

# Frequency Mixer

# TFM-4H

## 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=+14dBm<br>(dB) |       |       |
|---------------------|-------------|-------------------------------------------------------|------|------|---------------------|-------------|--------------------|-------|-------|---------------------|-------------|--------------------------------------|-------|-------|
|                     |             | @LO (dBm)                                             |      |      |                     |             | @LO (dBm)          |       |       |                     |             | @LO (dBm)                            |       |       |
|                     |             |                                                       |      |      |                     |             |                    |       |       |                     |             |                                      |       |       |
| +14                 | +17         | +20                                                   | +14  | +17  | +20                 | +14         | +17                | +20   |       |                     |             |                                      |       |       |
| 10.1                | 40.1        | 7.82                                                  | 6.58 | 6.18 | 10.1                | 40.1        | 23.70              | 28.32 | 31.93 | 10.1                | 40.1        | 0.37                                 | 0.12  | 0.10  |
| 49.9                | 79.9        | 8.37                                                  | 7.26 | 6.75 | 49.9                | 79.9        | 24.71              | 28.33 | 31.68 | 50.8                | 80.8        | 0.28                                 | 0.06  | 0.03  |
| 89.6                | 119.6       | 8.16                                                  | 7.02 | 6.55 | 89.6                | 119.6       | 23.52              | 27.49 | 30.74 | 91.5                | 121.5       | 0.22                                 | 0.10  | 0.07  |
| 129.4               | 159.4       | 8.18                                                  | 7.09 | 6.62 | 129.4               | 159.4       | 25.67              | 27.94 | 30.58 | 132.3               | 162.3       | 0.23                                 | 0.04  | 0.03  |
| 169.2               | 199.2       | 7.97                                                  | 6.92 | 6.47 | 169.2               | 199.2       | 25.70              | 27.77 | 26.77 | 173.0               | 203.0       | 0.42                                 | 0.16  | 0.11  |
| 208.9               | 238.9       | 8.14                                                  | 6.95 | 6.43 | 208.9               | 238.9       | 23.73              | 27.03 | 26.93 | 213.7               | 243.7       | 0.30                                 | 0.10  | 0.06  |
| 248.7               | 278.7       | 8.03                                                  | 6.91 | 6.43 | 248.7               | 278.7       | 23.44              | 25.35 | 28.14 | 254.4               | 284.4       | 0.25                                 | 0.08  | 0.07  |
| 288.5               | 318.5       | 7.85                                                  | 6.70 | 6.32 | 288.5               | 318.5       | 23.84              | 25.78 | 34.06 | 295.2               | 325.2       | 0.34                                 | 0.20  | 0.09  |
| 328.2               | 358.2       | 7.91                                                  | 6.80 | 6.40 | 328.2               | 358.2       | 22.97              | 25.10 | 30.33 | 335.9               | 365.9       | 0.39                                 | 0.16  | 0.06  |
| 368.0               | 398.0       | 7.53                                                  | 6.59 | 6.27 | 368.0               | 398.0       | 24.23              | 27.25 | 28.17 | 376.6               | 406.6       | 0.60                                 | 0.24  | 0.11  |
| 407.7               | 437.7       | 7.54                                                  | 6.59 | 6.29 | 407.7               | 437.7       | 23.10              | 28.98 | 29.25 | 417.3               | 447.3       | 0.54                                 | 0.19  | 0.08  |
| 447.5               | 477.5       | 7.50                                                  | 6.56 | 6.26 | 447.5               | 477.5       | 22.76              | 28.67 | 27.45 | 458.1               | 488.1       | 0.76                                 | 0.27  | 0.13  |
| 487.3               | 517.3       | 7.37                                                  | 6.54 | 6.26 | 487.3               | 517.3       | 24.68              | 25.90 | 26.16 | 498.8               | 528.8       | 0.72                                 | 0.22  | 0.10  |
| 527.0               | 557.0       | 7.36                                                  | 6.60 | 6.29 | 527.0               | 557.0       | 25.86              | 24.05 | 25.86 | 539.5               | 569.5       | 0.72                                 | 0.19  | 0.10  |
| 566.8               | 596.8       | 7.27                                                  | 6.57 | 6.25 | 566.8               | 596.8       | 25.85              | 23.85 | 25.85 | 580.2               | 610.2       | 0.70                                 | 0.17  | 0.08  |
| 606.6               | 636.6       | 7.34                                                  | 6.62 | 6.32 | 606.6               | 636.6       | 26.02              | 24.50 | 27.04 | 620.9               | 650.9       | 0.68                                 | 0.14  | 0.06  |
| 646.3               | 676.3       | 7.32                                                  | 6.59 | 6.31 | 646.3               | 676.3       | 25.29              | 26.20 | 28.72 | 661.7               | 691.7       | 0.72                                 | 0.17  | 0.08  |
| 686.1               | 716.1       | 7.37                                                  | 6.62 | 6.31 | 686.1               | 716.1       | 24.84              | 27.84 | 31.85 | 702.4               | 732.4       | 0.59                                 | 0.13  | 0.06  |
| 725.9               | 755.9       | 7.26                                                  | 6.60 | 6.27 | 725.9               | 755.9       | 25.77              | 27.71 | 30.50 | 743.1               | 773.1       | 0.77                                 | 0.19  | 0.15  |
| 765.6               | 795.6       | 7.26                                                  | 6.64 | 6.30 | 765.6               | 795.6       | 26.71              | 25.64 | 34.40 | 783.8               | 813.8       | 0.80                                 | 0.19  | 0.15  |
| 805.4               | 835.4       | 7.39                                                  | 6.81 | 6.47 | 805.4               | 835.4       | 23.69              | 23.63 | 25.29 | 824.6               | 854.6       | 0.92                                 | 0.24  | 0.16  |
| 845.2               | 875.2       | 7.41                                                  | 6.87 | 6.58 | 845.2               | 875.2       | 21.74              | 22.61 | 24.00 | 865.3               | 895.3       | 0.92                                 | 0.28  | 0.15  |
| 884.9               | 914.9       | 7.57                                                  | 7.00 | 6.71 | 884.9               | 914.9       | 20.04              | 21.16 | 23.04 | 906.0               | 936.0       | 0.97                                 | 0.31  | 0.10  |
| 924.7               | 954.7       | 7.70                                                  | 7.07 | 6.79 | 924.7               | 954.7       | 18.86              | 20.65 | 22.28 | 946.7               | 976.7       | 0.83                                 | 0.33  | 0.14  |
| 964.5               | 994.5       | 7.96                                                  | 7.19 | 6.85 | 964.5               | 994.5       | 17.94              | 20.61 | 22.38 | 987.4               | 1017.4      | 0.74                                 | 0.32  | 0.17  |
| 1004.2              | 1034.2      | 8.21                                                  | 7.31 | 6.85 | 1004.2              | 1034.2      | 17.26              | 20.91 | 23.47 | 1028.2              | 1058.2      | 0.67                                 | 0.41  | 0.27  |
| 1044.0              | 1074.0      | 8.50                                                  | 7.37 | 6.79 | 1044.0              | 1074.0      | 16.71              | 21.57 | 25.06 | 1068.9              | 1098.9      | 0.46                                 | 0.49  | 0.38  |
| 1103.6              | 1133.6      | 8.92                                                  | 7.36 | 6.62 | 1103.6              | 1133.6      | 15.26              | 23.22 | 28.75 | 1109.6              | 1139.6      | 0.27                                 | 0.57  | 0.49  |
| 1143.4              | 1173.4      | 9.22                                                  | 7.50 | 6.60 | 1143.4              | 1173.4      | 14.43              | 21.12 | 35.57 | 1150.3              | 1180.3      | 0.08                                 | 0.53  | 0.56  |
| 1203.0              | 1233.0      | 9.57                                                  | 7.90 | 6.72 | 1203.0              | 1233.0      | 14.26              | 17.71 | 29.12 | 1191.1              | 1221.1      | -0.02                                | 0.39  | 0.60  |
| 1242.8              | 1272.8      | 9.66                                                  | 8.03 | 6.85 | 1242.8              | 1272.8      | 14.54              | 17.56 | 23.80 | 1231.8              | 1261.8      | -0.12                                | 0.30  | 0.53  |
| 1302.5              | 1332.5      | 9.97                                                  | 8.55 | 7.08 | 1302.5              | 1332.5      | 14.69              | 16.64 | 22.36 | 1292.9              | 1322.9      | -0.17                                | 0.09  | 0.48  |
| 1342.2              | 1372.2      | 9.85                                                  | 8.68 | 7.17 | 1342.2              | 1372.2      | 15.39              | 16.43 | 23.20 | 1333.6              | 1363.6      | -0.24                                | -0.08 | 0.44  |
| 1401.9              | 1431.9      | 9.98                                                  | 9.00 | 7.66 | 1401.9              | 1431.9      | 16.87              | 16.83 | 20.55 | 1394.7              | 1424.7      | -0.04                                | -0.17 | 0.28  |
| 1441.6              | 1471.6      | 9.81                                                  | 8.94 | 7.81 | 1441.6              | 1471.6      | 17.57              | 17.52 | 19.88 | 1435.4              | 1465.4      | -0.03                                | -0.17 | 0.14  |
| 1501.3              | 1531.3      | 9.85                                                  | 9.09 | 8.29 | 1501.3              | 1531.3      | 18.51              | 18.09 | 18.54 | 1496.5              | 1526.5      | 0.04                                 | -0.18 | -0.13 |
| 1541.0              | 1571.0      | 9.67                                                  | 8.92 | 8.28 | 1541.0              | 1571.0      | 18.64              | 18.23 | 18.32 | 1537.2              | 1567.2      | 0.29                                 | 0.10  | 0.04  |
| 1600.7              | 1630.7      | 9.90                                                  | 9.10 | 8.53 | 1600.7              | 1630.7      | 18.46              | 18.38 | 18.35 | 1598.3              | 1628.3      | 0.15                                 | 0.10  | 0.03  |
| 1640.5              | 1670.5      | 9.76                                                  | 8.99 | 8.45 | 1640.5              | 1670.5      | 18.21              | 17.92 | 18.26 | 1639.0              | 1669.0      | 0.33                                 | 0.28  | 0.21  |
| 1700.1              | 1730.1      | 9.93                                                  | 9.02 | 8.47 | 1700.1              | 1730.1      | 18.08              | 18.22 | 18.66 | 1700.1              | 1730.1      | 0.35                                 | 0.38  | 0.31  |

# Frequency Mixer

TFM-4H

## Typical Performance Data

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=610.1MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=10.1MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=1210.1MHz<br>(dB) |
|----------------------|-------------|-----------------------------------------------------------------|----------------------|-------------|----------------------------------------------------------------|----------------------|-------------|------------------------------------------------------------------|
|                      |             | @LO (dBm)                                                       |                      |             | @LO (dBm)                                                      |                      |             | @LO (dBm)                                                        |
|                      |             | +17                                                             |                      |             | +17                                                            |                      |             | +17                                                              |
| 600.0                | 10.1        | 7.43                                                            | 10.0                 | 20.1        | 7.48                                                           | 1200.0               | 10.1        | 8.11                                                             |
| 584.9                | 25.2        | 7.24                                                            | 70.5                 | 80.6        | 7.41                                                           | 1159.7               | 50.4        | 7.89                                                             |
| 569.7                | 40.4        | 7.12                                                            | 131.1                | 141.2       | 7.14                                                           | 1119.3               | 90.8        | 7.88                                                             |
| 554.6                | 55.5        | 7.27                                                            | 191.6                | 201.7       | 7.28                                                           | 1099.2               | 110.9       | 7.64                                                             |
| 539.5                | 70.6        | 7.33                                                            | 252.1                | 262.2       | 7.32                                                           | 1058.8               | 151.3       | 7.47                                                             |
| 524.4                | 85.7        | 7.26                                                            | 312.7                | 322.8       | 7.34                                                           | 1038.6               | 171.5       | 7.37                                                             |
| 509.2                | 100.9       | 7.21                                                            | 373.2                | 383.3       | 7.50                                                           | 998.3                | 211.8       | 7.23                                                             |
| 494.1                | 116.0       | 7.08                                                            | 433.7                | 443.8       | 7.62                                                           | 978.1                | 232.0       | 7.12                                                             |
| 479.0                | 131.1       | 7.01                                                            | 494.2                | 504.3       | 7.57                                                           | 937.8                | 272.3       | 7.12                                                             |
| 463.8                | 146.3       | 7.05                                                            | 554.8                | 564.9       | 7.66                                                           | 917.6                | 292.5       | 7.01                                                             |
| 448.7                | 161.4       | 7.03                                                            | 615.3                | 625.4       | 7.66                                                           | 877.3                | 332.8       | 7.04                                                             |
| 433.6                | 176.5       | 7.00                                                            | 675.8                | 685.9       | 7.85                                                           | 857.1                | 353.0       | 7.03                                                             |
| 418.5                | 191.6       | 6.91                                                            | 736.4                | 746.5       | 7.97                                                           | 816.8                | 393.3       | 7.01                                                             |
| 403.3                | 206.8       | 6.98                                                            | 796.9                | 807.0       | 8.06                                                           | 796.6                | 413.5       | 7.05                                                             |
| 388.2                | 221.9       | 6.85                                                            | 857.4                | 867.5       | 8.23                                                           | 756.3                | 453.8       | 7.04                                                             |
| 373.1                | 237.0       | 6.78                                                            | 918.0                | 928.1       | 8.09                                                           | 736.1                | 474.0       | 7.01                                                             |
| 357.9                | 252.2       | 6.77                                                            | 978.5                | 988.6       | 8.00                                                           | 695.8                | 514.3       | 7.09                                                             |
| 342.8                | 267.3       | 6.73                                                            | 1039.0               | 1049.1      | 7.80                                                           | 675.6                | 534.5       | 7.10                                                             |
| 327.7                | 282.4       | 6.75                                                            | 1099.6               | 1109.7      | 7.71                                                           | 635.3                | 574.8       | 7.14                                                             |
| 312.6                | 297.5       | 6.76                                                            | 1160.1               | 1170.2      | 7.68                                                           | 615.1                | 595.0       | 7.19                                                             |
| 297.4                | 312.7       | 6.68                                                            | 1220.6               | 1230.7      | 7.75                                                           | 574.7                | 635.4       | 7.25                                                             |
| 282.3                | 327.8       | 6.61                                                            | 1281.2               | 1291.3      | 7.89                                                           | 554.6                | 655.5       | 7.31                                                             |
| 267.2                | 342.9       | 6.57                                                            | 1341.7               | 1351.8      | 7.90                                                           | 514.2                | 695.9       | 7.40                                                             |
| 252.1                | 358.0       | 6.62                                                            | 1402.2               | 1412.3      | 8.01                                                           | 494.1                | 716.0       | 7.37                                                             |
| 236.9                | 373.2       | 6.69                                                            | 1462.7               | 1472.8      | 7.79                                                           | 453.7                | 756.4       | 7.43                                                             |
| 221.8                | 388.3       | 6.76                                                            | 1523.3               | 1533.4      | 7.66                                                           | 433.6                | 776.5       | 7.49                                                             |
| 206.7                | 403.4       | 6.74                                                            | 1583.8               | 1593.9      | 7.63                                                           | 393.2                | 816.9       | 7.59                                                             |
| 191.5                | 418.6       | 6.65                                                            | 1644.3               | 1654.4      | 7.82                                                           | 373.1                | 837.0       | 7.68                                                             |
| 176.4                | 433.7       | 6.66                                                            | 1704.9               | 1715.0      | 7.99                                                           | 332.7                | 877.4       | 7.81                                                             |
| 161.3                | 448.8       | 6.79                                                            | 1765.4               | 1775.5      | 8.02                                                           | 312.5                | 897.6       | 7.90                                                             |
| 146.2                | 463.9       | 6.80                                                            | 1825.9               | 1836.0      | 8.17                                                           | 272.2                | 937.9       | 7.92                                                             |
| 131.0                | 479.1       | 6.74                                                            | 1886.5               | 1896.6      | 8.48                                                           | 252.0                | 958.1       | 7.95                                                             |
| 115.9                | 494.2       | 6.81                                                            | 1926.8               | 1936.9      | 8.65                                                           | 211.7                | 998.4       | 8.02                                                             |
| 100.8                | 509.3       | 6.95                                                            | 1987.3               | 1997.4      | 8.97                                                           | 191.5                | 1018.6      | 7.94                                                             |
| 85.6                 | 524.5       | 6.96                                                            | 2027.7               | 2037.8      | 9.23                                                           | 151.2                | 1058.9      | 7.95                                                             |
| 70.5                 | 539.6       | 7.14                                                            | 2088.2               | 2098.3      | 9.71                                                           | 131.0                | 1079.1      | 7.87                                                             |
| 55.4                 | 554.7       | 6.96                                                            | 2128.6               | 2138.7      | 9.97                                                           | 90.7                 | 1119.4      | 7.81                                                             |
| 40.3                 | 569.8       | 6.92                                                            | 2189.1               | 2199.2      | 10.58                                                          | 70.5                 | 1139.6      | 8.07                                                             |
| 25.1                 | 585.0       | 7.18                                                            | 2229.5               | 2239.6      | 10.88                                                          | 30.2                 | 1179.9      | 7.57                                                             |
| 10.0                 | 600.1       | 7.36                                                            | 2290.0               | 2300.1      | 11.39                                                          | 10.0                 | 1200.1      | 8.36                                                             |

## Typical Performance Data

| LO<br>(MHz) | LO-RF ISOLATION<br>(dB) |       |       | LO-IF ISOLATION<br>(dB) |       |       |
|-------------|-------------------------|-------|-------|-------------------------|-------|-------|
|             | @LO (dBm)               |       |       | @LO (dBm)               |       |       |
|             | +14                     | +17   | +20   | +14                     | +17   | +20   |
| 40.1        | 62.85                   | 64.05 | 64.43 | 61.10                   | 62.46 | 63.36 |
| 79.9        | 57.53                   | 58.55 | 59.26 | 55.82                   | 57.81 | 59.61 |
| 119.6       | 54.10                   | 55.33 | 56.23 | 52.75                   | 55.11 | 57.41 |
| 159.4       | 51.80                   | 52.97 | 53.97 | 50.48                   | 53.02 | 55.67 |
| 199.2       | 49.81                   | 50.88 | 51.93 | 48.73                   | 51.29 | 54.48 |
| 238.9       | 48.09                   | 49.17 | 50.24 | 47.46                   | 50.37 | 53.84 |
| 278.7       | 46.80                   | 47.93 | 49.22 | 46.24                   | 49.43 | 52.69 |
| 318.5       | 45.54                   | 46.83 | 48.11 | 45.10                   | 48.50 | 51.16 |
| 358.2       | 44.53                   | 45.88 | 47.04 | 44.37                   | 47.70 | 50.11 |
| 398.0       | 43.52                   | 45.13 | 46.40 | 43.51                   | 46.47 | 48.76 |
| 437.7       | 42.80                   | 44.43 | 45.72 | 42.84                   | 45.62 | 47.96 |
| 477.5       | 41.94                   | 43.49 | 44.84 | 42.02                   | 44.38 | 46.60 |
| 517.3       | 41.37                   | 42.83 | 43.97 | 41.00                   | 43.14 | 45.64 |
| 557.0       | 40.89                   | 42.22 | 43.26 | 40.52                   | 42.49 | 44.85 |
| 596.8       | 40.53                   | 42.02 | 42.96 | 40.22                   | 42.47 | 44.62 |
| 636.6       | 40.18                   | 41.77 | 42.80 | 39.76                   | 42.03 | 44.36 |
| 676.3       | 39.82                   | 41.68 | 42.80 | 39.22                   | 41.58 | 44.14 |
| 716.1       | 39.65                   | 41.49 | 42.87 | 38.90                   | 41.34 | 44.12 |
| 755.9       | 39.39                   | 41.31 | 42.84 | 38.58                   | 40.89 | 43.98 |
| 795.6       | 39.05                   | 41.05 | 42.65 | 38.13                   | 40.52 | 43.72 |
| 835.4       | 38.81                   | 40.84 | 42.33 | 37.99                   | 40.86 | 43.50 |
| 875.2       | 38.30                   | 40.36 | 41.94 | 37.80                   | 40.91 | 43.90 |
| 914.9       | 37.80                   | 39.61 | 41.32 | 37.28                   | 40.50 | 44.32 |
| 954.7       | 37.26                   | 39.04 | 40.85 | 37.01                   | 39.98 | 44.22 |
| 994.5       | 36.76                   | 38.68 | 40.59 | 37.24                   | 40.76 | 45.01 |
| 1034.2      | 36.40                   | 38.63 | 40.57 | 37.21                   | 41.01 | 45.97 |
| 1074.0      | 35.87                   | 38.28 | 40.37 | 37.05                   | 41.34 | 47.39 |
| 1133.6      | 35.58                   | 38.03 | 40.31 | 37.74                   | 41.77 | 48.58 |
| 1173.4      | 35.31                   | 37.61 | 40.01 | 38.36                   | 41.33 | 49.26 |
| 1233.0      | 35.15                   | 37.22 | 39.83 | 39.86                   | 41.96 | 49.93 |
| 1272.8      | 35.04                   | 36.97 | 39.61 | 40.74                   | 43.02 | 49.98 |
| 1332.5      | 34.87                   | 36.85 | 38.58 | 43.15                   | 47.07 | 53.63 |
| 1372.2      | 34.32                   | 36.31 | 37.85 | 43.63                   | 50.29 | 55.68 |
| 1431.9      | 31.46                   | 32.97 | 34.53 | 33.25                   | 36.22 | 38.69 |
| 1471.6      | 32.39                   | 34.15 | 36.01 | 32.84                   | 35.72 | 39.04 |
| 1531.3      | 33.17                   | 35.05 | 36.47 | 34.13                   | 38.00 | 41.75 |
| 1571.0      | 33.36                   | 35.03 | 36.41 | 34.33                   | 38.47 | 41.93 |
| 1630.7      | 33.49                   | 34.70 | 35.95 | 33.69                   | 38.22 | 41.93 |
| 1670.5      | 33.53                   | 34.38 | 35.29 | 33.26                   | 37.86 | 41.02 |
| 1730.1      | 33.96                   | 34.46 | 35.07 | 31.99                   | 36.74 | 40.18 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | +14                     | +17   | +20   |
| 10.1                | 40.1        | 54.85                   | 54.08 | 53.80 |
| 49.9                | 79.9        | 41.64                   | 42.03 | 42.22 |
| 89.6                | 119.6       | 36.78                   | 37.27 | 37.64 |
| 129.4               | 159.4       | 34.11                   | 34.64 | 35.12 |
| 169.2               | 199.2       | 32.33                   | 33.14 | 33.68 |
| 208.9               | 238.9       | 31.05                   | 32.01 | 32.64 |
| 248.7               | 278.7       | 30.21                   | 31.17 | 31.70 |
| 288.5               | 318.5       | 29.61                   | 30.47 | 31.08 |
| 328.2               | 358.2       | 29.25                   | 30.00 | 30.37 |
| 368.0               | 398.0       | 28.85                   | 29.96 | 30.60 |
| 407.7               | 437.7       | 28.66                   | 29.92 | 30.91 |
| 447.5               | 477.5       | 28.28                   | 29.57 | 31.05 |
| 487.3               | 517.3       | 28.21                   | 29.91 | 31.53 |
| 527.0               | 557.0       | 27.97                   | 29.53 | 30.58 |
| 566.8               | 596.8       | 27.51                   | 28.52 | 29.03 |
| 606.6               | 636.6       | 26.98                   | 27.60 | 27.92 |
| 646.3               | 676.3       | 26.21                   | 26.85 | 27.37 |
| 686.1               | 716.1       | 25.36                   | 25.99 | 26.54 |
| 725.9               | 755.9       | 24.48                   | 24.90 | 25.15 |
| 765.6               | 795.6       | 23.67                   | 23.80 | 23.67 |
| 805.4               | 835.4       | 22.83                   | 22.64 | 22.32 |
| 845.2               | 875.2       | 21.92                   | 21.54 | 21.22 |
| 884.9               | 914.9       | 21.01                   | 20.36 | 19.95 |
| 924.7               | 954.7       | 20.16                   | 19.44 | 19.00 |
| 964.5               | 994.5       | 19.56                   | 18.71 | 18.18 |
| 1004.2              | 1034.2      | 19.13                   | 18.13 | 17.59 |
| 1044.0              | 1074.0      | 18.74                   | 17.61 | 17.04 |
| 1103.6              | 1133.6      | 18.44                   | 17.23 | 16.72 |
| 1143.4              | 1173.4      | 18.01                   | 17.12 | 16.59 |
| 1203.0              | 1233.0      | 17.89                   | 17.45 | 17.07 |
| 1242.8              | 1272.8      | 17.70                   | 17.45 | 17.23 |
| 1302.5              | 1332.5      | 17.51                   | 17.35 | 17.22 |
| 1342.2              | 1372.2      | 17.37                   | 17.30 | 17.11 |
| 1401.9              | 1431.9      | 17.07                   | 17.04 | 16.70 |
| 1441.6              | 1471.6      | 17.72                   | 17.72 | 17.41 |
| 1501.3              | 1531.3      | 17.33                   | 17.45 | 17.23 |
| 1541.0              | 1571.0      | 16.85                   | 16.91 | 16.67 |
| 1600.7              | 1630.7      | 16.01                   | 16.02 | 15.69 |
| 1640.5              | 1670.5      | 15.40                   | 15.25 | 14.84 |
| 1700.1              | 1730.1      | 14.55                   | 14.15 | 13.53 |

# Frequency Mixer

# TFM-4H

## 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=1210MHz<br>(:1) |      |  |
|---------------------|-------------|-----------------|------|------|-------------|-----------------|------|------|--------|----------------------|--------------------------------|------|--|
|                     |             | @LO (dBm)       |      |      |             | @LO (dBm)       |      |      |        |                      | @LO (dBm)                      |      |  |
|                     |             | +14             | +17  | +20  |             | +14             | +17  | +20  | +14    |                      | +17                            | +20  |  |
| 10.1                | 40.1        | 1.67            | 1.49 | 1.38 | 40.1        | 1.04            | 1.62 | 2.39 | 10.0   | 3.02                 | 2.08                           | 1.52 |  |
| 49.9                | 79.9        | 1.70            | 1.52 | 1.41 | 79.9        | 1.03            | 1.52 | 2.18 | 50.3   | 3.02                 | 2.08                           | 1.54 |  |
| 89.6                | 119.6       | 1.70            | 1.52 | 1.41 | 119.6       | 1.05            | 1.56 | 2.26 | 90.7   | 3.00                 | 2.06                           | 1.53 |  |
| 129.4               | 159.4       | 1.68            | 1.49 | 1.39 | 159.4       | 1.07            | 1.55 | 2.24 | 110.8  | 3.09                 | 2.13                           | 1.58 |  |
| 169.2               | 199.2       | 1.68            | 1.50 | 1.40 | 199.2       | 1.08            | 1.51 | 2.16 | 151.2  | 3.10                 | 2.15                           | 1.61 |  |
| 208.9               | 238.9       | 1.71            | 1.52 | 1.40 | 238.9       | 1.12            | 1.56 | 2.25 | 171.4  | 3.04                 | 2.11                           | 1.57 |  |
| 248.7               | 278.7       | 1.70            | 1.52 | 1.39 | 278.7       | 1.15            | 1.52 | 2.15 | 211.7  | 3.01                 | 2.10                           | 1.57 |  |
| 288.5               | 318.5       | 1.69            | 1.49 | 1.36 | 318.5       | 1.16            | 1.53 | 2.20 | 231.9  | 3.09                 | 2.17                           | 1.63 |  |
| 328.2               | 358.2       | 1.69            | 1.49 | 1.35 | 358.2       | 1.20            | 1.56 | 2.20 | 272.2  | 3.04                 | 2.15                           | 1.64 |  |
| 368.0               | 398.0       | 1.66            | 1.46 | 1.32 | 398.0       | 1.25            | 1.56 | 2.18 | 292.4  | 3.03                 | 2.15                           | 1.64 |  |
| 407.7               | 437.7       | 1.66            | 1.43 | 1.31 | 437.7       | 1.27            | 1.59 | 2.22 | 332.7  | 3.04                 | 2.17                           | 1.67 |  |
| 447.5               | 477.5       | 1.67            | 1.44 | 1.31 | 477.5       | 1.31            | 1.60 | 2.18 | 352.9  | 3.00                 | 2.15                           | 1.66 |  |
| 487.3               | 517.3       | 1.63            | 1.40 | 1.29 | 517.3       | 1.36            | 1.63 | 2.22 | 393.2  | 2.92                 | 2.11                           | 1.64 |  |
| 527.0               | 557.0       | 1.60            | 1.39 | 1.28 | 557.0       | 1.38            | 1.64 | 2.20 | 413.4  | 3.03                 | 2.20                           | 1.71 |  |
| 566.8               | 596.8       | 1.59            | 1.39 | 1.29 | 596.8       | 1.43            | 1.67 | 2.22 | 453.7  | 3.04                 | 2.24                           | 1.77 |  |
| 606.6               | 636.6       | 1.55            | 1.36 | 1.27 | 636.6       | 1.48            | 1.72 | 2.25 | 473.9  | 2.93                 | 2.15                           | 1.69 |  |
| 646.3               | 676.3       | 1.55            | 1.36 | 1.27 | 676.3       | 1.51            | 1.72 | 2.22 | 514.2  | 2.93                 | 2.17                           | 1.72 |  |
| 686.1               | 716.1       | 1.52            | 1.33 | 1.24 | 716.1       | 1.54            | 1.76 | 2.25 | 534.4  | 2.96                 | 2.20                           | 1.76 |  |
| 725.9               | 755.9       | 1.47            | 1.29 | 1.20 | 755.9       | 1.59            | 1.79 | 2.25 | 574.7  | 2.86                 | 2.14                           | 1.73 |  |
| 765.6               | 795.6       | 1.45            | 1.28 | 1.19 | 795.6       | 1.62            | 1.80 | 2.26 | 594.9  | 2.92                 | 2.19                           | 1.76 |  |
| 805.4               | 835.4       | 1.43            | 1.27 | 1.19 | 835.4       | 1.65            | 1.83 | 2.29 | 635.3  | 2.92                 | 2.21                           | 1.80 |  |
| 845.2               | 875.2       | 1.42            | 1.28 | 1.21 | 875.2       | 1.70            | 1.85 | 2.28 | 655.4  | 2.83                 | 2.14                           | 1.74 |  |
| 884.9               | 914.9       | 1.41            | 1.28 | 1.22 | 914.9       | 1.74            | 1.86 | 2.28 | 695.8  | 2.78                 | 2.10                           | 1.70 |  |
| 924.7               | 954.7       | 1.42            | 1.29 | 1.23 | 954.7       | 1.78            | 1.88 | 2.27 | 715.9  | 2.85                 | 2.17                           | 1.77 |  |
| 964.5               | 994.5       | 1.45            | 1.32 | 1.26 | 994.5       | 1.83            | 1.90 | 2.26 | 756.3  | 2.77                 | 2.11                           | 1.74 |  |
| 1004.2              | 1034.2      | 1.48            | 1.34 | 1.27 | 1034.2      | 1.87            | 1.92 | 2.25 | 776.4  | 2.72                 | 2.07                           | 1.69 |  |
| 1044.0              | 1074.0      | 1.52            | 1.37 | 1.28 | 1074.0      | 1.90            | 1.95 | 2.25 | 816.8  | 2.77                 | 2.12                           | 1.73 |  |
| 1103.6              | 1133.6      | 1.59            | 1.39 | 1.30 | 1133.6      | 1.94            | 2.01 | 2.28 | 836.9  | 2.67                 | 2.03                           | 1.68 |  |
| 1143.4              | 1173.4      | 1.65            | 1.44 | 1.32 | 1173.4      | 1.96            | 2.06 | 2.33 | 877.3  | 2.60                 | 1.97                           | 1.61 |  |
| 1203.0              | 1233.0      | 1.72            | 1.53 | 1.39 | 1233.0      | 1.98            | 2.09 | 2.37 | 897.5  | 2.66                 | 2.03                           | 1.66 |  |
| 1242.8              | 1272.8      | 1.76            | 1.58 | 1.45 | 1272.8      | 2.00            | 2.11 | 2.40 | 937.8  | 2.60                 | 1.99                           | 1.63 |  |
| 1302.5              | 1332.5      | 1.84            | 1.69 | 1.54 | 1332.5      | 2.03            | 2.10 | 2.39 | 958.0  | 2.54                 | 1.92                           | 1.56 |  |
| 1342.2              | 1372.2      | 1.87            | 1.75 | 1.58 | 1372.2      | 2.04            | 2.11 | 2.40 | 998.3  | 2.51                 | 1.90                           | 1.53 |  |
| 1401.9              | 1431.9      | 1.92            | 1.83 | 1.69 | 1431.9      | 2.06            | 2.07 | 2.35 | 1018.5 | 2.51                 | 1.91                           | 1.54 |  |
| 1441.6              | 1471.6      | 1.95            | 1.86 | 1.74 | 1471.6      | 2.07            | 2.07 | 2.35 | 1058.8 | 2.42                 | 1.83                           | 1.47 |  |
| 1501.3              | 1531.3      | 2.03            | 1.96 | 1.88 | 1531.3      | 2.14            | 2.07 | 2.32 | 1079.0 | 2.45                 | 1.86                           | 1.48 |  |
| 1541.0              | 1571.0      | 2.06            | 2.00 | 1.94 | 1571.0      | 2.14            | 2.06 | 2.30 | 1119.3 | 2.46                 | 1.87                           | 1.48 |  |
| 1600.7              | 1630.7      | 2.14            | 2.06 | 2.01 | 1630.7      | 2.19            | 2.05 | 2.26 | 1139.5 | 2.35                 | 1.78                           | 1.40 |  |
| 1640.5              | 1670.5      | 2.14            | 2.07 | 2.03 | 1670.5      | 2.18            | 2.03 | 2.23 | 1179.8 | 2.28                 | 1.73                           | 1.36 |  |
| 1700.1              | 1730.1      | 2.20            | 2.12 | 2.08 | 1730.1      | 2.22            | 2.02 | 2.19 | 1200.0 | 2.33                 | 1.78                           | 1.40 |  |

## Harmonics Tables

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -      | 17  | 26  | 17  | 31  | 27  | 37  | 41  | 47  | 45  | 55  |
| 1      | -      | 21     | +0  | 37  | 16  | 45  | 43  | 32  | 37  | 34  | 36  | 36  |
| 2      | 64     | 57     | 61  | 59  | 60  | 70  | 54  | 66  | 62  | 78  | 64  | 68  |
| 3      | >90    | 69     | 56  | 68  | 54  | 74  | 50  | 63  | 53  | 67  | 70  | 65  |
| 4      | >90    | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 5      | >90    | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 6      | >90    | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 7      | >90    | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 8      | >90    | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 9      | >90    | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 10     | >90    | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

### LO HARMONICS ORDER

Test conditions: RF IN: 610 MHz; -1.00 dBm.  
LO IN: 640 MHz; +17.00 dBm  
IF OUT: 30 MHz; -8.45 dBm

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -      | 27  | 36  | 30  | 43  | 42  | 50  | 62  | 67  | 69  | 91  |
| 1      | -      | 22     | +0  | 34  | 16  | 40  | 33  | 36  | 44  | 38  | 45  | 44  |
| 2      | 44     | 53     | 56  | 55  | 52  | 75  | 47  | 59  | 54  | 65  | 61  | 73  |
| 3      | 71     | 57     | 41  | 55  | 44  | 55  | 35  | 52  | 42  | 52  | 55  | 53  |
| 4      | >90    | 68     | 70  | 68  | 68  | 73  | 71  | 76  | 65  | 84  | >92 | 76  |
| 5      | >90    | 83     | 57  | 64  | 51  | 68  | 49  | 87  | 48  | 62  | 54  | 62  |
| 6      | >90    | 89     | 85  | 81  | 88  | 77  | 85  | 84  | 77  | 76  | 74  | 80  |
| 7      | >90    | 76     | 83  | 86  | 71  | 73  | 67  | 78  | 66  | 81  | 61  | 72  |
| 8      | >90    | >92    | >92 | >92 | >92 | >92 | 88  | >92 | 86  | 87  | >92 | 82  |
| 9      | >90    | >92    | >92 | >92 | 90  | >92 | 78  | 85  | 75  | 91  | 76  | 87  |
| 10     | >90    | >92    | >92 | >92 | >92 | >92 | >92 | >92 | >92 | >92 | >92 | >92 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

### LO HARMONICS ORDER

Test conditions: RF IN: 610 MHz; 9.00 dBm.  
LO IN: 640 MHz; +17.00 dBm  
IF OUT: 30 MHz; 1.64 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.