

# Frequency Mixer

# TUF-5XSM

## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>IF FIXED<br>@IF(OUT)=30MHz<br>(dB) |       |      |
|---------------------|-------------|-------------------------------------------------------|-------|------|
|                     |             | @LO (dBm)                                             |       |      |
|                     |             | +4                                                    | +7    | +10  |
| 10.1                | 40.1        | 6.01                                                  | 5.72  | 5.31 |
| 70.1                | 100.1       | 6.36                                                  | 6.07  | 5.90 |
| 130.1               | 160.1       | 6.55                                                  | 6.22  | 6.05 |
| 190.1               | 220.1       | 6.59                                                  | 6.28  | 6.11 |
| 250.1               | 280.1       | 6.78                                                  | 6.44  | 6.23 |
| 310.1               | 340.1       | 6.73                                                  | 6.39  | 6.19 |
| 370.1               | 400.1       | 6.70                                                  | 6.36  | 6.18 |
| 430.1               | 460.1       | 6.93                                                  | 6.54  | 6.31 |
| 470.1               | 500.1       | 6.86                                                  | 6.51  | 6.29 |
| 530.1               | 560.1       | 7.10                                                  | 6.69  | 6.44 |
| 570.1               | 600.1       | 7.03                                                  | 6.66  | 6.43 |
| 630.1               | 660.1       | 7.15                                                  | 6.76  | 6.51 |
| 670.1               | 700.1       | 7.11                                                  | 6.77  | 6.54 |
| 730.1               | 760.1       | 7.04                                                  | 6.67  | 6.45 |
| 770.1               | 800.1       | 7.00                                                  | 6.62  | 6.43 |
| 830.1               | 860.1       | 7.00                                                  | 6.57  | 6.35 |
| 870.1               | 900.1       | 7.09                                                  | 6.63  | 6.38 |
| 930.1               | 960.1       | 7.11                                                  | 6.62  | 6.36 |
| 970.1               | 1000.1      | 7.24                                                  | 6.76  | 6.45 |
| 1030.1              | 1060.1      | 7.25                                                  | 6.84  | 6.54 |
| 1070.1              | 1100.1      | 7.24                                                  | 6.87  | 6.59 |
| 1130.1              | 1160.1      | 7.30                                                  | 6.93  | 6.68 |
| 1170.1              | 1200.1      | 7.24                                                  | 6.88  | 6.63 |
| 1230.1              | 1260.1      | 7.31                                                  | 6.91  | 6.66 |
| 1270.1              | 1300.1      | 7.27                                                  | 6.88  | 6.67 |
| 1330.1              | 1360.1      | 7.30                                                  | 6.93  | 6.75 |
| 1370.1              | 1400.1      | 7.35                                                  | 7.00  | 6.84 |
| 1430.1              | 1460.1      | 7.44                                                  | 7.11  | 6.95 |
| 1470.1              | 1500.1      | 7.61                                                  | 7.28  | 7.14 |
| 1530.1              | 1560.1      | 7.77                                                  | 7.41  | 7.27 |
| 1570.1              | 1600.1      | 8.03                                                  | 7.65  | 7.52 |
| 1630.1              | 1660.1      | 8.25                                                  | 7.86  | 7.73 |
| 1670.1              | 1700.1      | 8.57                                                  | 8.15  | 8.01 |
| 1730.1              | 1760.1      | 8.83                                                  | 8.41  | 8.29 |
| 1770.1              | 1800.1      | 9.18                                                  | 8.70  | 8.58 |
| 1830.1              | 1860.1      | 9.46                                                  | 8.99  | 8.87 |
| 1870.1              | 1900.1      | 9.81                                                  | 9.29  | 9.13 |
| 1930.1              | 1960.1      | 10.13                                                 | 9.58  | 9.38 |
| 1970.1              | 2000.1      | 10.50                                                 | 9.85  | 9.59 |
| 2030.1              | 2060.1      | 10.84                                                 | 10.13 | 9.80 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | IP3 INPUT<br>(dBm) |       |       |
|---------------------|-------------|--------------------|-------|-------|
|                     |             | @LO (dBm)          |       |       |
|                     |             | +4                 | +7    | +10   |
| 10.1                | 40.1        | 15.19              | 17.45 | 18.29 |
| 70.1                | 100.1       | 11.30              | 13.15 | 17.16 |
| 130.1               | 160.1       | 12.87              | 17.68 | 20.98 |
| 190.1               | 220.1       | 17.93              | 14.78 | 14.99 |
| 250.1               | 280.1       | 15.33              | 14.15 | 15.18 |
| 310.1               | 340.1       | 13.02              | 13.44 | 15.39 |
| 370.1               | 400.1       | 12.12              | 12.99 | 15.22 |
| 430.1               | 460.1       | 10.25              | 11.71 | 13.57 |
| 470.1               | 500.1       | 9.55               | 11.14 | 13.59 |
| 530.1               | 560.1       | 8.03               | 9.59  | 11.50 |
| 570.1               | 600.1       | 7.80               | 9.35  | 10.72 |
| 630.1               | 660.1       | 7.54               | 9.36  | 10.85 |
| 670.1               | 700.1       | 7.17               | 8.58  | 10.01 |
| 730.1               | 760.1       | 7.73               | 9.98  | 12.16 |
| 770.1               | 800.1       | 7.55               | 9.50  | 11.93 |
| 830.1               | 860.1       | 9.11               | 10.08 | 11.69 |
| 870.1               | 900.1       | 9.32               | 10.61 | 11.77 |
| 930.1               | 960.1       | 10.47              | 12.53 | 13.62 |
| 970.1               | 1000.1      | 8.97               | 11.45 | 12.97 |
| 1030.1              | 1060.1      | 7.31               | 8.71  | 10.34 |
| 1070.1              | 1100.1      | 6.64               | 7.54  | 8.59  |
| 1130.1              | 1160.1      | 6.44               | 7.06  | 7.86  |
| 1170.1              | 1200.1      | 6.96               | 7.86  | 8.74  |
| 1230.1              | 1260.1      | 8.68               | 10.81 | 12.17 |
| 1270.1              | 1300.1      | 8.93               | 11.12 | 13.46 |
| 1330.1              | 1360.1      | 9.79               | 12.92 | 15.59 |
| 1370.1              | 1400.1      | 9.75               | 13.09 | 15.40 |
| 1430.1              | 1460.1      | 10.56              | 13.96 | 15.31 |
| 1470.1              | 1500.1      | 9.81               | 13.54 | 15.10 |
| 1530.1              | 1560.1      | 9.76               | 13.68 | 15.03 |
| 1570.1              | 1600.1      | 9.08               | 13.52 | 15.71 |
| 1630.1              | 1660.1      | 9.70               | 14.13 | 17.24 |
| 1670.1              | 1700.1      | 9.53               | 13.88 | 17.80 |
| 1730.1              | 1760.1      | 11.31              | 15.03 | 18.59 |
| 1770.1              | 1800.1      | 12.22              | 14.84 | 18.25 |
| 1830.1              | 1860.1      | 10.49              | 15.09 | 18.20 |
| 1870.1              | 1900.1      | 8.50               | 13.63 | 18.28 |
| 1930.1              | 1960.1      | 6.65               | 11.55 | 17.59 |
| 1970.1              | 2000.1      | 5.60               | 9.82  | 16.58 |
| 2030.1              | 2060.1      | 5.42               | 9.33  | 16.40 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | COMPRESSION<br>@RF IN=+1dBm<br>(dB) |      |      |
|---------------------|-------------|-------------------------------------|------|------|
|                     |             | @LO (dBm)                           |      |      |
|                     |             | +4                                  | +7   | +10  |
| 10.1                | 40.1        | 1.01                                | 1.17 | 0.94 |
| 70.1                | 100.1       | 1.23                                | 0.90 | 0.65 |
| 130.1               | 160.1       | 1.25                                | 0.92 | 0.70 |
| 190.1               | 220.1       | 1.51                                | 1.16 | 0.91 |
| 250.1               | 280.1       | 1.37                                | 1.07 | 0.85 |
| 310.1               | 340.1       | 1.48                                | 1.19 | 0.96 |
| 370.1               | 400.1       | 1.74                                | 1.43 | 1.19 |
| 430.1               | 460.1       | 1.59                                | 1.33 | 1.14 |
| 470.1               | 500.1       | 1.74                                | 1.45 | 1.23 |
| 530.1               | 560.1       | 1.62                                | 1.36 | 1.19 |
| 570.1               | 600.1       | 1.67                                | 1.42 | 1.22 |
| 630.1               | 660.1       | 1.63                                | 1.37 | 1.21 |
| 670.1               | 700.1       | 1.62                                | 1.32 | 1.14 |
| 730.1               | 760.1       | 1.65                                | 1.38 | 1.20 |
| 770.1               | 800.1       | 1.64                                | 1.38 | 1.19 |
| 830.1               | 860.1       | 1.58                                | 1.35 | 1.16 |
| 870.1               | 900.1       | 1.52                                | 1.32 | 1.14 |
| 930.1               | 960.1       | 1.47                                | 1.28 | 1.12 |
| 970.1               | 1000.1      | 1.34                                | 1.13 | 1.03 |
| 1030.1              | 1060.1      | 1.29                                | 1.00 | 0.88 |
| 1070.1              | 1100.1      | 1.30                                | 0.96 | 0.80 |
| 1130.1              | 1160.1      | 1.30                                | 0.93 | 0.74 |
| 1170.1              | 1200.1      | 1.42                                | 1.00 | 0.77 |
| 1230.1              | 1260.1      | 1.36                                | 0.90 | 0.64 |
| 1270.1              | 1300.1      | 1.49                                | 0.92 | 0.62 |
| 1330.1              | 1360.1      | 1.35                                | 0.71 | 0.43 |
| 1370.1              | 1400.1      | 1.41                                | 0.69 | 0.40 |
| 1430.1              | 1460.1      | 1.19                                | 0.54 | 0.30 |
| 1470.1              | 1500.1      | 1.27                                | 0.55 | 0.30 |
| 1530.1              | 1560.1      | 1.17                                | 0.48 | 0.25 |
| 1570.1              | 1600.1      | 1.25                                | 0.51 | 0.26 |
| 1630.1              | 1660.1      | 1.13                                | 0.47 | 0.23 |
| 1670.1              | 1700.1      | 1.18                                | 0.51 | 0.24 |
| 1730.1              | 1760.1      | 1.09                                | 0.50 | 0.24 |
| 1770.1              | 1800.1      | 1.13                                | 0.54 | 0.26 |
| 1830.1              | 1860.1      | 1.16                                | 0.62 | 0.31 |
| 1870.1              | 1900.1      | 1.25                                | 0.73 | 0.37 |
| 1930.1              | 1960.1      | 1.30                                | 0.80 | 0.47 |
| 1970.1              | 2000.1      | 1.39                                | 0.92 | 0.55 |
| 2030.1              | 2060.1      | 1.42                                | 0.99 | 0.65 |

# Frequency Mixer

# TUF-5XSM

## Typical Performance Data

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=750.1MHz<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)=1500.1MHz<br>(dB) |
|----------------------|-------------|-----------------------------------------------------------------|----------------------|-------------|----------------------------------------------------------------|----------------------|-------------|------------------------------------------------------------------|
|                      |             | @LO (dBm)                                                       |                      |             | @LO (dBm)                                                      |                      |             | @LO (dBm)                                                        |
|                      |             | +7                                                              |                      |             | +7                                                             |                      |             | +7                                                               |
| 740.0                | 10.1        | 6.76                                                            | 10.0                 | 20.1        | 6.33                                                           | 1490.0               | 10.1        | 10.39                                                            |
| 720.0                | 30.1        | 6.79                                                            | 50.0                 | 60.1        | 5.83                                                           | 1450.0               | 50.1        | 10.04                                                            |
| 700.0                | 50.1        | 6.77                                                            | 90.0                 | 100.1       | 5.36                                                           | 1410.0               | 90.1        | 9.62                                                             |
| 680.0                | 70.1        | 6.77                                                            | 130.0                | 140.1       | 5.71                                                           | 1370.0               | 130.1       | 9.25                                                             |
| 660.0                | 90.1        | 6.71                                                            | 170.0                | 180.1       | 5.59                                                           | 1330.0               | 170.1       | 9.08                                                             |
| 640.0                | 110.1       | 6.70                                                            | 210.0                | 220.1       | 5.45                                                           | 1290.0               | 210.1       | 8.76                                                             |
| 620.0                | 130.1       | 6.72                                                            | 250.0                | 260.1       | 5.37                                                           | 1250.0               | 250.1       | 8.50                                                             |
| 600.0                | 150.1       | 6.65                                                            | 290.0                | 300.1       | 5.66                                                           | 1210.0               | 290.1       | 8.35                                                             |
| 580.0                | 170.1       | 6.67                                                            | 330.0                | 340.1       | 5.89                                                           | 1170.0               | 330.1       | 8.12                                                             |
| 560.0                | 190.1       | 6.55                                                            | 370.0                | 380.1       | 5.48                                                           | 1130.0               | 370.1       | 8.01                                                             |
| 540.0                | 210.1       | 6.58                                                            | 410.0                | 420.1       | 5.61                                                           | 1090.0               | 410.1       | 7.84                                                             |
| 520.0                | 230.1       | 6.56                                                            | 450.0                | 460.1       | 5.67                                                           | 1050.0               | 450.1       | 7.69                                                             |
| 500.0                | 250.1       | 6.64                                                            | 490.0                | 500.1       | 5.78                                                           | 1010.0               | 490.1       | 7.59                                                             |
| 480.0                | 270.1       | 6.61                                                            | 530.0                | 540.1       | 5.51                                                           | 970.0                | 530.1       | 7.48                                                             |
| 460.0                | 290.1       | 6.52                                                            | 570.0                | 580.1       | 5.66                                                           | 930.0                | 570.1       | 7.41                                                             |
| 440.0                | 310.1       | 6.54                                                            | 610.0                | 620.1       | 5.69                                                           | 890.0                | 610.1       | 7.25                                                             |
| 420.0                | 330.1       | 6.48                                                            | 650.0                | 660.1       | 5.90                                                           | 850.0                | 650.1       | 7.16                                                             |
| 400.0                | 350.1       | 6.44                                                            | 690.0                | 700.1       | 6.24                                                           | 810.0                | 690.1       | 7.09                                                             |
| 380.0                | 370.1       | 6.53                                                            | 730.0                | 740.1       | 5.87                                                           | 770.0                | 730.1       | 7.03                                                             |
| 360.0                | 390.1       | 6.47                                                            | 770.0                | 780.1       | 6.08                                                           | 730.0                | 770.1       | 6.95                                                             |
| 340.0                | 410.1       | 6.58                                                            | 810.0                | 820.1       | 5.81                                                           | 690.0                | 810.1       | 7.04                                                             |
| 320.0                | 430.1       | 6.53                                                            | 850.0                | 860.1       | 6.20                                                           | 650.0                | 850.1       | 7.05                                                             |
| 300.0                | 450.1       | 6.46                                                            | 890.0                | 900.1       | 6.28                                                           | 610.0                | 890.1       | 7.10                                                             |
| 280.0                | 470.1       | 6.50                                                            | 930.0                | 940.1       | 6.61                                                           | 570.0                | 930.1       | 7.15                                                             |
| 260.0                | 490.1       | 6.51                                                            | 970.0                | 980.1       | 6.90                                                           | 530.0                | 970.1       | 7.15                                                             |
| 240.0                | 510.1       | 6.40                                                            | 1010.0               | 1020.1      | 6.76                                                           | 490.0                | 1010.1      | 7.07                                                             |
| 220.0                | 530.1       | 6.56                                                            | 1050.0               | 1060.1      | 7.13                                                           | 450.0                | 1050.1      | 7.16                                                             |
| 200.0                | 550.1       | 6.53                                                            | 1090.0               | 1100.1      | 7.14                                                           | 410.0                | 1090.1      | 7.10                                                             |
| 180.0                | 570.1       | 6.48                                                            | 1130.0               | 1140.1      | 7.69                                                           | 370.0                | 1130.1      | 6.96                                                             |
| 160.0                | 590.1       | 6.48                                                            | 1170.0               | 1180.1      | 7.90                                                           | 330.0                | 1170.1      | 7.09                                                             |
| 140.0                | 610.1       | 6.52                                                            | 1210.0               | 1220.1      | 8.18                                                           | 290.0                | 1210.1      | 7.16                                                             |
| 130.0                | 620.1       | 6.62                                                            | 1250.0               | 1260.1      | 8.24                                                           | 250.0                | 1250.1      | 7.16                                                             |
| 110.0                | 640.1       | 6.58                                                            | 1290.0               | 1300.1      | 8.25                                                           | 210.0                | 1290.1      | 7.21                                                             |
| 100.0                | 650.1       | 6.65                                                            | 1330.0               | 1340.1      | 8.71                                                           | 190.0                | 1310.1      | 7.21                                                             |
| 80.0                 | 670.1       | 6.72                                                            | 1370.0               | 1380.1      | 8.92                                                           | 150.0                | 1350.1      | 7.23                                                             |
| 70.0                 | 680.1       | 6.58                                                            | 1430.0               | 1440.1      | 9.09                                                           | 130.0                | 1370.1      | 7.23                                                             |
| 50.0                 | 700.1       | 6.61                                                            | 1470.0               | 1480.1      | 9.53                                                           | 90.0                 | 1410.1      | 7.26                                                             |
| 40.0                 | 710.1       | 6.59                                                            | 1530.0               | 1540.1      | 10.07                                                          | 70.0                 | 1430.1      | 7.25                                                             |
| 20.0                 | 730.1       | 6.58                                                            | 1570.0               | 1580.1      | 10.35                                                          | 30.0                 | 1470.1      | 7.31                                                             |
| 10.0                 | 740.1       | 6.98                                                            | 1630.0               | 1640.1      | 10.47                                                          | 10.0                 | 1490.1      | 7.67                                                             |

# Frequency Mixer

# TUF-5XSM

## 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        | 54.68                   | 51.61 | 49.88 | 51.07                   | 50.36 | 49.85 |
| 100.1       | 50.10                   | 46.12 | 44.01 | 44.13                   | 43.59 | 43.10 |
| 160.1       | 47.93                   | 43.74 | 41.37 | 40.68                   | 40.02 | 39.47 |
| 220.1       | 45.81                   | 42.17 | 39.72 | 38.47                   | 37.77 | 37.21 |
| 280.1       | 42.38                   | 40.14 | 38.01 | 36.57                   | 35.83 | 35.29 |
| 340.1       | 38.69                   | 37.67 | 36.16 | 35.04                   | 34.39 | 33.88 |
| 400.1       | 36.05                   | 35.99 | 35.10 | 33.63                   | 33.00 | 32.52 |
| 460.1       | 33.49                   | 33.90 | 33.38 | 32.51                   | 32.01 | 31.60 |
| 500.1       | 32.26                   | 32.98 | 32.74 | 31.65                   | 31.18 | 30.81 |
| 560.1       | 30.29                   | 31.05 | 31.16 | 30.78                   | 30.28 | 29.91 |
| 600.1       | 29.58                   | 30.29 | 30.34 | 30.31                   | 29.89 | 29.56 |
| 660.1       | 28.09                   | 29.06 | 29.20 | 29.56                   | 29.17 | 28.87 |
| 700.1       | 27.54                   | 28.92 | 29.24 | 29.15                   | 28.87 | 28.60 |
| 760.1       | 26.10                   | 27.90 | 28.76 | 28.48                   | 28.29 | 28.08 |
| 800.1       | 25.81                   | 27.54 | 28.43 | 28.18                   | 28.00 | 27.82 |
| 860.1       | 24.82                   | 26.59 | 27.87 | 27.81                   | 27.74 | 27.57 |
| 900.1       | 24.46                   | 26.05 | 27.34 | 27.57                   | 27.55 | 27.44 |
| 960.1       | 23.98                   | 25.59 | 27.08 | 27.36                   | 27.35 | 27.37 |
| 1000.1      | 23.75                   | 25.15 | 26.40 | 27.32                   | 27.38 | 27.32 |
| 1060.1      | 23.99                   | 25.64 | 26.84 | 27.30                   | 27.47 | 27.50 |
| 1100.1      | 23.85                   | 25.65 | 26.90 | 27.40                   | 27.60 | 27.63 |
| 1160.1      | 23.62                   | 25.83 | 27.58 | 27.67                   | 27.92 | 28.00 |
| 1200.1      | 23.17                   | 25.42 | 27.35 | 27.93                   | 28.19 | 28.33 |
| 1260.1      | 23.01                   | 25.26 | 27.21 | 28.44                   | 28.72 | 28.82 |
| 1300.1      | 22.61                   | 24.71 | 26.57 | 28.89                   | 29.15 | 29.31 |
| 1360.1      | 22.65                   | 24.56 | 26.15 | 29.62                   | 29.89 | 29.96 |
| 1400.1      | 22.48                   | 24.27 | 25.71 | 30.14                   | 30.49 | 30.61 |
| 1460.1      | 22.67                   | 24.22 | 25.34 | 31.16                   | 31.71 | 32.01 |
| 1500.1      | 22.65                   | 24.14 | 25.15 | 31.50                   | 32.15 | 32.64 |
| 1560.1      | 22.88                   | 24.00 | 24.75 | 32.98                   | 33.90 | 34.81 |
| 1600.1      | 22.84                   | 23.88 | 24.59 | 33.53                   | 34.53 | 35.66 |
| 1660.1      | 23.06                   | 23.84 | 24.31 | 35.68                   | 37.30 | 39.25 |
| 1700.1      | 22.91                   | 23.63 | 23.95 | 36.73                   | 38.65 | 40.97 |
| 1760.1      | 23.10                   | 23.60 | 23.82 | 40.21                   | 43.93 | 49.81 |
| 1800.1      | 22.96                   | 23.31 | 23.58 | 42.08                   | 46.96 | 50.57 |
| 1860.1      | 23.01                   | 23.35 | 23.54 | 45.91                   | 49.29 | 44.66 |
| 1900.1      | 22.78                   | 23.19 | 23.32 | 42.25                   | 42.84 | 40.18 |
| 1960.1      | 22.65                   | 23.10 | 23.31 | 39.49                   | 39.29 | 37.31 |
| 2000.1      | 22.32                   | 22.74 | 23.08 | 35.86                   | 36.05 | 35.08 |
| 2060.1      | 21.68                   | 22.22 | 22.62 | 33.27                   | 33.50 | 32.71 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | +4                      | +7    | +10   |
| 10.1                | 40.1        | 47.97                   | 48.17 | 46.72 |
| 70.1                | 100.1       | 32.73                   | 32.65 | 32.61 |
| 130.1               | 160.1       | 28.34                   | 28.34 | 28.35 |
| 190.1               | 220.1       | 25.66                   | 25.72 | 25.77 |
| 250.1               | 280.1       | 24.51                   | 24.63 | 24.74 |
| 310.1               | 340.1       | 23.79                   | 24.00 | 24.15 |
| 370.1               | 400.1       | 23.38                   | 23.65 | 23.85 |
| 430.1               | 460.1       | 23.58                   | 23.82 | 23.99 |
| 470.1               | 500.1       | 23.40                   | 23.67 | 23.80 |
| 530.1               | 560.1       | 23.21                   | 23.54 | 24.05 |
| 570.1               | 600.1       | 22.69                   | 23.02 | 23.34 |
| 630.1               | 660.1       | 20.92                   | 21.12 | 21.06 |
| 670.1               | 700.1       | 20.05                   | 20.07 | 20.10 |
| 730.1               | 760.1       | 18.59                   | 18.60 | 18.74 |
| 770.1               | 800.1       | 17.76                   | 17.88 | 17.89 |
| 830.1               | 860.1       | 17.33                   | 17.30 | 17.30 |
| 870.1               | 900.1       | 17.12                   | 17.11 | 17.12 |
| 930.1               | 960.1       | 16.99                   | 16.99 | 16.94 |
| 970.1               | 1000.1      | 17.09                   | 17.06 | 17.06 |
| 1030.1              | 1060.1      | 17.18                   | 17.13 | 17.09 |
| 1070.1              | 1100.1      | 17.32                   | 17.38 | 17.31 |
| 1130.1              | 1160.1      | 17.59                   | 17.76 | 17.73 |
| 1170.1              | 1200.1      | 17.60                   | 17.71 | 17.71 |
| 1230.1              | 1260.1      | 17.28                   | 17.24 | 17.16 |
| 1270.1              | 1300.1      | 16.77                   | 16.66 | 16.48 |
| 1330.1              | 1360.1      | 15.50                   | 15.18 | 14.92 |
| 1370.1              | 1400.1      | 14.65                   | 14.22 | 13.94 |
| 1430.1              | 1460.1      | 13.43                   | 12.92 | 12.59 |
| 1470.1              | 1500.1      | 12.76                   | 12.11 | 11.68 |
| 1530.1              | 1560.1      | 11.64                   | 10.96 | 10.56 |
| 1570.1              | 1600.1      | 11.09                   | 10.33 | 9.87  |
| 1630.1              | 1660.1      | 10.10                   | 9.40  | 8.97  |
| 1670.1              | 1700.1      | 9.71                    | 8.92  | 8.51  |
| 1730.1              | 1760.1      | 9.02                    | 8.31  | 7.96  |
| 1770.1              | 1800.1      | 8.75                    | 7.99  | 7.61  |
| 1830.1              | 1860.1      | 8.36                    | 7.67  | 7.34  |
| 1870.1              | 1900.1      | 8.28                    | 7.59  | 7.25  |
| 1930.1              | 1960.1      | 7.96                    | 7.42  | 7.13  |
| 1970.1              | 2000.1      | 7.91                    | 7.46  | 7.20  |
| 2030.1              | 2060.1      | 7.50                    | 7.19  | 6.98  |

# Frequency Mixer

# TUF-5XSM

## 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=1500.1MHz<br>(:1) |      |      |
|---------------------|-------------|-----------------|------|------|-------------|-----------------|------|------|----------------------|----------------------------------|------|------|
|                     |             | @LO (dBm)       |      |      |             | @LO (dBm)       |      |      |                      | @LO (dBm)                        |      |      |
|                     |             | +4              | +7   | +10  |             | +4              | +7   | +10  |                      | +4                               | +7   | +10  |
| 10.1                | 40.1        | 1.43            | 1.09 | 1.06 | 40.1        | 1.95            | 2.96 | 4.36 | 10.1                 | 1.13                             | 1.11 | 1.13 |
| 70.1                | 100.1       | 1.18            | 1.05 | 1.03 | 100.1       | 1.90            | 2.78 | 3.92 | 30.1                 | 1.06                             | 1.04 | 1.09 |
| 130.1               | 160.1       | 1.22            | 1.09 | 1.03 | 160.1       | 1.87            | 2.68 | 3.68 | 50.1                 | 1.05                             | 1.02 | 1.08 |
| 190.1               | 220.1       | 1.31            | 1.19 | 1.12 | 220.1       | 1.81            | 2.54 | 3.45 | 70.1                 | 1.04                             | 1.03 | 1.08 |
| 250.1               | 280.1       | 1.36            | 1.24 | 1.17 | 280.1       | 1.92            | 2.71 | 3.67 | 90.1                 | 1.07                             | 1.01 | 1.07 |
| 310.1               | 340.1       | 1.41            | 1.28 | 1.20 | 340.1       | 2.03            | 2.87 | 3.90 | 110.1                | 1.05                             | 1.03 | 1.09 |
| 370.1               | 400.1       | 1.51            | 1.38 | 1.30 | 400.1       | 2.01            | 2.80 | 3.74 | 130.1                | 1.05                             | 1.03 | 1.09 |
| 430.1               | 460.1       | 1.58            | 1.45 | 1.36 | 460.1       | 2.04            | 2.80 | 3.71 | 150.1                | 1.06                             | 1.03 | 1.08 |
| 470.1               | 500.1       | 1.62            | 1.49 | 1.41 | 500.1       | 2.15            | 2.98 | 4.02 | 190.1                | 1.06                             | 1.04 | 1.08 |
| 530.1               | 560.1       | 1.67            | 1.54 | 1.46 | 560.1       | 2.21            | 3.02 | 4.03 | 210.1                | 1.05                             | 1.06 | 1.12 |
| 570.1               | 600.1       | 1.72            | 1.59 | 1.51 | 600.1       | 2.30            | 3.14 | 4.18 | 250.1                | 1.07                             | 1.08 | 1.12 |
| 630.1               | 660.1       | 1.75            | 1.64 | 1.58 | 660.1       | 2.35            | 3.18 | 4.20 | 270.1                | 1.06                             | 1.09 | 1.15 |
| 670.1               | 700.1       | 1.77            | 1.68 | 1.63 | 700.1       | 2.45            | 3.30 | 4.35 | 310.1                | 1.09                             | 1.11 | 1.16 |
| 730.1               | 760.1       | 1.75            | 1.68 | 1.67 | 760.1       | 2.51            | 3.31 | 4.34 | 330.1                | 1.09                             | 1.10 | 1.15 |
| 770.1               | 800.1       | 1.74            | 1.66 | 1.66 | 800.1       | 2.60            | 3.43 | 4.47 | 370.1                | 1.13                             | 1.16 | 1.21 |
| 830.1               | 860.1       | 1.73            | 1.65 | 1.66 | 860.1       | 2.69            | 3.51 | 4.53 | 390.1                | 1.15                             | 1.18 | 1.22 |
| 870.1               | 900.1       | 1.74            | 1.63 | 1.62 | 900.1       | 2.78            | 3.61 | 4.63 | 430.1                | 1.17                             | 1.19 | 1.23 |
| 930.1               | 960.1       | 1.75            | 1.64 | 1.60 | 960.1       | 2.88            | 3.70 | 4.72 | 450.1                | 1.22                             | 1.25 | 1.29 |
| 970.1               | 1000.1      | 1.77            | 1.66 | 1.60 | 1000.1      | 2.95            | 3.76 | 4.77 | 490.1                | 1.28                             | 1.31 | 1.35 |
| 1030.1              | 1060.1      | 1.77            | 1.71 | 1.66 | 1060.1      | 3.07            | 3.86 | 4.87 | 510.1                | 1.27                             | 1.30 | 1.34 |
| 1070.1              | 1100.1      | 1.73            | 1.69 | 1.66 | 1100.1      | 3.10            | 3.85 | 4.83 | 550.1                | 1.37                             | 1.40 | 1.44 |
| 1130.1              | 1160.1      | 1.70            | 1.68 | 1.67 | 1160.1      | 3.18            | 3.91 | 4.88 | 570.1                | 1.40                             | 1.42 | 1.45 |
| 1170.1              | 1200.1      | 1.61            | 1.60 | 1.61 | 1200.1      | 3.16            | 3.83 | 4.75 | 610.1                | 1.45                             | 1.47 | 1.50 |
| 1230.1              | 1260.1      | 1.54            | 1.56 | 1.62 | 1260.1      | 3.20            | 3.83 | 4.75 | 630.1                | 1.53                             | 1.55 | 1.57 |
| 1270.1              | 1300.1      | 1.46            | 1.51 | 1.58 | 1300.1      | 3.20            | 3.79 | 4.66 | 670.1                | 1.63                             | 1.65 | 1.67 |
| 1330.1              | 1360.1      | 1.42            | 1.52 | 1.60 | 1360.1      | 3.40            | 3.95 | 4.80 | 690.1                | 1.70                             | 1.72 | 1.74 |
| 1370.1              | 1400.1      | 1.35            | 1.46 | 1.55 | 1400.1      | 3.54            | 4.00 | 4.77 | 730.1                | 1.83                             | 1.85 | 1.87 |
| 1430.1              | 1460.1      | 1.33            | 1.46 | 1.57 | 1460.1      | 3.83            | 4.20 | 4.91 | 750.1                | 1.87                             | 1.89 | 1.90 |
| 1470.1              | 1500.1      | 1.26            | 1.40 | 1.52 | 1500.1      | 4.03            | 4.27 | 4.89 | 790.1                | 2.02                             | 2.03 | 2.04 |
| 1530.1              | 1560.1      | 1.24            | 1.40 | 1.53 | 1560.1      | 4.29            | 4.42 | 4.98 | 810.1                | 2.09                             | 2.10 | 2.10 |
| 1570.1              | 1600.1      | 1.19            | 1.38 | 1.51 | 1600.1      | 4.51            | 4.50 | 4.96 | 850.1                | 2.24                             | 2.25 | 2.25 |
| 1630.1              | 1660.1      | 1.19            | 1.38 | 1.51 | 1660.1      | 4.72            | 4.60 | 4.99 | 870.1                | 2.39                             | 2.41 | 2.41 |
| 1670.1              | 1700.1      | 1.17            | 1.39 | 1.54 | 1700.1      | 4.95            | 4.68 | 4.96 | 910.1                | 2.53                             | 2.54 | 2.54 |
| 1730.1              | 1760.1      | 1.19            | 1.41 | 1.55 | 1760.1      | 5.13            | 4.77 | 4.96 | 930.1                | 2.65                             | 2.67 | 2.67 |
| 1770.1              | 1800.1      | 1.19            | 1.44 | 1.58 | 1800.1      | 5.33            | 4.82 | 4.92 | 970.1                | 2.85                             | 2.88 | 2.87 |
| 1830.1              | 1860.1      | 1.21            | 1.43 | 1.57 | 1860.1      | 5.42            | 4.87 | 4.89 | 990.1                | 2.86                             | 2.88 | 2.87 |
| 1870.1              | 1900.1      | 1.22            | 1.44 | 1.58 | 1900.1      | 5.61            | 4.92 | 4.84 | 1030.1               | 3.12                             | 3.14 | 3.14 |
| 1930.1              | 1960.1      | 1.21            | 1.41 | 1.52 | 1960.1      | 5.65            | 4.92 | 4.79 | 1050.1               | 3.23                             | 3.25 | 3.25 |
| 1970.1              | 2000.1      | 1.21            | 1.40 | 1.51 | 2000.1      | 5.74            | 4.92 | 4.72 | 1090.1               | 3.35                             | 3.37 | 3.37 |
| 2030.1              | 2060.1      | 1.15            | 1.30 | 1.39 | 2060.1      | 5.72            | 4.89 | 4.64 | 1110.1               | 3.57                             | 3.60 | 3.59 |

## Harmonics Tables

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -      | 1   | 10  | 20  | 24  | 14  | 30  | 29  | 41  | 38  | 50  |
| 1      | -      | 12     | +0  | 39  | 17  | 28  | 31  | 40  | 38  | 40  | 48  | 44  |
| 2      | 78     | 52     | 54  | 45  | 51  | 59  | 52  | 53  | 44  | 56  | 50  | 57  |
| 3      | >90    | 62     | 61  | >69 | 59  | >69 | 67  | 60  | >69 | 66  | 66  | 64  |
| 4      | >90    | >69    | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 5      | >90    | >69    | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 6      | >90    | >69    | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 7      | >90    | >69    | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 8      | >90    | >69    | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 9      | >90    | >69    | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 10     | >90    | >69    | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

### LO HARMONICS ORDER

Test conditions: RF IN: 750.1 MHz; -14.00 dBm.  
LO IN: 780.1 MHz; +7.00 dBm  
IF OUT: 30 MHz; -20.69 dBm

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -      | 10  | 20  | 28  | 38  | 28  | 48  | 50  | 65  | 59  | 63  |
| 1      | -      | 11     | +0  | 36  | 17  | 33  | 35  | 43  | 47  | 52  | 65  | 64  |
| 2      | 58     | 52     | 49  | 43  | 46  | 52  | 56  | 51  | 41  | 54  | 54  | 65  |
| 3      | >90    | 40     | 40  | 59  | 39  | 54  | 51  | 45  | 54  | 57  | 57  | 58  |
| 4      | >90    | 71     | 71  | 55  | 59  | 51  | 58  | 65  | 60  | 61  | 53  | 64  |
| 5      | >90    | 72     | >79 | 72  | 64  | 65  | 56  | 77  | 63  | 59  | 74  | 69  |
| 6      | >90    | 76     | 78  | >79 | 76  | 66  | 76  | 61  | 70  | 73  | 69  | 71  |
| 7      | >90    | >79    | >79 | >79 | >79 | >79 | 73  | 78  | 67  | 76  | 73  | 74  |
| 8      | >90    | >79    | >79 | >79 | >79 | >79 | >79 | >79 | >79 | 76  | >79 | >79 |
| 9      | >90    | >79    | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 |
| 10     | >90    | >79    | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 | >79 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

### LO HARMONICS ORDER

Test conditions: RF IN: 750.1 MHz; -4.00 dBm.  
LO IN: 780.1 MHz; +7.00 dBm  
IF OUT: 30 MHz; -10.75 dBm

Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.  
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.

