

# Frequency Mixer

Level 7 (LO Power +7 dBm) 0.1 to 500 MHz

TSM-3+



CASE STYLE: A11

## Maximum Ratings

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

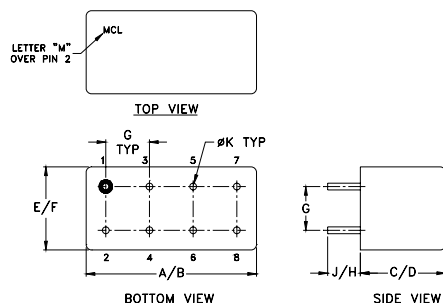
Permanent damage may occur if any of these limits are exceeded.

## Pin Connections

|             |         |
|-------------|---------|
| LO          | 8       |
| RF          | 1       |
| IF          | 3,4^    |
| GROUND      | 2,5,6,7 |
| CASE GROUND | 2       |

^ pins must be connected together externally

## Outline Drawing



## Outline Dimensions (inch/mm)

| A     | B     | C    | D    | E    | F    |
|-------|-------|------|------|------|------|
| .480  | .500  | .240 | .255 | .210 | .230 |
| 12.19 | 12.70 | 6.10 | 6.48 | 5.33 | 5.84 |

| G    | H    | J    | K    | wt    |
|------|------|------|------|-------|
| .100 | .20  | .14  | .020 | grams |
| 2.54 | 5.08 | 3.56 | 0.51 | 1.9   |

## Features

- low conversion loss, 4.75 dB typ.
- high L-R isolation, 50 dB typ., L-I isolation, 45 dB typ.
- rugged welded construction
- hermetically sealed

## Applications

- VHF/UHF
- FM radio
- defense & federal communications

## Electrical Specifications

| FREQUENCY (MHz) |        | CONVERSION LOSS (dB) |          |       |      | LO-RF ISOLATION (dB) |      |      |      |      |      | LO-IF ISOLATION (dB) |      |      |      |      |      |
|-----------------|--------|----------------------|----------|-------|------|----------------------|------|------|------|------|------|----------------------|------|------|------|------|------|
| LO/RF           | IF     | Mid-Band             |          | Total |      | L                    | M    | U    |      |      |      |                      | L    | M    | U    |      |      |
| $f_L$ - $f_U$   |        | $\bar{X}$            | $\sigma$ | Max.  | Max. | Typ.                 | Min. | Typ. | Min. | Typ. | Min. | Typ.                 | Min. | Typ. | Min. | Typ. | Min. |
| 0.1-500         | DC-500 | 4.75                 | 0.04     | 7.5   | 8.5  | 60                   | 50   | 50   | 35   | 35   | 25   | 55                   | 45   | 45   | 30   | 35   | 25   |

1 dB COMP.: +1 dBm typ.

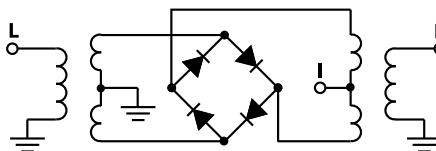
L = low range [ $f_L$  to  $10 f_L$ ] M = mid range [ $10 f_L$  to  $f_U/2$ ] U = upper range [ $f_U/2$  to  $f_U$ ]

m = mid band [ $2f_L$  to  $f_U/2$ ]

## Typical Performance Data

| Frequency (MHz) |        | Conversion Loss (dB) | Isolation L-R (dB) | Isolation L-I (dB) | VSWR RF Port (:1) | VSWR LO Port (:1) |
|-----------------|--------|----------------------|--------------------|--------------------|-------------------|-------------------|
| RF              | LO     | LO +7dBm             | LO +7dBm           | LO +7dBm           | LO +7dBm          | LO +7dBm          |
| 0.10            | 30.10  | 5.74                 | >67.00             | >67.00             | 1.11              | 2.55              |
| 0.20            | 30.20  | 5.22                 | >67.00             | >67.00             | 1.11              | 2.49              |
| 0.50            | 30.50  | 4.98                 | >67.00             | >67.00             | 1.11              | 2.41              |
| 1.00            | 31.00  | 4.89                 | >67.00             | >67.00             | 1.09              | 2.51              |
| 2.00            | 32.00  | 4.86                 | >67.00             | >67.00             | 1.09              | 2.51              |
| 5.00            | 35.00  | 4.82                 | >67.00             | >67.00             | 1.09              | 2.40              |
| 10.00           | 40.00  | 4.86                 | >67.00             | >67.00             | 1.08              | 2.27              |
| 20.00           | 50.00  | 4.94                 | 58.85              | 58.01              | 1.07              | 2.30              |
| 41.47           | 71.47  | 4.85                 | 51.90              | 51.69              | 1.06              | 2.31              |
| 55.26           | 85.26  | 4.89                 | 49.48              | 49.53              | 1.05              | 2.30              |
| 100.00          | 70.00  | 4.79                 | 44.78              | 44.91              | 1.05              | 2.30              |
| 151.79          | 121.79 | 4.81                 | 41.85              | 41.77              | 1.04              | 2.30              |
| 200.00          | 170.00 | 5.01                 | 39.70              | 39.48              | 1.04              | 2.30              |
| 220.74          | 190.74 | 5.05                 | 39.83              | 38.88              | 1.05              | 2.36              |
| 248.32          | 218.32 | 5.02                 | 39.44              | 38.41              | 1.06              | 2.38              |
| 303.48          | 273.48 | 5.11                 | 36.66              | 36.25              | 1.08              | 2.40              |
| 331.06          | 301.06 | 5.25                 | 36.60              | 36.25              | 1.11              | 2.46              |
| 358.64          | 328.64 | 5.48                 | 36.34              | 35.29              | 1.14              | 2.47              |
| 386.22          | 356.22 | 5.50                 | 36.21              | 33.15              | 1.17              | 2.52              |
| 400.00          | 370.00 | 5.52                 | 36.19              | 32.27              | 1.20              | 2.58              |

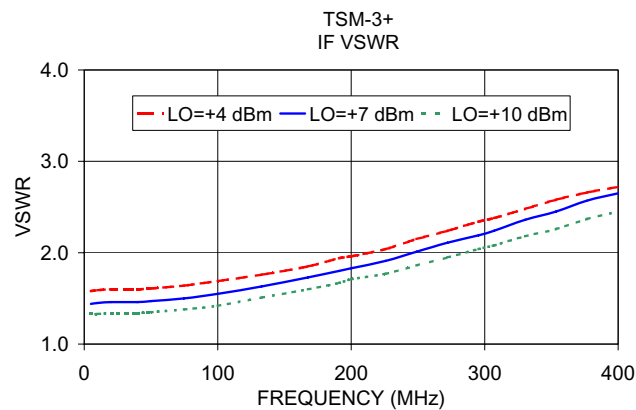
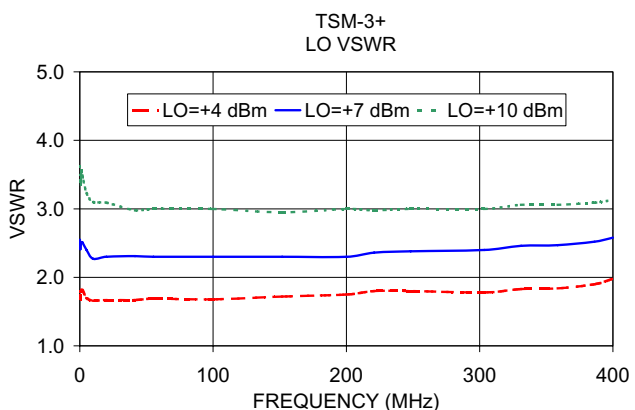
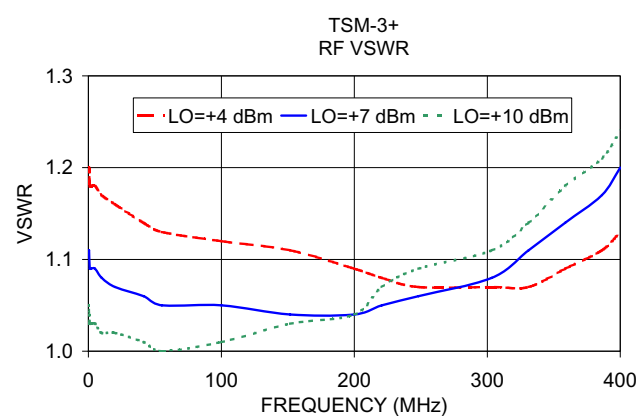
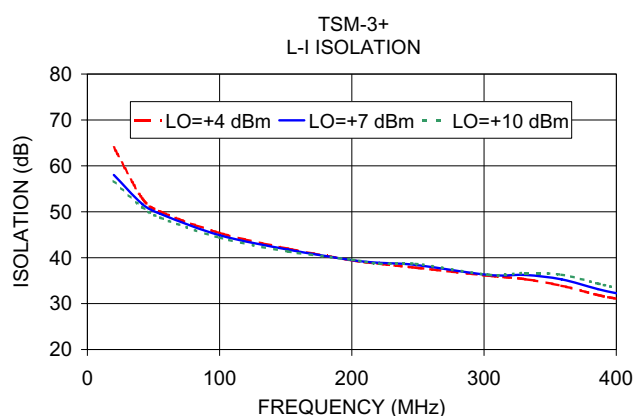
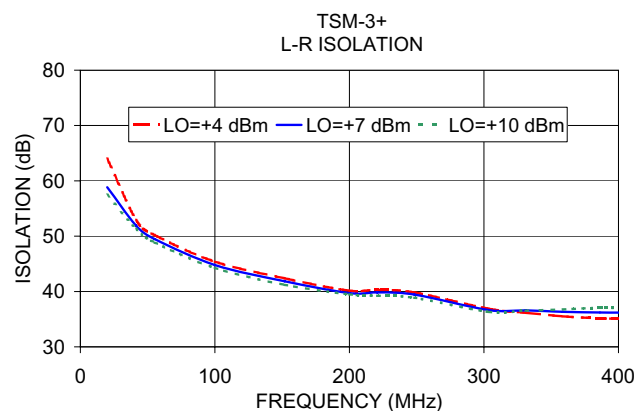
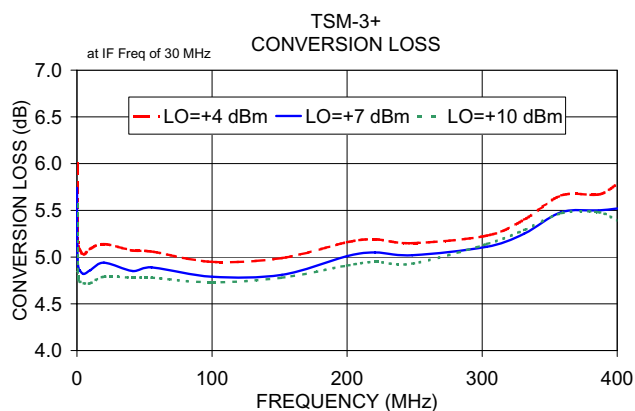
## Electrical Schematic



### Notes

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.  
 B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.  
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## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>IF FIXED<br>@IF(OUT)=30MHz<br>(dB) |       |       |
|---------------------|-------------|-------------------------------------------------------|-------|-------|
|                     |             | @LO (dBm)                                             |       |       |
|                     |             | +4                                                    | +7    | +10   |
| 0.1                 | 30.1        | 6.00                                                  | 5.74  | 5.57  |
| 0.2                 | 30.2        | 5.45                                                  | 5.22  | 5.09  |
| 0.5                 | 30.5        | 5.20                                                  | 4.98  | 4.85  |
| 1.0                 | 31.0        | 5.12                                                  | 4.89  | 4.76  |
| 2.0                 | 32.0        | 5.08                                                  | 4.86  | 4.74  |
| 5.0                 | 35.0        | 5.03                                                  | 4.82  | 4.72  |
| 10.0                | 40.0        | 5.09                                                  | 4.86  | 4.72  |
| 30.3                | 60.3        | 5.12                                                  | 4.86  | 4.73  |
| 50.5                | 80.5        | 5.16                                                  | 4.88  | 4.79  |
| 70.7                | 100.7       | 5.10                                                  | 4.89  | 4.79  |
| 90.9                | 120.9       | 5.09                                                  | 4.89  | 4.81  |
| 111.1               | 141.1       | 5.12                                                  | 4.90  | 4.81  |
| 151.5               | 181.5       | 5.16                                                  | 4.96  | 4.88  |
| 171.7               | 201.7       | 5.19                                                  | 4.98  | 4.87  |
| 191.9               | 221.9       | 5.21                                                  | 4.99  | 4.90  |
| 212.1               | 242.1       | 5.22                                                  | 5.02  | 4.94  |
| 252.5               | 282.5       | 5.35                                                  | 5.10  | 5.00  |
| 272.8               | 302.8       | 5.45                                                  | 5.16  | 5.04  |
| 293.0               | 323.0       | 5.47                                                  | 5.23  | 5.08  |
| 313.2               | 343.2       | 5.52                                                  | 5.32  | 5.15  |
| 353.6               | 383.6       | 5.56                                                  | 5.30  | 5.19  |
| 373.8               | 403.8       | 5.63                                                  | 5.36  | 5.22  |
| 394.0               | 424.0       | 5.73                                                  | 5.46  | 5.33  |
| 454.6               | 484.6       | 6.40                                                  | 5.91  | 5.56  |
| 495.0               | 525.0       | 6.75                                                  | 6.38  | 5.91  |
| 515.2               | 545.2       | 7.00                                                  | 6.57  | 6.13  |
| 555.6               | 585.6       | 7.30                                                  | 6.74  | 6.24  |
| 575.8               | 605.8       | 7.38                                                  | 6.77  | 6.22  |
| 616.2               | 646.2       | 7.17                                                  | 6.49  | 6.02  |
| 676.8               | 706.8       | 6.96                                                  | 6.40  | 6.12  |
| 697.0               | 727.0       | 6.98                                                  | 6.51  | 6.28  |
| 737.4               | 767.4       | 7.32                                                  | 6.87  | 6.65  |
| 757.7               | 787.7       | 7.44                                                  | 7.02  | 6.77  |
| 798.1               | 828.1       | 7.72                                                  | 7.29  | 7.10  |
| 818.3               | 848.3       | 8.04                                                  | 7.60  | 7.34  |
| 858.7               | 888.7       | 8.61                                                  | 8.21  | 8.01  |
| 878.9               | 908.9       | 8.87                                                  | 8.52  | 8.37  |
| 919.3               | 949.3       | 9.70                                                  | 9.27  | 9.15  |
| 979.9               | 1009.9      | 10.79                                                 | 10.28 | 10.18 |
| 1000.1              | 1030.1      | 11.42                                                 | 10.83 | 10.56 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | IP3 INPUT<br>(dBm) |       |       |
|---------------------|-------------|--------------------|-------|-------|
|                     |             | @LO (dBm)          |       |       |
|                     |             | +4                 | +7    | +10   |
| 10.1                | 40.1        | 23.94              | 23.55 | 24.66 |
| 30.3                | 60.3        | 23.21              | 26.57 | 23.26 |
| 50.5                | 80.5        | 21.47              | 26.56 | 23.91 |
| 70.7                | 100.7       | 21.54              | 23.07 | 22.31 |
| 90.9                | 120.9       | 22.00              | 23.18 | 21.85 |
| 111.1               | 141.1       | 22.55              | 26.55 | 24.18 |
| 131.3               | 161.3       | 24.82              | 20.04 | 22.07 |
| 151.5               | 181.5       | 21.41              | 16.93 | 19.11 |
| 171.7               | 201.7       | 21.19              | 18.44 | 20.61 |
| 191.9               | 221.9       | 18.29              | 18.74 | 20.71 |
| 212.1               | 242.1       | 16.67              | 18.36 | 15.89 |
| 232.3               | 262.3       | 16.72              | 16.87 | 17.11 |
| 252.5               | 282.5       | 18.22              | 17.58 | 20.78 |
| 272.8               | 302.8       | 18.98              | 19.11 | 24.00 |
| 293.0               | 323.0       | 16.81              | 17.22 | 19.90 |
| 313.2               | 343.2       | 16.50              | 16.21 | 18.28 |
| 333.4               | 363.4       | 14.89              | 16.75 | 18.24 |
| 353.6               | 383.6       | 14.60              | 16.12 | 17.49 |
| 373.8               | 403.8       | 15.54              | 15.83 | 20.94 |
| 394.0               | 424.0       | 15.18              | 17.11 | 20.10 |
| 434.4               | 464.4       | 10.92              | 15.56 | 18.49 |
| 454.6               | 484.6       | 9.03               | 11.76 | 16.23 |
| 495.0               | 525.0       | 7.87               | 9.10  | 11.79 |
| 515.2               | 545.2       | 7.73               | 8.74  | 10.28 |
| 555.6               | 585.6       | 8.90               | 10.72 | 13.04 |
| 575.8               | 605.8       | 10.65              | 13.09 | 14.82 |
| 616.2               | 646.2       | 13.89              | 17.33 | 24.37 |
| 636.4               | 666.4       | 16.35              | 24.04 | 25.99 |
| 676.8               | 706.8       | 20.94              | 21.81 | 21.37 |
| 697.0               | 727.0       | 21.63              | 20.43 | 19.15 |
| 737.4               | 767.4       | 16.97              | 20.73 | 18.40 |
| 757.7               | 787.7       | 16.54              | 20.10 | 19.43 |
| 798.1               | 828.1       | 15.32              | 15.09 | 16.35 |
| 818.3               | 848.3       | 14.87              | 14.81 | 15.16 |
| 858.7               | 888.7       | 17.56              | 14.06 | 16.67 |
| 878.9               | 908.9       | 16.07              | 18.76 | 15.80 |
| 919.3               | 949.3       | 14.88              | 18.33 | 20.31 |
| 939.5               | 969.5       | 21.55              | 18.75 | 21.53 |
| 979.9               | 1009.9      | 21.22              | 20.33 | 23.64 |
| 1000.1              | 1030.1      | 20.75              | 21.73 | 17.86 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | COMPRESSION<br>@RF IN=+1dBm<br>(dB) |      |      |
|---------------------|-------------|-------------------------------------|------|------|
|                     |             | @LO (dBm)                           |      |      |
|                     |             | +4                                  | +7   | +10  |
| 10.1                | 40.1        | 1.49                                | 1.17 | 0.97 |
| 30.3                | 60.3        | 1.39                                | 1.16 | 0.90 |
| 50.5                | 80.5        | 1.36                                | 1.07 | 0.89 |
| 70.7                | 100.7       | 1.25                                | 1.06 | 0.89 |
| 90.9                | 120.9       | 1.29                                | 0.99 | 0.83 |
| 111.1               | 141.1       | 1.20                                | 0.94 | 0.76 |
| 131.3               | 161.3       | 1.28                                | 0.95 | 0.78 |
| 151.5               | 181.5       | 1.18                                | 0.91 | 0.75 |
| 171.7               | 201.7       | 1.13                                | 0.88 | 0.72 |
| 191.9               | 221.9       | 1.10                                | 0.86 | 0.71 |
| 212.1               | 242.1       | 1.09                                | 0.87 | 0.71 |
| 232.3               | 262.3       | 1.10                                | 0.87 | 0.73 |
| 252.5               | 282.5       | 1.08                                | 0.84 | 0.68 |
| 272.8               | 302.8       | 1.14                                | 0.91 | 0.75 |
| 293.0               | 323.0       | 1.15                                | 0.95 | 0.80 |
| 313.2               | 343.2       | 1.24                                | 1.01 | 0.86 |
| 333.4               | 363.4       | 1.42                                | 1.11 | 0.93 |
| 353.6               | 383.6       | 1.64                                | 1.28 | 1.07 |
| 373.8               | 403.8       | 1.75                                | 1.36 | 1.14 |
| 394.0               | 424.0       | 1.91                                | 1.47 | 1.26 |
| 434.4               | 464.4       | 2.23                                | 1.84 | 1.55 |
| 454.6               | 484.6       | 2.30                                | 1.97 | 1.73 |
| 495.0               | 525.0       | 2.26                                | 1.93 | 1.77 |
| 515.2               | 545.2       | 2.17                                | 1.85 | 1.65 |
| 555.6               | 585.6       | 2.05                                | 1.80 | 1.61 |
| 575.8               | 605.8       | 1.90                                | 1.70 | 1.58 |
| 616.2               | 646.2       | 2.04                                | 1.83 | 1.66 |
| 636.4               | 666.4       | 2.07                                | 1.85 | 1.66 |
| 676.8               | 706.8       | 2.09                                | 1.81 | 1.56 |
| 697.0               | 727.0       | 2.05                                | 1.73 | 1.48 |
| 737.4               | 767.4       | 1.90                                | 1.59 | 1.37 |
| 757.7               | 787.7       | 1.91                                | 1.61 | 1.41 |
| 798.1               | 828.1       | 1.81                                | 1.63 | 1.51 |
| 818.3               | 848.3       | 1.85                                | 1.61 | 1.51 |
| 858.7               | 888.7       | 1.64                                | 1.35 | 1.27 |
| 878.9               | 908.9       | 1.54                                | 1.19 | 1.10 |
| 919.3               | 949.3       | 1.43                                | 1.01 | 0.87 |
| 939.5               | 969.5       | 1.32                                | 0.95 | 0.84 |
| 979.9               | 1009.9      | 1.22                                | 0.89 | 0.82 |
| 1000.1              | 1030.1      | 1.34                                | 0.91 | 0.83 |

# Frequency Mixer

**TSM-3+**

## Typical Performance Data

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=250.1MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=10.1MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=500.1MHz<br>(dB) |
|----------------------|-------------|-----------------------------------------------------------------|----------------------|-------------|----------------------------------------------------------------|----------------------|-------------|-----------------------------------------------------------------|
|                      |             | @LO (dBm)                                                       |                      |             | @LO (dBm)                                                      |                      |             | @LO (dBm)                                                       |
|                      |             | +7                                                              |                      |             | +7                                                             |                      |             | +7                                                              |
| 240.0                | 10.1        | 5.27                                                            | 10.0                 | 20.1        | 4.71                                                           | 490.0                | 10.1        | 6.18                                                            |
| 234.1                | 16.0        | 5.22                                                            | 22.3                 | 32.4        | 4.65                                                           | 477.7                | 22.4        | 6.11                                                            |
| 228.2                | 21.9        | 5.16                                                            | 34.6                 | 44.7        | 4.66                                                           | 465.4                | 34.7        | 6.06                                                            |
| 222.3                | 27.8        | 5.14                                                            | 46.9                 | 57.0        | 4.66                                                           | 453.1                | 47.0        | 6.05                                                            |
| 216.4                | 33.7        | 5.12                                                            | 59.2                 | 69.3        | 4.65                                                           | 440.8                | 59.3        | 6.10                                                            |
| 210.5                | 39.6        | 5.10                                                            | 71.5                 | 81.6        | 4.70                                                           | 428.5                | 71.6        | 6.05                                                            |
| 204.6                | 45.5        | 5.11                                                            | 83.8                 | 93.9        | 4.73                                                           | 416.2                | 83.9        | 6.00                                                            |
| 198.7                | 51.4        | 5.06                                                            | 96.2                 | 106.3       | 4.71                                                           | 403.8                | 96.3        | 5.98                                                            |
| 192.8                | 57.3        | 5.02                                                            | 108.5                | 118.6       | 4.74                                                           | 391.5                | 108.6       | 5.96                                                            |
| 186.9                | 63.2        | 5.05                                                            | 120.8                | 130.9       | 4.74                                                           | 379.2                | 120.9       | 6.01                                                            |
| 181.0                | 69.1        | 5.07                                                            | 133.1                | 143.2       | 4.74                                                           | 366.9                | 133.2       | 6.04                                                            |
| 175.1                | 75.0        | 5.08                                                            | 145.4                | 155.5       | 4.78                                                           | 354.6                | 145.5       | 5.98                                                            |
| 169.2                | 80.9        | 5.05                                                            | 157.7                | 167.8       | 4.84                                                           | 342.3                | 157.8       | 6.00                                                            |
| 163.3                | 86.8        | 5.03                                                            | 170.0                | 180.1       | 4.82                                                           | 330.0                | 170.1       | 6.00                                                            |
| 157.4                | 92.7        | 5.03                                                            | 182.3                | 192.4       | 4.86                                                           | 317.7                | 182.4       | 6.00                                                            |
| 151.5                | 98.6        | 5.03                                                            | 194.6                | 204.7       | 4.85                                                           | 305.4                | 194.7       | 6.04                                                            |
| 145.6                | 104.5       | 5.04                                                            | 206.9                | 217.0       | 4.87                                                           | 293.1                | 207.0       | 5.99                                                            |
| 139.7                | 110.4       | 5.06                                                            | 219.2                | 229.3       | 4.89                                                           | 280.8                | 219.3       | 5.98                                                            |
| 133.8                | 116.3       | 5.02                                                            | 231.5                | 241.6       | 4.90                                                           | 268.5                | 231.6       | 6.02                                                            |
| 127.9                | 122.2       | 5.00                                                            | 243.8                | 253.9       | 4.89                                                           | 256.2                | 243.9       | 6.02                                                            |
| 122.1                | 128.0       | 5.00                                                            | 256.2                | 266.3       | 4.93                                                           | 243.8                | 256.3       | 6.07                                                            |
| 116.2                | 133.9       | 5.02                                                            | 268.5                | 278.6       | 4.88                                                           | 231.5                | 268.6       | 6.05                                                            |
| 110.3                | 139.8       | 5.04                                                            | 280.8                | 290.9       | 4.95                                                           | 219.2                | 280.9       | 5.98                                                            |
| 104.4                | 145.7       | 5.02                                                            | 293.1                | 303.2       | 5.02                                                           | 206.9                | 293.2       | 6.04                                                            |
| 98.5                 | 151.6       | 5.02                                                            | 305.4                | 315.5       | 5.06                                                           | 194.6                | 305.5       | 6.02                                                            |
| 92.6                 | 157.5       | 5.02                                                            | 317.7                | 327.8       | 5.18                                                           | 182.3                | 317.8       | 6.02                                                            |
| 86.7                 | 163.4       | 5.04                                                            | 330.0                | 340.1       | 5.19                                                           | 170.0                | 330.1       | 6.06                                                            |
| 80.8                 | 169.3       | 5.05                                                            | 342.3                | 352.4       | 5.18                                                           | 157.7                | 342.4       | 6.03                                                            |
| 74.9                 | 175.2       | 5.06                                                            | 354.6                | 364.7       | 5.21                                                           | 145.4                | 354.7       | 6.01                                                            |
| 69.0                 | 181.1       | 5.03                                                            | 366.9                | 377.0       | 5.21                                                           | 133.1                | 367.0       | 5.99                                                            |
| 63.1                 | 187.0       | 5.01                                                            | 379.2                | 389.3       | 5.18                                                           | 120.8                | 379.3       | 5.93                                                            |
| 57.2                 | 192.9       | 5.02                                                            | 391.5                | 401.6       | 5.15                                                           | 108.5                | 391.6       | 5.91                                                            |
| 51.3                 | 198.8       | 5.02                                                            | 403.8                | 413.9       | 5.05                                                           | 96.2                 | 403.9       | 5.88                                                            |
| 45.4                 | 204.7       | 5.05                                                            | 416.2                | 426.3       | 5.10                                                           | 83.8                 | 416.3       | 5.77                                                            |
| 39.5                 | 210.6       | 5.06                                                            | 428.5                | 438.6       | 5.14                                                           | 71.5                 | 428.6       | 5.77                                                            |
| 33.6                 | 216.5       | 5.06                                                            | 440.8                | 450.9       | 5.16                                                           | 59.2                 | 440.9       | 5.77                                                            |
| 27.7                 | 222.4       | 5.05                                                            | 453.1                | 463.2       | 5.16                                                           | 46.9                 | 453.2       | 5.73                                                            |
| 21.8                 | 228.3       | 5.06                                                            | 465.4                | 475.5       | 5.16                                                           | 34.6                 | 465.5       | 5.86                                                            |
| 15.9                 | 234.2       | 5.08                                                            | 477.7                | 487.8       | 5.15                                                           | 22.3                 | 477.8       | 6.00                                                            |
| 10.0                 | 240.1       | 5.13                                                            | 490.0                | 500.1       | 5.14                                                           | 10.0                 | 490.1       | 6.02                                                            |

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## Typical Performance Data

| LO<br>(MHz) | LO-RF ISOLATION<br>(dB) |       |       | LO-IF ISOLATION<br>(dB) |       |       |
|-------------|-------------------------|-------|-------|-------------------------|-------|-------|
|             | @LO (dBm)               |       |       | @LO (dBm)               |       |       |
|             | +4                      | +7    | +10   | +4                      | +7    | +10   |
| 0.1         | 64.00                   | 67.00 | 70.00 | 64.00                   | 67.00 | 66.23 |
| 0.2         | 64.00                   | 67.00 | 70.00 | 64.00                   | 67.00 | 65.77 |
| 0.5         | 64.00                   | 67.00 | 70.00 | 64.00                   | 67.00 | 65.50 |
| 1.0         | 64.00                   | 67.00 | 70.00 | 64.00                   | 67.00 | 65.49 |
| 2.0         | 64.00                   | 67.00 | 70.00 | 64.00                   | 67.00 | 65.24 |
| 5.0         | 64.00                   | 67.00 | 70.00 | 64.00                   | 67.00 | 64.20 |
| 10.0        | 64.00                   | 67.00 | 64.53 | 64.00                   | 67.00 | 60.90 |
| 30.3        | 62.31                   | 63.44 | 64.26 | 65.52                   | 65.76 | 65.95 |
| 50.5        | 57.19                   | 58.94 | 60.01 | 64.15                   | 64.54 | 62.76 |
| 70.7        | 55.00                   | 55.85 | 56.72 | 60.57                   | 60.93 | 60.79 |
| 90.9        | 52.43                   | 53.71 | 54.57 | 58.16                   | 59.09 | 59.29 |
| 111.1       | 50.91                   | 51.93 | 52.93 | 55.12                   | 56.77 | 58.26 |
| 151.5       | 48.23                   | 49.20 | 49.86 | 50.64                   | 53.05 | 54.89 |
| 171.7       | 47.17                   | 48.48 | 49.29 | 48.92                   | 51.12 | 52.75 |
| 191.9       | 46.09                   | 47.15 | 47.98 | 47.39                   | 50.05 | 52.72 |
| 212.1       | 45.26                   | 45.90 | 46.67 | 46.24                   | 48.88 | 51.74 |
| 252.5       | 44.56                   | 45.51 | 46.31 | 43.44                   | 45.77 | 48.34 |
| 272.8       | 45.13                   | 46.49 | 47.39 | 42.70                   | 45.07 | 47.75 |
| 293.0       | 43.46                   | 44.82 | 45.82 | 43.49                   | 46.50 | 49.41 |
| 313.2       | 42.23                   | 43.49 | 44.69 | 42.56                   | 45.38 | 48.19 |
| 353.6       | 40.39                   | 41.98 | 43.56 | 40.54                   | 41.85 | 42.61 |
| 373.8       | 39.60                   | 41.29 | 42.96 | 39.54                   | 40.30 | 40.58 |
| 394.0       | 39.65                   | 41.77 | 44.10 | 38.55                   | 38.90 | 38.83 |
| 454.6       | 40.74                   | 42.60 | 44.25 | 37.74                   | 37.64 | 37.10 |
| 495.0       | 39.86                   | 41.81 | 43.38 | 36.85                   | 36.84 | 35.91 |
| 515.2       | 39.85                   | 41.81 | 43.35 | 35.52                   | 35.38 | 34.55 |
| 555.6       | 39.41                   | 41.01 | 42.16 | 33.24                   | 32.44 | 31.36 |
| 575.8       | 39.08                   | 40.51 | 41.38 | 32.12                   | 31.04 | 29.86 |
| 616.2       | 39.21                   | 39.99 | 40.00 | 30.11                   | 28.38 | 26.32 |
| 676.8       | 37.94                   | 37.62 | 37.19 | 27.54                   | 25.05 | 23.46 |
| 697.0       | 38.80                   | 38.47 | 38.15 | 26.52                   | 24.21 | 22.70 |
| 737.4       | 40.28                   | 38.80 | 37.35 | 24.38                   | 22.39 | 20.89 |
| 757.7       | 42.42                   | 38.73 | 36.24 | 23.55                   | 21.79 | 20.35 |
| 798.1       | 43.93                   | 37.11 | 33.94 | 21.37                   | 19.96 | 18.66 |
| 818.3       | 41.96                   | 35.77 | 32.89 | 20.21                   | 19.06 | 17.94 |
| 858.7       | 37.08                   | 33.15 | 30.66 | 18.75                   | 17.81 | 16.88 |
| 878.9       | 34.21                   | 31.51 | 29.46 | 18.09                   | 17.26 | 16.31 |
| 919.3       | 30.58                   | 28.91 | 27.37 | 17.00                   | 16.30 | 15.42 |
| 979.9       | 26.74                   | 26.34 | 25.20 | 16.04                   | 15.81 | 15.00 |
| 1000.1      | 25.73                   | 25.47 | 24.57 | 15.64                   | 15.44 | 14.73 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | +4                      | +7    | +10   |
| 10.1                | 40.1        | 44.57                   | 44.66 | 38.82 |
| 30.3                | 60.3        | 34.07                   | 34.76 | 35.17 |
| 50.5                | 80.5        | 31.12                   | 31.05 | 31.34 |
| 70.7                | 100.7       | 28.37                   | 28.85 | 28.66 |
| 90.9                | 120.9       | 26.99                   | 27.02 | 27.20 |
| 111.1               | 141.1       | 25.58                   | 25.81 | 26.04 |
| 131.3               | 161.3       | 24.74                   | 24.88 | 25.15 |
| 151.5               | 181.5       | 24.15                   | 24.43 | 24.64 |
| 171.7               | 201.7       | 23.94                   | 24.23 | 24.53 |
| 191.9               | 221.9       | 23.80                   | 24.32 | 24.75 |
| 212.1               | 242.1       | 23.39                   | 23.93 | 24.50 |
| 232.3               | 262.3       | 23.58                   | 24.10 | 24.67 |
| 252.5               | 282.5       | 23.82                   | 24.29 | 24.79 |
| 272.8               | 302.8       | 23.87                   | 24.19 | 24.53 |
| 293.0               | 323.0       | 25.02                   | 25.42 | 25.82 |
| 313.2               | 343.2       | 25.30                   | 26.01 | 26.66 |
| 333.4               | 363.4       | 25.47                   | 26.62 | 27.78 |
| 353.6               | 383.6       | 24.73                   | 25.96 | 26.99 |
| 373.8               | 403.8       | 23.08                   | 23.85 | 24.23 |
| 394.0               | 424.0       | 21.60                   | 21.86 | 21.78 |
| 434.4               | 464.4       | 18.77                   | 18.39 | 18.11 |
| 454.6               | 484.6       | 18.09                   | 17.83 | 17.45 |
| 495.0               | 525.0       | 16.98                   | 16.84 | 16.68 |
| 515.2               | 545.2       | 16.82                   | 16.65 | 16.51 |
| 555.6               | 585.6       | 17.04                   | 16.81 | 16.51 |
| 575.8               | 605.8       | 17.14                   | 16.83 | 16.45 |
| 616.2               | 646.2       | 17.10                   | 16.53 | 15.98 |
| 636.4               | 666.4       | 16.84                   | 16.19 | 15.64 |
| 676.8               | 706.8       | 15.96                   | 15.37 | 14.92 |
| 697.0               | 727.0       | 15.52                   | 15.04 | 14.69 |
| 737.4               | 767.4       | 14.55                   | 14.01 | 13.59 |
| 757.7               | 787.7       | 13.89                   | 13.42 | 13.00 |
| 798.1               | 828.1       | 12.48                   | 12.02 | 11.56 |
| 818.3               | 848.3       | 11.88                   | 11.42 | 10.98 |
| 858.7               | 888.7       | 10.46                   | 10.04 | 9.66  |
| 878.9               | 908.9       | 9.91                    | 9.42  | 9.09  |
| 919.3               | 949.3       | 8.95                    | 8.54  | 8.17  |
| 939.5               | 969.5       | 8.48                    | 8.08  | 7.71  |
| 979.9               | 1009.9      | 7.61                    | 7.29  | 6.99  |
| 1000.1              | 1030.1      | 7.35                    | 7.04  | 6.80  |

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## 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=500.1MHz<br>(:1) |      |      |
|---------------------|-------------|-----------------|------|------|-------------|-----------------|------|------|----------------------|---------------------------------|------|------|
|                     |             | @LO (dBm)       |      |      |             | @LO (dBm)       |      |      |                      | @LO (dBm)                       |      |      |
|                     |             | +4              | +7   | +10  |             | +4              | +7   | +10  |                      | +4                              | +7   | +10  |
| 5.0                 | 35.0        | 1.20            | 1.11 | 1.05 | 5.0         | 1.72            | 2.55 | 3.62 | 5.0                  | 0.58                            | 1.44 | 1.33 |
| 10.0                | 40.0        | 1.20            | 1.11 | 1.05 | 10.0        | 1.74            | 2.49 | 3.53 | 10.0                 | 0.59                            | 1.45 | 1.33 |
| 30.3                | 60.3        | 1.25            | 1.14 | 1.08 | 30.3        | 1.79            | 2.66 | 3.71 | 22.6                 | 2.17                            | 1.84 | 1.57 |
| 50.5                | 80.5        | 1.23            | 1.12 | 1.06 | 50.5        | 1.75            | 2.58 | 3.65 | 35.1                 | 2.07                            | 1.74 | 1.49 |
| 70.7                | 100.7       | 1.21            | 1.11 | 1.05 | 70.7        | 1.66            | 2.40 | 3.34 | 47.7                 | 2.06                            | 1.73 | 1.47 |
| 90.9                | 120.9       | 1.20            | 1.09 | 1.04 | 90.9        | 1.66            | 2.46 | 3.41 | 60.3                 | 2.07                            | 1.76 | 1.48 |
| 111.1               | 141.1       | 1.15            | 1.07 | 1.03 | 111.1       | 1.66            | 2.42 | 3.36 | 72.8                 | 2.11                            | 1.79 | 1.52 |
| 131.3               | 161.3       | 1.15            | 1.07 | 1.03 | 131.3       | 1.72            | 2.50 | 3.48 | 85.4                 | 2.10                            | 1.80 | 1.54 |
| 151.5               | 181.5       | 1.14            | 1.06 | 1.03 | 151.5       | 1.70            | 2.44 | 3.37 | 97.9                 | 2.10                            | 1.80 | 1.56 |
| 171.7               | 201.7       | 1.12            | 1.04 | 1.04 | 171.7       | 1.66            | 2.38 | 3.24 | 110.5                | 2.14                            | 1.83 | 1.58 |
| 191.9               | 221.9       | 1.10            | 1.04 | 1.06 | 191.9       | 1.68            | 2.38 | 3.22 | 123.1                | 2.19                            | 1.87 | 1.61 |
| 212.1               | 242.1       | 1.09            | 1.01 | 1.05 | 212.1       | 1.73            | 2.45 | 3.33 | 135.6                | 2.23                            | 1.90 | 1.63 |
| 232.3               | 262.3       | 1.08            | 1.01 | 1.05 | 232.3       | 1.76            | 2.52 | 3.39 | 148.2                | 2.21                            | 1.90 | 1.64 |
| 252.5               | 282.5       | 1.06            | 1.02 | 1.07 | 252.5       | 1.75            | 2.44 | 3.29 | 160.8                | 2.20                            | 1.89 | 1.64 |
| 272.8               | 302.8       | 1.06            | 1.02 | 1.08 | 272.8       | 1.80            | 2.52 | 3.35 | 173.3                | 2.19                            | 1.89 | 1.65 |
| 293.0               | 323.0       | 1.04            | 1.04 | 1.09 | 293.0       | 1.76            | 2.44 | 3.25 | 185.9                | 2.23                            | 1.93 | 1.69 |
| 313.2               | 343.2       | 1.02            | 1.05 | 1.10 | 313.2       | 1.82            | 2.52 | 3.35 | 198.5                | 2.28                            | 1.98 | 1.74 |
| 333.4               | 363.4       | 1.01            | 1.08 | 1.14 | 333.4       | 1.84            | 2.54 | 3.35 | 211.0                | 2.30                            | 2.01 | 1.77 |
| 353.6               | 383.6       | 1.04            | 1.11 | 1.17 | 353.6       | 1.83            | 2.50 | 3.28 | 223.6                | 2.27                            | 1.99 | 1.75 |
| 373.8               | 403.8       | 1.06            | 1.12 | 1.17 | 373.8       | 1.86            | 2.54 | 3.30 | 236.2                | 2.26                            | 1.97 | 1.74 |
| 394.0               | 424.0       | 1.07            | 1.12 | 1.14 | 394.0       | 1.87            | 2.51 | 3.29 | 248.7                | 2.28                            | 1.99 | 1.74 |
| 434.4               | 464.4       | 1.14            | 1.10 | 1.09 | 434.4       | 1.98            | 2.60 | 3.36 | 261.3                | 2.32                            | 2.03 | 1.79 |
| 454.6               | 484.6       | 1.22            | 1.16 | 1.12 | 454.6       | 2.07            | 2.72 | 3.47 | 273.8                | 2.34                            | 2.05 | 1.82 |
| 495.0               | 525.0       | 1.36            | 1.29 | 1.23 | 495.0       | 2.09            | 2.73 | 3.46 | 286.4                | 2.30                            | 2.05 | 1.83 |
| 515.2               | 545.2       | 1.46            | 1.39 | 1.33 | 515.2       | 2.13            | 2.78 | 3.51 | 299.0                | 2.27                            | 2.01 | 1.82 |
| 555.6               | 585.6       | 1.68            | 1.60 | 1.53 | 555.6       | 2.18            | 2.83 | 3.53 | 311.5                | 2.25                            | 2.01 | 1.81 |
| 575.8               | 605.8       | 1.80            | 1.70 | 1.63 | 575.8       | 2.14            | 2.77 | 3.47 | 324.1                | 2.29                            | 2.04 | 1.83 |
| 616.2               | 646.2       | 1.93            | 1.83 | 1.76 | 616.2       | 2.18            | 2.79 | 3.48 | 336.7                | 2.33                            | 2.08 | 1.87 |
| 636.4               | 666.4       | 1.98            | 1.88 | 1.81 | 636.4       | 2.20            | 2.82 | 3.50 | 349.2                | 2.34                            | 2.08 | 1.88 |
| 676.8               | 706.8       | 2.07            | 1.99 | 1.93 | 676.8       | 2.19            | 2.77 | 3.43 | 361.8                | 2.32                            | 2.05 | 1.86 |
| 697.0               | 727.0       | 2.16            | 2.08 | 2.02 | 697.0       | 2.23            | 2.80 | 3.46 | 374.4                | 2.29                            | 2.03 | 1.83 |
| 737.4               | 767.4       | 2.38            | 2.31 | 2.22 | 737.4       | 2.33            | 2.92 | 3.54 | 386.9                | 2.28                            | 2.03 | 1.84 |
| 757.7               | 787.7       | 2.47            | 2.39 | 2.30 | 757.7       | 2.31            | 2.85 | 3.47 | 399.5                | 2.32                            | 2.06 | 1.86 |
| 798.1               | 828.1       | 2.60            | 2.50 | 2.41 | 798.1       | 2.46            | 2.96 | 3.55 | 412.1                | 2.32                            | 2.07 | 1.88 |
| 818.3               | 848.3       | 2.69            | 2.58 | 2.49 | 818.3       | 2.56            | 3.05 | 3.60 | 424.6                | 2.28                            | 2.05 | 1.86 |
| 858.7               | 888.7       | 2.78            | 2.70 | 2.63 | 858.7       | 2.72            | 3.12 | 3.61 | 437.2                | 2.25                            | 2.01 | 1.83 |
| 878.9               | 908.9       | 2.81            | 2.74 | 2.69 | 878.9       | 2.84            | 3.21 | 3.66 | 449.7                | 2.28                            | 2.01 | 1.81 |
| 919.3               | 949.3       | 2.96            | 2.91 | 2.87 | 919.3       | 3.07            | 3.41 | 3.82 | 462.3                | 2.33                            | 2.04 | 1.84 |
| 939.5               | 969.5       | 2.97            | 2.93 | 2.91 | 939.5       | 3.09            | 3.38 | 3.76 | 474.9                | 2.33                            | 2.05 | 1.85 |
| 979.9               | 1009.9      | 3.00            | 2.96 | 2.96 | 979.9       | 3.19            | 3.48 | 3.83 | 487.4                | 2.31                            | 2.02 | 1.82 |
| 1000.1              | 1030.1      | 3.01            | 2.97 | 2.97 | 1000.1      | 3.22            | 3.52 | 3.86 | 500.0                | 2.36                            | 2.12 | 1.96 |

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## Harmonics Tables

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -      | 18  | 25  | 14  | 33  | 19  | 37  | 30  | 47  | 45  | 63  |
| 1      | -      | 21     | +0  | 29  | 12  | 32  | 21  | 40  | 37  | 48  | 50  | 48  |
| 2      | >100   | 67     | 58  | 69  | 59  | 64  | 54  | 65  | 55  | 74  | 64  | >81 |
| 3      | >100   | 71     | 59  | 74  | 59  | >81 | 56  | >81 | 73  | 77  | 77  | 76  |
| 4      | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 5      | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 6      | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 7      | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 8      | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 9      | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 10     | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

### LO HARMONICS ORDER

Test conditions:

RF IN: 250.1 MHz; -14.00 dBm.

LO IN: 280.01 MHz; +7.00 dBm

IF OUT: 29.91 MHz; -19.18 dBm

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -      | 28  | 35  | 24  | 44  | 31  | 48  | 42  | 59  | 59  | 75  |
| 1      | -      | 22     | +0  | 30  | 12  | 33  | 23  | 46  | 38  | 53  | 54  | 57  |
| 2      | 99     | 57     | 52  | 58  | 57  | 57  | 51  | 57  | 52  | 75  | 59  | 78  |
| 3      | >100   | 48     | 37  | 48  | 39  | 51  | 36  | 50  | 46  | 56  | 58  | 59  |
| 4      | >100   | 75     | 66  | 78  | 67  | 84  | 67  | 70  | 61  | 71  | 64  | 83  |
| 5      | >100   | 74     | 75  | 70  | 52  | 73  | 51  | 76  | 53  | 64  | 74  | 70  |
| 6      | >100   | 90     | 81  | 87  | 78  | 84  | 82  | >91 | 79  | 84  | 79  | >91 |
| 7      | >100   | >91    | 79  | 80  | 70  | 74  | 64  | 84  | 63  | 77  | 60  | 73  |
| 8      | >100   | >91    | >91 | >91 | >91 | 90  | >91 | >91 | 82  | >91 | 90  | 90  |
| 9      | >100   | >91    | >91 | >91 | 89  | >91 | 82  | >91 | 84  | 72  | 79  | >91 |
| 10     | >100   | >91    | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

### LO HARMONICS ORDER

Test conditions:

RF IN: 250.1 MHz; -4.00 dBm.

LO IN: 280.01 MHz; +7.00 dBm

IF OUT: 29.91 MHz; -9.37 dBm

Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.

2. + entry denotes harmonics are in (dBc) above IF OUTPUT.

3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

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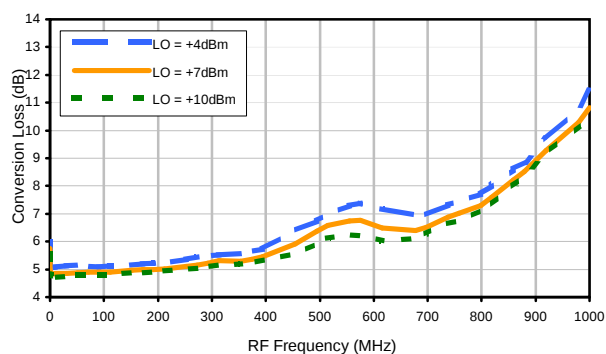


# Frequency Mixer

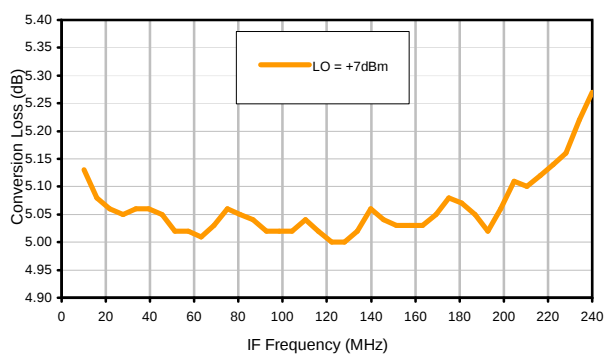
TSM-3+

## Typical Performance Curves

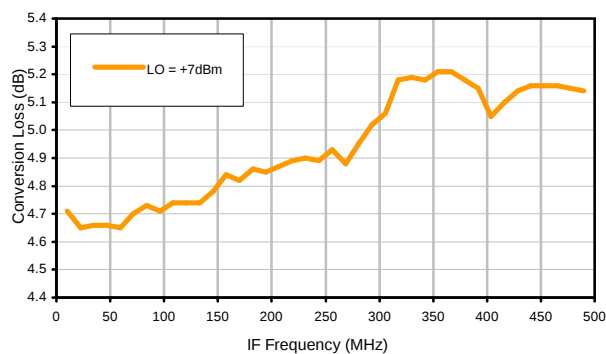
Conversion Loss @ IF=30MHz



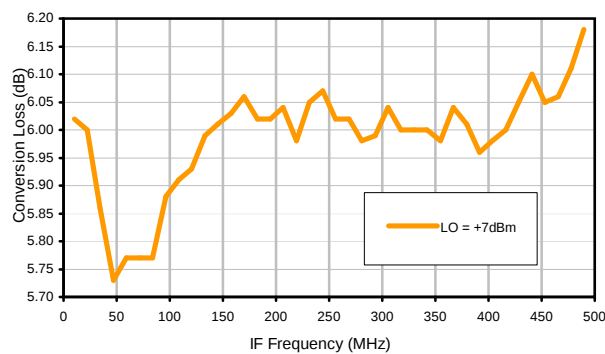
Conversion Loss vs. IF @ RF=250.1MHz



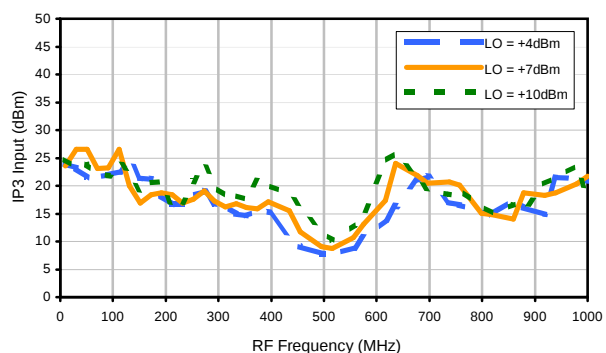
Conversion Loss vs. IF @ RF=10.1MHz



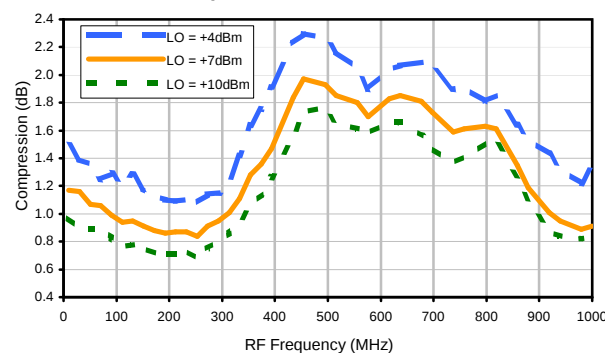
Conversion Loss vs. IF @ RF=500.1MHz



IP3 Input



Compression @ RF IN=+1dBm



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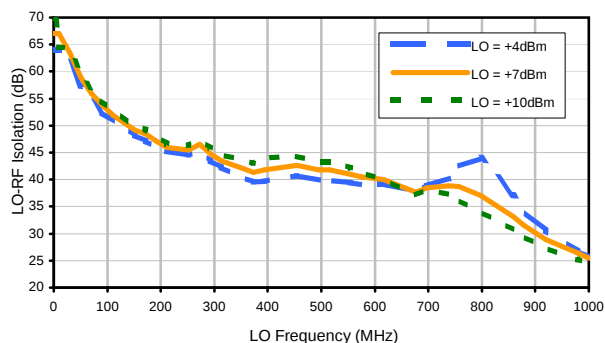


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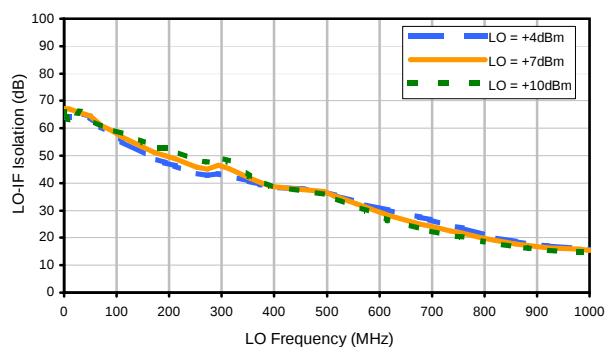


## Typical Performance Curves

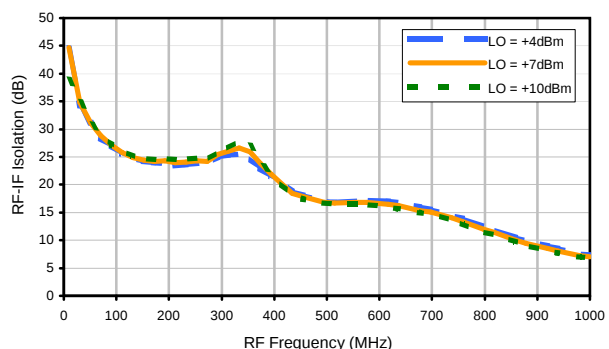
LO-RF Isolation



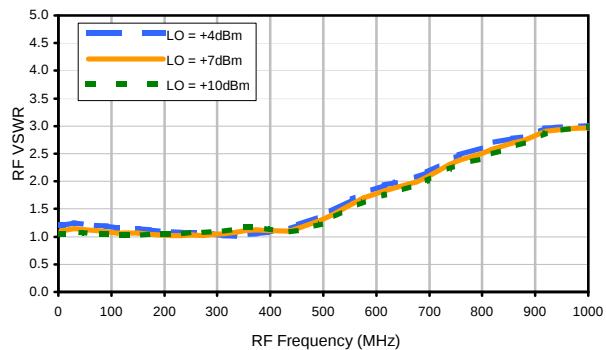
LO-IF Isolation



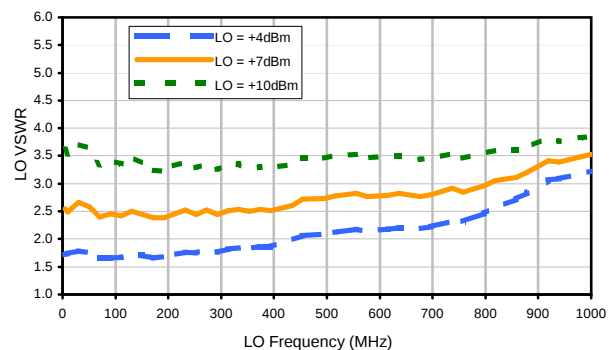
RF-IF Isolation



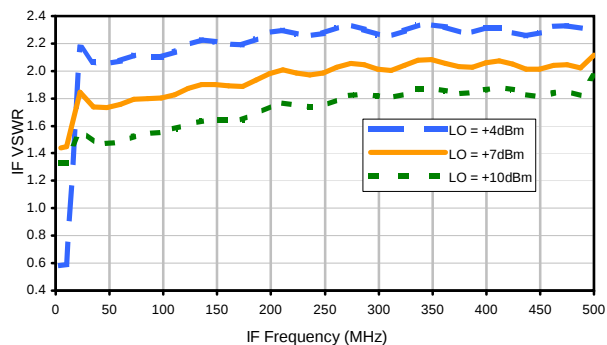
RF VSWR



LO VSWR



IF VSWR



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## Harmonics Tables

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -      | 18  | 25  | 14  | 33  | 19  | 37  | 30  | 47  | 45  | 63  |
| 1      | -      | 21     | +0  | 29  | 12  | 32  | 21  | 40  | 37  | 48  | 50  | 48  |
| 2      | >100   | 67     | 58  | 69  | 59  | 64  | 54  | 65  | 55  | 74  | 64  | >81 |
| 3      | >100   | 71     | 59  | 74  | 59  | >81 | 56  | >81 | 73  | 77  | 77  | 76  |
| 4      | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 5      | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 6      | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 7      | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 8      | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 9      | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| 10     | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 | >81 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

### LO HARMONICS ORDER

Test conditions:

RF IN: 250.1 MHz; -14.00 dBm.  
LO IN: 280.01 MHz; +7.00 dBm  
IF OUT: 29.91 MHz; -19.18 dBm

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -      | 28  | 35  | 24  | 44  | 31  | 48  | 42  | 59  | 59  | 75  |
| 1      | -      | 22     | +0  | 30  | 12  | 33  | 23  | 46  | 38  | 53  | 54  | 57  |
| 2      | 99     | 57     | 52  | 58  | 57  | 57  | 51  | 57  | 52  | 75  | 59  | 78  |
| 3      | >100   | 48     | 37  | 48  | 39  | 51  | 36  | 50  | 46  | 56  | 58  | 59  |
| 4      | >100   | 75     | 66  | 78  | 67  | 84  | 67  | 70  | 61  | 71  | 64  | 83  |
| 5      | >100   | 74     | 75  | 70  | 52  | 73  | 51  | 76  | 53  | 64  | 74  | 70  |
| 6      | >100   | 90     | 81  | 87  | 78  | 84  | 82  | >91 | 79  | 84  | 79  | >91 |
| 7      | >100   | >91    | 79  | 80  | 70  | 74  | 64  | 84  | 63  | 77  | 60  | 73  |
| 8      | >100   | >91    | >91 | >91 | >91 | 90  | >91 | >91 | 82  | >91 | 90  | 90  |
| 9      | >100   | >91    | >91 | >91 | 89  | >91 | 82  | >91 | 84  | 72  | 79  | >91 |
| 10     | >100   | >91    | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

### LO HARMONICS ORDER

Test conditions:

RF IN: 250.1 MHz; -4.00 dBm.  
LO IN: 280.01 MHz; +7.00 dBm  
IF OUT: 29.91 MHz; -9.37 dBm

Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.

2. + entry denotes harmonics are in (dBc) above IF OUTPUT.

3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

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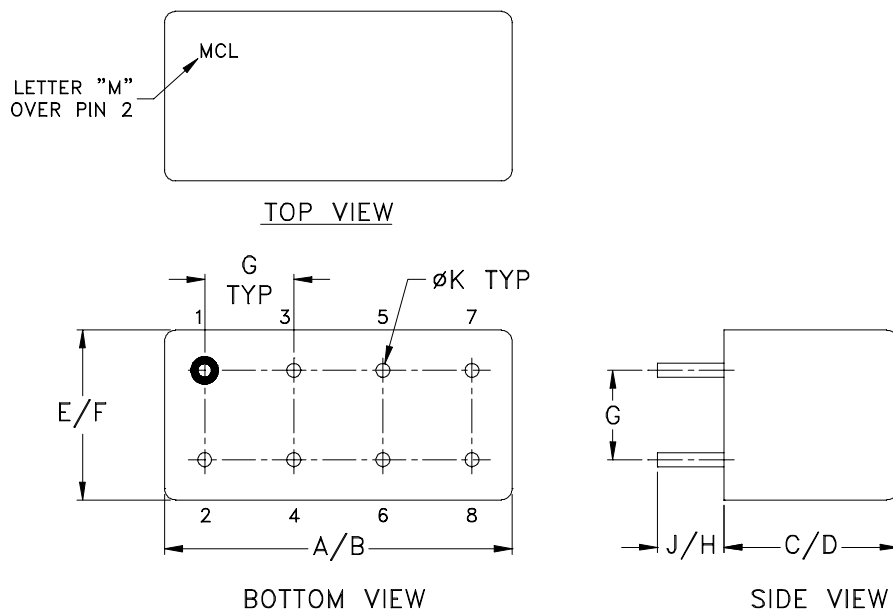
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A03

A11

## Outline Dimensions



| CASE# | A               | B               | C              | D               | E              | F              | G              | H             | J             | K             | WT,<br>GRAM |
|-------|-----------------|-----------------|----------------|-----------------|----------------|----------------|----------------|---------------|---------------|---------------|-------------|
| A03   | .480<br>(12.19) | .500<br>(12.70) | .390<br>(9.91) | .405<br>(10.29) | .210<br>(5.33) | .230<br>(5.84) | .100<br>(2.54) | .20<br>(5.08) | .14<br>(3.56) | .020<br>(.51) | 2.3         |
| A11   |                 |                 | .240<br>(6.10) | .255<br>(6.48)  |                |                |                |               |               |               | 1.9         |

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .03$ ; 3 Pl.  $\pm .015$

### Notes:

- Header material: C.R.S.  
Pin material: #52 alloy.  
Cover material: Cupro-Nickel.
- Pin finish: Electro Tin-Silver.
- Insulated spacer available. Request P/N B14-047-01.
- Tolerance on pin diameter  $\pm .005$  inch.
- Glass meniscus 0.015 inch max.
- Blue bead indicates Pin 1. Pin numbers do not appear on unit, for reference only.



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Mini-Circuits ISO 9001 & ISO 14001 Certified



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          | -55° to 100° C<br>Ambient Environment                                                                                                                           | Individual Model Data Sheet                                                                          |
| Storage Temperature            | -55° to 100° C<br>Ambient Environment                                                                                                                           | Individual Model Data Sheet                                                                          |
| Thermal Shock                  | -55° to 100°C, 100 cycles                                                                                                                                       | MIL-STD-202, Method 107, Condition A-3, except +100°C                                                |
| 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                                                                 |
| Moisture Resistance            | 10 cycles, 24 hours per cycle                                                                                                                                   | MIL-STD-202, Method 106, Condition A, except 50°C and end point electrical test done within 12 hours |
| Solderability                  | 10X Magnification                                                                                                                                               | J-STD-002, 95% Coverage                                                                              |
| Resistance to Solder Heat      | 260°C for 10 seconds                                                                                                                                            | MIL-STD-202, Method 210, Condition B                                                                 |
| 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                                                                              |
| Terminal Strength              | 4 1/2 Pound Pull                                                                                                                                                | MIL-STD-202, Method 211, Condition A                                                                 |



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| Specification       | Test/Inspection Condition | Reference/Spec                       |
|---------------------|---------------------------|--------------------------------------|
| Gross Leak          | 125°C Bubble Test         | MIL-STD-202, Method 112, Condition D |
| Barometric Pressure | 100,000 Feet              | MIL-STD-202, Method 105, Condition D |