

## Frequency Mixer

## HJK-ED11277

Level 21 (LO Power + 21 dBm)

### 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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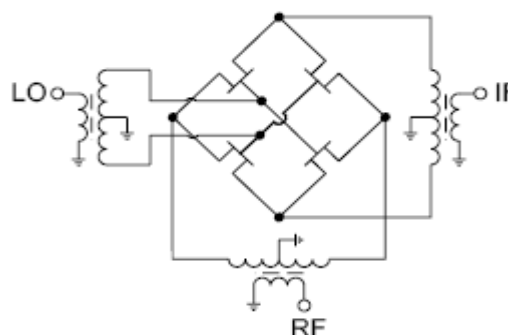
CASE STYLE : TTT167

| ELECTRICAL SPECIFICATIONS 50Ω @ +25°C |                                        |      |      |      |       |
|---------------------------------------|----------------------------------------|------|------|------|-------|
| Parameter                             |                                        | Min. | Typ. | Max. | Units |
| Frequency                             | LO (f <sub>L</sub> to f <sub>U</sub> ) | 850  |      | 1500 | MHz   |
|                                       | RF (f <sub>L</sub> to f <sub>U</sub> ) | 850  |      | 1500 | MHz   |
|                                       | IF                                     | 10   |      | 1500 | MHz   |
| Conversion Loss                       | Total Range                            |      | 7.0  |      | dB    |
| LO-RF Isolation                       |                                        |      | 34   |      | dB    |
| LO-IF Isolation                       |                                        |      | 36   |      | dB    |
| Input IP3                             |                                        |      | +28  |      | dBm   |
| 1 dB Compression                      |                                        |      | +17  |      | dBm   |

| MAXIMUM RATINGS       |                 |
|-----------------------|-----------------|
| Operating Temperature | -20°C to 85°C   |
| Storage Temperature   | -55°C to +100°C |

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

### Electrical Schematics



## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>IF FIXED<br>@IF(OUT)=470MHz<br>(dB) |       |       |
|---------------------|-------------|--------------------------------------------------------|-------|-------|
|                     |             | @LO (dBm)                                              |       |       |
|                     |             | +19                                                    | +21   | +23   |
| 10.1                | 480.1       | 15.61                                                  | 15.16 | 14.87 |
| 70.1                | 540.1       | 7.67                                                   | 7.51  | 7.44  |
| 130.1               | 600.1       | 7.03                                                   | 6.89  | 6.82  |
| 190.1               | 660.1       | 7.02                                                   | 6.92  | 6.89  |
| 250.1               | 720.1       | 7.19                                                   | 7.08  | 7.06  |
| 310.1               | 780.1       | 7.84                                                   | 7.79  | 7.79  |
| 370.1               | 840.1       | 7.55                                                   | 7.40  | 7.28  |
| 430.1               | 900.1       | 6.94                                                   | 6.89  | 6.89  |
| 490.1               | 960.1       | 6.78                                                   | 6.75  | 6.77  |
| 550.1               | 1020.1      | 6.73                                                   | 6.69  | 6.70  |
| 610.1               | 1080.1      | 6.70                                                   | 6.64  | 6.63  |
| 670.1               | 1140.1      | 6.73                                                   | 6.67  | 6.66  |
| 730.1               | 1200.1      | 6.70                                                   | 6.63  | 6.63  |
| 790.1               | 1260.1      | 6.70                                                   | 6.61  | 6.60  |
| 850.1               | 1320.1      | 6.79                                                   | 6.68  | 6.65  |
| 910.1               | 1380.1      | 6.88                                                   | 6.75  | 6.71  |
| 970.1               | 1440.1      | 6.87                                                   | 6.73  | 6.66  |
| 1030.1              | 1500.1      | 7.01                                                   | 6.87  | 6.81  |
| 1090.1              | 1560.1      | 7.04                                                   | 6.90  | 6.85  |
| 1150.1              | 1620.1      | 7.03                                                   | 6.90  | 6.86  |
| 1210.1              | 1680.1      | 7.09                                                   | 6.95  | 6.90  |
| 1270.1              | 1740.1      | 7.10                                                   | 6.96  | 6.89  |
| 1330.1              | 1800.1      | 7.14                                                   | 7.01  | 6.95  |
| 1390.1              | 1860.1      | 7.24                                                   | 7.10  | 7.04  |
| 1450.1              | 1920.1      | 7.23                                                   | 7.08  | 7.01  |
| 1510.1              | 1980.1      | 7.45                                                   | 7.31  | 7.24  |
| 1570.1              | 2040.1      | 7.68                                                   | 7.55  | 7.48  |
| 1630.1              | 2100.1      | 7.87                                                   | 7.74  | 7.68  |
| 1690.1              | 2160.1      | 8.01                                                   | 7.89  | 7.82  |
| 1750.1              | 2220.1      | 8.24                                                   | 8.12  | 8.06  |
| 1810.1              | 2280.1      | 8.49                                                   | 8.38  | 8.33  |
| 1870.1              | 2340.1      | 8.91                                                   | 8.76  | 8.71  |
| 1950.1              | 2420.1      | 9.42                                                   | 9.21  | 9.13  |
| 2010.1              | 2480.1      | 9.51                                                   | 9.30  | 9.22  |
| 2090.1              | 2560.1      | 9.56                                                   | 9.34  | 9.25  |
| 2150.1              | 2620.1      | 9.85                                                   | 9.63  | 9.53  |
| 2230.1              | 2700.1      | 10.37                                                  | 10.09 | 9.95  |
| 2290.1              | 2760.1      | 10.58                                                  | 10.24 | 10.10 |
| 2370.1              | 2840.1      | 10.95                                                  | 10.55 | 10.37 |
| 2430.1              | 2900.1      | 11.52                                                  | 11.06 | 10.83 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | IP3 INPUT<br>(dBm) |       |       |
|---------------------|-------------|--------------------|-------|-------|
|                     |             | @LO (dBm)          |       |       |
|                     |             | +19                | +21   | +23   |
| 10.1                | 480.1       | 28.36              | 29.20 | 29.91 |
| 70.1                | 540.1       | 23.77              | 24.76 | 25.88 |
| 130.1               | 600.1       | 23.38              | 24.14 | 25.04 |
| 190.1               | 660.1       | 23.99              | 24.25 | 24.99 |
| 250.1               | 720.1       | 25.02              | 26.56 | 28.26 |
| 310.1               | 780.1       | 22.41              | 23.82 | 25.27 |
| 370.1               | 840.1       | 23.01              | 24.62 | 26.07 |
| 430.1               | 900.1       | 25.97              | 27.61 | 28.77 |
| 490.1               | 960.1       | 26.02              | 26.80 | 28.74 |
| 550.1               | 1020.1      | 26.49              | 27.02 | 28.58 |
| 610.1               | 1080.1      | 26.85              | 27.46 | 29.34 |
| 670.1               | 1140.1      | 27.15              | 27.91 | 30.02 |
| 730.1               | 1200.1      | 27.25              | 28.23 | 30.67 |
| 790.1               | 1260.1      | 27.93              | 29.24 | 32.19 |
| 850.1               | 1320.1      | 28.49              | 29.98 | 32.91 |
| 910.1               | 1380.1      | 28.43              | 29.89 | 32.29 |
| 970.1               | 1440.1      | 28.37              | 29.84 | 32.52 |
| 1030.1              | 1500.1      | 27.79              | 29.16 | 30.80 |
| 1090.1              | 1560.1      | 27.49              | 28.68 | 30.29 |
| 1150.1              | 1620.1      | 27.51              | 28.74 | 30.04 |
| 1210.1              | 1680.1      | 26.98              | 28.26 | 29.59 |
| 1270.1              | 1740.1      | 26.74              | 27.57 | 28.91 |
| 1330.1              | 1800.1      | 26.99              | 27.71 | 29.12 |
| 1390.1              | 1860.1      | 26.99              | 27.65 | 28.94 |
| 1450.1              | 1920.1      | 26.73              | 27.56 | 28.66 |
| 1510.1              | 1980.1      | 26.46              | 27.48 | 28.69 |
| 1570.1              | 2040.1      | 26.31              | 27.36 | 28.51 |
| 1630.1              | 2100.1      | 26.38              | 27.71 | 29.26 |
| 1690.1              | 2160.1      | 26.66              | 28.32 | 30.69 |
| 1750.1              | 2220.1      | 26.66              | 28.18 | 30.26 |
| 1810.1              | 2280.1      | 26.52              | 28.71 | 30.25 |
| 1870.1              | 2340.1      | 24.99              | 27.62 | 29.64 |
| 1950.1              | 2420.1      | 21.78              | 24.29 | 26.55 |
| 2010.1              | 2480.1      | 21.06              | 22.67 | 24.45 |
| 2090.1              | 2560.1      | 22.20              | 23.40 | 24.88 |
| 2150.1              | 2620.1      | 23.53              | 24.80 | 26.45 |
| 2230.1              | 2700.1      | 24.61              | 26.23 | 28.46 |
| 2290.1              | 2760.1      | 24.66              | 26.41 | 28.71 |
| 2370.1              | 2840.1      | 25.38              | 27.38 | 29.72 |
| 2430.1              | 2900.1      | 26.50              | 28.51 | 30.90 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | COMPRESSION<br>@RF IN=+17dBm<br>(dB) |       |       |
|---------------------|-------------|--------------------------------------|-------|-------|
|                     |             | @LO (dBm)                            |       |       |
|                     |             | +19                                  | +21   | +23   |
| 10.1                | 480.1       | -0.02                                | -0.05 | -0.04 |
| 70.1                | 540.1       | 0.56                                 | 0.45  | 0.31  |
| 130.1               | 600.1       | 0.73                                 | 0.59  | 0.44  |
| 190.1               | 660.1       | 0.82                                 | 0.65  | 0.48  |
| 250.1               | 720.1       | 0.92                                 | 0.71  | 0.53  |
| 310.1               | 780.1       | 0.95                                 | 0.68  | 0.49  |
| 370.1               | 840.1       | 0.63                                 | 0.44  | 0.29  |
| 430.1               | 900.1       | 0.75                                 | 0.52  | 0.33  |
| 490.1               | 960.1       | 0.56                                 | 0.38  | 0.27  |
| 550.1               | 1020.1      | 0.44                                 | 0.31  | 0.22  |
| 610.1               | 1080.1      | 0.38                                 | 0.27  | 0.20  |
| 670.1               | 1140.1      | 0.35                                 | 0.25  | 0.17  |
| 730.1               | 1200.1      | 0.34                                 | 0.25  | 0.16  |
| 790.1               | 1260.1      | 0.29                                 | 0.20  | 0.13  |
| 850.1               | 1320.1      | 0.24                                 | 0.17  | 0.11  |
| 910.1               | 1380.1      | 0.21                                 | 0.14  | 0.09  |
| 970.1               | 1440.1      | 0.16                                 | 0.10  | 0.07  |
| 1030.1              | 1500.1      | 0.16                                 | 0.09  | 0.04  |
| 1090.1              | 1560.1      | 0.22                                 | 0.13  | 0.05  |
| 1150.1              | 1620.1      | 0.25                                 | 0.16  | 0.07  |
| 1210.1              | 1680.1      | 0.30                                 | 0.21  | 0.10  |
| 1270.1              | 1740.1      | 0.34                                 | 0.24  | 0.15  |
| 1330.1              | 1800.1      | 0.32                                 | 0.23  | 0.15  |
| 1390.1              | 1860.1      | 0.33                                 | 0.24  | 0.17  |
| 1450.1              | 1920.1      | 0.37                                 | 0.28  | 0.20  |
| 1510.1              | 1980.1      | 0.39                                 | 0.29  | 0.21  |
| 1570.1              | 2040.1      | 0.45                                 | 0.34  | 0.25  |
| 1630.1              | 2100.1      | 0.51                                 | 0.38  | 0.28  |
| 1690.1              | 2160.1      | 0.53                                 | 0.39  | 0.29  |
| 1750.1              | 2220.1      | 0.64                                 | 0.44  | 0.32  |
| 1810.1              | 2280.1      | 0.80                                 | 0.50  | 0.35  |
| 1870.1              | 2340.1      | 0.93                                 | 0.59  | 0.38  |
| 1950.1              | 2420.1      | 1.17                                 | 0.83  | 0.60  |
| 2010.1              | 2480.1      | 1.34                                 | 1.04  | 0.81  |
| 2090.1              | 2560.1      | 1.29                                 | 1.04  | 0.80  |
| 2150.1              | 2620.1      | 1.06                                 | 0.89  | 0.68  |
| 2230.1              | 2700.1      | 0.93                                 | 0.77  | 0.59  |
| 2290.1              | 2760.1      | 0.86                                 | 0.70  | 0.55  |
| 2370.1              | 2840.1      | 0.75                                 | 0.60  | 0.46  |
| 2430.1              | 2900.1      | 0.60                                 | 0.49  | 0.38  |

## Typical Performance Data

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=1090.1MHz<br>(dB) |
|----------------------|-------------|------------------------------------------------------------------|
|                      |             | @LO (dBm)                                                        |
|                      |             | +21                                                              |
| 1030.0               | 60.1        | 10.54                                                            |
| 979.6                | 110.5       | 7.05                                                             |
| 929.3                | 160.8       | 7.28                                                             |
| 878.9                | 211.2       | 7.51                                                             |
| 828.5                | 261.6       | 7.53                                                             |
| 778.1                | 312.0       | 7.82                                                             |
| 727.8                | 362.3       | 7.85                                                             |
| 677.4                | 412.7       | 8.17                                                             |
| 627.0                | 463.1       | 7.29                                                             |
| 576.7                | 513.4       | 7.17                                                             |
| 526.3                | 563.8       | 7.55                                                             |
| 475.9                | 614.2       | 7.30                                                             |
| 425.6                | 664.5       | 7.22                                                             |
| 375.2                | 714.9       | 7.48                                                             |
| 324.8                | 765.3       | 8.16                                                             |
| 274.4                | 815.7       | 7.96                                                             |
| 224.1                | 866.0       | 7.12                                                             |
| 173.7                | 916.4       | 6.84                                                             |
| 123.3                | 966.8       | 6.79                                                             |
| 73.0                 | 1017.1      | 6.78                                                             |
| 22.6                 | 1067.5      | 6.84                                                             |
| 65.3                 | 1155.4      | 6.74                                                             |
| 175.9                | 1266.0      | 6.80                                                             |
| 286.5                | 1376.6      | 6.81                                                             |
| 397.2                | 1487.3      | 6.83                                                             |
| 507.8                | 1597.9      | 6.84                                                             |
| 618.4                | 1708.5      | 7.01                                                             |
| 756.7                | 1846.8      | 7.06                                                             |
| 867.3                | 1957.4      | 7.14                                                             |
| 1005.6               | 2095.7      | 7.42                                                             |
| 1116.2               | 2206.3      | 7.87                                                             |
| 1254.4               | 2344.5      | 9.01                                                             |
| 1365.1               | 2455.2      | 9.43                                                             |
| 1503.3               | 2593.4      | 9.33                                                             |
| 1614.0               | 2704.1      | 9.37                                                             |
| 1752.2               | 2842.3      | 9.49                                                             |
| 1862.8               | 2952.9      | 9.65                                                             |
| 2001.1               | 3091.2      | 9.61                                                             |
| 2111.7               | 3201.8      | 9.82                                                             |
| 2250.0               | 3340.1      | 10.49                                                            |

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=700.1MHz<br>(dB) |
|----------------------|-------------|-----------------------------------------------------------------|
|                      |             | @LO (dBm)                                                       |
|                      |             | +21                                                             |
| 10.0                 | 710.1       | 7.77                                                            |
| 70.0                 | 770.1       | 7.96                                                            |
| 130.0                | 830.1       | 7.60                                                            |
| 190.0                | 890.1       | 6.96                                                            |
| 250.0                | 950.1       | 6.85                                                            |
| 310.0                | 1010.1      | 6.66                                                            |
| 370.0                | 1070.1      | 6.64                                                            |
| 430.0                | 1130.1      | 6.64                                                            |
| 490.0                | 1190.1      | 6.63                                                            |
| 550.0                | 1250.1      | 6.63                                                            |
| 630.0                | 1330.1      | 6.69                                                            |
| 690.0                | 1390.1      | 6.72                                                            |
| 770.0                | 1470.1      | 7.00                                                            |
| 830.0                | 1530.1      | 6.98                                                            |
| 910.0                | 1610.1      | 7.01                                                            |
| 970.0                | 1670.1      | 7.04                                                            |
| 1050.0               | 1750.1      | 7.06                                                            |
| 1110.0               | 1810.1      | 7.07                                                            |
| 1190.0               | 1890.1      | 7.10                                                            |
| 1250.0               | 1950.1      | 7.19                                                            |
| 1330.0               | 2030.1      | 7.39                                                            |
| 1390.0               | 2090.1      | 7.48                                                            |
| 1470.0               | 2170.1      | 7.85                                                            |
| 1530.0               | 2230.1      | 8.20                                                            |
| 1610.0               | 2310.1      | 8.90                                                            |
| 1670.0               | 2370.1      | 9.19                                                            |
| 1750.0               | 2450.1      | 9.14                                                            |
| 1810.0               | 2510.1      | 9.04                                                            |
| 1890.0               | 2590.1      | 9.04                                                            |
| 1950.0               | 2650.1      | 9.08                                                            |
| 2030.0               | 2730.1      | 9.28                                                            |
| 2090.0               | 2790.1      | 9.50                                                            |
| 2170.0               | 2870.1      | 9.68                                                            |
| 2230.0               | 2930.1      | 9.73                                                            |
| 2310.0               | 3010.1      | 9.84                                                            |
| 2370.0               | 3070.1      | 9.95                                                            |
| 2450.0               | 3150.1      | 10.15                                                           |
| 2510.0               | 3210.1      | 10.29                                                           |
| 2590.0               | 3290.1      | 10.65                                                           |
| 2650.0               | 3350.1      | 11.02                                                           |

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=1480.1MHz<br>(dB) |
|----------------------|-------------|------------------------------------------------------------------|
|                      |             | @LO (dBm)                                                        |
|                      |             | +21                                                              |
| 1430.0               | 50.1        | 13.81                                                            |
| 1390.0               | 90.1        | 7.92                                                             |
| 1350.0               | 130.1       | 7.47                                                             |
| 1310.0               | 170.1       | 7.73                                                             |
| 1270.0               | 210.1       | 7.93                                                             |
| 1230.0               | 250.1       | 8.07                                                             |
| 1190.0               | 290.1       | 8.11                                                             |
| 1150.0               | 330.1       | 8.32                                                             |
| 1110.0               | 370.1       | 8.38                                                             |
| 1070.0               | 410.1       | 9.01                                                             |
| 1030.0               | 450.1       | 8.12                                                             |
| 990.0                | 490.1       | 8.02                                                             |
| 950.0                | 530.1       | 8.02                                                             |
| 910.0                | 570.1       | 7.87                                                             |
| 870.0                | 610.1       | 7.85                                                             |
| 830.0                | 650.1       | 7.76                                                             |
| 790.0                | 690.1       | 7.93                                                             |
| 750.0                | 730.1       | 8.20                                                             |
| 710.0                | 770.1       | 8.69                                                             |
| 670.0                | 810.1       | 8.61                                                             |
| 630.0                | 850.1       | 7.76                                                             |
| 590.0                | 890.1       | 7.33                                                             |
| 550.0                | 930.1       | 7.10                                                             |
| 510.0                | 970.1       | 7.02                                                             |
| 470.0                | 1010.1      | 6.95                                                             |
| 430.0                | 1050.1      | 7.02                                                             |
| 390.0                | 1090.1      | 6.98                                                             |
| 370.0                | 1110.1      | 7.01                                                             |
| 330.0                | 1150.1      | 7.04                                                             |
| 310.0                | 1170.1      | 7.04                                                             |
| 270.0                | 1210.1      | 7.00                                                             |
| 250.0                | 1230.1      | 7.00                                                             |
| 210.0                | 1270.1      | 7.00                                                             |
| 190.0                | 1290.1      | 6.99                                                             |
| 150.0                | 1330.1      | 6.96                                                             |
| 130.0                | 1350.1      | 6.93                                                             |
| 90.0                 | 1390.1      | 6.95                                                             |
| 70.0                 | 1410.1      | 6.93                                                             |
| 30.0                 | 1450.1      | 6.93                                                             |
| 10.0                 | 1470.1      | 7.37                                                             |

## Typical Performance Data

| LO<br>(MHz) | LO-RF ISOLATION<br>(dB) |       |       | LO-IF ISOLATION<br>(dB) |       |       |
|-------------|-------------------------|-------|-------|-------------------------|-------|-------|
|             | @LO (dBm)               |       |       | @LO (dBm)               |       |       |
|             | +19                     | +21   | +23   | +19                     | +21   | +23   |
| 480.1       | 48.98                   | 49.27 | 49.41 | 45.92                   | 45.69 | 45.50 |
| 540.1       | 49.06                   | 49.39 | 49.77 | 44.46                   | 44.21 | 44.04 |
| 600.1       | 49.00                   | 49.28 | 49.60 | 43.29                   | 43.03 | 42.82 |
| 660.1       | 49.30                   | 49.88 | 50.39 | 42.41                   | 42.14 | 41.91 |
| 720.1       | 48.33                   | 49.01 | 49.54 | 42.31                   | 41.86 | 41.65 |
| 780.1       | 47.24                   | 47.53 | 47.51 | 44.26                   | 43.75 | 43.51 |
| 840.1       | 43.84                   | 43.91 | 43.75 | 43.60                   | 42.96 | 42.34 |
| 900.1       | 41.95                   | 41.73 | 41.20 | 43.11                   | 43.23 | 43.47 |
| 960.1       | 42.96                   | 42.97 | 42.82 | 41.14                   | 41.43 | 41.77 |
| 1020.1      | 42.67                   | 42.78 | 42.95 | 40.66                   | 40.87 | 41.00 |
| 1080.1      | 42.10                   | 42.20 | 42.37 | 40.18                   | 40.39 | 40.55 |
| 1140.1      | 40.95                   | 41.00 | 41.08 | 38.73                   | 38.95 | 39.17 |
| 1200.1      | 39.67                   | 39.79 | 39.87 | 38.12                   | 38.37 | 38.55 |
| 1260.1      | 39.88                   | 40.25 | 40.86 | 39.76                   | 40.02 | 40.26 |
| 1320.1      | 39.50                   | 40.05 | 40.83 | 41.66                   | 41.98 | 42.47 |
| 1380.1      | 38.86                   | 39.44 | 40.05 | 39.62                   | 39.48 | 39.48 |
| 1440.1      | 37.55                   | 38.03 | 38.56 | 37.33                   | 37.13 | 37.09 |
| 1500.1      | 36.12                   | 36.60 | 37.20 | 35.89                   | 35.69 | 35.64 |
| 1560.1      | 34.19                   | 34.64 | 35.20 | 34.48                   | 34.39 | 34.33 |
| 1620.1      | 31.38                   | 31.82 | 32.36 | 32.73                   | 32.69 | 32.67 |
| 1680.1      | 29.16                   | 29.72 | 30.36 | 32.23                   | 32.26 | 32.16 |
| 1740.1      | 29.59                   | 30.26 | 30.88 | 35.25                   | 35.25 | 35.23 |
| 1800.1      | 30.64                   | 31.35 | 31.97 | 41.90                   | 42.04 | 42.10 |
| 1860.1      | 31.50                   | 32.16 | 32.82 | 41.30                   | 42.36 | 43.33 |
| 1920.1      | 32.54                   | 33.10 | 33.71 | 35.10                   | 35.62 | 35.97 |
| 1980.1      | 33.20                   | 33.58 | 34.08 | 31.95                   | 32.23 | 32.50 |
| 2040.1      | 34.15                   | 34.45 | 34.79 | 30.49                   | 30.69 | 30.93 |
| 2100.1      | 35.45                   | 35.68 | 35.81 | 30.83                   | 31.08 | 31.22 |
| 2160.1      | 35.91                   | 35.98 | 35.78 | 32.55                   | 32.71 | 32.54 |
| 2220.1      | 36.40                   | 36.32 | 36.02 | 33.83                   | 33.56 | 33.16 |
| 2280.1      | 38.71                   | 37.99 | 37.72 | 32.51                   | 31.80 | 31.56 |
| 2340.1      | 42.99                   | 42.12 | 41.55 | 29.68                   | 29.13 | 28.99 |
| 2420.1      | 43.91                   | 44.98 | 45.82 | 26.91                   | 26.53 | 26.37 |
| 2480.1      | 42.26                   | 42.96 | 43.65 | 25.41                   | 25.16 | 25.11 |
| 2560.1      | 40.48                   | 40.14 | 39.79 | 24.08                   | 24.00 | 23.86 |
| 2620.1      | 38.71                   | 37.86 | 36.97 | 23.62                   | 23.60 | 23.32 |
| 2700.1      | 36.78                   | 35.59 | 34.65 | 23.51                   | 23.39 | 23.15 |
| 2760.1      | 35.85                   | 34.53 | 34.07 | 23.48                   | 23.20 | 23.24 |
| 2840.1      | 34.99                   | 34.08 | 33.78 | 23.59                   | 23.45 | 23.47 |
| 2900.1      | 34.56                   | 34.11 | 33.86 | 23.78                   | 23.74 | 23.79 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | +19                     | +21   | +23   |
| 10.1                | 480.1       | 41.87                   | 43.89 | 48.49 |
| 70.1                | 540.1       | 28.94                   | 28.86 | 26.42 |
| 130.1               | 600.1       | 28.07                   | 28.81 | 27.15 |
| 190.1               | 660.1       | 26.44                   | 27.37 | 26.11 |
| 250.1               | 720.1       | 22.53                   | 22.93 | 22.23 |
| 310.1               | 780.1       | 27.82                   | 29.00 | 29.10 |
| 370.1               | 840.1       | 32.21                   | 34.65 | 39.80 |
| 430.1               | 900.1       | 39.25                   | 46.20 | 31.72 |
| 490.1               | 960.1       | 33.27                   | 37.34 | 46.65 |
| 550.1               | 1020.1      | 37.19                   | 40.63 | 52.72 |
| 610.1               | 1080.1      | 40.04                   | 42.38 | 49.86 |
| 670.1               | 1140.1      | 36.13                   | 36.89 | 39.51 |
| 730.1               | 1200.1      | 34.56                   | 34.95 | 36.85 |
| 790.1               | 1260.1      | 35.45                   | 36.29 | 40.36 |
| 850.1               | 1320.1      | 36.33                   | 36.84 | 39.46 |
| 910.1               | 1380.1      | 36.02                   | 36.52 | 37.77 |
| 970.1               | 1440.1      | 34.61                   | 35.02 | 35.86 |
| 1030.1              | 1500.1      | 33.66                   | 33.97 | 34.76 |
| 1090.1              | 1560.1      | 32.75                   | 32.78 | 33.25 |
| 1150.1              | 1620.1      | 32.60                   | 32.57 | 32.71 |
| 1210.1              | 1680.1      | 33.14                   | 33.25 | 33.05 |
| 1270.1              | 1740.1      | 35.45                   | 35.92 | 36.23 |
| 1330.1              | 1800.1      | 38.42                   | 39.10 | 40.27 |
| 1390.1              | 1860.1      | 41.26                   | 41.30 | 43.20 |
| 1450.1              | 1920.1      | 42.19                   | 40.96 | 42.10 |
| 1510.1              | 1980.1      | 39.00                   | 37.78 | 37.99 |
| 1570.1              | 2040.1      | 35.42                   | 34.96 | 35.41 |
| 1630.1              | 2100.1      | 32.21                   | 32.11 | 32.65 |
| 1690.1              | 2160.1      | 30.72                   | 30.69 | 31.13 |
| 1750.1              | 2220.1      | 32.17                   | 32.29 | 33.28 |
| 1810.1              | 2280.1      | 36.26                   | 37.30 | 39.47 |
| 1870.1              | 2340.1      | 32.87                   | 33.42 | 33.08 |
| 1950.1              | 2420.1      | 27.33                   | 28.24 | 28.09 |
| 2010.1              | 2480.1      | 25.07                   | 26.30 | 26.63 |
| 2090.1              | 2560.1      | 24.28                   | 25.75 | 26.54 |
| 2150.1              | 2620.1      | 23.70                   | 25.19 | 26.18 |
| 2230.1              | 2700.1      | 22.78                   | 24.15 | 25.14 |
| 2290.1              | 2760.1      | 22.25                   | 23.44 | 24.08 |
| 2370.1              | 2840.1      | 22.12                   | 23.18 | 23.74 |
| 2430.1              | 2900.1      | 22.21                   | 23.12 | 23.49 |

## 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=1950MHz<br>(:1) |      |  |
|---------------------|-------------|-----------------|-------|-------|-------------|-----------------|-------|-------|--------|----------------------|--------------------------------|------|--|
|                     |             | @LO (dBm)       |       |       |             | @LO (dBm)       |       |       |        |                      | @LO (dBm)                      |      |  |
|                     |             | +19             | +21   | +23   |             | +19             | +21   | +23   | +19    |                      | +21                            | +23  |  |
| 10.1                | 480.1       | 15.00           | 14.50 | 14.03 | 480.1       | 39.49           | 39.49 | 37.77 | 10.0   | 1.36                 | 1.46                           | 1.55 |  |
| 70.1                | 540.1       | 1.98            | 1.99  | 2.01  | 540.1       | 35.46           | 34.07 | 32.79 | 50.0   | 1.37                 | 1.47                           | 1.55 |  |
| 130.1               | 600.1       | 1.37            | 1.42  | 1.47  | 600.1       | 32.79           | 32.18 | 31.03 | 90.0   | 1.42                 | 1.52                           | 1.61 |  |
| 190.1               | 660.1       | 1.21            | 1.30  | 1.37  | 660.1       | 29.96           | 28.96 | 28.03 | 130.0  | 1.45                 | 1.54                           | 1.62 |  |
| 250.1               | 720.1       | 1.15            | 1.24  | 1.29  | 720.1       | 23.49           | 22.87 | 21.46 | 170.0  | 1.52                 | 1.60                           | 1.68 |  |
| 310.1               | 780.1       | 1.23            | 1.30  | 1.36  | 780.1       | 18.30           | 17.93 | 17.39 | 210.0  | 1.55                 | 1.63                           | 1.70 |  |
| 370.1               | 840.1       | 1.32            | 1.39  | 1.44  | 840.1       | 17.39           | 17.22 | 16.72 | 250.0  | 1.61                 | 1.69                           | 1.77 |  |
| 430.1               | 900.1       | 1.40            | 1.48  | 1.54  | 900.1       | 17.05           | 16.56 | 15.67 | 310.0  | 1.70                 | 1.78                           | 1.85 |  |
| 490.1               | 960.1       | 1.43            | 1.48  | 1.52  | 960.1       | 16.41           | 16.11 | 15.53 | 350.0  | 1.73                 | 1.79                           | 1.86 |  |
| 550.1               | 1020.1      | 1.47            | 1.49  | 1.52  | 1020.1      | 13.09           | 12.80 | 12.26 | 410.0  | 1.82                 | 1.88                           | 1.94 |  |
| 610.1               | 1080.1      | 1.44            | 1.45  | 1.46  | 1080.1      | 10.89           | 10.62 | 10.31 | 450.0  | 1.83                 | 1.88                           | 1.93 |  |
| 670.1               | 1140.1      | 1.48            | 1.45  | 1.45  | 1140.1      | 9.13            | 8.99  | 8.86  | 510.0  | 1.87                 | 1.91                           | 1.96 |  |
| 730.1               | 1200.1      | 1.50            | 1.46  | 1.45  | 1200.1      | 7.41            | 7.25  | 7.02  | 550.0  | 1.89                 | 1.92                           | 1.96 |  |
| 790.1               | 1260.1      | 1.50            | 1.44  | 1.40  | 1260.1      | 6.24            | 6.13  | 6.01  | 610.0  | 1.84                 | 1.87                           | 1.90 |  |
| 850.1               | 1320.1      | 1.60            | 1.51  | 1.45  | 1320.1      | 5.23            | 5.16  | 5.09  | 650.0  | 1.88                 | 1.89                           | 1.91 |  |
| 910.1               | 1380.1      | 1.63            | 1.54  | 1.48  | 1380.1      | 4.41            | 4.35  | 4.26  | 710.0  | 1.79                 | 1.79                           | 1.80 |  |
| 970.1               | 1440.1      | 1.73            | 1.63  | 1.56  | 1440.1      | 4.01            | 3.98  | 3.93  | 750.0  | 1.82                 | 1.81                           | 1.82 |  |
| 1030.1              | 1500.1      | 1.80            | 1.70  | 1.63  | 1500.1      | 3.81            | 3.79  | 3.78  | 810.0  | 1.73                 | 1.71                           | 1.70 |  |
| 1090.1              | 1560.1      | 1.80            | 1.70  | 1.62  | 1560.1      | 3.72            | 3.71  | 3.68  | 850.0  | 1.74                 | 1.71                           | 1.70 |  |
| 1150.1              | 1620.1      | 1.84            | 1.74  | 1.66  | 1620.1      | 3.90            | 3.90  | 3.89  | 910.0  | 1.66                 | 1.61                           | 1.59 |  |
| 1210.1              | 1680.1      | 1.77            | 1.66  | 1.59  | 1680.1      | 4.28            | 4.30  | 4.32  | 950.0  | 1.63                 | 1.58                           | 1.55 |  |
| 1270.1              | 1740.1      | 1.70            | 1.60  | 1.52  | 1740.1      | 4.68            | 4.68  | 4.63  | 1010.0 | 1.61                 | 1.54                           | 1.49 |  |
| 1330.1              | 1800.1      | 1.60            | 1.51  | 1.44  | 1800.1      | 5.25            | 5.25  | 5.22  | 1050.0 | 1.55                 | 1.47                           | 1.43 |  |
| 1390.1              | 1860.1      | 1.48            | 1.40  | 1.34  | 1860.1      | 5.74            | 5.74  | 5.72  | 1110.0 | 1.60                 | 1.51                           | 1.45 |  |
| 1450.1              | 1920.1      | 1.39            | 1.32  | 1.26  | 1920.1      | 5.77            | 5.68  | 5.49  | 1150.0 | 1.55                 | 1.45                           | 1.39 |  |
| 1510.1              | 1980.1      | 1.25            | 1.20  | 1.17  | 1980.1      | 5.97            | 5.89  | 5.77  | 1210.0 | 1.62                 | 1.52                           | 1.45 |  |
| 1570.1              | 2040.1      | 1.15            | 1.13  | 1.14  | 2040.1      | 5.75            | 5.65  | 5.51  | 1250.0 | 1.60                 | 1.51                           | 1.43 |  |
| 1630.1              | 2100.1      | 1.13            | 1.16  | 1.19  | 2100.1      | 5.14            | 4.99  | 4.77  | 1310.0 | 1.67                 | 1.57                           | 1.50 |  |
| 1690.1              | 2160.1      | 1.21            | 1.26  | 1.31  | 2160.1      | 4.72            | 4.62  | 4.53  | 1350.0 | 1.70                 | 1.60                           | 1.53 |  |
| 1750.1              | 2220.1      | 1.27            | 1.33  | 1.39  | 2220.1      | 4.08            | 3.96  | 3.85  | 1410.0 | 1.74                 | 1.63                           | 1.56 |  |
| 1810.1              | 2280.1      | 1.37            | 1.44  | 1.49  | 2280.1      | 3.85            | 3.75  | 3.65  | 1450.0 | 1.79                 | 1.69                           | 1.61 |  |
| 1870.1              | 2340.1      | 1.51            | 1.60  | 1.66  | 2340.1      | 4.14            | 4.06  | 3.99  | 1510.0 | 1.75                 | 1.65                           | 1.58 |  |
| 1950.1              | 2420.1      | 1.65            | 1.75  | 1.82  | 2420.1      | 4.78            | 4.68  | 4.55  | 1550.0 | 1.80                 | 1.70                           | 1.63 |  |
| 2010.1              | 2480.1      | 1.81            | 1.90  | 1.96  | 2480.1      | 5.12            | 4.98  | 4.79  | 1610.0 | 1.73                 | 1.64                           | 1.56 |  |
| 2090.1              | 2560.1      | 2.14            | 2.22  | 2.30  | 2560.1      | 5.23            | 5.12  | 4.98  | 1650.0 | 1.72                 | 1.63                           | 1.56 |  |
| 2150.1              | 2620.1      | 2.33            | 2.41  | 2.50  | 2620.1      | 5.12            | 5.04  | 4.96  | 1710.0 | 1.60                 | 1.51                           | 1.44 |  |
| 2230.1              | 2700.1      | 2.59            | 2.65  | 2.72  | 2700.1      | 4.69            | 4.62  | 4.54  | 1750.0 | 1.53                 | 1.45                           | 1.39 |  |
| 2290.1              | 2760.1      | 2.91            | 2.95  | 2.99  | 2760.1      | 4.32            | 4.24  | 4.11  | 1810.0 | 1.41                 | 1.34                           | 1.28 |  |
| 2370.1              | 2840.1      | 3.21            | 3.24  | 3.26  | 2840.1      | 3.97            | 3.92  | 3.86  | 1850.0 | 1.35                 | 1.28                           | 1.24 |  |
| 2430.1              | 2900.1      | 3.34            | 3.33  | 3.34  | 2900.1      | 3.73            | 3.70  | 3.65  | 1910.0 | 1.25                 | 1.23                           | 1.21 |  |

## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 9   | 20  | 23  | 19  | 33  | 32  | 36  | 34  | 31  | 57  |
| 1  | -      | 25     | +0  | 37  | 20  | 41  | 26  | 55  | 36  | 54  | 39  | 50  |
| 2  | 60     | 60     | 55  | 62  | 54  | 61  | 63  | 65  | 66  | 56  | 68  | 65  |
| 3  | >90    | >85    | 67  | 74  | 68  | 70  | 72  | 81  | 77  | >85 | 72  | 77  |
| 4  | >90    | >85    | >85 | 82  | 84  | 81  | >85 | >85 | >85 | >85 | >85 | >85 |
| 5  | >90    | >85    | >85 | >85 | 82  | >85 | 80  | >85 | >85 | >85 | >85 | >85 |
| 6  | >90    | >85    | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 |
| 7  | >90    | >85    | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 |
| 8  | >90    | >85    | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 |
| 9  | >90    | >85    | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 |
| 10 | >90    | >85    | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

## LO HARMONICS ORDER

Test conditions:

RF IN: 1090.1 MHz; 2.00 dBm.

LO IN: 1560.1 MHz; +21.00 dBm

IF OUT: 470 MHz; -5.33 dBm

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 18  | 30  | 34  | 28  | 41  | 38  | 45  | 44  | 43  | 67  |
| 1  | -      | 25     | +0  | 38  | 20  | 40  | 27  | 54  | 37  | 53  | 42  | 49  |
| 2  | 40     | 50     | 49  | 55  | 48  | 52  | 56  | 57  | 60  | 49  | 68  | 60  |
| 3  | 70     | 62     | 43  | 60  | 42  | 57  | 51  | 65  | 57  | 68  | 57  | 61  |
| 4  | >90    | 84     | 72  | 78  | 75  | 78  | 78  | 85  | 75  | 79  | 72  | 70  |
| 5  | >90    | 79     | 82  | 85  | 68  | 69  | 67  | 79  | 75  | 85  | 82  | 94  |
| 6  | >90    | 85     | >95 | 92  | >95 | 87  | >95 | 85  | >95 | 94  | >95 | 91  |
| 7  | >90    | 94     | 88  | 89  | 90  | 79  | 83  | 90  | >95 | >95 | 92  | >95 |
| 8  | >90    | >95    | >95 | >95 | >95 | >95 | >95 | 94  | 92  | >95 | >95 | >95 |
| 9  | >90    | >95    | >95 | >95 | 92  | >95 | 82  | 90  | 86  | 94  | >95 | >95 |
| 10 | >90    | >95    | >95 | >95 | >95 | >95 | >95 | >95 | >95 | >95 | >95 | >95 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

## LO HARMONICS ORDER

Test conditions:

RF IN: 1090.1 MHz; 12.00 dBm.

LO IN: 1560.1 MHz; +21.00 dBm

IF OUT: 470 MHz; 4.67 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

HJK-ED11277

101012

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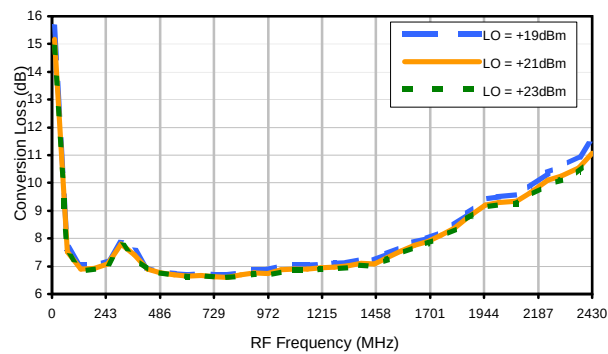


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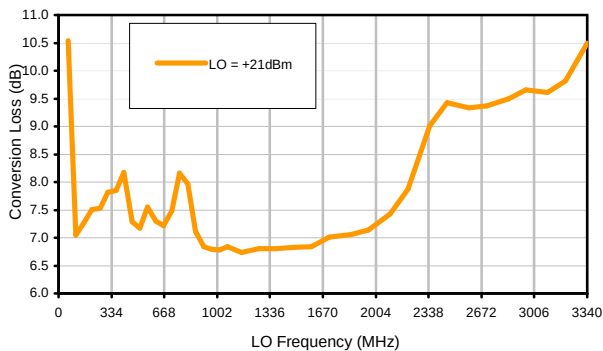


## Typical Performance Curves

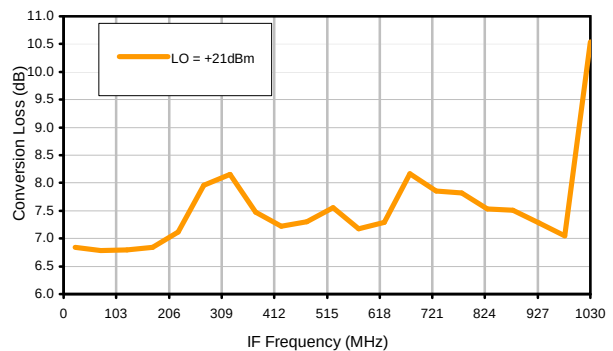
Conversion Loss @ IF=470MHz



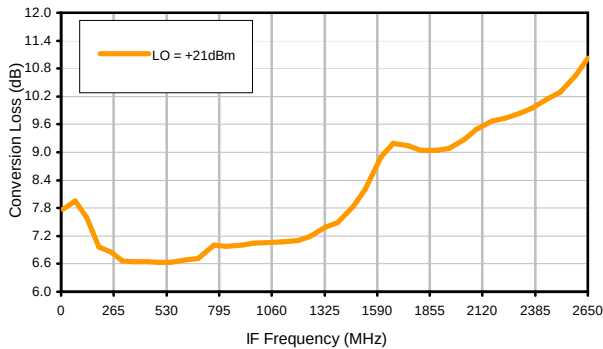
Conversion Loss vs. LO @ RF=1090.1MHz



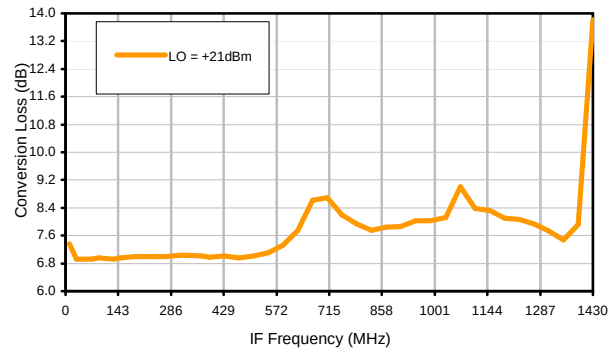
Conversion Loss vs. IF @ RF=1090.1MHz



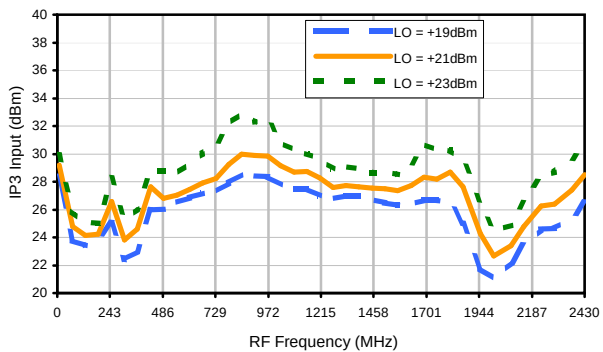
Conversion Loss vs. IF @ RF=700.1MHz



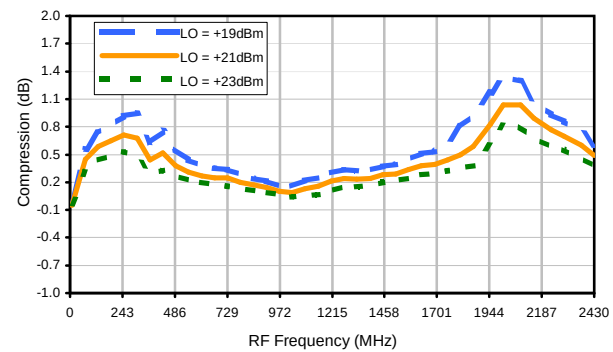
Conversion Loss vs. IF @ RF=1480.1MHz



IP3 Input



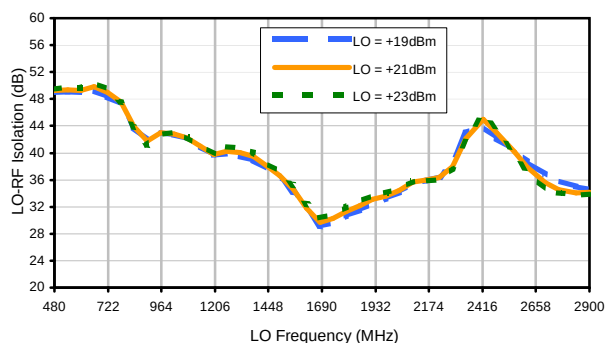
Compression @ RF IN=+17dBm



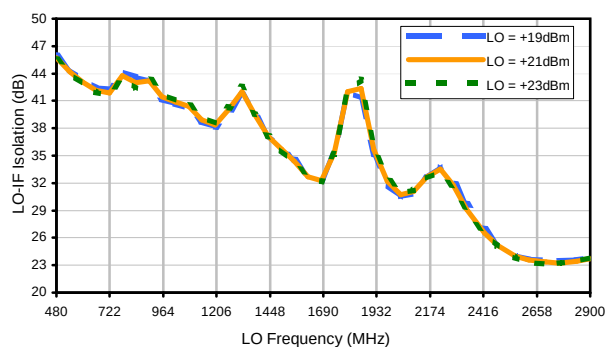


## Typical Performance Curves

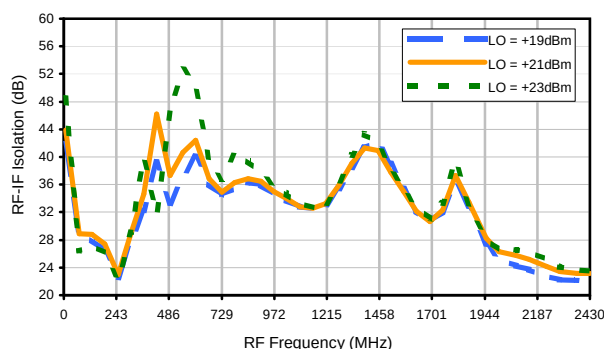
LO-RF Isolation



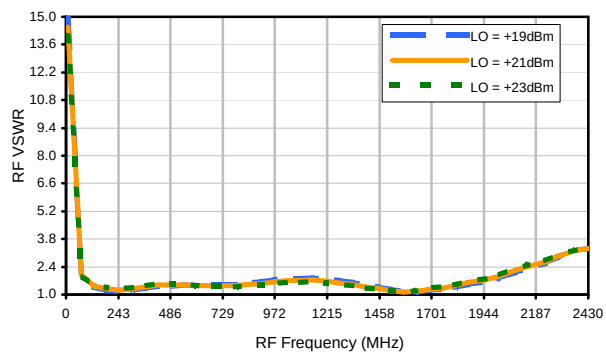
LO-IF Isolation



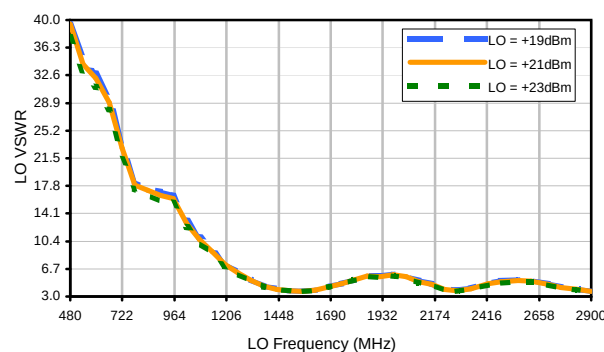
RF-IF Isolation



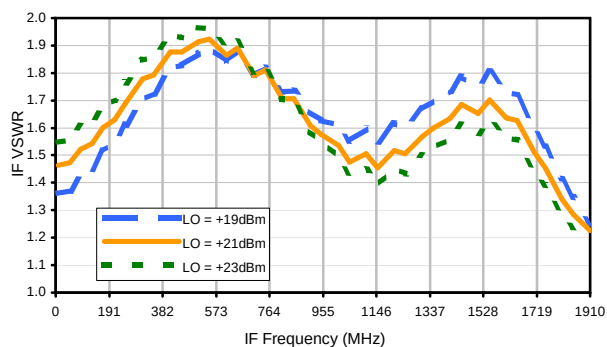
RF VSWR



LO VSWR



IF VSWR





## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 9   | 20  | 23  | 19  | 33  | 32  | 36  | 34  | 31  | 57  |
| 1  | -      | 25     | +0  | 37  | 20  | 41  | 26  | 55  | 36  | 54  | 39  | 50  |
| 2  | 60     | 60     | 55  | 62  | 54  | 61  | 63  | 65  | 66  | 56  | 68  | 65  |
| 3  | >90    | >85    | 67  | 74  | 68  | 70  | 72  | 81  | 77  | >85 | 72  | 77  |
| 4  | >90    | >85    | >85 | 82  | 84  | 81  | >85 | >85 | >85 | >85 | >85 | >85 |
| 5  | >90    | >85    | >85 | >85 | 82  | >85 | 80  | >85 | >85 | >85 | >85 | >85 |
| 6  | >90    | >85    | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 |
| 7  | >90    | >85    | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 |
| 8  | >90    | >85    | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 |
| 9  | >90    | >85    | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 |
| 10 | >90    | >85    | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 | >85 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions:

RF IN: 1090.1 MHz; 2.00 dBm.  
LO IN: 1560.1 MHz; +21.00 dBm  
IF OUT: 470 MHz; -5.33 dBm

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 18  | 30  | 34  | 28  | 41  | 38  | 45  | 44  | 43  | 67  |
| 1  | -      | 25     | +0  | 38  | 20  | 40  | 27  | 54  | 37  | 53  | 42  | 49  |
| 2  | 40     | 50     | 49  | 55  | 48  | 52  | 56  | 57  | 60  | 49  | 68  | 60  |
| 3  | 70     | 62     | 43  | 60  | 42  | 57  | 51  | 65  | 57  | 68  | 57  | 61  |
| 4  | >90    | 84     | 72  | 78  | 75  | 78  | 78  | 85  | 75  | 79  | 72  | 70  |
| 5  | >90    | 79     | 82  | 85  | 68  | 69  | 67  | 79  | 75  | 85  | 82  | 94  |
| 6  | >90    | 85     | >95 | 92  | >95 | 87  | >95 | 85  | >95 | 94  | >95 | 91  |
| 7  | >90    | 94     | 88  | 89  | 90  | 79  | 83  | 90  | >95 | >95 | 92  | >95 |
| 8  | >90    | >95    | >95 | >95 | >95 | >95 | >95 | 94  | 92  | >95 | >95 | >95 |
| 9  | >90    | >95    | >95 | >95 | 92  | >95 | 82  | 90  | 86  | 94  | >95 | >95 |
| 10 | >90    | >95    | >95 | >95 | >95 | >95 | >95 | >95 | >95 | >95 | >95 | >95 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

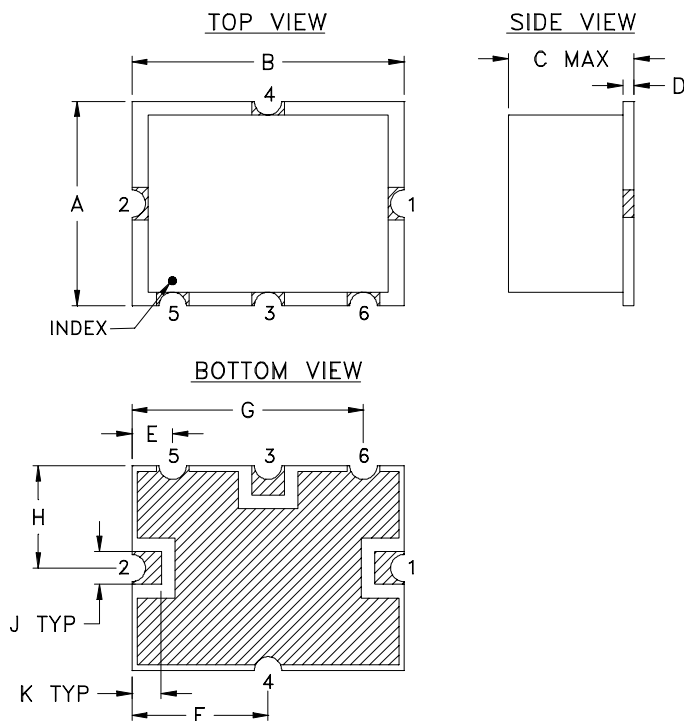
Test conditions:

RF IN: 1090.1 MHz; 12.00 dBm.  
LO IN: 1560.1 MHz; +21.00 dBm  
IF OUT: 470 MHz; 4.67 dBm

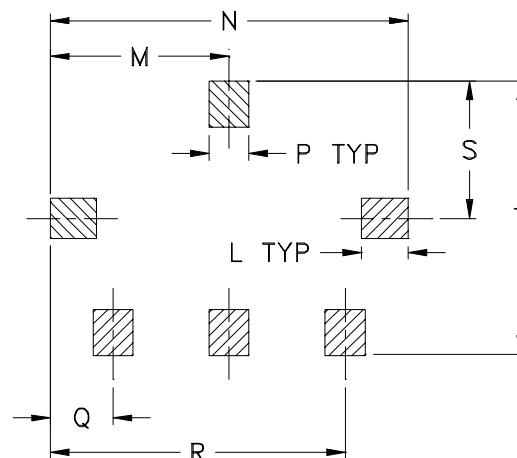
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.  
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.  
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

## 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) |                |                |                |                 |                |                |                |                |                |                 |

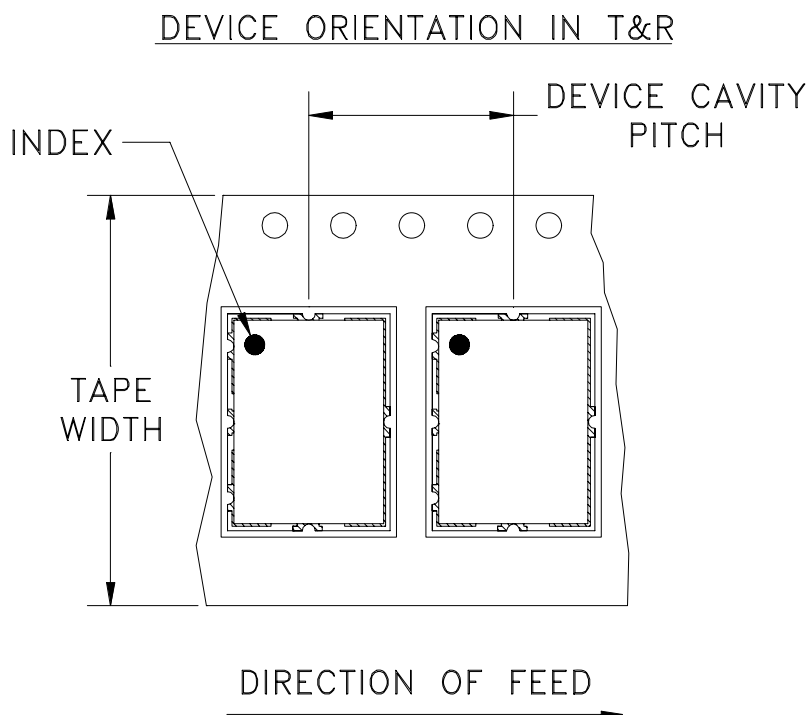
| CASE # | P              | Q              | R               | S              | T               | WT. GRAM |
|--------|----------------|----------------|-----------------|----------------|-----------------|----------|
| TTT166 | .060<br>(1.52) | .095<br>(2.41) | .445<br>(11.30) | .208<br>(5.28) | .415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



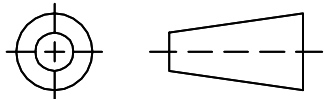
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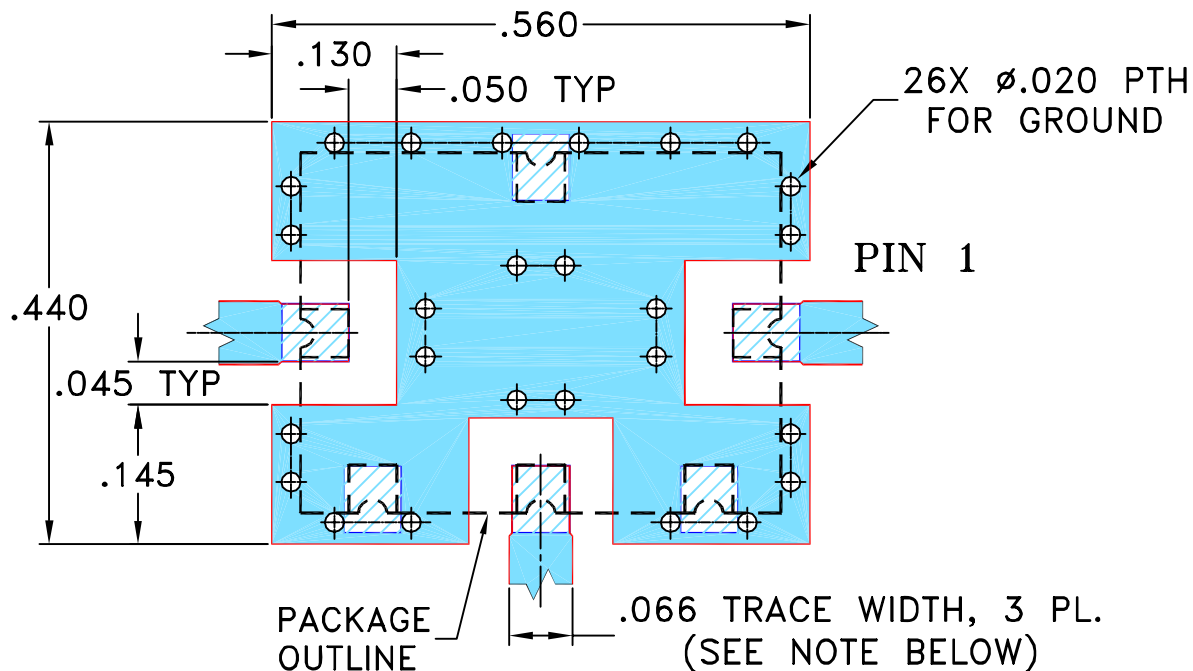
## THIRD ANGLE PROJECTION



## 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   |

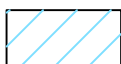
**SUGGESTED MOUNTING CONFIGURATION FOR  
TTT166/167 CASE STYLE, "hk"/"lp"/"lq"  
"x"/"ck"/"ec" PIN CONNECTIONS**

**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

DIMENSIONS ARE IN INCHES

TOLERANCES ON:

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

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

INITIALS

DATE

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

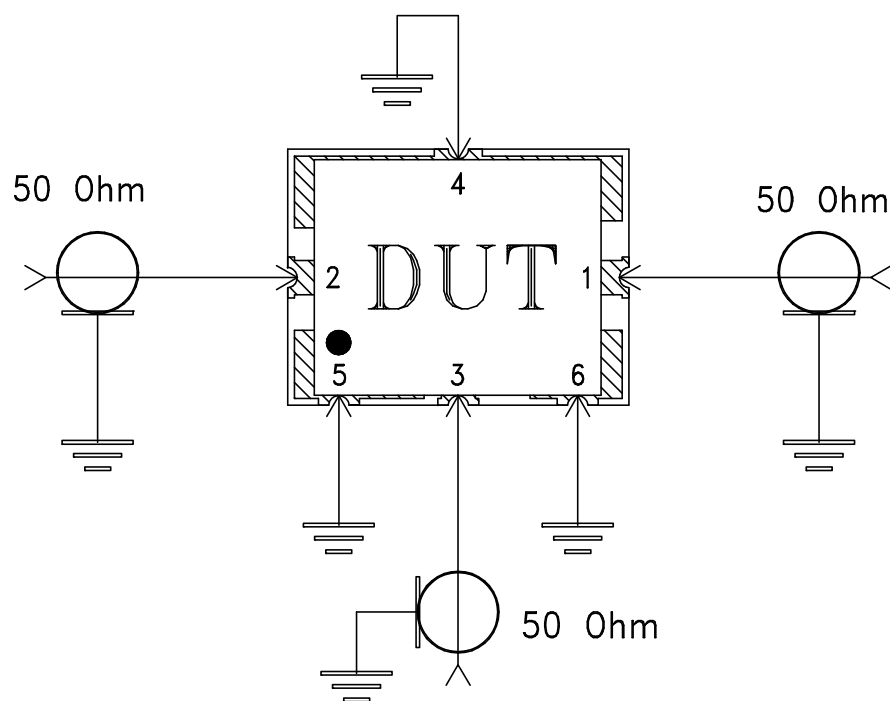
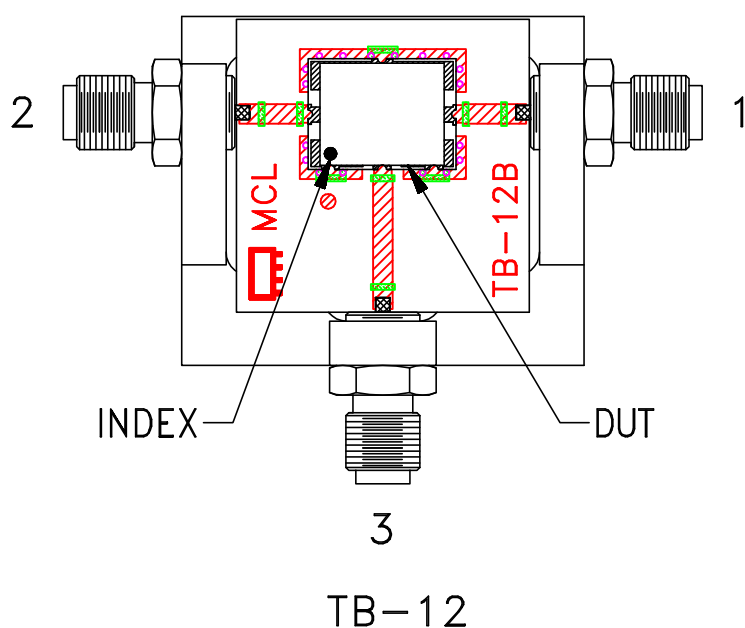
FILE: 98PL079

SCALE: 5:1

SHEET: 1 OF 1

# 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                                                                              |