

## Non-Catalog Model

# Frequency Mixer

# LMX-148

Level 10 (LO Power +10 dBm)

### Important Note

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



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CASE STYLE : BB48

| ELECTRICAL SPECIFICATIONS 50Ω @ +25°C |               |      |      |      |       |
|---------------------------------------|---------------|------|------|------|-------|
| Parameter                             |               | Min. | Typ. | Max. | Units |
| Frequency                             | LO (fL to fU) | 10   |      | 1500 | MHz   |
|                                       | RF (fL to fU) | 10   |      | 1500 | MHz   |
|                                       | IF            | 0    |      | 1500 | MHz   |
| Conversion Loss                       | mid band      |      | 6.5  | 7.5  | dB    |
|                                       | Total Range   |      |      | 10.0 | dB    |
| LO-RF Isolation                       | Low Range     | 40   | 45   |      | dB    |
|                                       | Mid Range     | 30   | 35   |      | dB    |
|                                       | Upper Range   | 20   | 25   |      | dB    |
| LO-IF Isolation                       | Low Range     | 35   | 40   |      | dB    |
|                                       | Mid Range     | 25   | 35   |      | dB    |
|                                       | Upper Range   | 12   | 20   |      | dB    |
| 1 dB Comp. Input Power                |               |      | +5   |      | dBm   |

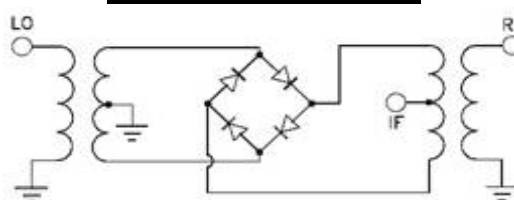
Notes: Low Range = [fL to 10fL]      Mid Range = [10fL to fU/2]      Upper Range = [fU/2 to fU]  
mid band = [2fL to fU/2]

Phase detection, positive polarity

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

| PIN CONNECTIONS |               |
|-----------------|---------------|
| LO              | 8             |
| RF              | 5             |
| IF              | 4             |
| GROUND          | 1, 2, 3, 6, 7 |

### Electrical Schematics



# Frequency Mixer

LMX-148

## 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=+5dBm<br>(dB) |      |      |
|---------------------|-------------|-------------------------------------------------------|-------|------|---------------------|-------------|--------------------|-------|-------|---------------------|-------------|-------------------------------------|------|------|
|                     |             | @LO (dBm)                                             |       |      |                     |             | @LO (dBm)          |       |       |                     |             | @LO (dBm)                           |      |      |
|                     |             | +7                                                    | +10   | +13  |                     |             | +7                 | +10   | +13   |                     |             | +7                                  | +10  | +13  |
| 10.1                | 40.1        | 6.96                                                  | 6.58  | 6.34 | 10.1                | 40.1        | 19.92              | 21.68 | 22.98 | 10.1                | 40.1        | 0.46                                | 0.31 | 0.20 |
| 70.4                | 100.4       | 7.16                                                  | 6.73  | 6.63 | 70.4                | 100.4       | 19.42              | 20.66 | 20.96 | 70.4                | 100.4       | 0.65                                | 0.39 | 0.23 |
| 130.7               | 160.7       | 7.15                                                  | 6.72  | 6.65 | 130.7               | 160.7       | 20.66              | 21.22 | 26.31 | 130.7               | 160.7       | 0.64                                | 0.37 | 0.22 |
| 190.9               | 220.9       | 7.21                                                  | 6.74  | 6.66 | 190.9               | 220.9       | 18.99              | 20.85 | 23.93 | 190.9               | 220.9       | 0.58                                | 0.34 | 0.20 |
| 251.2               | 281.2       | 7.15                                                  | 6.74  | 6.67 | 251.2               | 281.2       | 20.17              | 21.26 | 20.42 | 251.2               | 281.2       | 0.56                                | 0.33 | 0.18 |
| 311.5               | 341.5       | 7.19                                                  | 6.77  | 6.71 | 311.5               | 341.5       | 19.06              | 21.89 | 21.74 | 311.5               | 341.5       | 0.57                                | 0.35 | 0.20 |
| 371.8               | 401.8       | 7.20                                                  | 6.80  | 6.74 | 371.8               | 401.8       | 19.94              | 18.79 | 20.70 | 371.8               | 401.8       | 0.59                                | 0.35 | 0.21 |
| 432.0               | 462.0       | 7.12                                                  | 6.80  | 6.73 | 432.0               | 462.0       | 19.28              | 19.40 | 20.75 | 432.0               | 462.0       | 0.60                                | 0.36 | 0.23 |
| 492.3               | 522.3       | 7.17                                                  | 6.80  | 6.71 | 492.3               | 522.3       | 18.41              | 18.88 | 22.26 | 492.3               | 522.3       | 0.64                                | 0.38 | 0.25 |
| 552.6               | 582.6       | 7.19                                                  | 6.81  | 6.76 | 552.6               | 582.6       | 16.88              | 17.31 | 19.92 | 552.6               | 582.6       | 0.58                                | 0.36 | 0.25 |
| 612.9               | 642.9       | 7.18                                                  | 6.79  | 6.72 | 612.9               | 642.9       | 15.66              | 17.98 | 22.09 | 612.9               | 642.9       | 0.52                                | 0.33 | 0.25 |
| 673.1               | 703.1       | 7.21                                                  | 6.82  | 6.50 | 673.1               | 703.1       | 16.12              | 18.48 | 21.34 | 673.1               | 703.1       | 0.50                                | 0.29 | 0.25 |
| 733.4               | 763.4       | 7.26                                                  | 6.84  | 6.74 | 733.4               | 763.4       | 16.95              | 18.42 | 23.29 | 733.4               | 763.4       | 0.54                                | 0.36 | 0.25 |
| 793.7               | 823.7       | 7.26                                                  | 6.84  | 6.70 | 793.7               | 823.7       | 16.18              | 18.81 | 26.77 | 793.7               | 823.7       | 0.56                                | 0.40 | 0.28 |
| 854.0               | 884.0       | 7.27                                                  | 6.82  | 6.69 | 854.0               | 884.0       | 16.54              | 18.93 | 27.23 | 854.0               | 884.0       | 0.64                                | 0.43 | 0.32 |
| 914.2               | 944.2       | 7.34                                                  | 6.89  | 6.72 | 914.2               | 944.2       | 16.61              | 19.71 | 25.93 | 914.2               | 944.2       | 0.75                                | 0.49 | 0.36 |
| 974.5               | 1004.5      | 7.36                                                  | 6.93  | 6.76 | 974.5               | 1004.5      | 14.79              | 17.62 | 21.81 | 974.5               | 1004.5      | 0.84                                | 0.52 | 0.40 |
| 1034.8              | 1064.8      | 7.36                                                  | 6.91  | 6.70 | 1034.8              | 1064.8      | 13.86              | 16.34 | 19.53 | 1034.8              | 1064.8      | 0.85                                | 0.52 | 0.45 |
| 1095.1              | 1125.1      | 7.55                                                  | 7.00  | 6.98 | 1095.1              | 1125.1      | 13.41              | 15.66 | 20.48 | 1095.1              | 1125.1      | 0.92                                | 0.71 | 0.50 |
| 1155.3              | 1185.3      | 7.79                                                  | 7.19  | 6.93 | 1155.3              | 1185.3      | 12.14              | 15.93 | 23.82 | 1155.3              | 1185.3      | 0.89                                | 0.80 | 0.53 |
| 1215.6              | 1245.6      | 7.89                                                  | 7.24  | 6.92 | 1215.6              | 1245.6      | 11.41              | 16.77 | 24.69 | 1215.6              | 1245.6      | 0.85                                | 0.74 | 0.58 |
| 1275.9              | 1305.9      | 8.14                                                  | 7.36  | 6.99 | 1275.9              | 1305.9      | 11.01              | 15.49 | 22.57 | 1275.9              | 1305.9      | 0.81                                | 0.79 | 0.68 |
| 1336.2              | 1366.2      | 8.30                                                  | 7.44  | 7.04 | 1336.2              | 1366.2      | 11.06              | 16.19 | 20.99 | 1336.2              | 1366.2      | 0.84                                | 0.76 | 0.69 |
| 1396.4              | 1426.4      | 8.37                                                  | 7.50  | 7.09 | 1396.4              | 1426.4      | 11.66              | 15.91 | 20.52 | 1396.4              | 1426.4      | 0.85                                | 0.78 | 0.71 |
| 1436.6              | 1466.6      | 8.53                                                  | 7.65  | 7.19 | 1436.6              | 1466.6      | 11.49              | 15.30 | 19.34 | 1436.6              | 1466.6      | 0.80                                | 0.74 | 0.67 |
| 1496.9              | 1526.9      | 8.54                                                  | 7.68  | 7.24 | 1496.9              | 1526.9      | 11.70              | 15.69 | 17.57 | 1496.9              | 1526.9      | 0.78                                | 0.75 | 0.69 |
| 1537.1              | 1567.1      | 8.68                                                  | 7.79  | 7.30 | 1537.1              | 1567.1      | 11.16              | 14.19 | 15.64 | 1537.1              | 1567.1      | 0.76                                | 0.83 | 0.80 |
| 1597.3              | 1627.3      | 8.87                                                  | 7.98  | 7.47 | 1597.3              | 1627.3      | 10.30              | 13.24 | 13.94 | 1597.3              | 1627.3      | 0.71                                | 0.81 | 0.79 |
| 1637.5              | 1667.5      | 8.95                                                  | 8.05  | 7.57 | 1637.5              | 1667.5      | 10.05              | 12.45 | 13.81 | 1637.5              | 1667.5      | 0.62                                | 0.74 | 0.76 |
| 1697.8              | 1727.8      | 9.27                                                  | 8.37  | 7.78 | 1697.8              | 1727.8      | 9.14               | 10.98 | 13.13 | 1697.8              | 1727.8      | 0.55                                | 0.62 | 0.75 |
| 1738.0              | 1768.0      | 9.26                                                  | 8.47  | 7.95 | 1738.0              | 1768.0      | 8.85               | 10.53 | 12.66 | 1738.0              | 1768.0      | 0.56                                | 0.64 | 0.75 |
| 1798.3              | 1828.3      | 9.31                                                  | 8.52  | 8.04 | 1798.3              | 1828.3      | 9.21               | 11.38 | 14.22 | 1798.3              | 1828.3      | 0.67                                | 0.69 | 0.72 |
| 1838.4              | 1868.4      | 9.26                                                  | 8.57  | 8.20 | 1838.4              | 1868.4      | 10.53              | 12.92 | 15.19 | 1838.4              | 1868.4      | 0.74                                | 0.69 | 0.67 |
| 1898.7              | 1928.7      | 9.26                                                  | 8.71  | 8.43 | 1898.7              | 1928.7      | 12.24              | 14.30 | 16.81 | 1898.7              | 1928.7      | 0.83                                | 0.67 | 0.62 |
| 1938.9              | 1968.9      | 9.41                                                  | 8.95  | 8.72 | 1938.9              | 1968.9      | 12.67              | 14.97 | 17.41 | 1938.9              | 1968.9      | 0.92                                | 0.67 | 0.59 |
| 1999.2              | 2029.2      | 9.50                                                  | 9.19  | 9.03 | 1999.2              | 2029.2      | 14.63              | 15.99 | 18.20 | 1999.2              | 2029.2      | 0.76                                | 0.52 | 0.45 |
| 2039.4              | 2069.4      | 9.68                                                  | 9.40  | 9.27 | 2039.4              | 2069.4      | 15.37              | 16.13 | 18.10 | 2039.4              | 2069.4      | 0.71                                | 0.46 | 0.39 |
| 2099.6              | 2129.6      | 9.88                                                  | 9.64  | 9.58 | 2099.6              | 2129.6      | 16.93              | 16.52 | 18.14 | 2099.6              | 2129.6      | 0.57                                | 0.37 | 0.28 |
| 2139.8              | 2169.8      | 10.01                                                 | 9.80  | 9.75 | 2139.8              | 2169.8      | 17.67              | 18.08 | 17.65 | 2139.8              | 2169.8      | 0.56                                | 0.31 | 0.23 |
| 2200.1              | 2230.1      | 10.31                                                 | 10.04 | 9.96 | 2200.1              | 2230.1      | 17.12              | 19.70 | 18.79 | 2200.1              | 2230.1      | 0.47                                | 0.26 | 0.19 |

REV. X2

LMX-148

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## 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)                                                        |
|                      |             | +10                                                             |                      |             | +10                                                            |                      |             | +10                                                              |
| 730.0                | 20.1        | 6.89                                                            | 10.0                 | 20.1        | 6.62                                                           | 1490.0               | 10.1        | 7.74                                                             |
| 711.5                | 38.6        | 6.90                                                            | 50.5                 | 60.6        | 6.55                                                           | 1449.5               | 50.6        | 7.62                                                             |
| 693.1                | 57.0        | 6.86                                                            | 91.1                 | 101.2       | 6.57                                                           | 1408.9               | 91.2        | 7.56                                                             |
| 674.6                | 75.5        | 6.88                                                            | 131.6                | 141.7       | 6.54                                                           | 1368.4               | 131.7       | 7.51                                                             |
| 656.2                | 93.9        | 6.80                                                            | 172.2                | 182.3       | 6.59                                                           | 1327.8               | 172.3       | 7.54                                                             |
| 637.7                | 112.4       | 6.81                                                            | 212.7                | 222.8       | 6.61                                                           | 1287.3               | 212.8       | 7.54                                                             |
| 619.2                | 130.9       | 6.76                                                            | 253.3                | 263.4       | 6.65                                                           | 1246.7               | 253.4       | 7.55                                                             |
| 600.8                | 149.3       | 6.77                                                            | 293.8                | 303.9       | 6.67                                                           | 1206.2               | 293.9       | 7.56                                                             |
| 582.3                | 167.8       | 6.75                                                            | 334.4                | 344.5       | 6.67                                                           | 1165.6               | 334.5       | 7.53                                                             |
| 563.8                | 186.3       | 6.75                                                            | 374.9                | 385.0       | 6.72                                                           | 1125.1               | 375.0       | 7.40                                                             |
| 545.4                | 204.7       | 6.75                                                            | 415.5                | 425.6       | 6.71                                                           | 1084.5               | 415.6       | 7.54                                                             |
| 526.9                | 223.2       | 6.75                                                            | 456.0                | 466.1       | 6.76                                                           | 1044.0               | 456.1       | 7.54                                                             |
| 508.5                | 241.6       | 6.74                                                            | 496.6                | 506.7       | 6.79                                                           | 1003.4               | 496.7       | 7.53                                                             |
| 490.0                | 260.1       | 6.77                                                            | 537.1                | 547.2       | 6.79                                                           | 962.9                | 537.2       | 7.52                                                             |
| 471.5                | 278.6       | 6.74                                                            | 577.7                | 587.8       | 6.82                                                           | 922.3                | 577.8       | 7.52                                                             |
| 453.1                | 297.0       | 6.74                                                            | 618.2                | 628.3       | 6.81                                                           | 881.8                | 618.3       | 7.48                                                             |
| 434.6                | 315.5       | 6.76                                                            | 658.8                | 668.9       | 6.86                                                           | 841.2                | 658.9       | 7.54                                                             |
| 416.2                | 333.9       | 6.75                                                            | 699.3                | 709.4       | 6.89                                                           | 800.7                | 699.4       | 7.47                                                             |
| 397.7                | 352.4       | 6.76                                                            | 739.9                | 750.0       | 6.97                                                           | 760.1                | 740.0       | 7.47                                                             |
| 379.2                | 370.9       | 6.72                                                            | 780.4                | 790.5       | 6.97                                                           | 719.6                | 780.5       | 7.45                                                             |
| 360.8                | 389.3       | 6.75                                                            | 821.0                | 831.1       | 6.96                                                           | 679.0                | 821.1       | 7.36                                                             |
| 342.3                | 407.8       | 6.73                                                            | 861.5                | 871.6       | 7.08                                                           | 638.5                | 861.6       | 7.36                                                             |
| 323.8                | 426.3       | 6.74                                                            | 902.1                | 912.2       | 7.15                                                           | 597.9                | 902.2       | 7.36                                                             |
| 305.4                | 444.7       | 6.73                                                            | 942.6                | 952.7       | 7.24                                                           | 557.4                | 942.7       | 7.36                                                             |
| 286.9                | 463.2       | 6.72                                                            | 983.2                | 993.3       | 7.29                                                           | 516.8                | 983.3       | 7.30                                                             |
| 268.5                | 481.6       | 6.71                                                            | 1023.7               | 1033.8      | 7.31                                                           | 476.3                | 1023.8      | 7.24                                                             |
| 250.0                | 500.1       | 6.71                                                            | 1064.2               | 1074.3      | 7.29                                                           | 435.8                | 1064.3      | 7.27                                                             |
| 231.5                | 518.6       | 6.69                                                            | 1104.8               | 1114.9      | 7.24                                                           | 395.2                | 1104.9      | 7.22                                                             |
| 213.1                | 537.0       | 6.70                                                            | 1145.3               | 1155.4      | 7.22                                                           | 354.7                | 1145.4      | 7.20                                                             |
| 194.6                | 555.5       | 6.68                                                            | 1185.9               | 1196.0      | 7.19                                                           | 314.1                | 1186.0      | 7.15                                                             |
| 176.2                | 573.9       | 6.68                                                            | 1226.4               | 1236.5      | 7.16                                                           | 273.6                | 1226.5      | 7.10                                                             |
| 157.7                | 592.4       | 6.67                                                            | 1246.7               | 1256.8      | 7.14                                                           | 253.3                | 1246.8      | 7.07                                                             |
| 139.2                | 610.9       | 6.66                                                            | 1287.3               | 1297.4      | 7.13                                                           | 212.7                | 1287.4      | 7.08                                                             |
| 120.8                | 629.3       | 6.66                                                            | 1307.5               | 1317.6      | 7.14                                                           | 192.5                | 1307.6      | 7.04                                                             |
| 102.3                | 647.8       | 6.62                                                            | 1348.1               | 1358.2      | 7.18                                                           | 151.9                | 1348.2      | 7.04                                                             |
| 83.8                 | 666.3       | 6.66                                                            | 1368.4               | 1378.5      | 7.20                                                           | 131.6                | 1368.5      | 7.02                                                             |
| 65.4                 | 684.7       | 6.64                                                            | 1408.9               | 1419.0      | 7.21                                                           | 91.1                 | 1409.0      | 7.06                                                             |
| 46.9                 | 703.2       | 6.67                                                            | 1429.2               | 1439.3      | 7.21                                                           | 70.8                 | 1429.3      | 7.09                                                             |
| 28.5                 | 721.6       | 6.66                                                            | 1469.7               | 1479.8      | 7.21                                                           | 30.3                 | 1469.8      | 7.10                                                             |
| 10.0                 | 740.1       | 6.73                                                            | 1490.0               | 1500.1      | 7.24                                                           | 10.0                 | 1490.1      | 7.28                                                             |

## Typical Performance Data

| LO<br>(MHz) | LO-RF ISOLATION<br>(dB) |       |       | LO-IF ISOLATION<br>(dB) |       |       |
|-------------|-------------------------|-------|-------|-------------------------|-------|-------|
|             | @LO (dBm)               |       |       | @LO (dBm)               |       |       |
|             | +7                      | +10   | +13   | +7                      | +10   | +13   |
| 10.1        | 65.44                   | 65.15 | 64.15 | 61.64                   | 59.83 | 59.78 |
| 70.4        | 54.69                   | 54.86 | 54.56 | 53.22                   | 50.29 | 49.50 |
| 130.7       | 49.96                   | 50.16 | 50.11 | 48.03                   | 45.90 | 44.39 |
| 190.9       | 46.92                   | 47.10 | 47.29 | 45.31                   | 43.16 | 42.03 |
| 251.2       | 44.63                   | 44.95 | 45.17 | 43.05                   | 41.22 | 40.17 |
| 311.5       | 43.19                   | 43.53 | 43.68 | 41.61                   | 39.79 | 38.73 |
| 371.8       | 41.99                   | 42.32 | 42.46 | 40.10                   | 38.53 | 37.21 |
| 432.0       | 40.87                   | 41.13 | 41.42 | 39.11                   | 37.46 | 36.27 |
| 492.3       | 40.01                   | 40.38 | 40.64 | 38.21                   | 36.71 | 35.47 |
| 552.6       | 39.35                   | 39.72 | 39.96 | 36.59                   | 35.41 | 34.27 |
| 612.9       | 38.55                   | 39.00 | 39.26 | 35.32                   | 34.50 | 33.64 |
| 673.1       | 37.97                   | 38.17 | 38.75 | 34.11                   | 33.53 | 32.86 |
| 733.4       | 37.62                   | 37.95 | 38.05 | 32.65                   | 32.59 | 32.19 |
| 793.7       | 37.59                   | 37.79 | 37.67 | 31.42                   | 31.64 | 31.47 |
| 854.0       | 37.68                   | 37.75 | 37.70 | 30.33                   | 30.39 | 30.44 |
| 914.2       | 37.84                   | 37.64 | 37.48 | 29.60                   | 29.67 | 29.58 |
| 974.5       | 38.12                   | 37.64 | 37.47 | 29.17                   | 29.38 | 29.24 |
| 1034.8      | 38.55                   | 37.84 | 37.60 | 28.21                   | 28.70 | 28.83 |
| 1095.1      | 39.19                   | 38.62 | 37.79 | 27.38                   | 28.28 | 28.65 |
| 1155.3      | 39.96                   | 38.81 | 37.95 | 26.75                   | 27.84 | 28.14 |
| 1215.6      | 40.32                   | 39.20 | 38.25 | 25.66                   | 26.84 | 27.41 |
| 1275.9      | 40.60                   | 39.60 | 38.54 | 24.82                   | 26.03 | 26.84 |
| 1336.2      | 41.08                   | 40.20 | 38.95 | 24.11                   | 25.38 | 26.11 |
| 1396.4      | 42.03                   | 41.04 | 39.63 | 23.44                   | 25.18 | 25.41 |
| 1436.6      | 42.85                   | 40.84 | 39.95 | 23.23                   | 24.54 | 25.05 |
| 1496.9      | 44.90                   | 42.10 | 40.96 | 22.76                   | 23.56 | 24.33 |
| 1537.1      | 46.06                   | 43.09 | 41.80 | 22.68                   | 23.45 | 24.19 |
| 1597.3      | 47.81                   | 46.19 | 44.23 | 22.26                   | 23.19 | 23.93 |
| 1637.5      | 46.89                   | 48.15 | 46.45 | 22.04                   | 22.99 | 23.74 |
| 1697.8      | 42.85                   | 47.71 | 51.67 | 21.89                   | 22.93 | 23.83 |
| 1738.0      | 40.60                   | 45.47 | 52.85 | 21.69                   | 22.88 | 24.00 |
| 1798.3      | 38.36                   | 42.79 | 51.32 | 21.68                   | 22.90 | 24.28 |
| 1838.4      | 36.97                   | 41.34 | 49.33 | 21.31                   | 22.62 | 24.16 |
| 1898.7      | 35.32                   | 39.55 | 45.45 | 20.94                   | 22.41 | 24.12 |
| 1938.9      | 34.99                   | 39.16 | 44.55 | 20.74                   | 22.19 | 23.95 |
| 1999.2      | 33.66                   | 37.47 | 42.55 | 20.27                   | 21.62 | 23.90 |
| 2039.4      | 33.72                   | 37.58 | 42.11 | 20.32                   | 21.80 | 24.00 |
| 2099.6      | 33.05                   | 37.32 | 40.93 | 20.20                   | 21.71 | 24.10 |
| 2139.8      | 33.58                   | 38.55 | 41.20 | 20.35                   | 22.13 | 24.13 |
| 2200.1      | 33.38                   | 39.50 | 40.34 | 20.52                   | 24.15 | 24.28 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | +7                      | +10   | +13   |
| 10.1                | 40.1        | 52.15                   | 54.97 | 55.20 |
| 70.4                | 100.4       | 36.86                   | 37.04 | 37.18 |
| 130.7               | 160.7       | 32.00                   | 32.50 | 32.77 |
| 190.9               | 220.9       | 29.35                   | 29.83 | 29.95 |
| 251.2               | 281.2       | 27.58                   | 28.02 | 28.31 |
| 311.5               | 341.5       | 26.30                   | 26.76 | 27.15 |
| 371.8               | 401.8       | 25.54                   | 26.07 | 26.56 |
| 432.0               | 462.0       | 25.22                   | 25.77 | 26.30 |
| 492.3               | 522.3       | 24.92                   | 25.58 | 26.03 |
| 552.6               | 582.6       | 24.82                   | 25.52 | 26.04 |
| 612.9               | 642.9       | 25.11                   | 26.19 | 26.46 |
| 673.1               | 703.1       | 25.12                   | 26.88 | 26.69 |
| 733.4               | 763.4       | 24.47                   | 24.68 | 26.21 |
| 793.7               | 823.7       | 23.89                   | 24.51 | 25.39 |
| 854.0               | 884.0       | 23.25                   | 23.92 | 24.16 |
| 914.2               | 944.2       | 22.21                   | 22.64 | 22.48 |
| 974.5               | 1004.5      | 21.38                   | 21.42 | 21.43 |
| 1034.8              | 1064.8      | 20.45                   | 20.06 | 20.55 |
| 1095.1              | 1125.1      | 19.51                   | 18.77 | 19.41 |
| 1155.3              | 1185.3      | 19.09                   | 19.04 | 18.71 |
| 1215.6              | 1245.6      | 18.86                   | 18.32 | 18.13 |
| 1275.9              | 1305.9      | 18.62                   | 17.78 | 17.75 |
| 1336.2              | 1366.2      | 18.43                   | 17.24 | 17.42 |
| 1396.4              | 1426.4      | 18.09                   | 17.36 | 16.97 |
| 1436.6              | 1466.6      | 17.94                   | 18.07 | 16.76 |
| 1496.9              | 1526.9      | 17.57                   | 17.48 | 16.42 |
| 1537.1              | 1567.1      | 17.31                   | 17.06 | 16.26 |
| 1597.3              | 1627.3      | 16.81                   | 16.45 | 15.82 |
| 1637.5              | 1667.5      | 16.46                   | 16.00 | 15.50 |
| 1697.8              | 1727.8      | 15.92                   | 15.38 | 15.08 |
| 1738.0              | 1768.0      | 15.51                   | 14.96 | 14.68 |
| 1798.3              | 1828.3      | 14.92                   | 14.21 | 13.90 |
| 1838.4              | 1868.4      | 14.39                   | 13.64 | 13.44 |
| 1898.7              | 1928.7      | 13.53                   | 12.86 | 12.78 |
| 1938.9              | 1968.9      | 13.20                   | 12.56 | 12.44 |
| 1999.2              | 2029.2      | 12.60                   | 12.06 | 12.01 |
| 2039.4              | 2069.4      | 12.45                   | 11.93 | 11.79 |
| 2099.6              | 2129.6      | 12.08                   | 11.76 | 11.40 |
| 2139.8              | 2169.8      | 12.00                   | 11.93 | 11.18 |
| 2200.1              | 2230.1      | 11.82                   | 12.77 | 10.94 |

## 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)                        |      |      |
|                     |             | +7              | +10  | +13  |             | +7              | +10  | +13  |                      | +7                               | +10  | +13  |
| 10.1                | 40.1        | 1.23            | 1.30 | 1.36 | 10.1        | 1.67            | 2.42 | 3.20 | 10.0                 | 1.65                             | 1.48 | 1.41 |
| 70.4                | 100.4       | 1.16            | 1.25 | 1.31 | 70.4        | 1.60            | 2.35 | 3.27 | 49.7                 | 1.93                             | 1.49 | 1.25 |
| 130.7               | 160.7       | 1.17            | 1.26 | 1.33 | 130.7       | 1.67            | 2.45 | 3.40 | 89.5                 | 1.90                             | 1.49 | 1.25 |
| 190.9               | 220.9       | 1.19            | 1.27 | 1.33 | 190.9       | 1.66            | 2.37 | 3.24 | 129.2                | 1.85                             | 1.50 | 1.28 |
| 251.2               | 281.2       | 1.22            | 1.29 | 1.34 | 251.2       | 1.62            | 2.36 | 3.26 | 168.9                | 1.92                             | 1.50 | 1.25 |
| 311.5               | 341.5       | 1.23            | 1.29 | 1.33 | 311.5       | 1.67            | 2.38 | 3.25 | 208.7                | 1.85                             | 1.50 | 1.28 |
| 371.8               | 401.8       | 1.27            | 1.30 | 1.34 | 371.8       | 1.74            | 2.48 | 3.31 | 248.4                | 1.87                             | 1.49 | 1.25 |
| 432.0               | 462.0       | 1.30            | 1.33 | 1.36 | 432.0       | 1.70            | 2.39 | 3.26 | 288.1                | 1.82                             | 1.46 | 1.25 |
| 492.3               | 522.3       | 1.33            | 1.35 | 1.37 | 492.3       | 1.70            | 2.39 | 3.20 | 327.9                | 1.79                             | 1.45 | 1.24 |
| 552.6               | 582.6       | 1.36            | 1.35 | 1.37 | 552.6       | 1.80            | 2.52 | 3.33 | 367.6                | 1.80                             | 1.45 | 1.24 |
| 612.9               | 642.9       | 1.39            | 1.40 | 1.39 | 612.9       | 1.76            | 2.44 | 3.23 | 407.3                | 1.74                             | 1.42 | 1.23 |
| 673.1               | 703.1       | 1.42            | 1.46 | 1.39 | 673.1       | 1.76            | 2.42 | 3.18 | 447.1                | 1.79                             | 1.45 | 1.26 |
| 733.4               | 763.4       | 1.43            | 1.37 | 1.41 | 733.4       | 1.85            | 2.52 | 3.25 | 486.8                | 1.74                             | 1.43 | 1.25 |
| 793.7               | 823.7       | 1.45            | 1.40 | 1.42 | 793.7       | 1.86            | 2.49 | 3.18 | 526.5                | 1.74                             | 1.44 | 1.26 |
| 854.0               | 884.0       | 1.45            | 1.42 | 1.40 | 854.0       | 1.84            | 2.45 | 3.14 | 566.3                | 1.77                             | 1.46 | 1.29 |
| 914.2               | 944.2       | 1.47            | 1.43 | 1.38 | 914.2       | 1.90            | 2.50 | 3.17 | 606.0                | 1.72                             | 1.43 | 1.26 |
| 974.5               | 1004.5      | 1.47            | 1.42 | 1.37 | 974.5       | 1.97            | 2.54 | 3.17 | 645.7                | 1.76                             | 1.47 | 1.30 |
| 1034.8              | 1064.8      | 1.46            | 1.38 | 1.36 | 1034.8      | 1.94            | 2.47 | 3.13 | 685.5                | 1.73                             | 1.46 | 1.30 |
| 1095.1              | 1125.1      | 1.47            | 1.31 | 1.37 | 1095.1      | 1.95            | 2.46 | 3.07 | 725.2                | 1.74                             | 1.48 | 1.30 |
| 1155.3              | 1185.3      | 1.50            | 1.48 | 1.38 | 1155.3      | 2.03            | 2.55 | 3.13 | 764.9                | 1.75                             | 1.51 | 1.34 |
| 1215.6              | 1245.6      | 1.53            | 1.48 | 1.40 | 1215.6      | 2.03            | 2.51 | 3.04 | 804.7                | 1.74                             | 1.49 | 1.33 |
| 1275.9              | 1305.9      | 1.58            | 1.49 | 1.42 | 1275.9      | 2.02            | 2.49 | 3.04 | 844.4                | 1.74                             | 1.49 | 1.35 |
| 1336.2              | 1366.2      | 1.59            | 1.49 | 1.42 | 1336.2      | 2.07            | 2.54 | 3.06 | 884.1                | 1.73                             | 1.51 | 1.37 |
| 1396.4              | 1426.4      | 1.57            | 1.47 | 1.40 | 1396.4      | 2.07            | 2.51 | 3.01 | 923.9                | 1.75                             | 1.51 | 1.36 |
| 1436.6              | 1466.6      | 1.56            | 1.46 | 1.39 | 1436.6      | 2.09            | 2.53 | 3.04 | 963.6                | 1.72                             | 1.52 | 1.40 |
| 1496.9              | 1526.9      | 1.53            | 1.43 | 1.37 | 1496.9      | 2.05            | 2.43 | 2.94 | 1003.3               | 1.76                             | 1.56 | 1.40 |
| 1537.1              | 1567.1      | 1.51            | 1.42 | 1.36 | 1537.1      | 2.09            | 2.49 | 2.97 | 1043.1               | 1.70                             | 1.52 | 1.38 |
| 1597.3              | 1627.3      | 1.48            | 1.40 | 1.35 | 1597.3      | 2.07            | 2.46 | 2.93 | 1082.8               | 1.71                             | 1.57 | 1.43 |
| 1637.5              | 1667.5      | 1.46            | 1.39 | 1.34 | 1637.5      | 2.10            | 2.49 | 2.98 | 1122.5               | 1.72                             | 1.57 | 1.40 |
| 1697.8              | 1727.8      | 1.46            | 1.40 | 1.35 | 1697.8      | 2.11            | 2.48 | 2.94 | 1162.3               | 1.66                             | 1.57 | 1.42 |
| 1738.0              | 1768.0      | 1.46            | 1.41 | 1.37 | 1738.0      | 2.11            | 2.48 | 2.95 | 1202.0               | 1.71                             | 1.63 | 1.45 |
| 1798.3              | 1828.3      | 1.50            | 1.47 | 1.44 | 1798.3      | 2.14            | 2.49 | 2.95 | 1241.7               | 1.65                             | 1.60 | 1.42 |
| 1838.4              | 1868.4      | 1.55            | 1.54 | 1.52 | 1838.4      | 2.13            | 2.46 | 2.92 | 1281.5               | 1.64                             | 1.66 | 1.46 |
| 1898.7              | 1928.7      | 1.68            | 1.67 | 1.67 | 1898.7      | 2.14            | 2.48 | 2.93 | 1321.2               | 1.64                             | 1.67 | 1.43 |
| 1938.9              | 1968.9      | 1.78            | 1.78 | 1.77 | 1938.9      | 2.21            | 2.56 | 2.98 | 1360.9               | 1.55                             | 1.65 | 1.43 |
| 1999.2              | 2029.2      | 1.96            | 1.96 | 1.95 | 1999.2      | 2.26            | 2.54 | 3.00 | 1380.8               | 1.52                             | 1.59 | 1.41 |
| 2039.4              | 2069.4      | 2.08            | 2.09 | 2.08 | 2039.4      | 2.35            | 2.64 | 3.05 | 1420.5               | 1.56                             | 1.19 | 1.45 |
| 2099.6              | 2129.6      | 2.28            | 2.30 | 2.28 | 2099.6      | 2.46            | 2.68 | 3.09 | 1440.4               | 1.52                             | 1.04 | 1.43 |
| 2139.8              | 2169.8      | 2.42            | 2.45 | 2.44 | 2139.8      | 2.55            | 2.75 | 3.14 | 1480.1               | 1.48                             | 1.18 | 1.43 |
| 2200.1              | 2230.1      | 2.61            | 2.70 | 2.65 | 2200.1      | 2.67            | 2.83 | 3.20 | 1500.0               | 1.60                             | 1.49 | 1.83 |

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## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 15  | 27  | 21  | 37  | 30  | 42  | 39  | 60  | 72  | 76  |
| 1  | -      | 19     | +0  | 30  | 14  | 43  | 26  | 40  | 49  | 41  | 60  | 61  |
| 2  | 86     | 57     | 39  | 57  | 38  | 65  | 39  | 52  | 52  | 57  | 53  | 72  |
| 3  | >100   | 48     | 50  | 49  | 47  | 57  | 43  | 58  | 55  | 57  | 59  | 54  |
| 4  | >100   | 81     | 63  | 71  | 61  | 72  | 65  | 87  | 61  | 72  | 70  | 63  |
| 5  | >100   | 73     | 65  | 68  | 57  | 66  | 55  | 65  | 55  | 63  | 59  | 69  |
| 6  | >100   | >93    | 92  | 86  | 79  | 83  | 72  | 77  | 68  | 77  | 66  | 75  |
| 7  | >100   | 83     | 88  | 86  | 82  | >93 | 84  | 85  | 81  | 82  | 79  | 84  |
| 8  | >100   | >93    | >93 | >93 | >93 | >93 | 88  | >93 | 88  | 91  | 87  | 93  |
| 9  | >100   | >93    | >93 | >93 | >93 | >93 | 91  | >93 | 88  | 92  | 87  | >93 |
| 10 | >100   | >93    | >93 | >93 | >93 | >93 | >93 | >93 | >93 | >93 | >93 | >93 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions: RF IN: 750.1 MHz; 0.00 dBm.  
LO IN: 780.01 MHz; +10.00 dBm  
IF OUT: 29.91 MHz; -6.9 dBm

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 5   | 17  | 9   | 25  | 19  | 29  | 25  | 53  | 52  | 56  |
| 1  | -      | 19     | +0  | 31  | 14  | 41  | 26  | 36  | 48  | 35  | 52  | 54  |
| 2  | 99     | 65     | 46  | 67  | 46  | 80  | 47  | 62  | 58  | 60  | 66  | 66  |
| 3  | >100   | 66     | 63  | 66  | 59  | 68  | 58  | 67  | 63  | 73  | 72  | 79  |
| 4  | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 5  | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 6  | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 7  | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 8  | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 9  | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 10 | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions: RF IN: 750.1 MHz; -10.00 dBm.  
LO IN: 780.01 MHz; +10.00 dBm  
IF OUT: 29.91 MHz; -16.92 dBm

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

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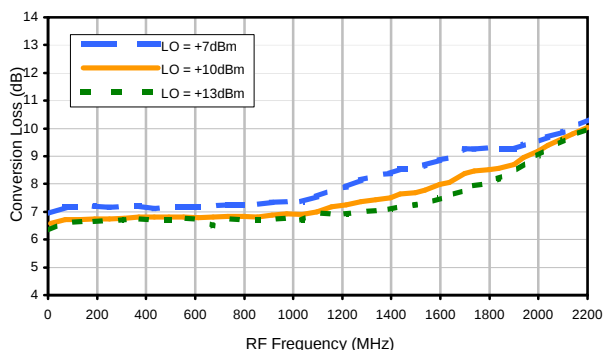


# Frequency Mixer

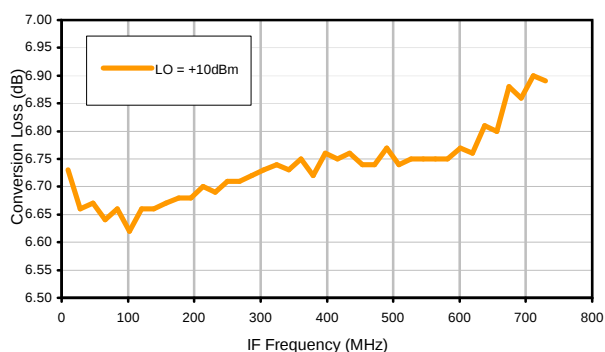
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## Typical Performance Curves

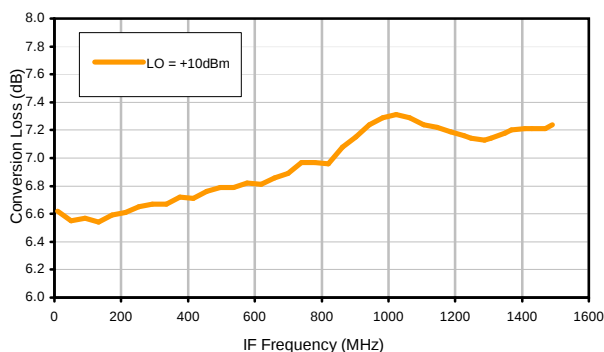
Conversion Loss @ IF=30MHz



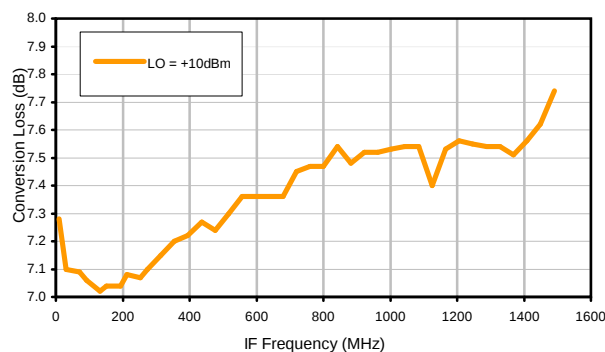
Conversion Loss vs. IF @ RF=750.1MHz



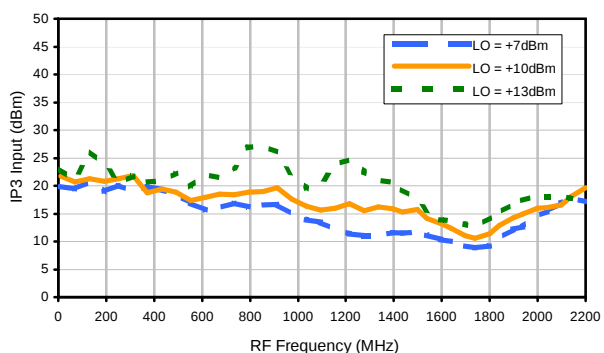
Conversion Loss vs. IF @ RF=10.1MHz



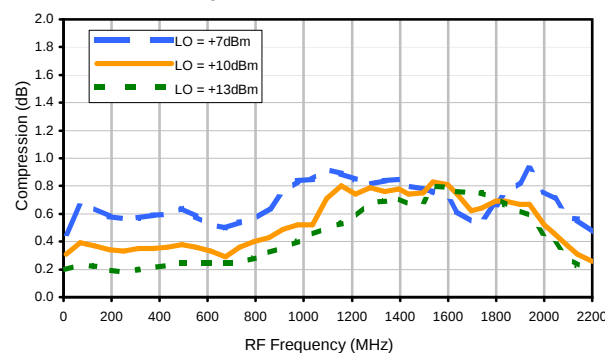
Conversion Loss vs. IF @ RF=1500.1MHz



IP3 Input



Compression @ RF IN=+5dBm



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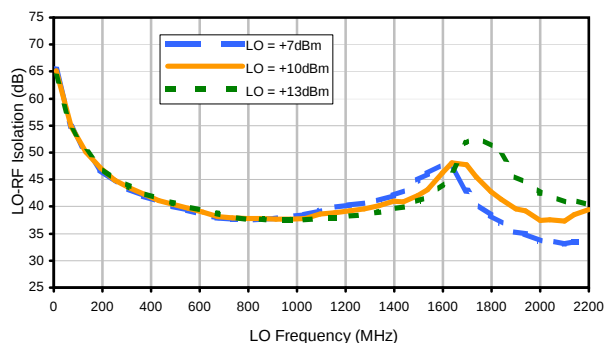


# Frequency Mixer

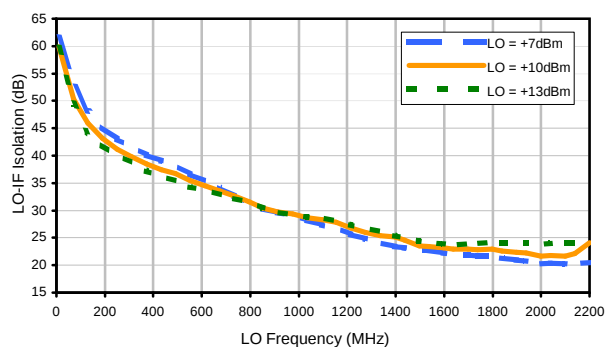
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## Typical Performance Curves

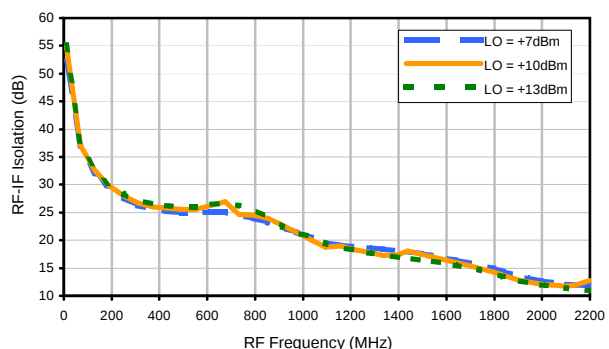
LO-RF Isolation



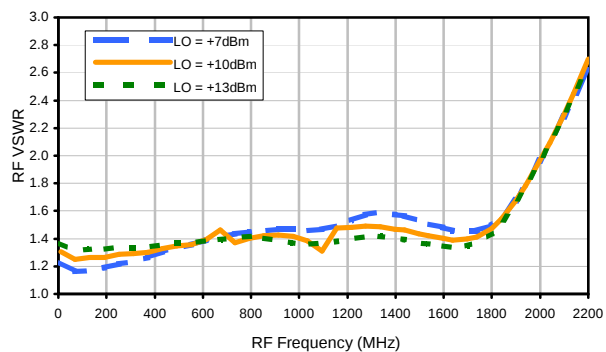
LO-IF Isolation



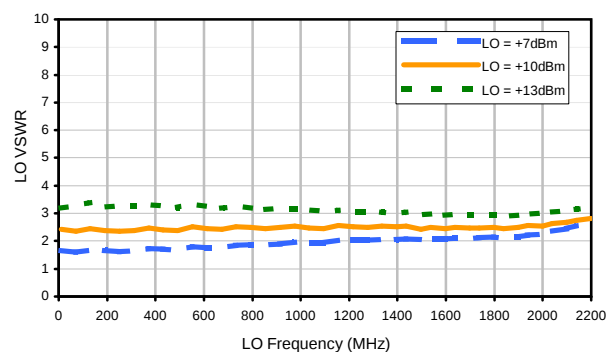
RF-IF Isolation



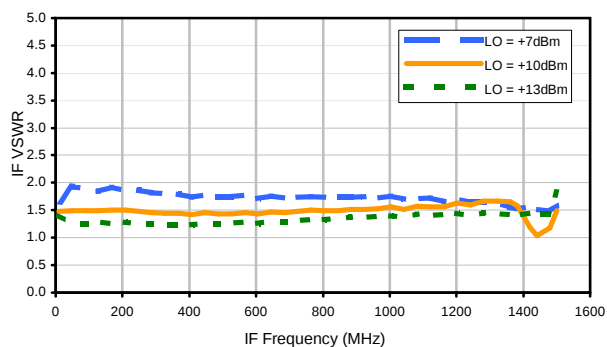
RF VSWR



LO VSWR



IF VSWR



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## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 15  | 27  | 21  | 37  | 30  | 42  | 39  | 60  | 72  | 76  |
| 1  | -      | 19     | +0  | 30  | 14  | 43  | 26  | 40  | 49  | 41  | 60  | 61  |
| 2  | 86     | 57     | 39  | 57  | 38  | 65  | 39  | 52  | 52  | 57  | 53  | 72  |
| 3  | >100   | 48     | 50  | 49  | 47  | 57  | 43  | 58  | 55  | 57  | 59  | 54  |
| 4  | >100   | 81     | 63  | 71  | 61  | 72  | 65  | 87  | 61  | 72  | 70  | 63  |
| 5  | >100   | 73     | 65  | 68  | 57  | 66  | 55  | 65  | 55  | 63  | 59  | 69  |
| 6  | >100   | >93    | 92  | 86  | 79  | 83  | 72  | 77  | 68  | 77  | 66  | 75  |
| 7  | >100   | 83     | 88  | 86  | 82  | >93 | 84  | 85  | 81  | 82  | 79  | 84  |
| 8  | >100   | >93    | >93 | >93 | >93 | >93 | 88  | >93 | 88  | 91  | 87  | 93  |
| 9  | >100   | >93    | >93 | >93 | >93 | >93 | 91  | >93 | 88  | 92  | 87  | >93 |
| 10 | >100   | >93    | >93 | >93 | >93 | >93 | >93 | >93 | >93 | >93 | >93 | >93 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions: RF IN: 750.1 MHz; 0.00 dBm.  
LO IN: 780.01 MHz; +10.00 dBm  
IF OUT: 29.91 MHz; -6.9 dBm

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 5   | 17  | 9   | 25  | 19  | 29  | 25  | 53  | 52  | 56  |
| 1  | -      | 19     | +0  | 31  | 14  | 41  | 26  | 36  | 48  | 35  | 52  | 54  |
| 2  | 99     | 65     | 46  | 67  | 46  | 80  | 47  | 62  | 58  | 60  | 66  | 66  |
| 3  | >100   | 66     | 63  | 66  | 59  | 68  | 58  | 67  | 63  | 73  | 72  | 79  |
| 4  | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 5  | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 6  | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 7  | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 8  | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 9  | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
| 10 | >100   | >83    | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 | >83 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

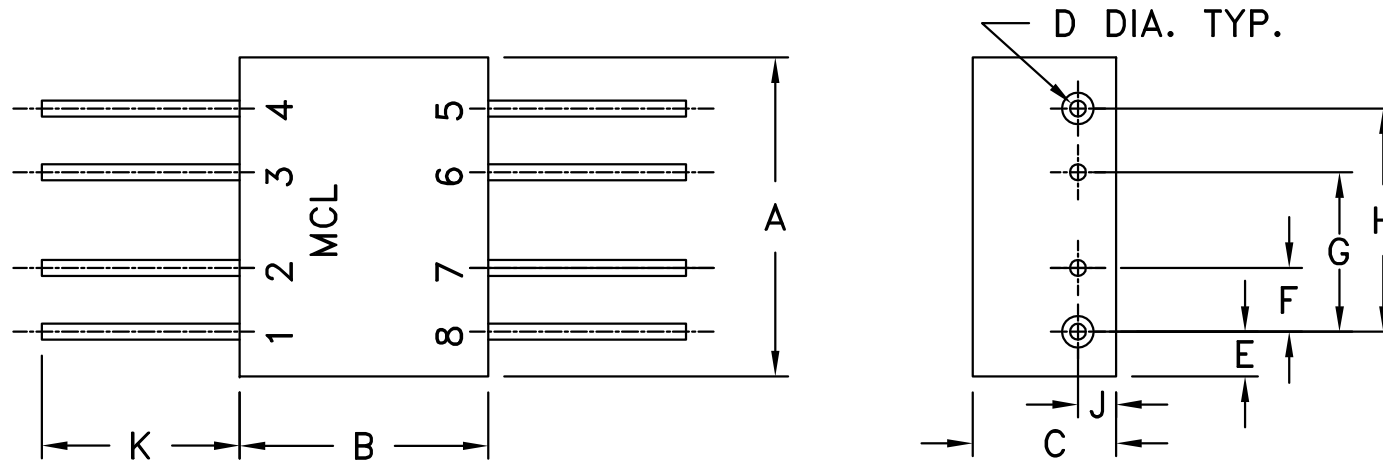
Test conditions: RF IN: 750.1 MHz; -10.00 dBm.  
LO IN: 780.01 MHz; +10.00 dBm  
IF OUT: 29.91 MHz; -16.92 dBm

- 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. X2  
LMX-148  
100817  
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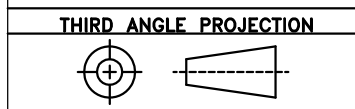


NOTE: PIN NUMBERS DO NOT APPEAR  
ON UNIT. FOR REFERENCE ONLY.



| CASE NO. | A              | B             | C              | D              | E             | F              | G              | H              | J             | K             | NOTES | WT. GRAMS |
|----------|----------------|---------------|----------------|----------------|---------------|----------------|----------------|----------------|---------------|---------------|-------|-----------|
| BB48     | .50<br>(12.70) | .39<br>(9.91) | .225<br>(5.72) | .025<br>(0.63) | .07<br>(1.78) | .100<br>(2.54) | .250<br>(6.35) | .350<br>(8.89) | .06<br>(1.52) | .31<br>(7.87) | A1,E1 | 3.0       |

REFER TO GN-219 FOR TEXT OF NOTES.



| OR        | M42441  | CHANGED PART NO. | PM           |
|-----------|---------|------------------|--------------|
| REV       | ECN No. | DESCRIPTION      | DATE DR AUTH |
| REVISIONS |         |                  |              |

|                            |          |          |
|----------------------------|----------|----------|
| UNLESS OTHERWISE SPECIFIED | INITIALS | DATE     |
| DIMENSIONS ARE IN INCHES   | DRAWN    | PM       |
| TOLERANCES ON:             | CHECKED  | 10.16.95 |
| 2 PL. DECIMALS ± .03       | APPROVED |          |
| 3 PL. DECIMALS ± .015      |          |          |
| ANGLES ±                   |          |          |
| FRACTIONS ±                |          |          |

Mini-Circuits

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BSHEETA1.DWG REV:A DATE:01/12/94

|                      |                     |                                                                   |            |
|----------------------|---------------------|-------------------------------------------------------------------|------------|
| Mini-Circuits        |                     | Mini-Circuit Laboratory<br>13 Neptune Avenue<br>Brooklyn NY 11235 |            |
| CATALOG OUTLINE "BB" |                     |                                                                   |            |
| SIZE<br>B            | CODE IDENT<br>15542 | DRAWING NO:<br>98-BB                                              | REV:<br>OR |
| FILE:<br>98-BB       | SCALE:<br>NONE      | SHEET:<br>1 OF 1                                                  |            |