6                 | 60.7        | 5.33                                                           |
| 91.3                 | 101.4       | 5.64                                                           |
| 131.9                | 142.0       | 5.73                                                           |
| 172.5                | 182.6       | 5.55                                                           |
| 213.2                | 223.3       | 5.71                                                           |
| 253.8                | 263.9       | 5.39                                                           |
| 294.4                | 304.5       | 5.65                                                           |
| 335.1                | 345.2       | 5.46                                                           |
| 375.7                | 385.8       | 5.75                                                           |
| 416.3                | 426.4       | 5.80                                                           |
| 436.7                | 446.8       | 5.81                                                           |
| 477.3                | 487.4       | 5.96                                                           |
| 497.6                | 507.7       | 6.03                                                           |
| 538.3                | 548.4       | 6.03                                                           |
| 558.6                | 568.7       | 6.38                                                           |
| 599.2                | 609.3       | 6.33                                                           |
| 619.5                | 629.6       | 6.47                                                           |
| 660.2                | 670.3       | 6.40                                                           |
| 680.5                | 690.6       | 6.49                                                           |
| 721.1                | 731.2       | 6.86                                                           |
| 741.4                | 751.5       | 6.95                                                           |
| 782.1                | 792.2       | 7.28                                                           |
| 802.4                | 812.5       | 7.50                                                           |
| 843.0                | 853.1       | 7.19                                                           |
| 863.3                | 873.4       | 7.55                                                           |
| 904.0                | 914.1       | 7.84                                                           |
| 924.3                | 934.4       | 8.03                                                           |
| 964.9                | 975.0       | 8.19                                                           |
| 985.2                | 995.3       | 8.20                                                           |
| 1025.9               | 1036.0      | 8.43                                                           |
| 1046.2               | 1056.3      | 8.65                                                           |
| 1086.8               | 1096.9      | 9.09                                                           |
| 1107.1               | 1117.2      | 8.88                                                           |
| 1147.8               | 1157.9      | 9.25                                                           |
| 1168.1               | 1178.2      | 9.52                                                           |
| 1208.7               | 1218.8      | 9.75                                                           |
| 1229.0               | 1239.1      | 9.77                                                           |
| 1269.7               | 1279.8      | 10.25                                                          |
| 1290.0               | 1300.1      | 10.55                                                          |

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=2010.1MHz<br>(dB) |
|----------------------|-------------|------------------------------------------------------------------|
|                      |             | @LO (dBm)                                                        |
|                      |             | +7                                                               |
| 1110.0               | 900.1       | 10.28                                                            |
| 1090.0               | 920.1       | 10.17                                                            |
| 1070.0               | 940.1       | 9.98                                                             |
| 1050.0               | 960.1       | 9.77                                                             |
| 1030.0               | 980.1       | 9.71                                                             |
| 1010.0               | 1000.1      | 9.65                                                             |
| 990.0                | 1020.1      | 9.60                                                             |
| 970.0                | 1040.1      | 9.45                                                             |
| 930.0                | 1080.1      | 9.20                                                             |
| 910.0                | 1100.1      | 9.15                                                             |
| 870.0                | 1140.1      | 8.96                                                             |
| 850.0                | 1160.1      | 8.85                                                             |
| 810.0                | 1200.1      | 8.75                                                             |
| 790.0                | 1220.1      | 8.72                                                             |
| 750.0                | 1260.1      | 8.60                                                             |
| 730.0                | 1280.1      | 8.54                                                             |
| 690.0                | 1320.1      | 8.45                                                             |
| 670.0                | 1340.1      | 8.40                                                             |
| 630.0                | 1380.1      | 8.34                                                             |
| 610.0                | 1400.1      | 8.31                                                             |
| 570.0                | 1440.1      | 8.25                                                             |
| 550.0                | 1460.1      | 8.21                                                             |
| 510.0                | 1500.1      | 8.12                                                             |
| 490.0                | 1520.1      | 8.07                                                             |
| 450.0                | 1560.1      | 7.99                                                             |
| 430.0                | 1580.1      | 7.96                                                             |
| 390.0                | 1620.1      | 7.86                                                             |
| 370.0                | 1640.1      | 7.80                                                             |
| 330.0                | 1680.1      | 7.70                                                             |
| 310.0                | 1700.1      | 7.65                                                             |
| 270.0                | 1740.1      | 7.54                                                             |
| 250.0                | 1760.1      | 7.51                                                             |
| 210.0                | 1800.1      | 7.42                                                             |
| 190.0                | 1820.1      | 7.41                                                             |
| 150.0                | 1860.1      | 7.35                                                             |
| 130.0                | 1880.1      | 7.35                                                             |
| 90.0                 | 1920.1      | 7.34                                                             |
| 70.0                 | 1940.1      | 7.33                                                             |
| 30.0                 | 1980.1      | 7.29                                                             |
| 10.0                 | 2000.1      | 7.36                                                             |

## 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   |
| 40.1        | 58.41                   | 59.10 | 60.15 | 58.93                   | 59.88 | 60.55 |
| 120.4       | 51.49                   | 52.10 | 52.64 | 55.35                   | 54.11 | 53.59 |
| 200.6       | 47.85                   | 48.63 | 49.32 | 49.63                   | 48.91 | 49.02 |
| 280.9       | 45.48                   | 46.49 | 47.38 | 45.86                   | 45.52 | 45.74 |
| 361.1       | 43.87                   | 45.12 | 46.25 | 42.46                   | 42.68 | 42.91 |
| 441.4       | 42.60                   | 43.82 | 44.88 | 41.92                   | 41.39 | 40.81 |
| 521.6       | 41.54                   | 42.77 | 43.74 | 40.70                   | 39.85 | 38.90 |
| 601.9       | 40.23                   | 41.43 | 42.49 | 38.88                   | 38.12 | 37.18 |
| 682.1       | 39.06                   | 40.05 | 40.95 | 38.80                   | 37.04 | 35.62 |
| 762.4       | 38.13                   | 38.95 | 39.69 | 38.89                   | 36.15 | 34.27 |
| 842.6       | 37.58                   | 38.21 | 38.85 | 38.51                   | 35.18 | 33.31 |
| 922.9       | 37.06                   | 37.73 | 38.25 | 37.71                   | 34.32 | 32.32 |
| 1003.1      | 36.13                   | 36.79 | 37.38 | 37.36                   | 33.86 | 31.80 |
| 1083.4      | 35.45                   | 36.11 | 36.70 | 36.72                   | 33.22 | 31.25 |
| 1163.6      | 34.75                   | 35.33 | 35.81 | 35.98                   | 32.56 | 30.43 |
| 1243.9      | 34.52                   | 35.11 | 35.67 | 35.01                   | 31.69 | 29.90 |
| 1324.1      | 34.08                   | 34.72 | 35.16 | 34.35                   | 31.24 | 29.22 |
| 1404.4      | 33.83                   | 34.52 | 35.08 | 33.46                   | 30.77 | 28.85 |
| 1484.6      | 33.51                   | 34.40 | 35.04 | 32.60                   | 30.49 | 28.76 |
| 1564.9      | 32.96                   | 34.11 | 34.89 | 31.47                   | 30.03 | 28.41 |
| 1645.1      | 32.50                   | 33.91 | 34.88 | 30.93                   | 29.76 | 28.26 |
| 1725.4      | 31.98                   | 33.37 | 34.42 | 31.18                   | 30.12 | 28.84 |
| 1805.6      | 32.48                   | 34.35 | 35.77 | 32.07                   | 31.61 | 30.99 |
| 1885.9      | 31.63                   | 33.05 | 34.07 | 37.25                   | 36.21 | 35.06 |
| 1966.1      | 31.13                   | 32.37 | 33.35 | 35.22                   | 34.85 | 33.79 |
| 2046.4      | 30.85                   | 31.82 | 32.60 | 33.08                   | 33.15 | 32.48 |
| 2126.6      | 30.81                   | 31.68 | 32.32 | 32.16                   | 32.62 | 32.05 |
| 2206.9      | 30.89                   | 31.66 | 32.11 | 31.66                   | 32.61 | 31.92 |
| 2287.1      | 30.83                   | 31.54 | 31.86 | 31.27                   | 32.62 | 32.18 |
| 2367.4      | 30.94                   | 31.55 | 31.82 | 31.18                   | 32.93 | 32.76 |
| 2447.6      | 31.11                   | 31.38 | 31.68 | 31.19                   | 33.12 | 33.29 |
| 2527.9      | 31.31                   | 31.44 | 31.67 | 31.39                   | 33.49 | 33.90 |
| 2608.2      | 31.25                   | 31.56 | 31.67 | 31.67                   | 33.94 | 34.44 |
| 2688.4      | 31.43                   | 31.75 | 31.74 | 32.02                   | 34.39 | 34.95 |
| 2768.7      | 31.12                   | 31.49 | 31.81 | 32.80                   | 35.21 | 36.03 |
| 2869.0      | 30.96                   | 31.02 | 31.10 | 33.79                   | 36.47 | 37.75 |
| 2949.2      | 31.01                   | 30.87 | 31.10 | 34.68                   | 37.14 | 38.55 |
| 3049.5      | 30.80                   | 30.97 | 30.97 | 36.57                   | 39.23 | 40.63 |
| 3129.8      | 30.87                   | 31.00 | 31.07 | 38.41                   | 41.28 | 43.00 |
| 3230.1      | 31.33                   | 31.36 | 31.36 | 41.48                   | 44.40 | 46.66 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | +4                      | +7    | +10   |
| 10.1                | 40.1        | 22.84                   | 22.73 | 23.02 |
| 90.4                | 120.4       | 22.86                   | 22.94 | 23.21 |
| 170.6               | 200.6       | 23.82                   | 24.49 | 24.55 |
| 250.9               | 280.9       | 25.04                   | 25.46 | 26.03 |
| 331.1               | 361.1       | 26.51                   | 27.31 | 27.70 |
| 411.4               | 441.4       | 26.92                   | 27.51 | 27.99 |
| 491.6               | 521.6       | 27.55                   | 27.47 | 27.47 |
| 571.9               | 601.9       | 27.47                   | 27.65 | 27.67 |
| 652.1               | 682.1       | 26.81                   | 26.71 | 26.78 |
| 732.4               | 762.4       | 26.74                   | 26.80 | 26.84 |
| 812.6               | 842.6       | 26.95                   | 27.20 | 27.37 |
| 892.9               | 922.9       | 27.81                   | 28.24 | 28.50 |
| 973.1               | 1003.1      | 30.43                   | 30.91 | 31.23 |
| 1053.4              | 1083.4      | 33.09                   | 33.40 | 33.37 |
| 1133.6              | 1163.6      | 35.84                   | 35.24 | 34.52 |
| 1213.9              | 1243.9      | 37.01                   | 35.65 | 34.30 |
| 1294.1              | 1324.1      | 36.90                   | 35.32 | 34.16 |
| 1374.4              | 1404.4      | 36.97                   | 35.28 | 34.38 |
| 1454.6              | 1484.6      | 35.60                   | 34.88 | 34.42 |
| 1534.9              | 1564.9      | 32.88                   | 32.72 | 32.77 |
| 1615.1              | 1645.1      | 30.83                   | 30.75 | 30.71 |
| 1695.4              | 1725.4      | 30.08                   | 29.93 | 29.91 |
| 1775.6              | 1805.6      | 29.57                   | 29.31 | 29.08 |
| 1855.9              | 1885.9      | 30.67                   | 30.45 | 30.24 |
| 1936.1              | 1966.1      | 30.36                   | 30.25 | 30.21 |
| 2016.4              | 2046.4      | 28.75                   | 28.89 | 28.96 |
| 2096.6              | 2126.6      | 26.14                   | 26.33 | 26.57 |
| 2176.9              | 2206.9      | 23.94                   | 24.13 | 24.34 |
| 2257.1              | 2287.1      | 21.83                   | 22.07 | 22.22 |
| 2337.4              | 2367.4      | 20.27                   | 20.49 | 20.65 |
| 2417.6              | 2447.6      | 19.19                   | 19.33 | 19.55 |
| 2497.9              | 2527.9      | 18.35                   | 18.62 | 18.80 |
| 2578.2              | 2608.2      | 17.67                   | 17.94 | 18.18 |
| 2658.4              | 2688.4      | 17.36                   | 17.60 | 17.79 |
| 2738.7              | 2768.7      | 17.07                   | 17.41 | 17.62 |
| 2839.0              | 2869.0      | 16.99                   | 17.42 | 17.76 |
| 2919.2              | 2949.2      | 16.94                   | 17.41 | 17.82 |
| 3019.5              | 3049.5      | 17.55                   | 17.90 | 18.15 |
| 3099.8              | 3129.8      | 17.85                   | 18.09 | 18.28 |
| 3200.1              | 3230.1      | 18.28                   | 18.35 | 18.38 |

# Frequency Mixer

TFM-11+

## 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=2000MHz<br>(:1) |      |      |
|---------------------|-------------|-----------------|------|------|-------------|-----------------|------|------|----------------------|--------------------------------|------|------|
|                     |             | @LO (dBm)       |      |      |             | @LO (dBm)       |      |      |                      | @LO (dBm)                      |      |      |
|                     |             | +4              | +7   | +10  |             | +4              | +7   | +10  |                      | +4                             | +7   | +10  |
| 10.1                | 40.1        | 1.06            | 1.07 | 1.07 | 40.1        | 1.86            | 2.78 | 3.96 | 10.0                 | 1.07                           | 1.12 | 1.25 |
| 90.4                | 120.4       | 1.21            | 1.11 | 1.05 | 120.4       | 1.79            | 2.59 | 3.62 | 30.2                 | 1.01                           | 1.14 | 1.28 |
| 170.6               | 200.6       | 1.31            | 1.24 | 1.20 | 200.6       | 1.72            | 2.44 | 3.37 | 50.4                 | 1.04                           | 1.14 | 1.28 |
| 250.9               | 280.9       | 1.57            | 1.48 | 1.43 | 280.9       | 1.73            | 2.41 | 3.28 | 70.6                 | 1.05                           | 1.16 | 1.30 |
| 331.1               | 361.1       | 1.90            | 1.80 | 1.73 | 361.1       | 1.73            | 2.39 | 3.24 | 90.8                 | 1.06                           | 1.14 | 1.26 |
| 411.4               | 441.4       | 2.29            | 2.15 | 2.05 | 441.4       | 1.75            | 2.38 | 3.20 | 111.0                | 1.06                           | 1.18 | 1.31 |
| 491.6               | 521.6       | 2.75            | 2.57 | 2.44 | 521.6       | 1.72            | 2.31 | 3.09 | 131.2                | 1.08                           | 1.18 | 1.31 |
| 571.9               | 601.9       | 3.11            | 2.89 | 2.75 | 601.9       | 1.70            | 2.24 | 2.96 | 151.4                | 1.12                           | 1.23 | 1.35 |
| 652.1               | 682.1       | 3.37            | 3.15 | 2.99 | 682.1       | 1.68            | 2.16 | 2.83 | 171.6                | 1.11                           | 1.21 | 1.33 |
| 732.4               | 762.4       | 3.47            | 3.25 | 3.11 | 762.4       | 1.67            | 2.09 | 2.70 | 191.8                | 1.14                           | 1.24 | 1.36 |
| 812.6               | 842.6       | 3.48            | 3.27 | 3.13 | 842.6       | 1.64            | 2.02 | 2.58 | 212.0                | 1.14                           | 1.25 | 1.38 |
| 892.9               | 922.9       | 3.34            | 3.17 | 3.03 | 922.9       | 1.64            | 1.96 | 2.48 | 232.2                | 1.18                           | 1.30 | 1.43 |
| 973.1               | 1003.1      | 3.61            | 3.43 | 3.30 | 1003.1      | 1.60            | 1.88 | 2.37 | 252.4                | 1.20                           | 1.33 | 1.46 |
| 1053.4              | 1083.4      | 3.37            | 3.22 | 3.11 | 1083.4      | 1.58            | 1.81 | 2.26 | 272.7                | 1.21                           | 1.32 | 1.45 |
| 1133.6              | 1163.6      | 2.95            | 2.83 | 2.75 | 1163.6      | 1.54            | 1.75 | 2.18 | 292.9                | 1.24                           | 1.36 | 1.50 |
| 1213.9              | 1243.9      | 2.54            | 2.43 | 2.35 | 1243.9      | 1.53            | 1.70 | 2.11 | 313.1                | 1.24                           | 1.37 | 1.50 |
| 1294.1              | 1324.1      | 2.25            | 2.12 | 2.04 | 1324.1      | 1.50            | 1.65 | 2.03 | 333.3                | 1.31                           | 1.45 | 1.59 |
| 1374.4              | 1404.4      | 2.10            | 1.97 | 1.87 | 1404.4      | 1.48            | 1.60 | 1.97 | 353.5                | 1.30                           | 1.44 | 1.57 |
| 1454.6              | 1484.6      | 1.96            | 1.83 | 1.74 | 1484.6      | 1.47            | 1.58 | 1.94 | 373.7                | 1.34                           | 1.48 | 1.62 |
| 1534.9              | 1564.9      | 1.87            | 1.72 | 1.62 | 1564.9      | 1.46            | 1.58 | 1.94 | 393.9                | 1.34                           | 1.49 | 1.63 |
| 1615.1              | 1645.1      | 1.73            | 1.60 | 1.51 | 1645.1      | 1.44            | 1.59 | 1.97 | 434.3                | 1.42                           | 1.59 | 1.75 |
| 1695.4              | 1725.4      | 1.64            | 1.51 | 1.43 | 1725.4      | 1.42            | 1.58 | 1.97 | 454.5                | 1.45                           | 1.61 | 1.76 |
| 1775.6              | 1805.6      | 1.61            | 1.48 | 1.39 | 1805.6      | 1.43            | 1.62 | 2.01 | 494.9                | 1.49                           | 1.66 | 1.81 |
| 1855.9              | 1885.9      | 1.59            | 1.48 | 1.40 | 1885.9      | 1.43            | 1.63 | 2.04 | 515.1                | 1.56                           | 1.74 | 1.91 |
| 1936.1              | 1966.1      | 1.67            | 1.55 | 1.47 | 1966.1      | 1.43            | 1.65 | 2.04 | 555.5                | 1.62                           | 1.81 | 1.99 |
| 2016.4              | 2046.4      | 1.77            | 1.66 | 1.58 | 2046.4      | 1.43            | 1.66 | 2.06 | 575.7                | 1.61                           | 1.80 | 1.97 |
| 2096.6              | 2126.6      | 1.86            | 1.78 | 1.71 | 2126.6      | 1.43            | 1.68 | 2.08 | 616.1                | 1.71                           | 1.92 | 2.10 |
| 2176.9              | 2206.9      | 1.81            | 1.77 | 1.73 | 2206.9      | 1.44            | 1.68 | 2.08 | 636.3                | 1.76                           | 1.97 | 2.15 |
| 2257.1              | 2287.1      | 1.71            | 1.70 | 1.69 | 2287.1      | 1.43            | 1.65 | 2.04 | 676.7                | 1.80                           | 2.01 | 2.20 |
| 2337.4              | 2367.4      | 1.63            | 1.62 | 1.61 | 2367.4      | 1.41            | 1.61 | 1.99 | 696.9                | 1.88                           | 2.10 | 2.30 |
| 2417.6              | 2447.6      | 1.66            | 1.64 | 1.63 | 2447.6      | 1.41            | 1.59 | 1.94 | 737.3                | 1.98                           | 2.21 | 2.40 |
| 2497.9              | 2527.9      | 1.82            | 1.80 | 1.78 | 2527.9      | 1.44            | 1.59 | 1.92 | 757.6                | 1.97                           | 2.19 | 2.38 |
| 2578.2              | 2608.2      | 1.98            | 1.96 | 1.94 | 2608.2      | 1.45            | 1.59 | 1.92 | 798.0                | 2.09                           | 2.32 | 2.52 |
| 2658.4              | 2688.4      | 2.06            | 2.06 | 2.06 | 2688.4      | 1.44            | 1.55 | 1.86 | 818.2                | 2.17                           | 2.41 | 2.61 |
| 2738.7              | 2768.7      | 1.93            | 1.94 | 1.95 | 2768.7      | 1.44            | 1.52 | 1.79 | 858.6                | 2.22                           | 2.46 | 2.66 |
| 2839.0              | 2869.0      | 1.93            | 1.94 | 1.96 | 2869.0      | 1.41            | 1.49 | 1.76 | 878.8                | 2.30                           | 2.54 | 2.74 |
| 2919.2              | 2949.2      | 1.74            | 1.76 | 1.78 | 2949.2      | 1.38            | 1.49 | 1.75 | 919.2                | 2.43                           | 2.68 | 2.89 |
| 3019.5              | 3049.5      | 1.75            | 1.76 | 1.79 | 3049.5      | 1.32            | 1.47 | 1.74 | 939.4                | 2.42                           | 2.66 | 2.86 |
| 3099.8              | 3129.8      | 1.56            | 1.58 | 1.61 | 3129.8      | 1.28            | 1.47 | 1.74 | 979.8                | 2.55                           | 2.79 | 2.99 |
| 3200.1              | 3230.1      | 1.64            | 1.67 | 1.70 | 3230.1      | 1.27            | 1.49 | 1.77 | 1000.0               | 2.74                           | 2.94 | 3.07 |

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TFM-11+  
101011  
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## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 5   | 39  | 19  | 51  | 23  | 39  | 33  | 50  | 45  | >69 |
| 1  | -      | 24     | +0  | 37  | 36  | 44  | 30  | 37  | 46  | 36  | 43  | 42  |
| 2  | >90    | >69    | 59  | 66  | 63  | >69 | 58  | >69 | 59  | 65  | 61  | >69 |
| 3  | >90    | >69    | >69 | >69 | 53  | >69 | >69 | >69 | 65  | >69 | >69 | 67  |
| 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: 1000 MHz; -14.00 dBm.  
LO IN: 1030 MHz; +7.00 dBm  
IF OUT: 30 MHz; -21.31 dBm

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 15  | 50  | 30  | 55  | 35  | 47  | 48  | 59  | 59  | 73  |
| 1  | -      | 25     | +0  | 38  | 36  | 49  | 31  | 41  | 50  | 43  | 52  | 53  |
| 2  | 70     | 69     | 49  | 51  | 54  | 77  | 52  | 69  | 55  | 69  | 60  | 75  |
| 3  | >90    | 50     | 56  | 60  | 36  | 71  | 63  | 63  | 51  | 55  | 63  | 55  |
| 4  | >90    | >79    | 72  | >79 | 71  | 66  | 72  | >79 | 68  | >79 | 70  | 71  |
| 5  | >90    | 72     | 67  | 72  | 75  | 75  | 53  | >79 | 74  | >79 | 64  | 66  |
| 6  | >90    | >79    | >79 | >79 | >79 | >79 | >79 | 77  | >79 | >79 | 78  | >79 |
| 7  | >90    | >79    | >79 | >79 | >79 | >79 | >79 | >79 | 65  | >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  |

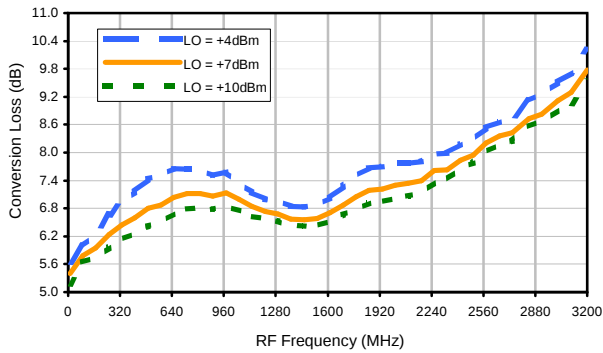
### LO HARMONICS ORDER

Test conditions: RF IN: 1000 MHz; -4.00 dBm.  
LO IN: 1030 MHz; +7.00 dBm  
IF OUT: 30 MHz; -11.17 dBm

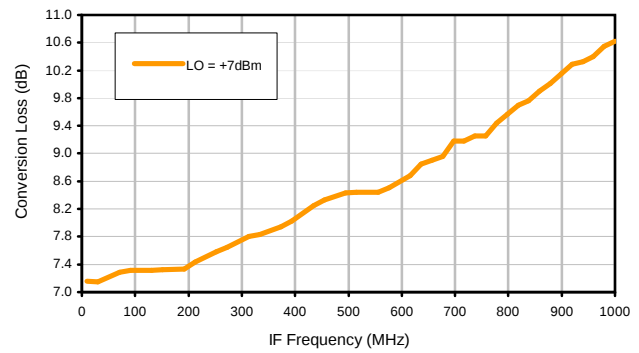
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.  
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.  
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

## Typical Performance Curves

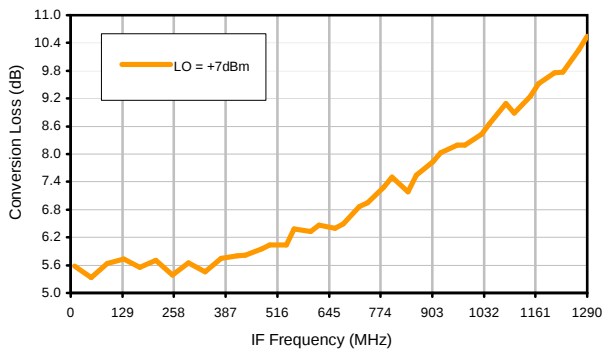
Conversion Loss @ IF=30MHz



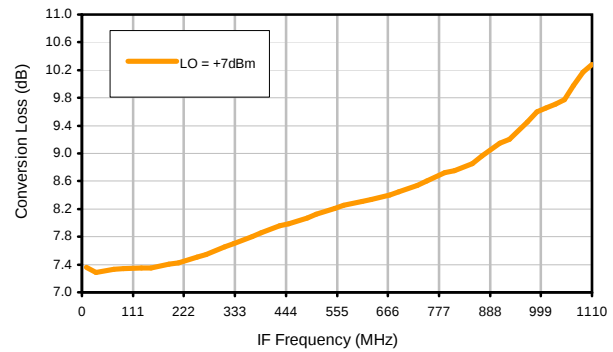
Conversion Loss vs. IF @ RF=1010.1MHz



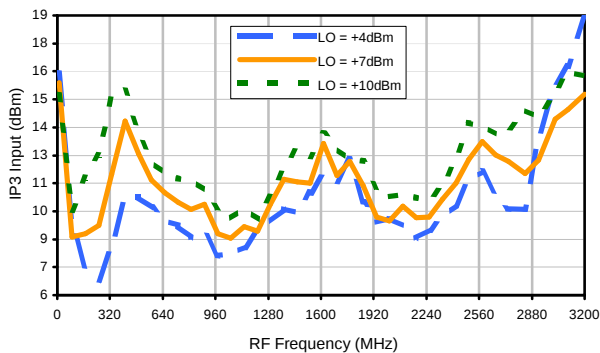
Conversion Loss vs. IF @ RF=10.1MHz



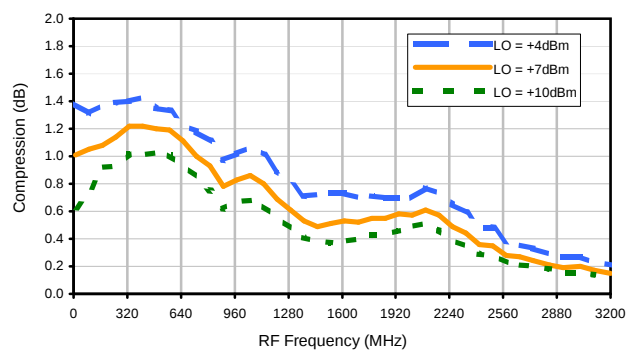
Conversion Loss vs. IF @ RF=2010.1MHz



IP3 Input

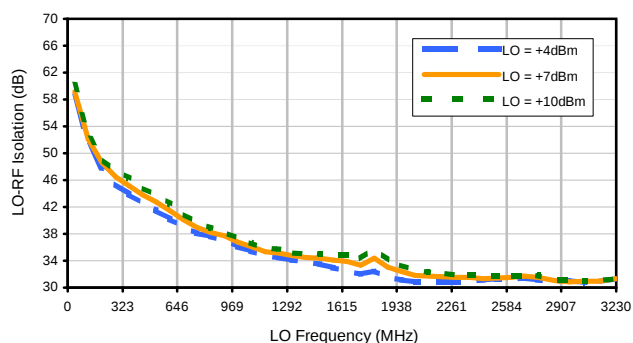


Compression @ RF IN=+1dBm

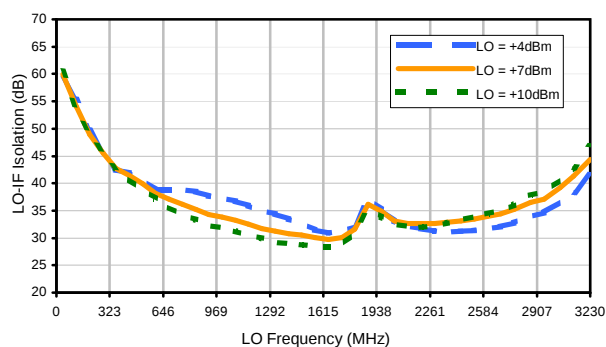


## Typical Performance Curves

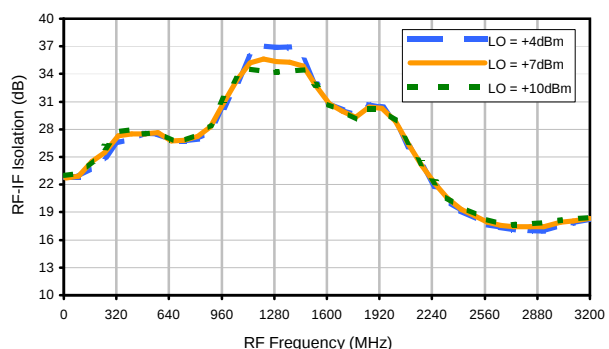
LO-RF Isolation



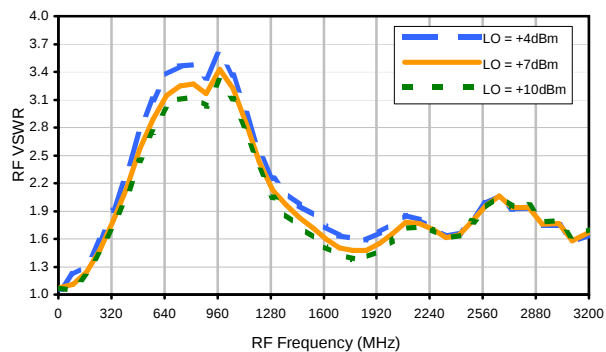
LO-IF Isolation



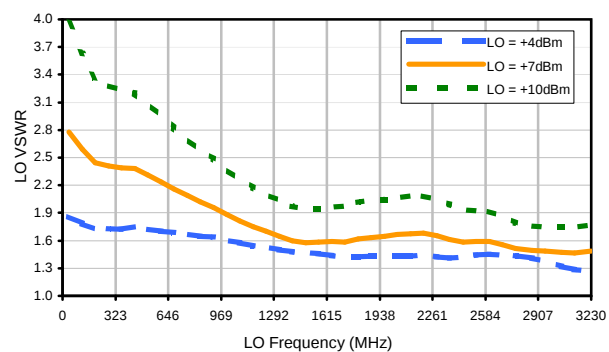
RF-IF Isolation



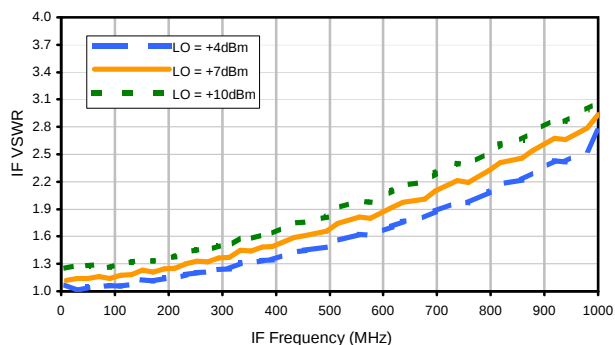
RF VSWR



LO VSWR



IF VSWR



## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 5   | 39  | 19  | 51  | 23  | 39  | 33  | 50  | 45  | >69 |
| 1  | -      | 24     | +0  | 37  | 36  | 44  | 30  | 37  | 46  | 36  | 43  | 42  |
| 2  | >90    | >69    | 59  | 66  | 63  | >69 | 58  | >69 | 59  | 65  | 61  | >69 |
| 3  | >90    | >69    | >69 | >69 | 53  | >69 | >69 | >69 | 65  | >69 | >69 | 67  |
| 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: 1000 MHz; -14.00 dBm.

LO IN: 1030 MHz; +7.00 dBm

IF OUT: 30 MHz; -21.31 dBm

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 15  | 50  | 30  | 55  | 35  | 47  | 48  | 59  | 59  | 73  |
| 1  | -      | 25     | +0  | 38  | 36  | 49  | 31  | 41  | 50  | 43  | 52  | 53  |
| 2  | 70     | 69     | 49  | 51  | 54  | 77  | 52  | 69  | 55  | 69  | 60  | 75  |
| 3  | >90    | 50     | 56  | 60  | 36  | 71  | 63  | 63  | 51  | 55  | 63  | 55  |
| 4  | >90    | >79    | 72  | >79 | 71  | 66  | 72  | >79 | 68  | >79 | 70  | 71  |
| 5  | >90    | 72     | 67  | 72  | 75  | 75  | 53  | >79 | 74  | >79 | 64  | 66  |
| 6  | >90    | >79    | >79 | >79 | >79 | >79 | >79 | 77  | >79 | >79 | 78  | >79 |
| 7  | >90    | >79    | >79 | >79 | >79 | >79 | >79 | >79 | 65  | >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: 1000 MHz; -4.00 dBm.

LO IN: 1030 MHz; +7.00 dBm

IF OUT: 30 MHz; -11.17 dBm

Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.

2. + entry denotes harmonics are in (dBc) above IF OUTPUT.

3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

REV. X3

TFM-11+

101011

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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 |