

## Frequency Mixer

## SYM-ED7158/1

Level 17 (LO Power +17 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.



Please click "Back", and then click "Contact Us" for Applications support.

**CASE STYLE : TTT167**

| ELECTRICAL SPECIFICATIONS 50Ω @ +25°C |                                        |      |      |      |       |
|---------------------------------------|----------------------------------------|------|------|------|-------|
| Parameter                             |                                        | Min. | Typ. | Max. | Units |
| Frequency                             | LO (f <sub>L</sub> to f <sub>U</sub> ) | 10   |      | 2830 | MHz   |
|                                       | RF (f <sub>L</sub> to f <sub>U</sub> ) | 10   |      | 2830 | MHz   |
|                                       | IF                                     | 5    |      | 1260 | MHz   |
| Conversion Loss                       | mid band                               |      | 6.3  |      | dB    |
|                                       | Total Range                            |      | 6.7  |      | dB    |
| LO-RF Isolation                       | Low Range                              |      | 37   |      | dB    |
|                                       | Mid Range                              |      | 42   |      | dB    |
|                                       | Upper Range                            |      | 36   |      | dB    |
| LO-IF Isolation                       | Low Range                              |      | 43   |      | dB    |
|                                       | Mid Range                              |      | 38   |      | dB    |
|                                       | Upper Range                            |      | 41   |      | dB    |

**Note:** Low Range = [f<sub>L</sub> to 10f<sub>L</sub>]      Mid Range = [10f<sub>L</sub> to f<sub>U</sub>/2]      Upper Range = [f<sub>U</sub>/2 to f<sub>U</sub>]  
mid band = [2f<sub>L</sub> to f<sub>U</sub>/2]

| MAXIMUM RATINGS       |                |
|-----------------------|----------------|
| Operating Temperature | -40°C to 85°C  |
| Storage Temperature   | -55°C to 100°C |

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

# Frequency Mixer

SYM-ED7158/1

## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>IF FIXED<br>@IF(OUT)=30MHz<br>(dB) |       |      |
|---------------------|-------------|-------------------------------------------------------|-------|------|
|                     |             | @LO (dBm)                                             |       |      |
|                     |             | +14                                                   | +17   | +20  |
| 10.1                | 40.1        | 7.31                                                  | 6.69  | 6.26 |
| 110.1               | 140.1       | 6.75                                                  | 6.21  | 5.91 |
| 210.1               | 240.1       | 7.16                                                  | 6.56  | 6.19 |
| 310.1               | 340.1       | 7.68                                                  | 6.89  | 6.22 |
| 390.1               | 420.1       | 7.96                                                  | 6.85  | 6.22 |
| 490.1               | 520.1       | 8.06                                                  | 6.75  | 6.20 |
| 570.1               | 600.1       | 8.12                                                  | 6.69  | 6.18 |
| 670.1               | 700.1       | 7.31                                                  | 6.49  | 6.16 |
| 750.1               | 780.1       | 7.04                                                  | 6.35  | 6.05 |
| 850.1               | 880.1       | 6.95                                                  | 6.40  | 6.14 |
| 930.1               | 960.1       | 6.88                                                  | 6.34  | 6.09 |
| 1030.1              | 1060.1      | 7.08                                                  | 6.54  | 6.26 |
| 1110.1              | 1140.1      | 7.15                                                  | 6.68  | 6.43 |
| 1210.1              | 1240.1      | 7.17                                                  | 6.77  | 6.55 |
| 1290.1              | 1320.1      | 7.15                                                  | 6.77  | 6.59 |
| 1390.1              | 1420.1      | 7.13                                                  | 6.70  | 6.56 |
| 1470.1              | 1500.1      | 7.20                                                  | 6.68  | 6.51 |
| 1570.1              | 1600.1      | 7.44                                                  | 6.85  | 6.63 |
| 1650.1              | 1680.1      | 7.49                                                  | 6.84  | 6.61 |
| 1750.1              | 1780.1      | 7.56                                                  | 7.00  | 6.76 |
| 1830.1              | 1860.1      | 7.63                                                  | 7.02  | 6.76 |
| 1930.1              | 1960.1      | 7.67                                                  | 7.03  | 6.79 |
| 2010.1              | 2040.1      | 7.70                                                  | 7.10  | 6.82 |
| 2110.1              | 2140.1      | 7.61                                                  | 7.00  | 6.78 |
| 2190.1              | 2220.1      | 7.54                                                  | 7.03  | 6.80 |
| 2290.1              | 2320.1      | 7.48                                                  | 7.03  | 6.82 |
| 2370.1              | 2400.1      | 7.60                                                  | 7.14  | 6.90 |
| 2470.1              | 2500.1      | 7.69                                                  | 7.24  | 6.98 |
| 2550.1              | 2580.1      | 7.95                                                  | 7.47  | 7.19 |
| 2650.1              | 2680.1      | 8.16                                                  | 7.64  | 7.34 |
| 2730.1              | 2760.1      | 8.28                                                  | 7.71  | 7.40 |
| 2830.1              | 2860.1      | 8.64                                                  | 8.05  | 7.68 |
| 2910.1              | 2940.1      | 8.83                                                  | 8.20  | 7.79 |
| 3010.1              | 3040.1      | 9.24                                                  | 8.49  | 8.01 |
| 3090.1              | 3120.1      | 9.43                                                  | 8.65  | 8.14 |
| 3190.1              | 3220.1      | 9.72                                                  | 8.84  | 8.33 |
| 3270.1              | 3300.1      | 10.00                                                 | 9.00  | 8.43 |
| 3370.1              | 3400.1      | 10.54                                                 | 9.30  | 8.60 |
| 3450.1              | 3480.1      | 11.19                                                 | 9.71  | 8.93 |
| 3550.1              | 3580.1      | 12.06                                                 | 10.08 | 9.03 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | IP3 INPUT<br>(dBm) |       |       |
|---------------------|-------------|--------------------|-------|-------|
|                     |             | @LO (dBm)          |       |       |
|                     |             | +14                | +17   | +20   |
| 10.1                | 40.1        | 21.36              | 27.83 | 27.76 |
| 110.1               | 140.1       | 20.49              | 20.84 | 21.00 |
| 210.1               | 240.1       | 18.83              | 21.27 | 23.91 |
| 310.1               | 340.1       | 19.37              | 21.65 | 25.30 |
| 390.1               | 420.1       | 18.89              | 23.37 | 28.77 |
| 490.1               | 520.1       | 18.64              | 25.83 | 28.25 |
| 570.1               | 600.1       | 17.86              | 27.04 | 26.83 |
| 670.1               | 700.1       | 24.64              | 24.10 | 25.01 |
| 750.1               | 780.1       | 25.07              | 24.50 | 24.74 |
| 850.1               | 880.1       | 23.30              | 23.29 | 24.36 |
| 930.1               | 960.1       | 23.58              | 24.89 | 25.55 |
| 1030.1              | 1060.1      | 21.88              | 22.45 | 23.83 |
| 1110.1              | 1140.1      | 21.40              | 22.29 | 23.81 |
| 1210.1              | 1240.1      | 21.53              | 22.51 | 24.20 |
| 1290.1              | 1320.1      | 21.41              | 23.30 | 24.15 |
| 1390.1              | 1420.1      | 22.45              | 23.95 | 25.06 |
| 1470.1              | 1500.1      | 25.75              | 24.63 | 26.00 |
| 1570.1              | 1600.1      | 23.90              | 24.50 | 24.61 |
| 1650.1              | 1680.1      | 25.19              | 24.59 | 25.23 |
| 1750.1              | 1780.1      | 27.79              | 25.44 | 25.06 |
| 1830.1              | 1860.1      | 28.58              | 25.95 | 25.26 |
| 1930.1              | 1960.1      | 28.23              | 26.03 | 26.76 |
| 2010.1              | 2040.1      | 28.77              | 28.66 | 26.53 |
| 2110.1              | 2140.1      | 27.17              | 26.56 | 27.87 |
| 2190.1              | 2220.1      | 25.34              | 28.91 | 28.34 |
| 2290.1              | 2320.1      | 24.27              | 27.68 | 29.25 |
| 2370.1              | 2400.1      | 23.36              | 27.41 | 29.05 |
| 2470.1              | 2500.1      | 23.31              | 25.89 | 28.71 |
| 2550.1              | 2580.1      | 23.48              | 25.10 | 25.58 |
| 2650.1              | 2680.1      | 23.13              | 24.98 | 25.23 |
| 2730.1              | 2760.1      | 22.69              | 24.16 | 24.98 |
| 2830.1              | 2860.1      | 22.40              | 23.62 | 25.44 |
| 2910.1              | 2940.1      | 22.57              | 24.23 | 23.92 |
| 3010.1              | 3040.1      | 21.44              | 24.32 | 23.81 |
| 3090.1              | 3120.1      | 20.78              | 24.38 | 24.09 |
| 3190.1              | 3220.1      | 19.51              | 22.98 | 24.50 |
| 3270.1              | 3300.1      | 18.86              | 21.74 | 24.39 |
| 3370.1              | 3400.1      | 18.08              | 20.79 | 23.51 |
| 3450.1              | 3480.1      | 17.23              | 20.76 | 22.99 |
| 3550.1              | 3580.1      | 16.16              | 19.84 | 21.51 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | COMPRESSION<br>@RF IN=+10dBm<br>(dB) |       |       |
|---------------------|-------------|--------------------------------------|-------|-------|
|                     |             | @LO (dBm)                            |       |       |
|                     |             | +14                                  | +17   | +20   |
| 10.1                | 40.1        | -0.07                                | 0.12  | 0.05  |
| 110.1               | 140.1       | -0.10                                | -0.09 | -0.08 |
| 210.1               | 240.1       | -0.18                                | -0.16 | -0.11 |
| 310.1               | 340.1       | -0.42                                | -0.29 | -0.06 |
| 390.1               | 420.1       | -0.58                                | -0.18 | -0.02 |
| 490.1               | 520.1       | -0.55                                | -0.09 | -0.03 |
| 570.1               | 600.1       | -0.56                                | -0.06 | -0.03 |
| 670.1               | 700.1       | 0.04                                 | 0.01  | 0.00  |
| 750.1               | 780.1       | 0.18                                 | 0.05  | 0.03  |
| 850.1               | 880.1       | 0.14                                 | 0.02  | 0.01  |
| 930.1               | 960.1       | 0.14                                 | 0.07  | 0.04  |
| 1030.1              | 1060.1      | 0.10                                 | 0.05  | 0.04  |
| 1110.1              | 1140.1      | 0.09                                 | 0.04  | 0.03  |
| 1210.1              | 1240.1      | 0.05                                 | 0.01  | 0.02  |
| 1290.1              | 1320.1      | 0.10                                 | 0.04  | 0.03  |
| 1390.1              | 1420.1      | 0.12                                 | 0.06  | 0.04  |
| 1470.1              | 1500.1      | 0.10                                 | 0.05  | 0.05  |
| 1570.1              | 1600.1      | 0.09                                 | 0.05  | 0.05  |
| 1650.1              | 1680.1      | 0.09                                 | 0.06  | 0.06  |
| 1750.1              | 1780.1      | 0.06                                 | 0.04  | 0.04  |
| 1830.1              | 1860.1      | 0.05                                 | 0.05  | 0.04  |
| 1930.1              | 1960.1      | 0.09                                 | 0.06  | 0.05  |
| 2010.1              | 2040.1      | 0.13                                 | 0.07  | 0.04  |
| 2110.1              | 2140.1      | 0.22                                 | 0.14  | 0.07  |
| 2190.1              | 2220.1      | 0.31                                 | 0.14  | 0.07  |
| 2290.1              | 2320.1      | 0.37                                 | 0.14  | 0.08  |
| 2370.1              | 2400.1      | 0.45                                 | 0.15  | 0.07  |
| 2470.1              | 2500.1      | 0.44                                 | 0.18  | 0.09  |
| 2550.1              | 2580.1      | 0.46                                 | 0.20  | 0.10  |
| 2650.1              | 2680.1      | 0.46                                 | 0.23  | 0.12  |
| 2730.1              | 2760.1      | 0.55                                 | 0.23  | 0.15  |
| 2830.1              | 2860.1      | 0.56                                 | 0.22  | 0.13  |
| 2910.1              | 2940.1      | 0.64                                 | 0.24  | 0.14  |
| 3010.1              | 3040.1      | 0.73                                 | 0.29  | 0.15  |
| 3090.1              | 3120.1      | 0.81                                 | 0.33  | 0.17  |
| 3190.1              | 3220.1      | 1.02                                 | 0.44  | 0.18  |
| 3270.1              | 3300.1      | 1.17                                 | 0.50  | 0.22  |
| 3370.1              | 3400.1      | 1.35                                 | 0.65  | 0.30  |
| 3450.1              | 3480.1      | 1.35                                 | 0.65  | 0.34  |
| 3550.1              | 3580.1      | 1.12                                 | 0.69  | 0.49  |

# Frequency Mixer

SYM-ED7158/1

## Typical Performance Data

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=1425.1MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=10MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=2840.1MHz<br>(dB) |
|----------------------|-------------|------------------------------------------------------------------|----------------------|-------------|--------------------------------------------------------------|----------------------|-------------|------------------------------------------------------------------|
|                      |             | @LO (dBm)                                                        |                      |             | @LO (dBm)                                                    |                      |             | @LO (dBm)                                                        |
|                      |             | +17                                                              |                      |             | +17                                                          |                      |             | +17                                                              |
| 1410.1               | 15.0        | 10.44                                                            | 10.1                 | 20.1        | 6.44                                                         | 1330.1               | 1510.0      | 10.22                                                            |
| 1369.5               | 55.6        | 10.36                                                            | 50.1                 | 60.1        | 6.31                                                         | 1289.5               | 1550.6      | 10.03                                                            |
| 1328.9               | 96.2        | 10.17                                                            | 90.1                 | 100.1       | 6.27                                                         | 1248.9               | 1591.2      | 9.89                                                             |
| 1288.4               | 136.7       | 9.93                                                             | 130.1                | 140.1       | 6.46                                                         | 1208.3               | 1631.8      | 9.70                                                             |
| 1247.8               | 177.3       | 9.85                                                             | 170.1                | 180.1       | 6.68                                                         | 1167.6               | 1672.5      | 9.62                                                             |
| 1207.2               | 217.9       | 9.67                                                             | 210.1                | 220.1       | 6.47                                                         | 1127.0               | 1713.1      | 9.56                                                             |
| 1166.6               | 258.5       | 9.59                                                             | 250.1                | 260.1       | 6.40                                                         | 1086.4               | 1753.7      | 9.47                                                             |
| 1126.0               | 299.1       | 9.46                                                             | 290.1                | 300.1       | 6.61                                                         | 1045.8               | 1794.3      | 9.41                                                             |
| 1085.5               | 339.6       | 9.29                                                             | 330.1                | 340.1       | 6.66                                                         | 1005.2               | 1834.9      | 9.28                                                             |
| 1044.9               | 380.2       | 9.20                                                             | 370.1                | 380.1       | 6.71                                                         | 964.6                | 1875.5      | 9.17                                                             |
| 1004.3               | 420.8       | 9.03                                                             | 410.1                | 420.1       | 6.72                                                         | 923.9                | 1916.2      | 9.11                                                             |
| 963.7                | 461.4       | 8.90                                                             | 450.1                | 460.1       | 6.91                                                         | 883.3                | 1956.8      | 8.97                                                             |
| 923.1                | 502.0       | 8.69                                                             | 490.1                | 500.1       | 6.67                                                         | 842.7                | 1997.4      | 9.00                                                             |
| 882.6                | 542.5       | 8.48                                                             | 530.1                | 540.1       | 6.88                                                         | 802.1                | 2038.0      | 8.86                                                             |
| 842.0                | 583.1       | 8.34                                                             | 570.1                | 580.1       | 7.06                                                         | 761.5                | 2078.6      | 8.81                                                             |
| 801.4                | 623.7       | 8.20                                                             | 610.1                | 620.1       | 7.34                                                         | 741.2                | 2098.9      | 8.78                                                             |
| 760.8                | 664.3       | 8.07                                                             | 650.1                | 660.1       | 7.48                                                         | 700.6                | 2139.5      | 8.60                                                             |
| 720.2                | 704.9       | 7.96                                                             | 690.1                | 700.1       | 7.50                                                         | 680.3                | 2159.8      | 8.60                                                             |
| 679.7                | 745.4       | 7.61                                                             | 730.1                | 740.1       | 7.42                                                         | 639.6                | 2200.5      | 8.54                                                             |
| 639.1                | 786.0       | 7.52                                                             | 770.1                | 780.1       | 7.87                                                         | 619.3                | 2220.8      | 8.48                                                             |
| 598.5                | 826.6       | 7.50                                                             | 810.1                | 820.1       | 8.11                                                         | 578.7                | 2261.4      | 8.39                                                             |
| 557.9                | 867.2       | 7.46                                                             | 850.1                | 860.1       | 7.82                                                         | 558.4                | 2281.7      | 8.34                                                             |
| 517.3                | 907.8       | 7.36                                                             | 890.1                | 900.1       | 8.14                                                         | 517.8                | 2322.3      | 8.22                                                             |
| 497.1                | 928.0       | 7.29                                                             | 930.1                | 940.1       | 8.66                                                         | 497.5                | 2342.6      | 8.19                                                             |
| 456.5                | 968.6       | 7.27                                                             | 970.1                | 980.1       | 8.68                                                         | 456.9                | 2383.2      | 8.13                                                             |
| 436.2                | 988.9       | 7.06                                                             | 1010.1               | 1020.1      | 8.86                                                         | 436.6                | 2403.5      | 8.03                                                             |
| 395.6                | 1029.5      | 7.05                                                             | 1050.1               | 1060.1      | 8.91                                                         | 395.9                | 2444.2      | 8.02                                                             |
| 375.3                | 1049.8      | 7.04                                                             | 1090.1               | 1100.1      | 9.06                                                         | 375.6                | 2464.5      | 7.99                                                             |
| 334.7                | 1090.4      | 6.94                                                             | 1130.1               | 1140.1      | 9.13                                                         | 335.0                | 2505.1      | 7.91                                                             |
| 314.4                | 1110.7      | 6.98                                                             | 1170.1               | 1180.1      | 9.37                                                         | 314.7                | 2525.4      | 7.87                                                             |
| 273.9                | 1151.2      | 6.91                                                             | 1210.1               | 1220.1      | 9.60                                                         | 274.1                | 2566.0      | 7.86                                                             |
| 253.6                | 1171.5      | 6.88                                                             | 1230.1               | 1240.1      | 9.82                                                         | 253.8                | 2586.3      | 7.85                                                             |
| 213.0                | 1212.1      | 6.83                                                             | 1270.1               | 1280.1      | 9.90                                                         | 213.2                | 2626.9      | 7.77                                                             |
| 192.7                | 1232.4      | 6.79                                                             | 1290.1               | 1300.1      | 9.68                                                         | 192.9                | 2647.2      | 7.80                                                             |
| 152.1                | 1273.0      | 6.79                                                             | 1330.1               | 1340.1      | 9.95                                                         | 152.3                | 2687.8      | 7.81                                                             |
| 131.8                | 1293.3      | 6.77                                                             | 1350.1               | 1360.1      | 9.87                                                         | 131.9                | 2708.2      | 7.75                                                             |
| 91.3                 | 1333.8      | 6.75                                                             | 1390.1               | 1400.1      | 9.87                                                         | 91.3                 | 2748.8      | 7.80                                                             |
| 71.0                 | 1354.1      | 6.77                                                             | 1410.1               | 1420.1      | 10.17                                                        | 71.0                 | 2769.1      | 7.86                                                             |
| 30.4                 | 1394.7      | 6.75                                                             | 1450.1               | 1460.1      | 10.22                                                        | 30.4                 | 2809.7      | 7.85                                                             |
| 10.1                 | 1415.0      | 6.99                                                             | 1470.1               | 1480.1      | 10.45                                                        | 10.1                 | 2830.0      | 8.22                                                             |

REV. X3

SYM-ED7158/1

101011

Page 2 of 5



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED • RoHS compliant  
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, instantly • For detailed performance specs & shopping online see



## Typical Performance Data

| LO<br>(MHz) | LO-RF ISOLATION<br>(dB) |       |       | LO-IF ISOLATION<br>(dB) |       |       |
|-------------|-------------------------|-------|-------|-------------------------|-------|-------|
|             | @LO (dBm)               |       |       | @LO (dBm)               |       |       |
|             | +14                     | +17   | +20   | +14                     | +17   | +20   |
| 40.1        | 30.91                   | 34.62 | 38.37 | 38.72                   | 43.28 | 47.69 |
| 140.1       | 36.08                   | 39.71 | 43.35 | 39.53                   | 43.33 | 44.43 |
| 240.1       | 38.06                   | 41.81 | 45.49 | 40.48                   | 42.03 | 40.15 |
| 340.1       | 38.50                   | 42.32 | 46.71 | 42.21                   | 40.28 | 36.86 |
| 420.1       | 39.41                   | 43.79 | 49.19 | 43.58                   | 37.79 | 34.82 |
| 520.1       | 39.74                   | 44.57 | 51.24 | 43.57                   | 36.21 | 33.52 |
| 600.1       | 40.58                   | 46.04 | 55.51 | 43.55                   | 35.39 | 32.79 |
| 700.1       | 41.55                   | 48.00 | 57.84 | 39.59                   | 34.33 | 32.09 |
| 780.1       | 41.49                   | 47.24 | 51.34 | 38.90                   | 34.07 | 31.79 |
| 880.1       | 40.97                   | 44.72 | 46.67 | 37.85                   | 33.77 | 31.62 |
| 960.1       | 39.60                   | 42.79 | 43.90 | 37.59                   | 33.85 | 31.70 |
| 1060.1      | 38.06                   | 40.86 | 42.78 | 37.10                   | 33.82 | 31.92 |
| 1140.1      | 37.12                   | 39.31 | 40.70 | 36.99                   | 34.21 | 32.28 |
| 1240.1      | 35.91                   | 38.51 | 40.15 | 36.84                   | 34.79 | 32.90 |
| 1320.1      | 35.67                   | 37.96 | 39.59 | 36.79                   | 35.40 | 33.59 |
| 1420.1      | 35.23                   | 37.26 | 38.85 | 36.60                   | 36.37 | 35.02 |
| 1500.1      | 34.66                   | 36.58 | 38.09 | 36.50                   | 37.27 | 36.11 |
| 1600.1      | 34.52                   | 37.48 | 39.30 | 36.28                   | 38.88 | 38.15 |
| 1680.1      | 34.20                   | 37.81 | 40.22 | 36.14                   | 40.24 | 40.32 |
| 1780.1      | 34.01                   | 37.91 | 41.25 | 35.52                   | 41.95 | 45.21 |
| 1860.1      | 33.66                   | 37.52 | 41.03 | 34.90                   | 42.28 | 52.03 |
| 1960.1      | 32.83                   | 36.18 | 39.88 | 34.77                   | 41.11 | 51.54 |
| 2040.1      | 32.98                   | 35.41 | 38.45 | 35.29                   | 40.46 | 44.32 |
| 2140.1      | 32.44                   | 34.26 | 35.89 | 36.09                   | 40.53 | 42.10 |
| 2220.1      | 32.87                   | 34.99 | 36.77 | 37.10                   | 40.89 | 41.67 |
| 2320.1      | 33.40                   | 34.87 | 35.88 | 36.64                   | 38.93 | 39.24 |
| 2400.1      | 33.02                   | 33.82 | 34.30 | 37.65                   | 38.85 | 38.32 |
| 2500.1      | 32.90                   | 33.58 | 33.57 | 38.80                   | 39.28 | 38.09 |
| 2580.1      | 32.94                   | 33.09 | 33.05 | 39.39                   | 38.95 | 37.58 |
| 2680.1      | 32.65                   | 32.42 | 32.42 | 41.42                   | 39.52 | 37.65 |
| 2760.1      | 31.10                   | 30.20 | 30.29 | 43.41                   | 39.71 | 38.06 |
| 2860.1      | 29.22                   | 28.49 | 28.44 | 45.02                   | 40.50 | 38.36 |
| 2940.1      | 28.14                   | 27.72 | 27.84 | 44.23                   | 40.55 | 38.85 |
| 3040.1      | 26.94                   | 26.96 | 27.40 | 42.85                   | 40.01 | 38.84 |
| 3120.1      | 26.56                   | 26.90 | 27.52 | 42.81                   | 40.31 | 39.23 |
| 3220.1      | 26.05                   | 26.58 | 27.37 | 43.53                   | 41.46 | 40.37 |
| 3300.1      | 25.84                   | 26.48 | 27.35 | 44.08                   | 42.49 | 41.51 |
| 3400.1      | 25.18                   | 26.26 | 27.33 | 44.46                   | 44.04 | 43.16 |
| 3480.1      | 24.44                   | 25.96 | 27.22 | 45.05                   | 45.40 | 44.90 |
| 3580.1      | 23.61                   | 25.93 | 27.92 | 46.95                   | 48.06 | 49.75 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | +14                     | +17   | +20   |
| 10.1                | 40.1        | 26.74                   | 26.28 | 26.38 |
| 110.1               | 140.1       | 27.65                   | 27.83 | 27.89 |
| 210.1               | 240.1       | 27.88                   | 28.09 | 28.57 |
| 310.1               | 340.1       | 28.29                   | 28.81 | 29.14 |
| 390.1               | 420.1       | 29.46                   | 29.81 | 29.83 |
| 490.1               | 520.1       | 30.86                   | 31.18 | 30.74 |
| 570.1               | 600.1       | 33.39                   | 31.77 | 31.38 |
| 670.1               | 700.1       | 34.65                   | 32.67 | 32.01 |
| 750.1               | 780.1       | 35.31                   | 33.20 | 32.75 |
| 850.1               | 880.1       | 35.98                   | 34.23 | 33.48 |
| 930.1               | 960.1       | 36.35                   | 34.68 | 33.65 |
| 1030.1              | 1060.1      | 36.88                   | 35.33 | 34.40 |
| 1110.1              | 1140.1      | 37.05                   | 35.32 | 34.44 |
| 1210.1              | 1240.1      | 36.16                   | 35.22 | 34.65 |
| 1290.1              | 1320.1      | 35.60                   | 34.71 | 34.29 |
| 1390.1              | 1420.1      | 34.95                   | 34.42 | 33.95 |
| 1470.1              | 1500.1      | 35.04                   | 34.06 | 33.57 |
| 1570.1              | 1600.1      | 34.99                   | 34.02 | 33.59 |
| 1650.1              | 1680.1      | 34.64                   | 33.78 | 33.15 |
| 1750.1              | 1780.1      | 33.85                   | 34.13 | 33.62 |
| 1830.1              | 1860.1      | 33.90                   | 34.35 | 34.49 |
| 1930.1              | 1960.1      | 33.08                   | 34.30 | 34.86 |
| 2010.1              | 2040.1      | 32.90                   | 33.99 | 34.36 |
| 2110.1              | 2140.1      | 33.09                   | 33.85 | 34.60 |
| 2190.1              | 2220.1      | 33.99                   | 34.28 | 34.58 |
| 2290.1              | 2320.1      | 35.69                   | 36.40 | 36.41 |
| 2370.1              | 2400.1      | 36.79                   | 37.66 | 38.88 |
| 2470.1              | 2500.1      | 38.06                   | 38.92 | 39.53 |
| 2550.1              | 2580.1      | 38.85                   | 39.63 | 41.02 |
| 2650.1              | 2680.1      | 39.65                   | 40.90 | 41.57 |
| 2730.1              | 2760.1      | 41.66                   | 43.31 | 43.34 |
| 2830.1              | 2860.1      | 42.14                   | 48.55 | 47.88 |
| 2910.1              | 2940.1      | 42.18                   | 45.34 | 49.98 |
| 3010.1              | 3040.1      | 42.24                   | 43.35 | 46.77 |
| 3090.1              | 3120.1      | 43.25                   | 43.88 | 44.19 |
| 3190.1              | 3220.1      | 43.24                   | 43.23 | 43.55 |
| 3270.1              | 3300.1      | 42.35                   | 42.03 | 42.40 |
| 3370.1              | 3400.1      | 42.80                   | 41.30 | 41.12 |
| 3450.1              | 3480.1      | 41.98                   | 42.00 | 40.96 |
| 3550.1              | 3580.1      | 38.63                   | 39.90 | 39.77 |

# Frequency Mixer

SYM-ED7158/1

## 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=2830MHz<br>(:1) |      |      |
|---------------------|-------------|-----------------|------|------|-------------|-----------------|------|------|----------------------|--------------------------------|------|------|
|                     |             | @LO (dBm)       |      |      |             | @LO (dBm)       |      |      |                      | @LO (dBm)                      |      |      |
|                     |             | +14             | +17  | +20  |             | +14             | +17  | +20  |                      | +14                            | +17  | +20  |
| 10.1                | 40.1        | 1.43            | 1.31 | 1.49 | 40.1        | 1.23            | 1.76 | 2.68 | 10.0                 | 1.36                           | 1.16 | 1.08 |
| 110.1               | 140.1       | 1.44            | 1.28 | 1.18 | 140.1       | 1.02            | 1.63 | 2.49 | 90.6                 | 1.39                           | 1.20 | 1.15 |
| 210.1               | 240.1       | 1.53            | 1.37 | 1.29 | 240.1       | 1.05            | 1.57 | 2.36 | 171.2                | 1.41                           | 1.27 | 1.26 |
| 310.1               | 340.1       | 1.69            | 1.52 | 1.39 | 340.1       | 1.08            | 1.52 | 2.25 | 251.7                | 1.46                           | 1.37 | 1.37 |
| 390.1               | 420.1       | 1.82            | 1.60 | 1.47 | 420.1       | 1.12            | 1.47 | 2.20 | 332.3                | 1.51                           | 1.46 | 1.50 |
| 490.1               | 520.1       | 1.95            | 1.70 | 1.58 | 520.1       | 1.16            | 1.44 | 2.12 | 412.9                | 1.56                           | 1.55 | 1.59 |
| 570.1               | 600.1       | 2.06            | 1.79 | 1.66 | 600.1       | 1.17            | 1.39 | 2.06 | 493.5                | 1.61                           | 1.63 | 1.70 |
| 670.1               | 700.1       | 2.02            | 1.83 | 1.73 | 700.1       | 1.23            | 1.34 | 1.99 | 553.9                | 1.67                           | 1.72 | 1.80 |
| 750.1               | 780.1       | 2.04            | 1.86 | 1.76 | 780.1       | 1.27            | 1.32 | 1.94 | 634.5                | 1.70                           | 1.78 | 1.88 |
| 850.1               | 880.1       | 2.04            | 1.90 | 1.80 | 880.1       | 1.31            | 1.29 | 1.88 | 694.9                | 1.72                           | 1.82 | 1.92 |
| 930.1               | 960.1       | 2.05            | 1.90 | 1.82 | 960.1       | 1.36            | 1.28 | 1.83 | 775.5                | 1.74                           | 1.86 | 1.96 |
| 1030.1              | 1060.1      | 2.11            | 1.97 | 1.88 | 1060.1      | 1.40            | 1.27 | 1.78 | 835.9                | 1.77                           | 1.89 | 2.00 |
| 1110.1              | 1140.1      | 2.11            | 2.00 | 1.92 | 1140.1      | 1.43            | 1.25 | 1.75 | 916.5                | 1.74                           | 1.87 | 1.98 |
| 1210.1              | 1240.1      | 2.12            | 2.04 | 1.98 | 1240.1      | 1.46            | 1.21 | 1.69 | 976.9                | 1.72                           | 1.86 | 1.97 |
| 1290.1              | 1320.1      | 2.12            | 2.04 | 2.00 | 1320.1      | 1.51            | 1.18 | 1.66 | 1057.5               | 1.67                           | 1.81 | 1.92 |
| 1390.1              | 1420.1      | 2.16            | 2.07 | 2.03 | 1420.1      | 1.54            | 1.14 | 1.61 | 1117.9               | 1.64                           | 1.78 | 1.89 |
| 1470.1              | 1500.1      | 2.21            | 2.08 | 2.03 | 1500.1      | 1.57            | 1.12 | 1.59 | 1198.5               | 1.60                           | 1.74 | 1.86 |
| 1570.1              | 1600.1      | 2.29            | 2.15 | 2.08 | 1600.1      | 1.57            | 1.07 | 1.57 | 1258.9               | 1.58                           | 1.73 | 1.84 |
| 1650.1              | 1680.1      | 2.33            | 2.16 | 2.09 | 1680.1      | 1.56            | 1.07 | 1.58 | 1339.5               | 1.58                           | 1.73 | 1.85 |
| 1750.1              | 1780.1      | 2.33            | 2.18 | 2.10 | 1780.1      | 1.53            | 1.13 | 1.62 | 1399.9               | 1.62                           | 1.76 | 1.87 |
| 1830.1              | 1860.1      | 2.35            | 2.17 | 2.09 | 1860.1      | 1.51            | 1.22 | 1.69 | 1480.5               | 1.67                           | 1.80 | 1.92 |
| 1930.1              | 1960.1      | 2.33            | 2.14 | 2.05 | 1960.1      | 1.51            | 1.35 | 1.81 | 1540.9               | 1.73                           | 1.85 | 1.96 |
| 2010.1              | 2040.1      | 2.28            | 2.10 | 2.00 | 2040.1      | 1.53            | 1.49 | 1.94 | 1621.5               | 1.84                           | 1.95 | 2.04 |
| 2110.1              | 2140.1      | 2.17            | 2.01 | 1.90 | 2140.1      | 1.61            | 1.66 | 2.12 | 1681.9               | 1.90                           | 2.01 | 2.10 |
| 2190.1              | 2220.1      | 2.06            | 1.91 | 1.82 | 2220.1      | 1.62            | 1.75 | 2.22 | 1762.5               | 2.02                           | 2.11 | 2.20 |
| 2290.1              | 2320.1      | 1.96            | 1.81 | 1.73 | 2320.1      | 1.61            | 1.87 | 2.37 | 1822.9               | 2.10                           | 2.19 | 2.26 |
| 2370.1              | 2400.1      | 1.90            | 1.76 | 1.67 | 2400.1      | 1.59            | 1.92 | 2.42 | 1903.5               | 2.23                           | 2.31 | 2.39 |
| 2470.1              | 2500.1      | 1.86            | 1.72 | 1.62 | 2500.1      | 1.59            | 1.99 | 2.51 | 1964.0               | 2.31                           | 2.38 | 2.45 |
| 2550.1              | 2580.1      | 1.86            | 1.72 | 1.62 | 2580.1      | 1.64            | 2.08 | 2.57 | 2044.5               | 2.43                           | 2.50 | 2.55 |
| 2650.1              | 2680.1      | 1.87            | 1.72 | 1.61 | 2680.1      | 1.70            | 2.17 | 2.64 | 2105.0               | 2.51                           | 2.57 | 2.62 |
| 2730.1              | 2760.1      | 1.87            | 1.72 | 1.61 | 2760.1      | 1.74            | 2.20 | 2.64 | 2185.5               | 2.63                           | 2.68 | 2.72 |
| 2830.1              | 2860.1      | 1.89            | 1.73 | 1.62 | 2860.1      | 1.82            | 2.26 | 2.68 | 2246.0               | 2.70                           | 2.75 | 2.79 |
| 2910.1              | 2940.1      | 1.93            | 1.77 | 1.66 | 2940.1      | 1.88            | 2.30 | 2.69 | 2326.5               | 2.77                           | 2.82 | 2.86 |
| 3010.1              | 3040.1      | 1.98            | 1.83 | 1.71 | 3040.1      | 1.97            | 2.37 | 2.73 | 2387.0               | 2.86                           | 2.92 | 2.96 |
| 3090.1              | 3120.1      | 2.00            | 1.85 | 1.73 | 3120.1      | 2.10            | 2.48 | 2.82 | 2467.6               | 2.94                           | 3.00 | 3.04 |
| 3190.1              | 3220.1      | 2.01            | 1.85 | 1.74 | 3220.1      | 2.22            | 2.55 | 2.85 | 2528.0               | 2.98                           | 3.03 | 3.07 |
| 3270.1              | 3300.1      | 1.99            | 1.82 | 1.70 | 3300.1      | 2.35            | 2.66 | 2.95 | 2608.6               | 3.04                           | 3.09 | 3.12 |
| 3370.1              | 3400.1      | 1.96            | 1.77 | 1.64 | 3400.1      | 2.49            | 2.73 | 2.98 | 2669.0               | 3.15                           | 3.19 | 3.23 |
| 3450.1              | 3480.1      | 1.98            | 1.77 | 1.63 | 3480.1      | 2.62            | 2.80 | 3.02 | 2749.6               | 3.21                           | 3.26 | 3.29 |
| 3550.1              | 3580.1      | 2.01            | 1.78 | 1.60 | 3580.1      | 2.80            | 2.90 | 3.07 | 2810.0               | 3.26                           | 3.31 | 3.34 |

## Harmonics Tables

### RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -      | 8   | 15  | 18  | 33  | 28  | 35  | 27  | 33  | 35  | 47  |
| 1      | -      | 27     | +0  | 38  | 19  | 46  | 22  | 44  | 53  | 70  | 46  | 44  |
| 2      | 65     | 70     | 61  | 65  | 65  | 77  | 68  | 75  | 65  | 74  | 61  | 65  |
| 3      | >90    | >78    | 72  | >78 | 70  | >78 | 76  | >78 | 76  | >78 | 77  | >78 |
| 4      | >90    | >78    | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 |
| 5      | >90    | >78    | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 |
| 6      | >90    | >78    | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 |
| 7      | >90    | >78    | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 |
| 8      | >90    | >78    | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 |
| 9      | >90    | >78    | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 |
| 10     | >90    | >78    | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

Test conditions:

RF IN: 1420 MHz; -5.00 dBm.  
LO IN: 1450 MHz; +17.00 dBm  
IF OUT: 30 MHz; -12.25 dBm

### RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -      | 18  | 25  | 29  | 43  | 39  | 47  | 39  | 47  | 48  | 66  |
| 1      | -      | 27     | +0  | 38  | 19  | 47  | 22  | 45  | 54  | 72  | 50  | 46  |
| 2      | 45     | 60     | 52  | 54  | 56  | 78  | 58  | 65  | 59  | 66  | 55  | 59  |
| 3      | >90    | 66     | 52  | 68  | 51  | 76  | 57  | 70  | 56  | 82  | 59  | 81  |
| 4      | >90    | 81     | 81  | 78  | 74  | 77  | 76  | 83  | 79  | 84  | 72  | >88 |
| 5      | >90    | >88    | 88  | >88 | 80  | >88 | 72  | >88 | 76  | >88 | 73  | 85  |
| 6      | >90    | >88    | >88 | >88 | >88 | >88 | >88 | 88  | >88 | >88 | >88 | >88 |
| 7      | >90    | >88    | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 |
| 8      | >90    | >88    | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 |
| 9      | >90    | >88    | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 |
| 10     | >90    | >88    | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

### LO HARMONICS ORDER

Test conditions:

RF IN: 1420 MHz; 5.00 dBm.  
LO IN: 1450 MHz; +17.00 dBm  
IF OUT: 30 MHz; -2.2 dBm

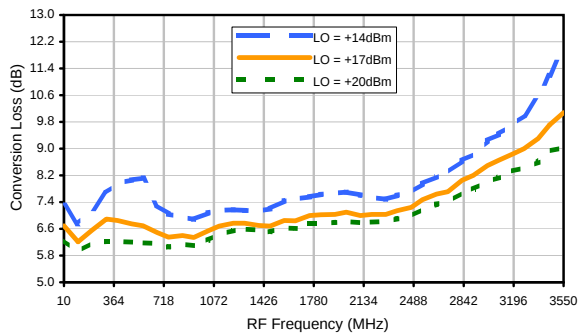
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.  
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.  
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

# Frequency Mixer

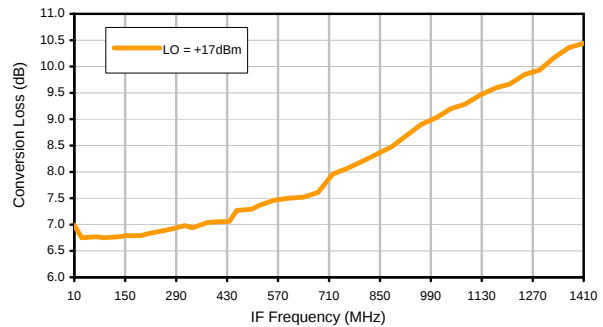
SYM-ED7158/1

## Typical Performance Curves

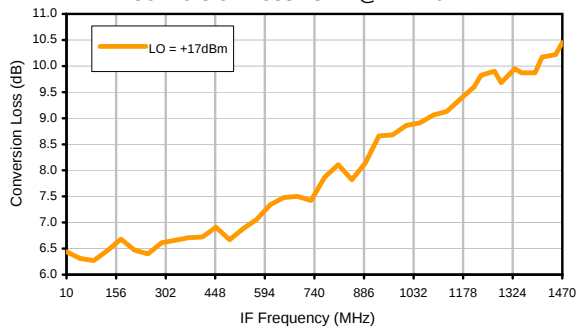
Conversion Loss @ IF=30MHz



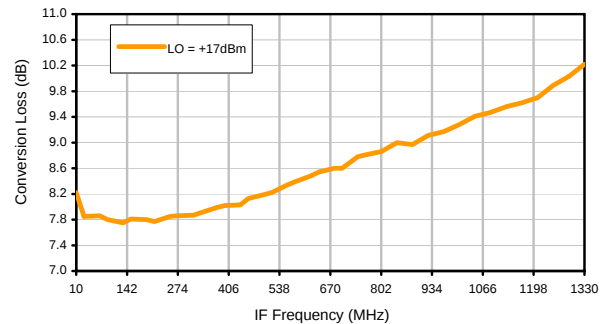
Conversion Loss vs. IF @ RF=1425.1MHz



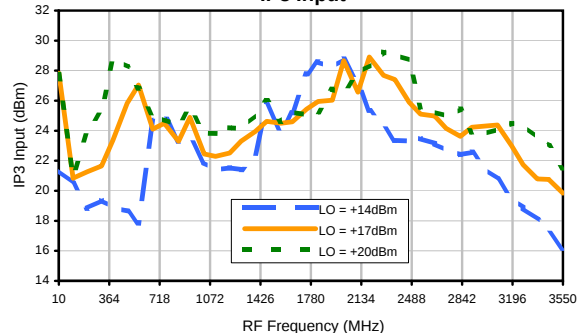
Conversion Loss vs. IF @ RF=10MHz



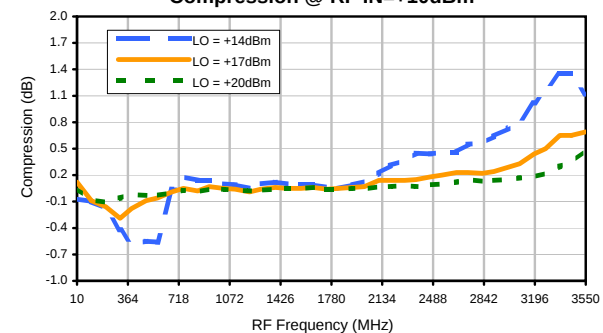
Conversion Loss vs. IF @ RF=2840.1MHz



IP3 Input



Compression @ RF IN=+10dBm

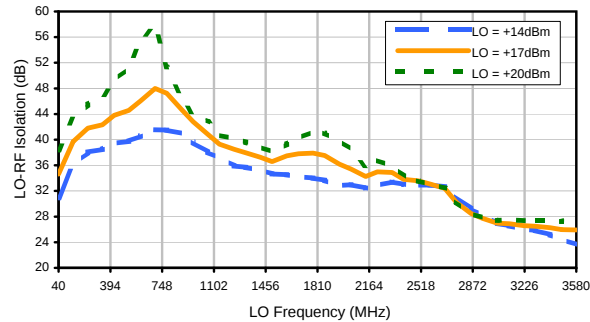


# Frequency Mixer

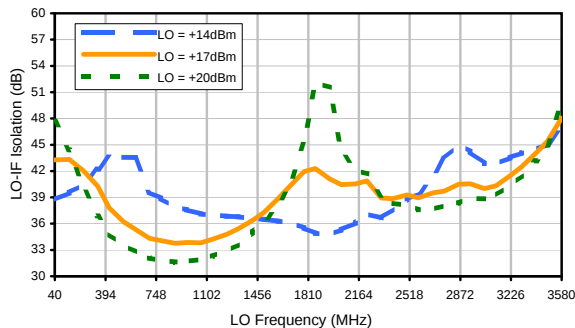
SYM-ED7158/1

## Typical Performance Curves

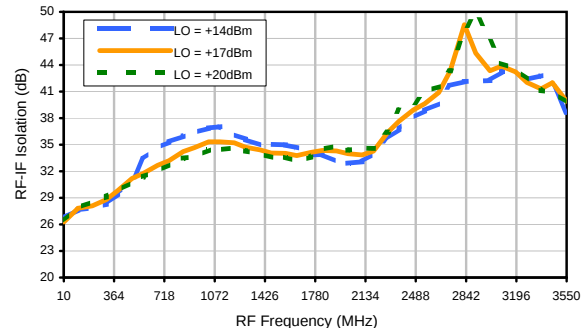
LO-RF Isolation



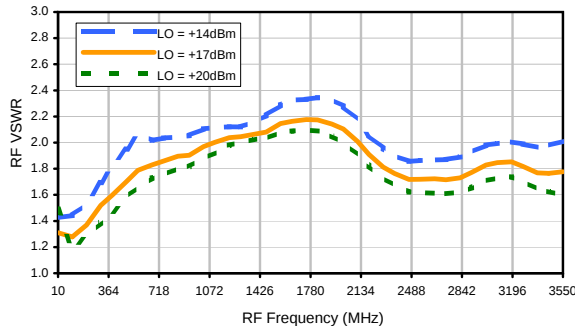
LO-IF Isolation



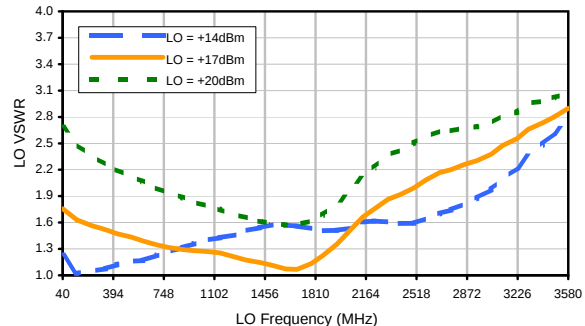
RF-IF Isolation



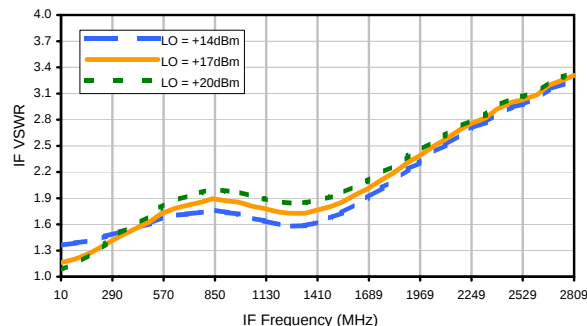
RF VSWR



LO VSWR



IF VSWR



# Frequency Mixer

SYM-ED7158/1

## Harmonics Tables

### RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 8   | 15  | 18  | 33  | 28  | 35  | 27  | 33  | 35  | 47  |
| 1  | -      | 27     | +0  | 38  | 19  | 46  | 22  | 44  | 53  | 70  | 46  | 44  |
| 2  | 65     | 70     | 61  | 65  | 65  | 77  | 68  | 75  | 65  | 74  | 61  | 65  |
| 3  | >90    | >78    | 72  | >78 | 70  | >78 | 76  | >78 | 76  | >78 | 77  | >78 |
| 4  | >90    | >78    | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 |
| 5  | >90    | >78    | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 |
| 6  | >90    | >78    | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 |
| 7  | >90    | >78    | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 |
| 8  | >90    | >78    | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 |
| 9  | >90    | >78    | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 |
| 10 | >90    | >78    | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 | >78 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

Test conditions: RF IN: 1420 MHz; -5.00 dBm.  
LO IN: 1450 MHz; +17.00 dBm  
IF OUT: 30 MHz; -12.25 dBm

### RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 18  | 25  | 29  | 43  | 39  | 47  | 39  | 47  | 48  | 66  |
| 1  | -      | 27     | +0  | 38  | 19  | 47  | 22  | 45  | 54  | 72  | 50  | 46  |
| 2  | 45     | 60     | 52  | 54  | 56  | 78  | 58  | 65  | 59  | 66  | 55  | 59  |
| 3  | >90    | 66     | 52  | 68  | 51  | 76  | 57  | 70  | 56  | 82  | 59  | 81  |
| 4  | >90    | 81     | 81  | 78  | 74  | 77  | 76  | 83  | 79  | 84  | 72  | >88 |
| 5  | >90    | >88    | 88  | >88 | 80  | >88 | 72  | >88 | 76  | >88 | 73  | 85  |
| 6  | >90    | >88    | >88 | >88 | >88 | >88 | >88 | 88  | >88 | >88 | >88 | >88 |
| 7  | >90    | >88    | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 |
| 8  | >90    | >88    | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 |
| 9  | >90    | >88    | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 |
| 10 | >90    | >88    | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 | >88 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

Test conditions: RF IN: 1420 MHz; 5.00 dBm.  
LO IN: 1450 MHz; +17.00 dBm  
IF OUT: 30 MHz; -2.2 dBm

### LO HARMONICS ORDER

- 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)



INTERNET <http://www.minicircuits.com>

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

Mini-Circuits ISO 9001 & ISO 14001 Certified

## 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

Mini-Circuits®

THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE, MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.

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          | -40° 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                                                                              |