

# Engineering Development Model

Level 13 (LO Power +13 dBm)

## Frequency Mixer

HJK-ED11067A/1

### Important Note

*This model has been designed, built and tested in our engineering department. Performance data represents model capability. At present it is a non-catalog model. On request, we can supply a final specification sheet, part number and price/delivery information.*

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**CASE STYLE: TTT167**

### ELECTRICAL SPECIFICATIONS 50Ω @25°C

| Parameter        | Min.  | Typ. | Max. | Units |
|------------------|-------|------|------|-------|
| Frequency        | LO/RF |      |      | MHz   |
|                  | IF    |      |      | MHz   |
| Conversion Loss  | 600   |      | 1000 |       |
|                  | 0.3   |      | 300  |       |
| L-R Isolation    |       | 7.6  |      | dB    |
| L-I Isolation    |       | 36   |      | dB    |
| IP3              |       | 37   |      | dB    |
|                  |       | +26  |      | dBm   |
| 1 dB Compression |       | +13  |      | dBm   |

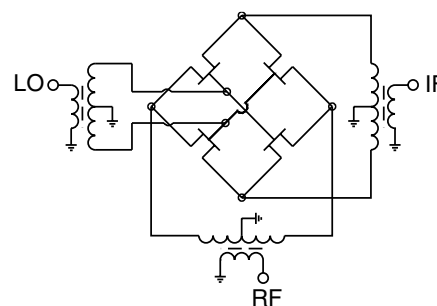
### MAXIMUM RATINGS

|                       |                |
|-----------------------|----------------|
| Operating Temperature | -20°C to 85°C  |
| Storage Temperature   | -55°C to 100°C |
| RF Power              | +15 dBm        |

### PIN CONNECTIONS

|        |       |
|--------|-------|
| LO     | 2     |
| RF     | 1     |
| IF     | 3     |
| GROUND | 4,5,6 |

### Electrical Schematic



# Frequency Mixer

# HJK-ED11067A/1

## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>IF FIXED<br>@IF(OUT)=70MHz<br>(dB) |       |       |
|---------------------|-------------|-------------------------------------------------------|-------|-------|
|                     |             | @LO (dBm)                                             |       |       |
|                     |             | +10                                                   | +13   | +16   |
| 540.1               | 610.1       | 11.31                                                 | 10.49 | 9.90  |
| 580.1               | 650.1       | 8.36                                                  | 8.36  | 8.46  |
| 620.1               | 690.1       | 7.73                                                  | 7.82  | 7.96  |
| 660.1               | 730.1       | 7.58                                                  | 7.68  | 7.83  |
| 700.1               | 770.1       | 7.30                                                  | 7.37  | 7.49  |
| 740.1               | 810.1       | 7.29                                                  | 7.36  | 7.47  |
| 780.1               | 850.1       | 7.10                                                  | 7.13  | 7.21  |
| 820.1               | 890.1       | 7.14                                                  | 7.14  | 7.20  |
| 860.1               | 930.1       | 7.17                                                  | 7.15  | 7.20  |
| 900.1               | 970.1       | 7.23                                                  | 7.14  | 7.13  |
| 940.1               | 1010.1      | 7.34                                                  | 7.23  | 7.21  |
| 980.1               | 1050.1      | 7.50                                                  | 7.32  | 7.27  |
| 1020.1              | 1090.1      | 7.75                                                  | 7.52  | 7.45  |
| 1060.1              | 1130.1      | 8.13                                                  | 7.94  | 7.92  |
| 1100.1              | 1170.1      | 8.64                                                  | 8.53  | 8.53  |
| 1140.1              | 1210.1      | 8.79                                                  | 8.52  | 8.35  |
| 1180.1              | 1250.1      | 8.61                                                  | 8.20  | 8.00  |
| 1210.1              | 1280.1      | 8.45                                                  | 8.00  | 7.79  |
| 1250.1              | 1320.1      | 8.46                                                  | 8.00  | 7.81  |
| 1280.1              | 1350.1      | 8.47                                                  | 8.01  | 7.81  |
| 1320.1              | 1390.1      | 8.55                                                  | 7.95  | 7.69  |
| 1350.1              | 1420.1      | 8.69                                                  | 8.08  | 7.81  |
| 1390.1              | 1460.1      | 8.92                                                  | 8.28  | 7.99  |
| 1420.1              | 1490.1      | 9.31                                                  | 8.55  | 8.26  |
| 1460.1              | 1530.1      | 9.57                                                  | 8.85  | 8.58  |
| 1490.1              | 1560.1      | 9.63                                                  | 8.86  | 8.54  |
| 1530.1              | 1600.1      | 10.04                                                 | 9.16  | 8.80  |
| 1560.1              | 1630.1      | 10.11                                                 | 9.26  | 8.90  |
| 1600.1              | 1670.1      | 10.26                                                 | 9.32  | 8.92  |
| 1630.1              | 1700.1      | 10.53                                                 | 9.57  | 9.17  |
| 1670.1              | 1740.1      | 10.49                                                 | 9.59  | 9.18  |
| 1700.1              | 1770.1      | 10.68                                                 | 9.70  | 9.29  |
| 1740.1              | 1810.1      | 10.93                                                 | 9.97  | 9.57  |
| 1770.1              | 1840.1      | 10.75                                                 | 9.82  | 9.47  |
| 1810.1              | 1880.1      | 11.13                                                 | 10.10 | 9.74  |
| 1840.1              | 1910.1      | 11.10                                                 | 10.16 | 9.83  |
| 1880.1              | 1950.1      | 11.09                                                 | 10.07 | 9.74  |
| 1910.1              | 1980.1      | 11.47                                                 | 10.39 | 10.03 |
| 1950.1              | 2020.1      | 11.19                                                 | 10.25 | 9.90  |
| 1980.1              | 2050.1      | 11.37                                                 | 10.34 | 9.96  |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | IP3 INPUT<br>(dBm) |       |       |
|---------------------|-------------|--------------------|-------|-------|
|                     |             | @LO (dBm)          |       |       |
|                     |             | +10                | +13   | +16   |
| 540.1               | 610.1       | 18.89              | 20.09 | 21.75 |
| 580.1               | 650.1       | 21.49              | 26.42 | 31.33 |
| 620.1               | 690.1       | 24.86              | 28.81 | 33.99 |
| 660.1               | 730.1       | 26.06              | 29.83 | 35.29 |
| 700.1               | 770.1       | 26.37              | 29.87 | 34.64 |
| 740.1               | 810.1       | 25.30              | 28.62 | 33.61 |
| 780.1               | 850.1       | 24.93              | 27.66 | 31.76 |
| 820.1               | 890.1       | 23.88              | 26.06 | 29.78 |
| 860.1               | 930.1       | 23.31              | 25.66 | 28.73 |
| 900.1               | 970.1       | 21.93              | 26.06 | 27.25 |
| 940.1               | 1010.1      | 21.44              | 25.86 | 27.72 |
| 980.1               | 1050.1      | 20.92              | 23.95 | 28.46 |
| 1020.1              | 1090.1      | 19.92              | 22.28 | 25.48 |
| 1060.1              | 1130.1      | 20.44              | 24.69 | 29.32 |
| 1100.1              | 1170.1      | 25.36              | 25.24 | 27.03 |
| 1140.1              | 1210.1      | 23.15              | 22.57 | 25.01 |
| 1180.1              | 1250.1      | 20.26              | 21.42 | 24.92 |
| 1210.1              | 1280.1      | 18.98              | 20.89 | 23.54 |
| 1250.1              | 1320.1      | 17.78              | 20.59 | 23.25 |
| 1280.1              | 1350.1      | 17.75              | 21.05 | 23.74 |
| 1320.1              | 1390.1      | 17.12              | 20.88 | 23.99 |
| 1350.1              | 1420.1      | 17.14              | 20.84 | 24.07 |
| 1390.1              | 1460.1      | 17.33              | 20.86 | 23.02 |
| 1420.1              | 1490.1      | 16.71              | 20.28 | 22.24 |
| 1460.1              | 1530.1      | 16.83              | 20.64 | 22.99 |
| 1490.1              | 1560.1      | 16.48              | 20.04 | 23.46 |
| 1530.1              | 1600.1      | 15.64              | 18.63 | 22.88 |
| 1560.1              | 1630.1      | 15.82              | 18.71 | 22.99 |
| 1600.1              | 1670.1      | 15.73              | 18.24 | 21.65 |
| 1630.1              | 1700.1      | 15.96              | 18.45 | 21.56 |
| 1670.1              | 1740.1      | 16.39              | 18.99 | 22.23 |
| 1700.1              | 1770.1      | 16.31              | 18.91 | 21.88 |
| 1740.1              | 1810.1      | 16.75              | 19.59 | 22.70 |
| 1770.1              | 1840.1      | 16.83              | 20.03 | 23.29 |
| 1810.1              | 1880.1      | 16.62              | 19.85 | 23.25 |
| 1840.1              | 1910.1      | 16.96              | 20.35 | 23.87 |
| 1880.1              | 1950.1      | 16.66              | 19.92 | 23.47 |
| 1910.1              | 1980.1      | 16.78              | 20.05 | 23.91 |
| 1950.1              | 2020.1      | 17.19              | 20.78 | 25.02 |
| 1980.1              | 2050.1      | 16.98              | 20.46 | 24.51 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | COMPRESSION<br>@RF IN=+13dBm<br>(dB) |      |      |
|---------------------|-------------|--------------------------------------|------|------|
|                     |             | @LO (dBm)                            |      |      |
|                     |             | +10                                  | +13  | +16  |
| 540.1               | 610.1       | 0.01                                 | 0.72 | 0.64 |
| 580.1               | 650.1       | 1.08                                 | 0.40 | 0.13 |
| 620.1               | 690.1       | 0.70                                 | 0.19 | 0.08 |
| 660.1               | 730.1       | 0.44                                 | 0.16 | 0.07 |
| 700.1               | 770.1       | 0.40                                 | 0.16 | 0.07 |
| 740.1               | 810.1       | 0.44                                 | 0.18 | 0.09 |
| 780.1               | 850.1       | 0.50                                 | 0.22 | 0.10 |
| 820.1               | 890.1       | 0.54                                 | 0.28 | 0.13 |
| 860.1               | 930.1       | 0.50                                 | 0.31 | 0.15 |
| 900.1               | 970.1       | 0.42                                 | 0.31 | 0.18 |
| 940.1               | 1010.1      | 0.40                                 | 0.31 | 0.19 |
| 980.1               | 1050.1      | 0.38                                 | 0.32 | 0.20 |
| 1020.1              | 1090.1      | 0.42                                 | 0.32 | 0.23 |
| 1060.1              | 1130.1      | 0.48                                 | 0.22 | 0.11 |
| 1100.1              | 1170.1      | 0.58                                 | 0.19 | 0.14 |
| 1140.1              | 1210.1      | 0.62                                 | 0.53 | 0.38 |
| 1180.1              | 1250.1      | 0.64                                 | 0.56 | 0.34 |
| 1210.1              | 1280.1      | 0.83                                 | 0.69 | 0.41 |
| 1250.1              | 1320.1      | 1.05                                 | 0.85 | 0.51 |
| 1280.1              | 1350.1      | 1.14                                 | 0.89 | 0.52 |
| 1320.1              | 1390.1      | 1.29                                 | 0.99 | 0.58 |
| 1350.1              | 1420.1      | 1.33                                 | 1.00 | 0.58 |
| 1390.1              | 1460.1      | 1.36                                 | 1.05 | 0.64 |
| 1420.1              | 1490.1      | 1.36                                 | 1.11 | 0.70 |
| 1460.1              | 1530.1      | 1.18                                 | 0.93 | 0.60 |
| 1490.1              | 1560.1      | 1.15                                 | 0.90 | 0.58 |
| 1530.1              | 1600.1      | 1.08                                 | 0.89 | 0.56 |
| 1560.1              | 1630.1      | 0.95                                 | 0.81 | 0.49 |
| 1600.1              | 1670.1      | 0.85                                 | 0.81 | 0.49 |
| 1630.1              | 1700.1      | 0.71                                 | 0.73 | 0.45 |
| 1670.1              | 1740.1      | 0.66                                 | 0.67 | 0.39 |
| 1700.1              | 1770.1      | 0.62                                 | 0.70 | 0.39 |
| 1740.1              | 1810.1      | 0.59                                 | 0.67 | 0.35 |
| 1770.1              | 1840.1      | 0.62                                 | 0.66 | 0.35 |
| 1810.1              | 1880.1      | 0.56                                 | 0.70 | 0.36 |
| 1840.1              | 1910.1      | 0.63                                 | 0.68 | 0.33 |
| 1880.1              | 1950.1      | 0.64                                 | 0.77 | 0.40 |
| 1910.1              | 1980.1      | 0.59                                 | 0.76 | 0.39 |
| 1950.1              | 2020.1      | 0.68                                 | 0.70 | 0.33 |
| 1980.1              | 2050.1      | 0.63                                 | 0.74 | 0.36 |

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# Frequency Mixer

HJK-ED11067A/1

## Typical Performance Data

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=800MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=589.9MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=1010.1MHz<br>(dB) |
|----------------------|-------------|---------------------------------------------------------------|----------------------|-------------|-----------------------------------------------------------------|----------------------|-------------|------------------------------------------------------------------|
|                      |             | @LO (dBm)                                                     |                      |             | @LO (dBm)                                                       |                      |             | @LO (dBm)                                                        |
|                      |             | +13                                                           |                      |             | +13                                                             |                      |             | +13                                                              |
| 190.0                | 610.0       | 11.38                                                         | 10.1                 | 600.0       | 12.20                                                           | 370.1                | 640.0       | 10.93                                                            |
| 181.8                | 618.2       | 10.17                                                         | 20.1                 | 610.0       | 10.50                                                           | 360.1                | 650.0       | 10.58                                                            |
| 173.6                | 626.4       | 9.51                                                          | 40.1                 | 630.0       | 8.63                                                            | 350.1                | 660.0       | 10.18                                                            |
| 165.5                | 634.5       | 9.18                                                          | 50.1                 | 640.0       | 8.46                                                            | 340.1                | 670.0       | 9.89                                                             |
| 157.3                | 642.7       | 8.87                                                          | 70.1                 | 660.0       | 8.12                                                            | 330.1                | 680.0       | 9.71                                                             |
| 149.1                | 650.9       | 8.57                                                          | 80.1                 | 670.0       | 8.01                                                            | 320.1                | 690.0       | 9.51                                                             |
| 140.9                | 659.1       | 8.48                                                          | 100.1                | 690.0       | 7.86                                                            | 310.1                | 700.0       | 9.28                                                             |
| 132.7                | 667.3       | 8.28                                                          | 110.1                | 700.0       | 7.83                                                            | 300.1                | 710.0       | 9.13                                                             |
| 124.5                | 675.5       | 8.23                                                          | 130.1                | 720.0       | 7.78                                                            | 290.1                | 720.0       | 8.98                                                             |
| 116.4                | 683.6       | 8.07                                                          | 140.1                | 730.0       | 7.74                                                            | 280.1                | 730.0       | 8.81                                                             |
| 108.2                | 691.8       | 7.88                                                          | 160.1                | 750.0       | 7.87                                                            | 270.1                | 740.0       | 8.72                                                             |
| 100.0                | 700.0       | 7.79                                                          | 170.1                | 760.0       | 7.82                                                            | 260.1                | 750.0       | 8.58                                                             |
| 91.8                 | 708.2       | 7.71                                                          | 190.1                | 780.0       | 7.91                                                            | 250.1                | 760.0       | 8.42                                                             |
| 83.6                 | 716.4       | 7.74                                                          | 200.1                | 790.0       | 7.94                                                            | 240.1                | 770.0       | 8.31                                                             |
| 75.5                 | 724.5       | 7.60                                                          | 220.1                | 810.0       | 8.01                                                            | 230.1                | 780.0       | 8.24                                                             |
| 67.3                 | 732.7       | 7.59                                                          | 230.1                | 820.0       | 8.06                                                            | 220.1                | 790.0       | 8.10                                                             |
| 59.1                 | 740.9       | 7.62                                                          | 250.1                | 840.0       | 8.12                                                            | 210.1                | 800.0       | 7.90                                                             |
| 50.9                 | 749.1       | 7.48                                                          | 260.1                | 850.0       | 8.20                                                            | 200.1                | 810.0       | 7.87                                                             |
| 42.7                 | 757.3       | 7.51                                                          | 280.1                | 870.0       | 8.27                                                            | 190.1                | 820.0       | 7.77                                                             |
| 30.5                 | 769.5       | 7.42                                                          | 290.1                | 880.0       | 8.36                                                            | 180.1                | 830.0       | 7.64                                                             |
| 22.3                 | 777.7       | 7.34                                                          | 310.1                | 900.0       | 8.45                                                            | 170.1                | 840.0       | 7.55                                                             |
| 10.0                 | 790.0       | 7.40                                                          | 320.1                | 910.0       | 8.49                                                            | 160.1                | 850.0       | 7.53                                                             |
| 46.4                 | 846.4       | 7.13                                                          | 340.1                | 930.0       | 8.58                                                            | 150.1                | 860.0       | 7.41                                                             |
| 155.5                | 955.5       | 7.40                                                          | 350.1                | 940.0       | 8.62                                                            | 140.1                | 870.0       | 7.35                                                             |
| 228.2                | 1028.2      | 7.63                                                          | 370.1                | 960.0       | 8.70                                                            | 130.1                | 880.0       | 7.37                                                             |
| 337.3                | 1137.3      | 8.59                                                          | 380.1                | 970.0       | 8.70                                                            | 120.1                | 890.0       | 7.37                                                             |
| 410.0                | 1210.0      | 9.18                                                          | 400.1                | 990.0       | 8.78                                                            | 110.1                | 900.0       | 7.26                                                             |
| 519.1                | 1319.1      | 9.03                                                          | 410.1                | 1000.0      | 8.80                                                            | 100.1                | 910.0       | 7.21                                                             |
| 591.8                | 1391.8      | 9.09                                                          | 430.1                | 1020.0      | 8.81                                                            | 90.1                 | 920.0       | 7.27                                                             |
| 700.9                | 1500.9      | 9.43                                                          | 440.1                | 1030.0      | 8.88                                                            | 85.1                 | 925.0       | 7.19                                                             |
| 773.6                | 1573.6      | 9.63                                                          | 460.1                | 1050.0      | 8.99                                                            | 75.1                 | 935.0       | 7.18                                                             |
| 882.7                | 1682.7      | 9.52                                                          | 470.1                | 1060.0      | 9.05                                                            | 70.1                 | 940.0       | 7.20                                                             |
| 955.5                | 1755.5      | 9.47                                                          | 490.1                | 1080.0      | 9.16                                                            | 60.1                 | 950.0       | 7.28                                                             |
| 1064.5               | 1864.5      | 9.31                                                          | 500.1                | 1090.0      | 9.27                                                            | 55.1                 | 955.0       | 7.28                                                             |
| 1137.3               | 1937.3      | 9.26                                                          | 520.1                | 1110.0      | 9.42                                                            | 45.1                 | 965.0       | 7.29                                                             |
| 1246.4               | 2046.4      | 9.31                                                          | 530.1                | 1120.0      | 9.58                                                            | 40.1                 | 970.0       | 7.26                                                             |
| 1319.1               | 2119.1      | 9.28                                                          | 550.1                | 1140.0      | 9.89                                                            | 30.1                 | 980.0       | 7.26                                                             |
| 1428.2               | 2228.2      | 9.48                                                          | 560.1                | 1150.0      | 10.05                                                           | 25.1                 | 985.0       | 7.28                                                             |
| 1500.9               | 2300.9      | 9.61                                                          | 580.1                | 1170.0      | 10.28                                                           | 15.1                 | 995.0       | 7.33                                                             |
| 1610.0               | 2410.0      | 10.15                                                         | 590.1                | 1180.0      | 10.32                                                           | 10.1                 | 1000.0      | 7.44                                                             |

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# Frequency Mixer

HJK-ED11067A/1

## Typical Performance Data

| LO<br>(MHz) | LO-RF ISOLATION<br>(dB) |       |       | LO-IF ISOLATION<br>(dB) |       |       |
|-------------|-------------------------|-------|-------|-------------------------|-------|-------|
|             | @LO (dBm)               |       |       | @LO (dBm)               |       |       |
|             | +10                     | +13   | +16   | +10                     | +13   | +16   |
| 610.1       | 40.83                   | 43.16 | 44.55 | 40.31                   | 41.11 | 41.75 |
| 650.1       | 43.52                   | 45.01 | 46.22 | 39.34                   | 39.92 | 40.35 |
| 690.1       | 42.39                   | 44.00 | 45.23 | 39.53                   | 40.25 | 40.80 |
| 730.1       | 40.83                   | 41.99 | 42.88 | 40.60                   | 40.55 | 40.79 |
| 770.1       | 40.44                   | 41.55 | 42.20 | 45.41                   | 44.65 | 44.05 |
| 810.1       | 39.75                   | 40.86 | 41.60 | 47.95                   | 46.84 | 46.09 |
| 850.1       | 38.72                   | 39.68 | 40.45 | 47.20                   | 46.27 | 45.86 |
| 890.1       | 37.19                   | 37.89 | 38.21 | 44.31                   | 43.51 | 42.91 |
| 930.1       | 37.89                   | 38.76 | 39.28 | 42.70                   | 41.88 | 41.26 |
| 970.1       | 38.32                   | 39.27 | 40.02 | 42.23                   | 41.47 | 41.17 |
| 1010.1      | 39.53                   | 40.70 | 41.55 | 41.60                   | 41.13 | 40.93 |
| 1050.1      | 40.17                   | 41.30 | 42.03 | 40.93                   | 40.48 | 40.12 |
| 1090.1      | 40.94                   | 41.93 | 42.66 | 40.24                   | 39.73 | 39.50 |
| 1130.1      | 42.12                   | 43.22 | 43.91 | 39.22                   | 38.74 | 38.44 |
| 1170.1      | 43.33                   | 44.56 | 44.92 | 37.84                   | 37.25 | 36.80 |
| 1210.1      | 44.10                   | 44.52 | 44.31 | 37.42                   | 37.12 | 37.07 |
| 1250.1      | 42.77                   | 42.44 | 42.04 | 38.37                   | 38.70 | 38.83 |
| 1280.1      | 42.12                   | 41.66 | 41.35 | 39.71                   | 40.26 | 40.52 |
| 1320.1      | 41.60                   | 41.30 | 41.17 | 41.69                   | 42.59 | 43.15 |
| 1350.1      | 41.06                   | 40.75 | 40.59 | 43.20                   | 44.57 | 45.54 |
| 1390.1      | 40.59                   | 39.98 | 39.69 | 45.08                   | 48.09 | 51.43 |
| 1420.1      | 41.04                   | 40.16 | 39.67 | 46.12                   | 49.42 | 52.88 |
| 1460.1      | 43.32                   | 42.34 | 41.76 | 42.99                   | 42.13 | 41.83 |
| 1490.1      | 45.45                   | 44.72 | 44.52 | 41.78                   | 39.73 | 38.94 |
| 1530.1      | 45.71                   | 45.40 | 45.61 | 41.76                   | 39.44 | 38.41 |
| 1560.1      | 46.13                   | 45.28 | 45.29 | 42.85                   | 39.92 | 38.58 |
| 1600.1      | 46.69                   | 45.07 | 44.56 | 46.40                   | 42.06 | 40.16 |
| 1630.1      | 46.75                   | 44.99 | 44.25 | 48.58                   | 43.54 | 41.31 |
| 1670.1      | 47.24                   | 44.94 | 43.83 | 56.03                   | 47.42 | 44.17 |
| 1700.1      | 47.36                   | 44.89 | 43.60 | 57.84                   | 50.75 | 46.31 |
| 1740.1      | 47.21                   | 44.77 | 43.26 | 51.28                   | 54.15 | 50.10 |
| 1770.1      | 47.33                   | 45.14 | 43.58 | 46.92                   | 50.08 | 51.56 |
| 1810.1      | 47.04                   | 45.05 | 43.79 | 43.71                   | 45.18 | 46.51 |
| 1840.1      | 46.65                   | 44.96 | 44.01 | 41.87                   | 42.66 | 43.41 |
| 1880.1      | 46.53                   | 45.24 | 44.61 | 39.79                   | 40.04 | 40.36 |
| 1910.1      | 46.02                   | 45.19 | 44.83 | 38.56                   | 38.68 | 38.86 |
| 1950.1      | 45.61                   | 44.99 | 44.96 | 37.33                   | 37.37 | 37.61 |
| 1980.1      | 45.37                   | 45.07 | 44.97 | 36.52                   | 36.59 | 36.68 |
| 2020.1      | 44.95                   | 44.85 | 44.80 | 35.76                   | 36.00 | 36.15 |
| 2050.1      | 44.41                   | 44.40 | 44.51 | 35.20                   | 35.49 | 35.74 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | +10                     | +13   | +16   |
| 540.1               | 610.1       | 30.61                   | 29.10 | 35.92 |
| 580.1               | 650.1       | 45.31                   | 52.85 | 63.81 |
| 620.1               | 690.1       | 49.35                   | 53.95 | 57.78 |
| 660.1               | 730.1       | 47.63                   | 50.23 | 52.21 |
| 700.1               | 770.1       | 46.25                   | 49.23 | 51.90 |
| 740.1               | 810.1       | 44.52                   | 48.75 | 52.85 |
| 780.1               | 850.1       | 41.91                   | 46.12 | 50.91 |
| 820.1               | 890.1       | 39.37                   | 43.32 | 48.52 |
| 860.1               | 930.1       | 37.63                   | 41.84 | 48.18 |
| 900.1               | 970.1       | 35.37                   | 39.40 | 44.23 |
| 940.1               | 1010.1      | 32.58                   | 35.45 | 38.04 |
| 980.1               | 1050.1      | 29.10                   | 30.97 | 32.41 |
| 1020.1              | 1090.1      | 25.32                   | 26.21 | 26.51 |
| 1060.1              | 1130.1      | 22.33                   | 22.43 | 22.30 |
| 1100.1              | 1170.1      | 21.46                   | 21.64 | 21.60 |
| 1140.1              | 1210.1      | 23.69                   | 24.21 | 24.03 |
| 1180.1              | 1250.1      | 28.61                   | 28.95 | 29.36 |
| 1210.1              | 1280.1      | 32.82                   | 32.76 | 33.46 |
| 1250.1              | 1320.1      | 37.60                   | 36.85 | 37.69 |
| 1280.1              | 1350.1      | 37.56                   | 37.27 | 37.66 |
| 1320.1              | 1390.1      | 34.69                   | 35.25 | 35.67 |
| 1350.1              | 1420.1      | 32.46                   | 33.59 | 34.45 |
| 1390.1              | 1460.1      | 30.61                   | 32.76 | 34.78 |
| 1420.1              | 1490.1      | 30.61                   | 34.46 | 37.02 |
| 1460.1              | 1530.1      | 31.17                   | 35.85 | 37.50 |
| 1490.1              | 1560.1      | 30.66                   | 35.51 | 37.87 |
| 1530.1              | 1600.1      | 29.81                   | 34.55 | 37.96 |
| 1560.1              | 1630.1      | 29.89                   | 34.36 | 37.75 |
| 1600.1              | 1670.1      | 29.57                   | 33.55 | 37.13 |
| 1630.1              | 1700.1      | 29.52                   | 32.74 | 35.61 |
| 1670.1              | 1740.1      | 30.09                   | 32.82 | 35.33 |
| 1700.1              | 1770.1      | 30.55                   | 32.79 | 34.62 |
| 1740.1              | 1810.1      | 31.74                   | 34.01 | 35.61 |
| 1770.1              | 1840.1      | 32.94                   | 35.59 | 37.20 |
| 1810.1              | 1880.1      | 34.57                   | 37.74 | 39.72 |
| 1840.1              | 1910.1      | 36.68                   | 41.57 | 45.52 |
| 1880.1              | 1950.1      | 38.99                   | 46.29 | 53.42 |
| 1910.1              | 1980.1      | 40.65                   | 50.52 | 66.46 |
| 1950.1              | 2020.1      | 45.04                   | 68.70 | 50.25 |
| 1980.1              | 2050.1      | 45.72                   | 62.29 | 51.04 |

# Frequency Mixer

# HJK-ED11067A/1

## 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=1000MHz<br>(:1) |      |      |
|---------------------|-------------|-----------------|------|------|-------------|-----------------|-------|-------|----------------------|--------------------------------|------|------|
|                     |             | @LO (dBm)       |      |      |             | @LO (dBm)       |       |       |                      | @LO (dBm)                      |      |      |
|                     |             | +10             | +13  | +16  |             | +10             | +13   | +16   |                      | +10                            | +13  | +16  |
| 540.1               | 610.1       | 3.35            | 3.91 | 4.44 | 610.1       | 6.30            | 6.56  | 6.66  | 10.0                 | 1.64                           | 1.43 | 1.31 |
| 580.1               | 650.1       | 3.74            | 4.13 | 4.44 | 650.1       | 6.15            | 6.09  | 6.03  | 30.0                 | 1.62                           | 1.41 | 1.28 |
| 620.1               | 690.1       | 3.62            | 3.97 | 4.29 | 690.1       | 5.42            | 5.38  | 5.33  | 50.0                 | 1.69                           | 1.49 | 1.38 |
| 660.1               | 730.1       | 3.42            | 3.76 | 4.03 | 730.1       | 5.22            | 5.22  | 5.20  | 70.0                 | 1.76                           | 1.56 | 1.44 |
| 700.1               | 770.1       | 3.30            | 3.63 | 3.90 | 770.1       | 5.97            | 6.01  | 6.05  | 90.0                 | 1.76                           | 1.56 | 1.46 |
| 740.1               | 810.1       | 3.08            | 3.45 | 3.72 | 810.1       | 7.20            | 7.28  | 7.34  | 110.0                | 1.83                           | 1.64 | 1.55 |
| 780.1               | 850.1       | 2.89            | 3.29 | 3.56 | 850.1       | 8.99            | 9.08  | 9.18  | 130.0                | 1.97                           | 1.78 | 1.68 |
| 820.1               | 890.1       | 2.70            | 3.12 | 3.43 | 890.1       | 10.75           | 10.82 | 10.89 | 150.0                | 2.03                           | 1.84 | 1.74 |
| 860.1               | 930.1       | 2.53            | 2.95 | 3.29 | 930.1       | 12.99           | 13.19 | 13.19 | 170.0                | 2.11                           | 1.93 | 1.85 |
| 900.1               | 970.1       | 2.39            | 2.82 | 3.13 | 970.1       | 15.00           | 15.26 | 15.26 | 190.0                | 2.24                           | 2.06 | 1.97 |
| 940.1               | 1010.1      | 2.29            | 2.68 | 2.99 | 1010.1      | 16.89           | 17.05 | 17.05 | 210.0                | 2.32                           | 2.12 | 2.02 |
| 980.1               | 1050.1      | 2.25            | 2.62 | 2.93 | 1050.1      | 18.70           | 18.90 | 18.90 | 230.0                | 2.40                           | 2.22 | 2.12 |
| 1020.1              | 1090.1      | 2.24            | 2.61 | 2.88 | 1090.1      | 19.32           | 19.32 | 19.11 | 250.0                | 2.60                           | 2.41 | 2.32 |
| 1060.1              | 1130.1      | 2.28            | 2.65 | 2.92 | 1130.1      | 20.45           | 20.22 | 19.98 | 270.0                | 2.72                           | 2.52 | 2.42 |
| 1100.1              | 1170.1      | 2.46            | 2.86 | 3.17 | 1170.1      | 19.76           | 19.32 | 18.90 | 290.0                | 2.73                           | 2.52 | 2.42 |
| 1140.1              | 1210.1      | 2.55            | 2.93 | 3.18 | 1210.1      | 20.45           | 20.70 | 20.70 | 310.0                | 2.89                           | 2.70 | 2.59 |
| 1180.1              | 1250.1      | 2.63            | 2.90 | 3.11 | 1250.1      | 21.46           | 22.00 | 22.00 | 330.0                | 3.10                           | 2.89 | 2.78 |
| 1210.1              | 1280.1      | 2.61            | 2.85 | 3.05 | 1280.1      | 21.46           | 22.00 | 21.73 | 350.0                | 3.14                           | 2.93 | 2.81 |
| 1250.1              | 1320.1      | 2.65            | 2.84 | 3.04 | 1320.1      | 22.87           | 23.49 | 23.49 | 370.0                | 3.20                           | 3.00 | 2.89 |
| 1280.1              | 1350.1      | 2.74            | 2.91 | 3.09 | 1350.1      | 22.58           | 22.87 | 22.58 | 390.0                | 3.39                           | 3.19 | 3.08 |
| 1320.1              | 1390.1      | 2.84            | 2.92 | 3.07 | 1390.1      | 21.73           | 21.73 | 21.20 | 430.0                | 3.54                           | 3.34 | 3.22 |
| 1350.1              | 1420.1      | 2.97            | 3.01 | 3.13 | 1420.1      | 21.73           | 21.46 | 20.95 | 450.0                | 3.70                           | 3.51 | 3.40 |
| 1390.1              | 1460.1      | 3.24            | 3.22 | 3.32 | 1460.1      | 19.98           | 19.54 | 18.70 | 490.0                | 3.83                           | 3.62 | 3.50 |
| 1420.1              | 1490.1      | 3.43            | 3.34 | 3.42 | 1490.1      | 20.70           | 20.22 | 19.54 | 510.0                | 3.92                           | 3.74 | 3.64 |
| 1460.1              | 1530.1      | 3.62            | 3.50 | 3.58 | 1530.1      | 21.46           | 21.20 | 20.95 | 550.0                | 4.07                           | 3.90 | 3.79 |
| 1490.1              | 1560.1      | 3.79            | 3.62 | 3.65 | 1560.1      | 20.95           | 20.70 | 19.98 | 570.0                | 4.01                           | 3.86 | 3.76 |
| 1530.1              | 1600.1      | 4.00            | 3.76 | 3.74 | 1600.1      | 21.20           | 20.70 | 20.45 | 610.0                | 4.16                           | 4.06 | 4.00 |
| 1560.1              | 1630.1      | 4.13            | 3.89 | 3.86 | 1630.1      | 20.45           | 20.22 | 19.98 | 630.0                | 4.02                           | 3.95 | 3.91 |
| 1600.1              | 1670.1      | 4.31            | 3.99 | 3.92 | 1670.1      | 19.76           | 19.32 | 18.50 | 670.0                | 4.01                           | 3.98 | 3.98 |
| 1630.1              | 1700.1      | 4.41            | 4.09 | 4.01 | 1700.1      | 19.76           | 19.32 | 18.90 | 690.0                | 3.91                           | 3.89 | 3.90 |
| 1670.1              | 1740.1      | 4.56            | 4.24 | 4.15 | 1740.1      | 18.90           | 18.50 | 17.93 | 730.0                | 3.79                           | 3.80 | 3.85 |
| 1700.1              | 1770.1      | 4.66            | 4.28 | 4.17 | 1770.1      | 18.50           | 17.93 | 17.22 | 750.0                | 3.67                           | 3.67 | 3.72 |
| 1740.1              | 1810.1      | 4.80            | 4.40 | 4.29 | 1810.1      | 18.11           | 17.75 | 17.39 | 790.0                | 3.45                           | 3.46 | 3.52 |
| 1770.1              | 1840.1      | 4.88            | 4.45 | 4.34 | 1840.1      | 17.22           | 16.72 | 16.26 | 810.0                | 3.39                           | 3.38 | 3.44 |
| 1810.1              | 1880.1      | 4.96            | 4.45 | 4.32 | 1880.1      | 16.89           | 16.41 | 15.96 | 850.0                | 3.09                           | 3.05 | 3.09 |
| 1840.1              | 1910.1      | 5.02            | 4.54 | 4.40 | 1910.1      | 16.72           | 16.41 | 16.11 | 870.0                | 2.99                           | 2.92 | 2.95 |
| 1880.1              | 1950.1      | 5.19            | 4.61 | 4.44 | 1950.1      | 15.67           | 15.26 | 14.74 | 910.0                | 2.78                           | 2.66 | 2.64 |
| 1910.1              | 1980.1      | 5.23            | 4.63 | 4.44 | 1980.1      | 15.53           | 15.13 | 14.74 | 930.0                | 2.68                           | 2.52 | 2.49 |
| 1950.1              | 2020.1      | 5.31            | 4.75 | 4.55 | 2020.1      | 15.13           | 14.74 | 14.50 | 970.0                | 2.46                           | 2.25 | 2.17 |
| 1980.1              | 2050.1      | 5.41            | 4.79 | 4.55 | 2050.1      | 14.38           | 14.03 | 13.49 | 990.0                | 2.40                           | 2.17 | 2.06 |

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## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 23  | 15  | 25  | 46  | 60  | 42  | 40  | 45  | 39  | 46  |
| 1  | -      | 39     | +0  | 41  | 17  | 53  | 23  | 54  | 32  | 58  | 39  | 56  |
| 2  | 65     | 66     | 70  | 60  | 76  | 65  | 68  | >81 | 78  | 68  | 74  | 67  |
| 3  | >90    | 78     | 60  | 79  | 63  | 79  | 71  | >81 | 69  | >81 | 76  | >81 |
| 4  | >90    | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 5  | >90    | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 6  | >90    | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 7  | >90    | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 8  | >90    | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 9  | >90    | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 10 | >90    | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions: RF IN: 800 MHz; -2.00 dBm.  
LO IN: 870 MHz; +13.00 dBm  
IF OUT: 70 MHz; -9.13 dBm

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 34  | 25  | 35  | 49  | 70  | 49  | 52  | 51  | 53  | 51  |
| 1  | -      | 37     | +0  | 42  | 17  | 49  | 24  | 53  | 34  | 55  | 42  | 58  |
| 2  | 45     | 55     | 60  | 49  | 60  | 55  | 60  | 70  | 76  | 60  | 74  | 58  |
| 3  | 71     | 57     | 40  | 60  | 42  | 60  | 49  | 67  | 48  | 81  | 52  | 78  |
| 4  | >90    | 74     | 81  | 76  | 82  | 74  | 79  | 76  | 79  | 87  | 88  | 79  |
| 5  | >90    | 86     | 75  | 79  | 63  | 74  | 66  | 70  | 69  | 79  | 73  | 76  |
| 6  | >90    | >91    | >91 | 89  | >91 | 83  | >91 | 84  | 90  | >91 | >91 | 86  |
| 7  | >90    | >91    | >91 | >91 | 78  | 90  | 77  | 91  | 76  | 85  | 82  | >91 |
| 8  | >90    | >91    | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 |
| 9  | >90    | >91    | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 | 89  | >91 |
| 10 | >90    | >91    | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions: RF IN: 800 MHz; 8.00 dBm.  
LO IN: 870 MHz; +13.00 dBm  
IF OUT: 70 MHz; 0.82 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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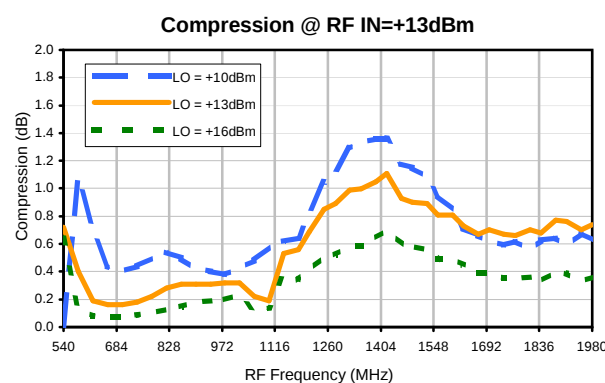
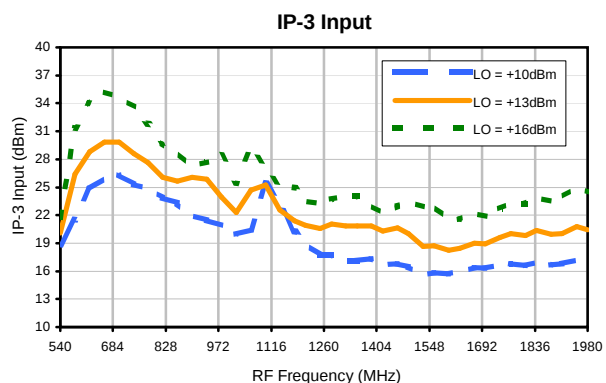
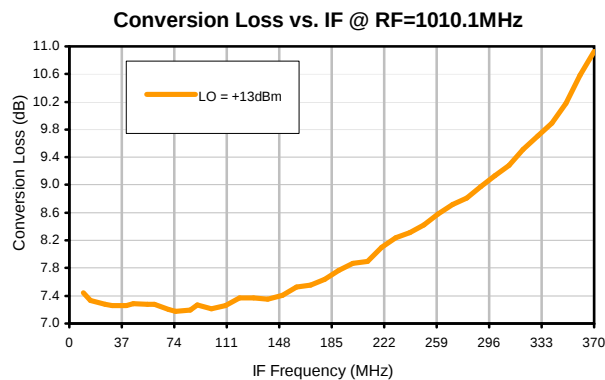
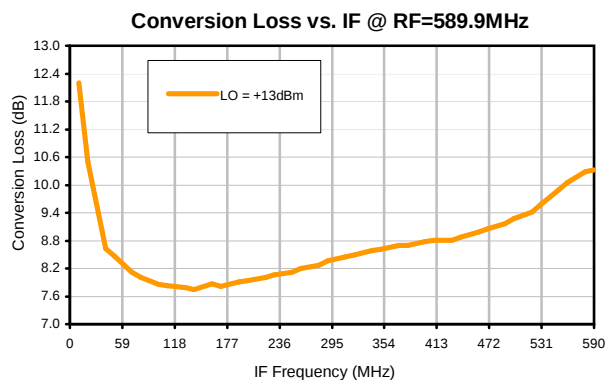
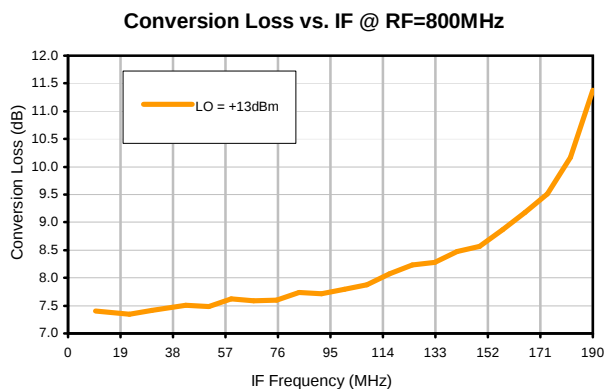
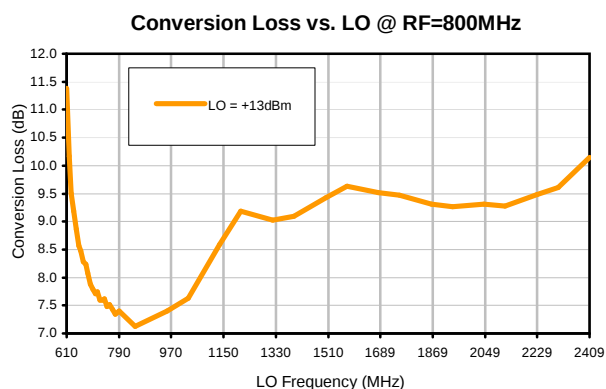
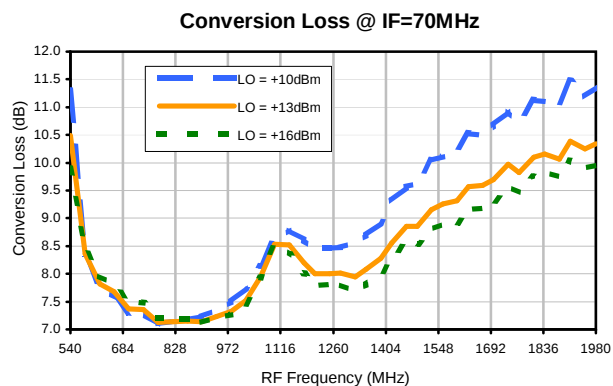
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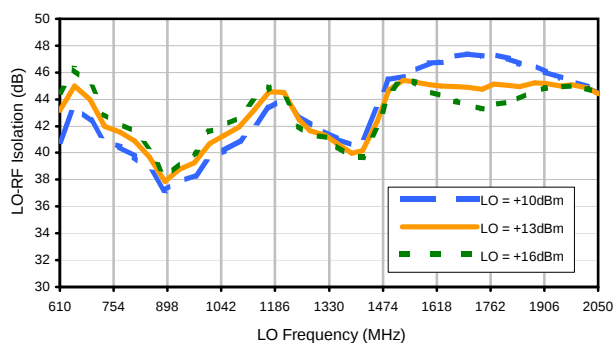


## Typical Performance Curves

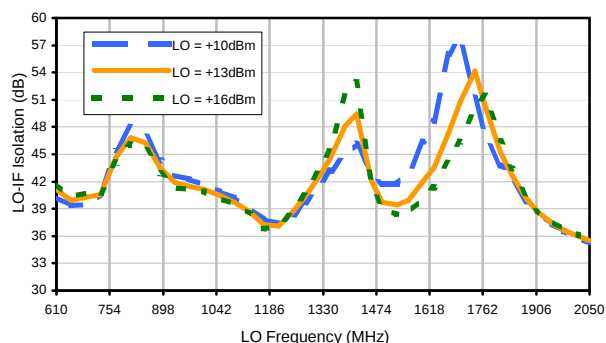


## Typical Performance Curves

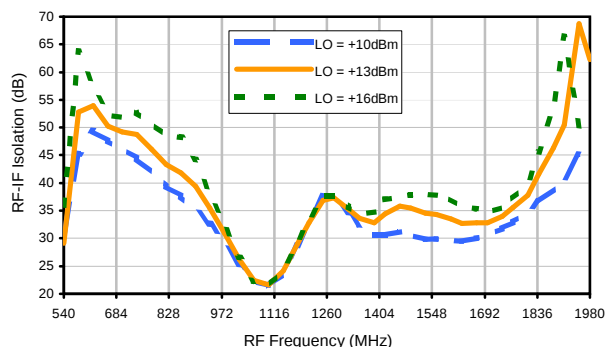
LO-RF Isolation



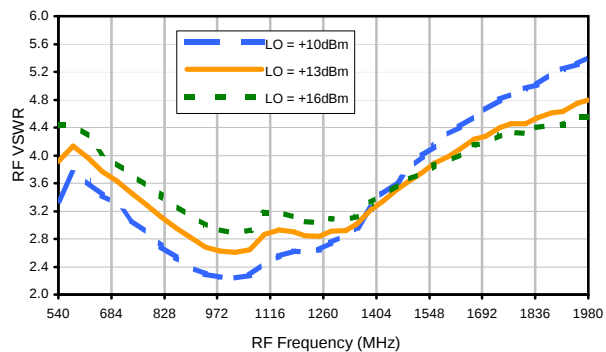
LO-IF Isolation



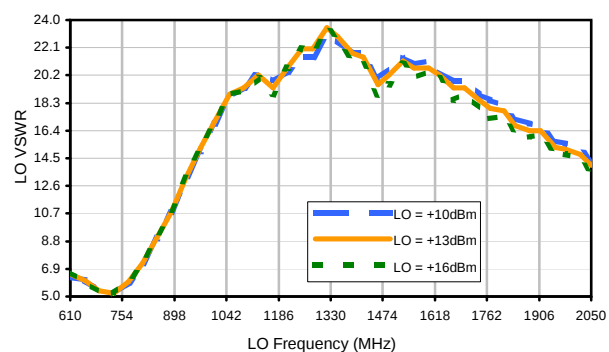
RF-IF Isolation



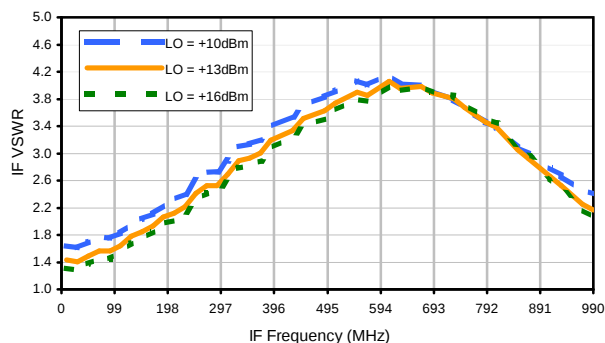
RF VSWR



LO VSWR



IF VSWR



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## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 23  | 15  | 25  | 46  | 60  | 42  | 40  | 45  | 39  | 46  |
| 1  | -      | 39     | +0  | 41  | 17  | 53  | 23  | 54  | 32  | 58  | 39  | 56  |
| 2  | 65     | 66     | 70  | 60  | 76  | 65  | 68  | >81 | 78  | 68  | 74  | 67  |
| 3  | >90    | 78     | 60  | 79  | 63  | 79  | 71  | >81 | 69  | >81 | 76  | >81 |
| 4  | >90    | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 5  | >90    | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 6  | >90    | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 7  | >90    | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 8  | >90    | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 9  | >90    | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 10 | >90    | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions: RF IN: 800 MHz; -2.00 dBm.  
LO IN: 870 MHz; +13.00 dBm  
IF OUT: 70 MHz; -9.13 dBm

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 34  | 25  | 35  | 49  | 70  | 49  | 52  | 51  | 53  | 51  |
| 1  | -      | 37     | +0  | 42  | 17  | 49  | 24  | 53  | 34  | 55  | 42  | 58  |
| 2  | 45     | 55     | 60  | 49  | 60  | 55  | 60  | 70  | 76  | 60  | 74  | 58  |
| 3  | 71     | 57     | 40  | 60  | 42  | 60  | 49  | 67  | 48  | 81  | 52  | 78  |
| 4  | >90    | 74     | 81  | 76  | 82  | 74  | 79  | 76  | 79  | 87  | 88  | 79  |
| 5  | >90    | 86     | 75  | 79  | 63  | 74  | 66  | 70  | 69  | 79  | 73  | 76  |
| 6  | >90    | >91    | >91 | 89  | >91 | 83  | >91 | 84  | 90  | >91 | >91 | 86  |
| 7  | >90    | >91    | >91 | >91 | 78  | 90  | 77  | 91  | 76  | 85  | 82  | >91 |
| 8  | >90    | >91    | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 |
| 9  | >90    | >91    | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 | 89  | >91 |
| 10 | >90    | >91    | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions: RF IN: 800 MHz; 8.00 dBm.  
LO IN: 870 MHz; +13.00 dBm  
IF OUT: 70 MHz; 0.82 dBm

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

REV. X3  
HJK-ED11067A/1  
101012  
Page 3 of 3

## Outline Dimensions

TTT166  
TTT167



## PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm .002$

| CASE # | A             | B              | C             | D              | E              | F              | G               | H              | J              | K              | L              | M              | N               |
|--------|---------------|----------------|---------------|----------------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|----------------|-----------------|
| TTT166 | .38<br>(9.65) | .50<br>(12.70) | .15<br>(3.81) | .020<br>(0.51) | .075<br>(1.91) | .250<br>(6.35) | .425<br>(10.80) | .187<br>(4.75) | .050<br>(1.27) | .050<br>(1.27) | .070<br>(1.78) | .270<br>(6.86) | .540<br>(13.72) |
| TTT167 |               |                | .23<br>(5.84) |                |                |                |                 |                |                |                |                |                |                 |

| CASE # | P              | Q              | R               | S              | T               | WT. GRAM |
|--------|----------------|----------------|-----------------|----------------|-----------------|----------|
| TTT166 | .060<br>(1.52) | .095<br>(2.41) | .445<br>(11.30) | .208<br>(5.28) | .415<br>(10.54) | .8       |
| TTT167 |                |                |                 |                |                 | .8       |

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .01$ ; 3 Pl.  $\pm .005$

### Note:

- Case material: Plastic.
- Base material: Printed wiring laminate.
- Termination finish:
  - For RoHS Case Styles: 3-5  $\mu$  inch (.08-.13 microns) Gold over 120-240  $\mu$  inch (3.05-6.10 microns) Nickel plate. All models, (+) suffix.
  - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

# Tape & Reel Packaging TR-F12



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel                    |     |
|----------------|-------------------------|-------------------|-------------------------------------|-----|
| 24             | 12                      | 7                 | Small quantity standards (see note) | 10  |
|                |                         |                   |                                     | 20  |
|                |                         |                   |                                     | 50  |
|                |                         |                   |                                     | 100 |
|                |                         |                   |                                     | 200 |
|                |                         | 13                | Standard                            | 500 |

Note: Please Consult individual model data sheet to determine device per reel availability.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: [www.minicircuits.com/pages/pdfs/tape.pdf](http://www.minicircuits.com/pages/pdfs/tape.pdf)



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## THIRD ANGLE PROJECTION



## REVISIONS

| REV | ECN No. | DESCRIPTION                 | DATE     | DR  | AUTH |
|-----|---------|-----------------------------|----------|-----|------|
| A   | M86762  | ADDED CONNECTIONS "lp & lq" | 05/23/03 | MMG | WL   |
| B   | M94598  | ADDED CONNECTION "hk"       | 10/08/04 | MMG | HY   |
| C   | M102713 | UPDATED NOTES & DESCRIPTION | 01/14/06 | GF  | IL   |
| D   | M132989 | UPDATED NOTE 2              | 08/24/11 | GF  | DJ   |

**SUGGESTED MOUNTING CONFIGURATION FOR  
TTT166/167 CASE STYLE, "hk"/"lp"/"lq"  
"x"/"ck"/"ec" PIN CONNECTIONS**

**NOTE:**

1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030"  $\pm$  .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. THE USE OF SOLDER MASK OVER THE GROUND AREA UNDER THE UNIT AS SHOWN IS RECOMMENDED TO PREVENT POTENTIAL SHORTING. IF USER CHOOSES TO EXPOSE METAL UNDER THE ENTIRE UNIT GROUND PAD FOR IMPROVED GROUNDING, IT IS RECOMMENDED A SOLDER MASK DAM BE APPLIED AROUND EACH GROUND PAD TO ENSURE FILLET AND CONNECTION AT GROUND PADS.
3. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.



DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER), SEE NOTE 2.



DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED

INITIALS

DATE

DIMENSIONS ARE IN INCHES

TOLERANCES ON:

2 PL DECIMALS  $\pm$ 3 PL DECIMALS  $\pm$  .005ANGLES  $\pm$ FRACTIONS  $\pm$ 

DRAWN

GF

03/18/03

CHECKED

IL

04/15/03

APPROVED

DJ

04/15/03



**Mini-Circuits®**

13 Neptune Avenue  
Brooklyn NY 11235

PL, hk/lp/lq/x/ck/ec, TTT166/167,  
SYM/HJK/SYAS/SYPD, TB-12

SIZE  
A

CODE IDENT  
15542

DRAWING NO:  
98-PL-079

REV:  
D

FILE: 98PL079

SCALE: 5:1

SHEET: 1 OF 1

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ASHEETA1.DWG REV:A DATE:01/12/95

# Evaluation Board and Circuit

For Pin Connections Refer to Data Sheet of the DUT



Schematic Diagram

## Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,  
Dielectric Constant=3.5, Thickness=.030 inch.

 **Mini-Circuits®**



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

| Specification                  | Test/Inspection Condition                                                                                                                                       | Reference/Spec                                                                                       |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Operating Temperature          | -20° to 85°C<br>Ambient Environment                                                                                                                             | Individual Model Data Sheet                                                                          |
| Storage Temperature            | -55° to 100° C<br>Ambient Environment                                                                                                                           | Individual Model Data Sheet                                                                          |
| Humidity                       | 90 to 95% RH, 240 hours, 50°C                                                                                                                                   | MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours |
| Thermal Shock                  | -55° to 100°C, 100 cycles                                                                                                                                       | MIL-STD-202, Method 107, Condition A-3, except +100°C                                                |
| Solder Reflow Heat             | Sn-Pb Eutetic Process: 225°C peak<br>Pb-Free Process 245° - 250°C peak                                                                                          | J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1                                                        |
| Solderability                  | 10X Magnification                                                                                                                                               | J-STD-002, 95% Coverage                                                                              |
| Vibration (High Frequency)     | 20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)                                                                             | MIL-STD-202, Method 204, Condition D                                                                 |
| Mechanical Shock               | 50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes                                                                                               | MIL-STD-202, Method 213, Condition A                                                                 |
| Marking Resistance to Solvents | Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C;<br>distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C | MIL-STD-202, Method 215                                                                              |