

# Coaxial Frequency Mixer

Level 7 (LO Power +7 dBm) 0.15 to 400 MHz

**ZP-3+  
ZP-3**



Generic photo used for illustration purposes only

CASE STYLE: GG60

| Connectors | Model     |
|------------|-----------|
| BNC        | ZP-3+     |
| SMA        | ZP-3-S(+) |

**+RoHS Compliant**

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

## 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.

## Coaxial Connections

|    |   |
|----|---|
| LO | L |
| RF | R |
| IF | X |

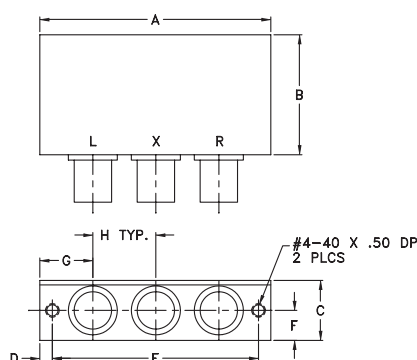
## Features

- low conversion loss, 4.7 dB typ.
- IF response to DC
- excellent L-R isolation, 46 dB typ., L-I, 47 dB typ.
- rugged shielded case

## Applications

- VHF/UHF
- cellular
- instrumentation

## Outline Drawing



## Outline Dimensions (inch)

| A     | B     | C     | D    | E     | F    | G     | H     | wt    |
|-------|-------|-------|------|-------|------|-------|-------|-------|
| 2.31  | 1.20  | .60   | .125 | 2.062 | .30  | .53   | .63   | grams |
| 58.67 | 30.48 | 15.24 | 3.18 | 52.37 | 7.62 | 13.46 | 16.00 | 75.0  |

## Electrical Specifications

| FREQUENCY<br>(MHz) |          | CONVERSION LOSS<br>(dB) |          |      |                        | LO-RF ISOLATION<br>(dB) |      |      |      |      |      | LO-IF ISOLATION<br>(dB) |      |      |      |      |      |
|--------------------|----------|-------------------------|----------|------|------------------------|-------------------------|------|------|------|------|------|-------------------------|------|------|------|------|------|
|                    |          | Mid-Band<br>m           |          |      |                        | L                       |      | M    |      | U    |      | L                       |      | M    |      | U    |      |
|                    | LO/RF IF | $\bar{X}$               | $\sigma$ | Max. | Total<br>Range<br>Max. | Typ.                    | Min. | Typ. | Min. | Typ. | Min. | Typ.                    | Min. | Typ. | Min. | Typ. | Min. |
| 0.15-400           | DC-400   | 4.7                     | 0.10     | 7.0  | 8.0                    | 60                      | 50   | 46   | 30   | 35   | 25   | 60                      | 40   | 47   | 25   | 35   | 20   |

1 dB COMP: +1 dBm typ.

For phase detection, DC output has positive polarity with in-phase LO and RF signals.

L = low range [ $f_L$  to  $10 f_L$ ]

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

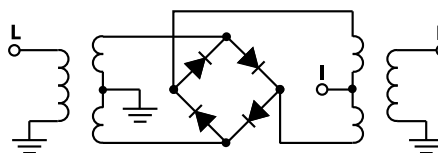
M = mid range [ $10 f_L$  to  $f_U/2$ ]

U = upper range [ $f_U/2$  to  $f_U$ ]

## Typical Performance Data

| Frequency<br>(MHz) |        | Conversion<br>Loss<br>(dB) | VSWR<br>RF Port<br>(:1) | Frequency<br>(MHz) | Isolation<br>L-R<br>(dB) | Isolation<br>L-I<br>(dB) | VSWR<br>LO Port<br>(:1) |
|--------------------|--------|----------------------------|-------------------------|--------------------|--------------------------|--------------------------|-------------------------|
| RF                 | LO     |                            |                         |                    |                          |                          |                         |
|                    |        | LO<br>+7dBm                | LO<br>+7dBm             |                    | LO<br>+7dBm              | LO<br>+7dBm              | LO<br>+7dBm             |
| 0.15               | 30.15  | 5.37                       | 1.57                    | 10.00              | 68.68                    | 61.84                    | 2.59                    |
| 0.23               | 30.23  | 5.27                       | 1.41                    | 20.00              | 65.36                    | 56.87                    | 2.60                    |
| 0.30               | 30.30  | 5.21                       | 1.33                    | 30.00              | 63.22                    | 54.20                    | 2.59                    |
| 0.50               | 30.50  | 5.16                       | 1.25                    | 40.00              | 61.75                    | 52.09                    | 2.58                    |
| 1.00               | 31.00  | 5.08                       | 1.21                    | 76.00              | 57.56                    | 47.59                    | 2.54                    |
| 2.80               | 32.80  | 4.91                       | 1.21                    | 94.00              | 56.48                    | 45.97                    | 2.50                    |
| 6.40               | 36.40  | 4.91                       | 1.21                    | 112.00             | 54.90                    | 44.70                    | 2.50                    |
| 10.00              | 40.00  | 4.73                       | 1.21                    | 149.00             | 52.63                    | 42.36                    | 2.57                    |
| 28.00              | 58.00  | 4.71                       | 1.21                    | 168.00             | 54.13                    | 42.02                    | 2.55                    |
| 64.00              | 94.00  | 4.75                       | 1.17                    | 206.00             | 49.62                    | 38.81                    | 2.62                    |
| 100.00             | 130.00 | 4.83                       | 1.14                    | 225.00             | 48.10                    | 38.56                    | 2.66                    |
| 138.00             | 168.00 | 4.85                       | 1.13                    | 244.00             | 48.03                    | 37.82                    | 2.68                    |
| 157.00             | 187.00 | 4.88                       | 1.10                    | 282.00             | 53.65                    | 37.79                    | 2.67                    |
| 195.00             | 225.00 | 4.92                       | 1.08                    | 301.00             | 55.10                    | 38.07                    | 2.76                    |
| 233.00             | 263.00 | 4.97                       | 1.10                    | 320.00             | 54.03                    | 37.59                    | 2.82                    |
| 252.00             | 282.00 | 5.10                       | 1.12                    | 340.00             | 52.86                    | 36.62                    | 2.76                    |
| 271.00             | 301.00 | 5.17                       | 1.14                    | 360.00             | 51.53                    | 35.44                    | 2.69                    |
| 290.00             | 320.00 | 5.15                       | 1.17                    | 390.00             | 47.44                    | 33.11                    | 2.86                    |
| 370.00             | 340.00 | 5.38                       | 1.10                    | 410.00             | 45.39                    | 32.24                    | 3.05                    |
| 400.00             | 370.00 | 5.41                       | 1.05                    | 430.00             | 44.42                    | 32.17                    | 3.06                    |

## Electrical Schematic



## Notes

- 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.
- 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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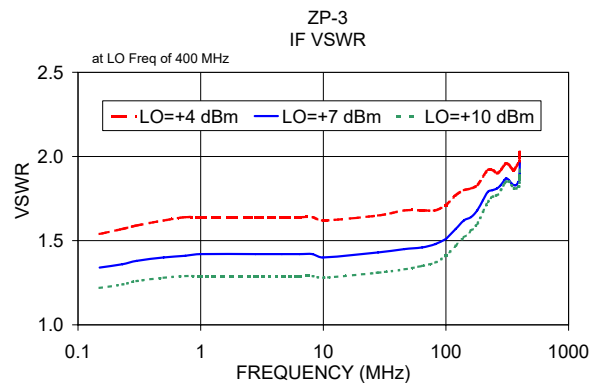
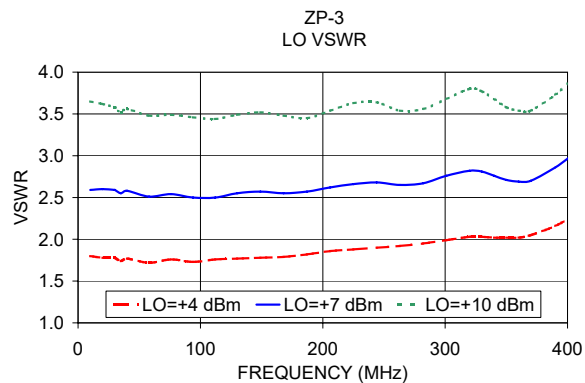
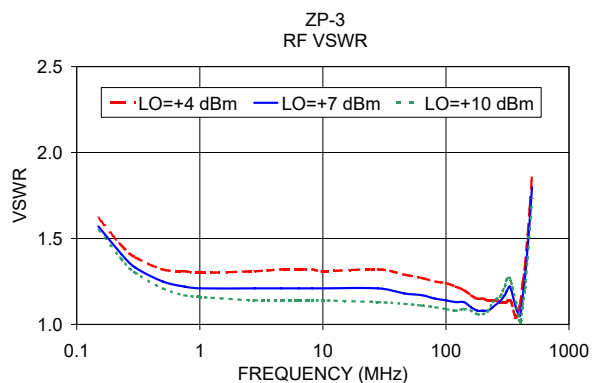
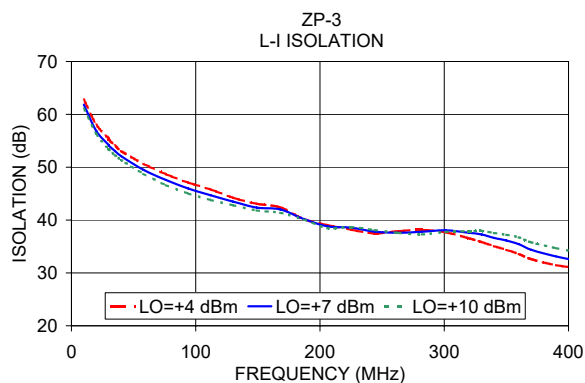
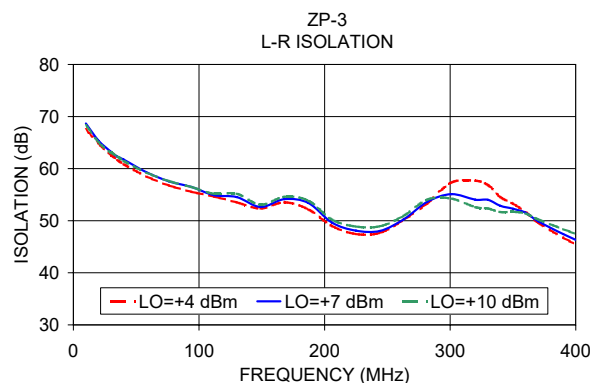
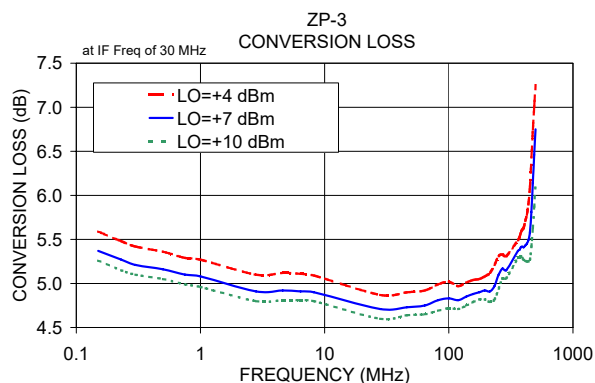


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# Performance Charts

**ZP-3+**  
**ZP-3**



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# Frequency Mixer

**ZP-3+**

## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>IF FIXED<br>@IF(OUT)=30MHz<br>(dB) |       |       | RF<br>(IN)<br>(MHz) | LO<br>(MHz) | IP3 INPUT<br>(dBm) |       |       | RF<br>(IN)<br>(MHz) | LO<br>(MHz) | COMPRESSION<br>@RF IN=+1dBm<br>(dB) |      |      |
|---------------------|-------------|-------------------------------------------------------|-------|-------|---------------------|-------------|--------------------|-------|-------|---------------------|-------------|-------------------------------------|------|------|
|                     |             | @LO (dBm)                                             |       |       |                     |             | @LO (dBm)          |       |       |                     |             | @LO (dBm)                           |      |      |
|                     |             |                                                       |       |       |                     |             |                    |       |       |                     |             |                                     |      |      |
| +4                  | +7          | +10                                                   | +4    | +7    | +10                 | +4          | +7                 | +10   | +4    | +7                  | +10         |                                     |      |      |
| 0.15                | 30.2        | 5.84                                                  | 5.60  | 5.46  | 10.1                | 40.1        | 17.19              | 21.35 | 19.03 | 10.1                | 40.1        | 1.15                                | 0.81 | 0.57 |
| 0.2                 | 30.2        | 5.75                                                  | 5.52  | 5.39  | 27.8                | 57.8        | 18.32              | 18.01 | 19.22 | 27.8                | 57.8        | 1.07                                | 0.80 | 0.57 |
| 0.3                 | 30.3        | 6.69                                                  | 5.47  | 5.33  | 45.5                | 75.5        | 19.83              | 18.86 | 24.60 | 45.5                | 75.5        | 1.22                                | 0.83 | 0.61 |
| 0.5                 | 30.5        | 5.64                                                  | 5.41  | 5.28  | 63.2                | 93.2        | 20.63              | 23.22 | 18.46 | 63.2                | 93.2        | 1.05                                | 0.77 | 0.54 |
| 1.0                 | 31.0        | 5.54                                                  | 5.31  | 5.20  | 80.9                | 110.9       | 16.80              | 26.58 | 16.94 | 80.9                | 110.9       | 0.97                                | 0.74 | 0.52 |
| 1.5                 | 31.5        | 5.47                                                  | 5.25  | 5.14  | 98.6                | 128.6       | 25.04              | 16.13 | 14.33 | 98.6                | 128.6       | 1.00                                | 0.64 | 0.52 |
| 2.0                 | 32.0        | 5.44                                                  | 5.22  | 5.10  | 116.3               | 146.3       | 18.41              | 17.83 | 17.27 | 116.3               | 146.3       | 0.96                                | 0.66 | 0.49 |
| 5.0                 | 35.0        | 5.44                                                  | 5.19  | 5.06  | 133.9               | 163.9       | 18.99              | 15.58 | 14.06 | 133.9               | 163.9       | 0.94                                | 0.72 | 0.53 |
| 10.0                | 40.0        | 5.46                                                  | 5.21  | 5.07  | 151.6               | 181.6       | 14.11              | 13.19 | 13.45 | 151.6               | 181.6       | 0.96                                | 0.72 | 0.56 |
| 27.8                | 57.8        | 5.11                                                  | 4.78  | 4.63  | 169.3               | 199.3       | 12.04              | 10.62 | 10.62 | 169.3               | 199.3       | 0.83                                | 0.64 | 0.49 |
| 45.5                | 75.5        | 5.16                                                  | 4.84  | 4.72  | 187.0               | 217.0       | 14.03              | 12.27 | 13.06 | 187.0               | 217.0       | 0.89                                | 0.64 | 0.50 |
| 98.6                | 128.6       | 5.10                                                  | 4.84  | 4.72  | 204.7               | 234.7       | 21.75              | 26.48 | 21.67 | 204.7               | 234.7       | 0.92                                | 0.69 | 0.51 |
| 116.3               | 146.3       | 5.16                                                  | 4.92  | 4.79  | 222.4               | 252.4       | 19.43              | 19.51 | 21.84 | 222.4               | 252.4       | 0.94                                | 0.72 | 0.57 |
| 133.9               | 163.9       | 5.14                                                  | 4.93  | 4.79  | 240.1               | 270.1       | 10.61              | 10.51 | 11.18 | 240.1               | 270.1       | 1.08                                | 0.83 | 0.65 |
| 151.6               | 181.6       | 5.19                                                  | 4.95  | 4.78  | 257.8               | 287.8       | 9.99               | 9.60  | 10.16 | 257.8               | 287.8       | 1.25                                | 0.93 | 0.73 |
| 169.3               | 199.3       | 5.29                                                  | 5.04  | 4.87  | 275.5               | 305.5       | 9.05               | 9.09  | 9.47  | 275.5               | 305.5       | 1.43                                | 1.04 | 0.81 |
| 187.0               | 217.0       | 5.31                                                  | 5.04  | 4.87  | 293.2               | 323.2       | 8.02               | 8.83  | 10.18 | 293.2               | 323.2       | 1.63                                | 1.19 | 0.91 |
| 222.4               | 252.4       | 5.44                                                  | 5.16  | 4.96  | 310.9               | 340.9       | 8.21               | 9.85  | 12.08 | 310.9               | 340.9       | 1.78                                | 1.25 | 0.94 |
| 240.1               | 270.1       | 5.45                                                  | 5.22  | 5.05  | 328.6               | 358.6       | 6.41               | 10.59 | 13.64 | 328.6               | 358.6       | 2.01                                | 1.50 | 1.10 |
| 257.8               | 287.8       | 5.43                                                  | 5.24  | 5.10  | 346.3               | 376.3       | 4.33               | 8.82  | 15.99 | 346.3               | 376.3       | 2.00                                | 1.67 | 1.31 |
| 275.5               | 305.5       | 5.41                                                  | 5.21  | 5.09  | 363.9               | 393.9       | 2.25               | 5.33  | 11.08 | 363.9               | 393.9       | 1.99                                | 1.76 | 1.49 |
| 293.2               | 323.2       | 5.46                                                  | 5.19  | 5.08  | 381.6               | 411.6       | 1.43               | 3.34  | 7.25  | 381.6               | 411.6       | 1.90                                | 1.69 | 1.53 |
| 310.9               | 340.9       | 5.59                                                  | 5.31  | 5.15  | 399.3               | 429.3       | 2.08               | 3.41  | 5.95  | 399.3               | 429.3       | 1.68                                | 1.55 | 1.49 |
| 346.3               | 376.3       | 6.23                                                  | 5.62  | 5.19  | 417.0               | 447.0       | 2.94               | 3.92  | 5.87  | 417.0               | 447.0       | 1.40                                | 1.32 | 1.27 |
| 363.9               | 393.9       | 6.64                                                  | 5.98  | 5.36  | 434.7               | 464.7       | 3.70               | 4.97  | 6.58  | 434.7               | 464.7       | 1.17                                | 1.12 | 1.07 |
| 381.6               | 411.6       | 6.92                                                  | 6.28  | 5.55  | 452.4               | 482.4       | 4.07               | 5.57  | 7.07  | 452.4               | 482.4       | 1.10                                | 1.04 | 1.01 |
| 399.3               | 429.3       | 7.15                                                  | 6.50  | 5.79  | 470.1               | 500.1       | 6.38               | 8.50  | 10.40 | 470.1               | 500.1       | 1.07                                | 0.99 | 0.97 |
| 417.0               | 447.0       | 7.57                                                  | 6.99  | 6.25  | 487.8               | 517.8       | 10.01              | 12.67 | 16.66 | 487.8               | 517.8       | 1.14                                | 1.02 | 0.90 |
| 452.4               | 482.4       | 8.14                                                  | 7.44  | 6.86  | 505.5               | 535.5       | 13.53              | 16.04 | 15.00 | 505.5               | 535.5       | 1.20                                | 1.10 | 0.94 |
| 470.1               | 500.1       | 8.03                                                  | 7.40  | 6.92  | 523.2               | 553.2       | 14.72              | 13.43 | 13.07 | 523.2               | 553.2       | 1.34                                | 1.18 | 0.97 |
| 487.8               | 517.8       | 7.98                                                  | 7.42  | 7.06  | 540.9               | 570.9       | 10.55              | 13.42 | 12.55 | 540.9               | 570.9       | 1.49                                | 1.23 | 1.01 |
| 505.5               | 535.5       | 8.12                                                  | 7.55  | 7.22  | 558.6               | 588.6       | 8.68               | 12.20 | 13.85 | 558.6               | 588.6       | 1.51                                | 1.07 | 0.83 |
| 540.9               | 570.9       | 7.97                                                  | 7.45  | 7.21  | 576.3               | 606.3       | 8.28               | 11.47 | 13.65 | 576.3               | 606.3       | 1.39                                | 0.93 | 0.71 |
| 558.6               | 588.6       | 7.95                                                  | 7.52  | 7.44  | 593.9               | 623.9       | 8.60               | 10.97 | 12.11 | 593.9               | 623.9       | 1.38                                | 0.88 | 0.66 |
| 576.3               | 606.3       | 8.19                                                  | 7.87  | 7.79  | 611.6               | 641.6       | 8.94               | 11.82 | 12.88 | 611.6               | 641.6       | 1.33                                | 0.83 | 0.65 |
| 593.9               | 623.9       | 8.53                                                  | 8.17  | 8.11  | 629.3               | 659.3       | 10.22              | 12.68 | 12.12 | 629.3               | 659.3       | 1.30                                | 0.75 | 0.65 |
| 611.6               | 641.6       | 8.76                                                  | 8.45  | 8.41  | 647.0               | 677.0       | 10.42              | 10.90 | 11.99 | 647.0               | 677.0       | 1.13                                | 0.66 | 0.62 |
| 647.0               | 677.0       | 9.48                                                  | 9.19  | 9.21  | 664.7               | 694.7       | 11.02              | 10.57 | 9.90  | 664.7               | 694.7       | 1.05                                | 0.64 | 0.63 |
| 682.4               | 712.4       | 10.44                                                 | 10.16 | 10.11 | 682.4               | 712.4       | 10.02              | 9.84  | 9.42  | 682.4               | 712.4       | 1.19                                | 0.76 | 0.80 |
| 700.1               | 730.1       | 10.89                                                 | 10.62 | 10.53 | 700.1               | 730.1       | 10.10              | 11.11 | 9.05  | 700.1               | 730.1       | 1.32                                | 0.82 | 0.80 |

REV. X2

ZP-3+

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**Mini-Circuits®**

IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS 9100 CERTIFIED • RoHS compliant

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# Frequency Mixer

**ZP-3+**

## Typical Performance Data

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=200.1MHz<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)=400.1MHz<br>(dB) |
|----------------------|-------------|-----------------------------------------------------------------|----------------------|-------------|----------------------------------------------------------------|----------------------|-------------|-----------------------------------------------------------------|
|                      |             | @LO (dBm)                                                       |                      |             | @LO (dBm)                                                      |                      |             | @LO (dBm)                                                       |
|                      |             | +7                                                              |                      |             | +7                                                             |                      |             | +7                                                              |
| 190.0                | 10.1        | 5.14                                                            | 10.0                 | 20.1        | 4.69                                                           | 390.0                | 10.1        | 6.14                                                            |
| 185.4                | 14.7        | 5.14                                                            | 19.7                 | 29.8        | 4.68                                                           | 380.3                | 19.8        | 6.10                                                            |
| 180.8                | 19.3        | 5.10                                                            | 29.5                 | 39.6        | 4.64                                                           | 370.5                | 29.6        | 6.04                                                            |
| 176.2                | 23.9        | 5.04                                                            | 39.2                 | 49.3        | 4.68                                                           | 360.8                | 39.3        | 6.01                                                            |
| 171.5                | 28.6        | 5.03                                                            | 49.0                 | 59.1        | 4.75                                                           | 351.0                | 49.1        | 6.00                                                            |
| 166.9                | 33.2        | 4.98                                                            | 58.7                 | 68.8        | 4.70                                                           | 341.3                | 58.8        | 5.96                                                            |
| 162.3                | 37.8        | 4.97                                                            | 68.5                 | 78.6        | 4.77                                                           | 331.5                | 68.6        | 5.95                                                            |
| 157.7                | 42.4        | 4.97                                                            | 78.2                 | 88.3        | 4.79                                                           | 321.8                | 78.3        | 6.01                                                            |
| 153.1                | 47.0        | 4.98                                                            | 87.9                 | 98.0        | 4.77                                                           | 312.1                | 88.0        | 6.01                                                            |
| 148.5                | 51.6        | 4.96                                                            | 97.7                 | 107.8       | 4.79                                                           | 302.3                | 97.8        | 5.95                                                            |
| 143.8                | 56.3        | 4.95                                                            | 107.4                | 117.5       | 4.78                                                           | 292.6                | 107.5       | 5.95                                                            |
| 139.2                | 60.9        | 4.95                                                            | 117.2                | 127.3       | 4.80                                                           | 282.8                | 117.3       | 5.94                                                            |
| 134.6                | 65.5        | 4.93                                                            | 126.9                | 137.0       | 4.80                                                           | 273.1                | 127.0       | 5.94                                                            |
| 130.0                | 70.1        | 4.94                                                            | 136.7                | 146.8       | 4.85                                                           | 263.3                | 136.8       | 5.97                                                            |
| 125.4                | 74.7        | 4.95                                                            | 146.4                | 156.5       | 4.90                                                           | 253.6                | 146.5       | 6.05                                                            |
| 120.8                | 79.3        | 4.96                                                            | 156.2                | 166.3       | 4.90                                                           | 243.8                | 156.3       | 6.05                                                            |
| 116.2                | 83.9        | 4.96                                                            | 165.9                | 176.0       | 4.90                                                           | 234.1                | 166.0       | 6.02                                                            |
| 111.5                | 88.6        | 4.96                                                            | 175.6                | 185.7       | 4.91                                                           | 224.4                | 175.7       | 6.02                                                            |
| 106.9                | 93.2        | 4.95                                                            | 185.4                | 195.5       | 4.94                                                           | 214.6                | 185.5       | 6.02                                                            |
| 102.3                | 97.8        | 4.91                                                            | 195.1                | 205.2       | 4.88                                                           | 204.9                | 195.2       | 6.01                                                            |
| 97.7                 | 102.4       | 4.91                                                            | 204.9                | 215.0       | 4.87                                                           | 195.1                | 205.0       | 6.02                                                            |
| 93.1                 | 107.0       | 4.94                                                            | 214.6                | 224.7       | 4.93                                                           | 185.4                | 214.7       | 6.01                                                            |
| 88.5                 | 111.6       | 4.95                                                            | 224.4                | 234.5       | 4.93                                                           | 175.6                | 224.5       | 5.97                                                            |
| 83.8                 | 116.3       | 4.96                                                            | 234.1                | 244.2       | 5.01                                                           | 165.9                | 234.2       | 5.92                                                            |
| 79.2                 | 120.9       | 4.95                                                            | 243.8                | 253.9       | 5.19                                                           | 156.2                | 243.9       | 5.96                                                            |
| 74.6                 | 125.5       | 4.95                                                            | 253.6                | 263.7       | 5.27                                                           | 146.4                | 253.7       | 5.96                                                            |
| 70.0                 | 130.1       | 4.95                                                            | 263.3                | 273.4       | 5.23                                                           | 136.7                | 263.4       | 5.92                                                            |
| 65.4                 | 134.7       | 4.94                                                            | 273.1                | 283.2       | 5.26                                                           | 126.9                | 273.2       | 5.97                                                            |
| 60.8                 | 139.3       | 4.93                                                            | 282.8                | 292.9       | 5.21                                                           | 117.2                | 282.9       | 5.98                                                            |
| 56.2                 | 143.9       | 4.95                                                            | 292.6                | 302.7       | 5.08                                                           | 107.4                | 292.7       | 5.88                                                            |
| 51.5                 | 148.6       | 4.95                                                            | 302.3                | 312.4       | 5.11                                                           | 97.7                 | 302.4       | 5.90                                                            |
| 46.9                 | 153.2       | 4.93                                                            | 312.1                | 322.2       | 5.07                                                           | 87.9                 | 312.2       | 5.92                                                            |
| 42.3                 | 157.8       | 4.95                                                            | 321.8                | 331.9       | 4.97                                                           | 78.2                 | 321.9       | 5.85                                                            |
| 37.7                 | 162.4       | 4.96                                                            | 331.5                | 341.6       | 4.99                                                           | 68.5                 | 331.6       | 5.75                                                            |
| 33.1                 | 167.0       | 4.96                                                            | 341.3                | 351.4       | 4.97                                                           | 58.7                 | 341.4       | 5.65                                                            |
| 28.5                 | 171.6       | 4.99                                                            | 351.0                | 361.1       | 4.97                                                           | 49.0                 | 351.1       | 5.65                                                            |
| 23.8                 | 176.3       | 5.01                                                            | 360.8                | 370.9       | 5.11                                                           | 39.2                 | 360.9       | 5.70                                                            |
| 19.2                 | 180.9       | 4.98                                                            | 370.5                | 380.6       | 5.18                                                           | 29.5                 | 370.6       | 5.77                                                            |
| 14.6                 | 185.5       | 5.05                                                            | 380.3                | 390.4       | 5.14                                                           | 19.7                 | 380.4       | 5.95                                                            |
| 10.0                 | 190.1       | 5.04                                                            | 390.0                | 400.1       | 5.19                                                           | 10.0                 | 390.1       | 6.03                                                            |

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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   |
| 0.15        | 82.59                   | 77.37 | 74.58 | 60.69                   | 63.67 | 66.98 |
| 0.2         | 83.04                   | 77.64 | 74.35 | 60.44                   | 63.64 | 66.75 |
| 0.3         | 82.49                   | 77.00 | 74.12 | 60.19                   | 63.40 | 66.52 |
| 0.5         | 81.86                   | 76.78 | 74.01 | 60.36                   | 63.48 | 66.51 |
| 1.0         | 80.26                   | 76.45 | 73.66 | 60.46                   | 63.55 | 66.86 |
| 1.5         | 80.37                   | 75.88 | 73.40 | 60.37                   | 63.58 | 66.40 |
| 2.0         | 79.14                   | 75.76 | 73.07 | 60.34                   | 63.46 | 66.57 |
| 5.0         | 77.84                   | 74.18 | 72.40 | 60.54                   | 63.18 | 65.20 |
| 10.0        | 74.42                   | 72.35 | 70.36 | 59.32                   | 61.65 | 63.66 |
| 27.8        | 63.36                   | 64.37 | 64.63 | 65.82                   | 64.86 | 63.03 |
| 45.5        | 59.13                   | 60.10 | 60.69 | 61.27                   | 59.10 | 58.04 |
| 98.6        | 52.71                   | 53.38 | 53.86 | 52.07                   | 52.15 | 51.66 |
| 116.3       | 50.71                   | 51.70 | 52.21 | 51.00                   | 51.11 | 50.48 |
| 133.9       | 49.83                   | 50.33 | 50.90 | 48.95                   | 49.53 | 48.82 |
| 151.6       | 49.09                   | 50.12 | 50.47 | 48.78                   | 49.06 | 47.96 |
| 169.3       | 46.78                   | 47.47 | 48.21 | 48.66                   | 48.85 | 47.25 |
| 187.0       | 45.40                   | 45.85 | 46.04 | 49.47                   | 48.40 | 47.07 |
| 222.4       | 45.59                   | 45.68 | 45.92 | 47.27                   | 45.31 | 43.31 |
| 240.1       | 46.94                   | 46.37 | 46.00 | 44.01                   | 42.26 | 40.97 |
| 257.8       | 49.47                   | 48.54 | 47.19 | 42.36                   | 40.12 | 38.69 |
| 275.5       | 53.60                   | 51.81 | 49.42 | 44.13                   | 39.87 | 37.68 |
| 293.2       | 49.36                   | 48.94 | 47.44 | 46.76                   | 40.23 | 37.20 |
| 310.9       | 46.45                   | 48.13 | 48.53 | 50.46                   | 40.02 | 36.05 |
| 346.3       | 43.55                   | 46.50 | 48.48 | 43.66                   | 36.70 | 32.41 |
| 363.9       | 43.37                   | 46.26 | 49.20 | 38.59                   | 35.36 | 31.91 |
| 381.6       | 43.61                   | 46.24 | 49.52 | 35.50                   | 33.67 | 31.30 |
| 399.3       | 46.01                   | 50.53 | 59.92 | 32.90                   | 31.38 | 29.23 |
| 417.0       | 45.82                   | 49.32 | 53.26 | 30.76                   | 29.64 | 27.85 |
| 452.4       | 43.93                   | 45.55 | 47.26 | 27.62                   | 26.66 | 25.59 |
| 470.1       | 42.42                   | 43.87 | 45.53 | 26.75                   | 25.85 | 24.76 |
| 487.8       | 39.39                   | 39.99 | 40.47 | 25.79                   | 25.09 | 23.81 |
| 505.5       | 37.41                   | 38.12 | 37.97 | 24.69                   | 24.25 | 22.78 |
| 540.9       | 33.55                   | 34.16 | 33.19 | 22.22                   | 22.21 | 20.41 |
| 558.6       | 32.20                   | 33.05 | 31.90 | 21.18                   | 21.39 | 19.33 |
| 576.3       | 30.41                   | 31.10 | 29.80 | 20.16                   | 20.30 | 18.32 |
| 593.9       | 28.62                   | 29.15 | 27.73 | 18.89                   | 19.10 | 17.27 |
| 611.6       | 26.80                   | 27.33 | 26.40 | 17.39                   | 17.51 | 16.24 |
| 647.0       | 23.27                   | 23.69 | 23.30 | 14.91                   | 15.10 | 14.35 |
| 682.4       | 20.87                   | 21.10 | 20.88 | 13.92                   | 13.89 | 13.07 |
| 700.1       | 20.19                   | 20.35 | 20.16 | 13.64                   | 13.45 | 12.65 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | +4                      | +7    | +10   |
| 10.1                | 40.1        | 41.02                   | 36.72 | 39.99 |
| 27.8                | 57.8        | 31.44                   | 32.31 | 32.00 |
| 45.5                | 75.5        | 28.16                   | 28.67 | 28.44 |
| 63.2                | 93.2        | 26.34                   | 26.37 | 26.37 |
| 80.9                | 110.9       | 24.81                   | 25.10 | 25.16 |
| 98.6                | 128.6       | 23.64                   | 23.75 | 24.00 |
| 116.3               | 146.3       | 23.28                   | 23.47 | 23.65 |
| 133.9               | 163.9       | 22.66                   | 23.09 | 23.33 |
| 151.6               | 181.6       | 22.34                   | 22.83 | 23.38 |
| 169.3               | 199.3       | 22.24                   | 22.56 | 22.94 |
| 187.0               | 217.0       | 22.96                   | 23.18 | 23.38 |
| 204.7               | 234.7       | 24.00                   | 24.27 | 24.42 |
| 222.4               | 252.4       | 25.41                   | 26.21 | 26.83 |
| 240.1               | 270.1       | 25.85                   | 27.03 | 28.34 |
| 257.8               | 287.8       | 24.66                   | 25.82 | 26.80 |
| 275.5               | 305.5       | 22.30                   | 22.91 | 23.41 |
| 293.2               | 323.2       | 20.22                   | 20.34 | 20.39 |
| 310.9               | 340.9       | 18.84                   | 18.70 | 18.56 |
| 328.6               | 358.6       | 17.74                   | 17.42 | 17.23 |
| 346.3               | 376.3       | 16.94                   | 16.73 | 16.59 |
| 363.9               | 393.9       | 16.36                   | 16.21 | 16.15 |
| 381.6               | 411.6       | 16.28                   | 16.17 | 16.10 |
| 399.3               | 429.3       | 16.54                   | 16.31 | 16.22 |
| 417.0               | 447.0       | 17.05                   | 16.85 | 16.72 |
| 434.7               | 464.7       | 17.22                   | 17.06 | 16.93 |
| 452.4               | 482.4       | 17.00                   | 16.93 | 16.97 |
| 470.1               | 500.1       | 16.33                   | 16.36 | 16.44 |
| 487.8               | 517.8       | 15.44                   | 15.47 | 15.58 |
| 505.5               | 535.5       | 14.77                   | 14.88 | 14.83 |
| 523.2               | 553.2       | 13.94                   | 13.88 | 13.69 |
| 540.9               | 570.9       | 13.20                   | 13.04 | 12.70 |
| 558.6               | 588.6       | 12.41                   | 12.06 | 11.56 |
| 576.3               | 606.3       | 11.44                   | 11.02 | 10.43 |
| 593.9               | 623.9       | 10.63                   | 10.17 | 9.67  |
| 611.6               | 641.6       | 9.69                    | 9.25  | 8.81  |
| 629.3               | 659.3       | 8.83                    | 8.41  | 8.00  |
| 647.0               | 677.0       | 8.05                    | 7.67  | 7.34  |
| 664.7               | 694.7       | 7.36                    | 7.02  | 6.68  |
| 682.4               | 712.4       | 6.95                    | 6.61  | 6.36  |
| 700.1               | 730.1       | 6.62                    | 6.30  | 6.07  |

# Frequency Mixer

**ZP-3+**

## 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=400.1MHz<br>(:1) |      |      |
|---------------------|-------------|-----------------|------|------|-------------|-----------------|------|------|----------------------|---------------------------------|------|------|
|                     |             | @LO (dBm)       |      |      |             | @LO (dBm)       |      |      |                      | @LO (dBm)                       |      |      |
|                     |             | +4              | +7   | +10  |             | +4              | +7   | +10  |                      | +4                              | +7   | +10  |
| 5.0                 | 35.0        | 1.27            | 1.21 | 1.22 | 5.0         | 1.81            | 2.60 | 3.64 | 5.0                  | 1.67                            | 1.41 | 1.23 |
| 10.0                | 40.0        | 1.19            | 1.09 | 1.07 | 10.0        | 1.71            | 2.50 | 3.52 | 10.0                 | 1.68                            | 1.41 | 1.23 |
| 27.8                | 57.8        | 1.33            | 1.22 | 1.15 | 27.8        | 1.58            | 2.44 | 3.49 | 20.0                 | 2.01                            | 1.61 | 1.31 |
| 45.5                | 75.5        | 1.37            | 1.25 | 1.16 | 45.5        | 1.58            | 2.37 | 3.40 | 30.0                 | 2.16                            | 1.75 | 1.44 |
| 63.2                | 93.2        | 1.30            | 1.23 | 1.15 | 63.2        | 1.51            | 2.21 | 3.12 | 40.0                 | 2.23                            | 1.84 | 1.50 |
| 80.9                | 110.9       | 1.30            | 1.20 | 1.14 | 80.9        | 1.49            | 2.14 | 2.98 | 50.0                 | 2.28                            | 1.86 | 1.53 |
| 98.6                | 128.6       | 1.28            | 1.19 | 1.13 | 98.6        | 1.50            | 2.19 | 3.06 | 60.0                 | 2.24                            | 1.85 | 1.52 |
| 116.3               | 146.3       | 1.29            | 1.18 | 1.12 | 116.3       | 1.57            | 2.30 | 3.22 | 70.0                 | 2.25                            | 1.84 | 1.52 |
| 133.9               | 163.9       | 1.27            | 1.18 | 1.12 | 133.9       | 1.62            | 2.36 | 3.29 | 80.0                 | 2.20                            | 1.81 | 1.52 |
| 151.6               | 181.6       | 1.27            | 1.17 | 1.10 | 151.6       | 1.61            | 2.30 | 3.18 | 90.0                 | 2.28                            | 1.88 | 1.54 |
| 169.3               | 199.3       | 1.25            | 1.16 | 1.11 | 169.3       | 1.60            | 2.26 | 3.10 | 100.0                | 2.31                            | 1.89 | 1.57 |
| 187.0               | 217.0       | 1.24            | 1.16 | 1.11 | 187.0       | 1.62            | 2.29 | 3.13 | 110.0                | 2.28                            | 1.90 | 1.58 |
| 204.7               | 234.7       | 1.20            | 1.11 | 1.08 | 204.7       | 1.70            | 2.39 | 3.26 | 120.0                | 2.27                            | 1.89 | 1.58 |
| 222.4               | 252.4       | 1.21            | 1.12 | 1.09 | 222.4       | 1.77            | 2.47 | 3.36 | 130.0                | 2.28                            | 1.89 | 1.59 |
| 240.1               | 270.1       | 1.18            | 1.12 | 1.10 | 240.1       | 1.82            | 2.50 | 3.35 | 140.0                | 2.31                            | 1.92 | 1.61 |
| 257.8               | 287.8       | 1.15            | 1.09 | 1.09 | 257.8       | 1.82            | 2.49 | 3.34 | 150.0                | 2.37                            | 1.99 | 1.66 |
| 275.5               | 305.5       | 1.11            | 1.05 | 1.07 | 275.5       | 1.84            | 2.50 | 3.35 | 160.0                | 2.44                            | 2.04 | 1.71 |
| 293.2               | 323.2       | 1.07            | 1.02 | 1.07 | 293.2       | 1.90            | 2.57 | 3.44 | 170.0                | 2.42                            | 2.04 | 1.72 |
| 310.9               | 340.9       | 1.11            | 1.02 | 1.03 | 310.9       | 1.98            | 2.66 | 3.54 | 180.0                | 2.38                            | 2.01 | 1.70 |
| 328.6               | 358.6       | 1.22            | 1.12 | 1.07 | 328.6       | 2.06            | 2.70 | 3.55 | 190.0                | 2.32                            | 1.96 | 1.66 |
| 346.3               | 376.3       | 1.37            | 1.25 | 1.19 | 346.3       | 2.12            | 2.73 | 3.54 | 200.0                | 2.29                            | 1.94 | 1.65 |
| 363.9               | 393.9       | 1.54            | 1.43 | 1.33 | 363.9       | 2.19            | 2.81 | 3.60 | 210.0                | 2.26                            | 1.94 | 1.67 |
| 381.6               | 411.6       | 1.70            | 1.58 | 1.47 | 381.6       | 2.27            | 2.94 | 3.76 | 220.0                | 2.29                            | 1.96 | 1.70 |
| 399.3               | 429.3       | 1.85            | 1.73 | 1.60 | 399.3       | 2.35            | 3.08 | 3.94 | 230.0                | 2.36                            | 2.03 | 1.75 |
| 417.0               | 447.0       | 2.14            | 2.01 | 1.85 | 417.0       | 2.43            | 3.17 | 4.07 | 240.0                | 2.40                            | 2.08 | 1.81 |
| 434.7               | 464.7       | 2.34            | 2.19 | 2.03 | 434.7       | 2.46            | 3.18 | 4.07 | 250.0                | 2.39                            | 2.08 | 1.83 |
| 452.4               | 482.4       | 2.42            | 2.26 | 2.10 | 452.4       | 2.48            | 3.17 | 4.05 | 260.0                | 2.34                            | 2.05 | 1.81 |
| 470.1               | 500.1       | 2.40            | 2.26 | 2.12 | 470.1       | 2.53            | 3.22 | 4.09 | 270.0                | 2.30                            | 2.00 | 1.77 |
| 487.8               | 517.8       | 2.40            | 2.27 | 2.17 | 487.8       | 2.60            | 3.30 | 4.19 | 280.0                | 2.32                            | 2.00 | 1.76 |
| 505.5               | 535.5       | 2.55            | 2.42 | 2.34 | 505.5       | 2.68            | 3.37 | 4.25 | 290.0                | 2.30                            | 2.01 | 1.79 |
| 523.2               | 553.2       | 2.58            | 2.45 | 2.38 | 523.2       | 2.72            | 3.38 | 4.23 | 300.0                | 2.30                            | 2.04 | 1.83 |
| 540.9               | 570.9       | 2.52            | 2.41 | 2.34 | 540.9       | 2.75            | 3.36 | 4.16 | 310.0                | 2.33                            | 2.04 | 1.85 |
| 558.6               | 588.6       | 2.48            | 2.40 | 2.34 | 558.6       | 2.78            | 3.37 | 4.14 | 320.0                | 2.33                            | 2.05 | 1.85 |
| 576.3               | 606.3       | 2.52            | 2.45 | 2.39 | 576.3       | 2.85            | 3.40 | 4.15 | 330.0                | 2.31                            | 2.05 | 1.86 |
| 593.9               | 623.9       | 2.57            | 2.52 | 2.45 | 593.9       | 2.93            | 3.45 | 4.18 | 340.0                | 2.28                            | 2.02 | 1.85 |
| 611.6               | 641.6       | 2.58            | 2.51 | 2.45 | 611.6       | 3.03            | 3.51 | 4.21 | 350.0                | 2.30                            | 2.02 | 1.83 |
| 629.3               | 659.3       | 2.51            | 2.45 | 2.41 | 629.3       | 3.18            | 3.59 | 4.25 | 360.0                | 2.33                            | 2.03 | 1.83 |
| 647.0               | 677.0       | 2.51            | 2.45 | 2.42 | 647.0       | 3.36            | 3.73 | 4.32 | 370.0                | 2.36                            | 2.07 | 1.85 |
| 664.7               | 694.7       | 2.49            | 2.44 | 2.41 | 664.7       | 3.54            | 3.88 | 4.43 | 380.0                | 2.35                            | 2.05 | 1.86 |
| 682.4               | 712.4       | 2.47            | 2.41 | 2.37 | 682.4       | 3.67            | 4.03 | 4.55 | 390.0                | 2.28                            | 2.01 | 1.84 |
| 700.1               | 730.1       | 2.43            | 2.35 | 2.32 | 700.1       | 3.73            | 4.11 | 4.61 | 400.0                | 2.28                            | 2.02 | 1.87 |

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## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 16  | 31  | 11  | 52  | 19  | 43  | 24  | 39  | 37  | 47  |
| 1  | -      | 19     | +0  | 24  | 11  | 35  | 30  | 42  | 38  | 43  | 39  | 48  |
| 2  | >100   | 57     | 56  | 55  | 57  | 56  | 51  | 72  | 59  | 67  | 59  | >81 |
| 3  | >100   | 76     | 71  | 74  | 65  | 72  | 65  | 77  | 73  | 72  | 66  | 75  |
| 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 | 78  | >81 | >81 | >81 | >81 | >81 |
| 7  | >100   | >81    | >81 | >81 | >81 | >81 | >81 | 72  | >81 | >81 | >81 | >81 |
| 8  | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | 62  | >81 | >81 | >81 |
| 9  | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | 75  | >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: 200.1 MHz; -14.00 dBm.  
LO IN: 230.01 MHz; +7.00 dBm  
IF OUT: 29.91 MHz; -19.24 dBm

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |    |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|
| 0  | -      | -      | 26  | 39  | 21  | 55  | 30  | 61  | 39  | 50  | 50 | 60  |
| 1  | -      | 19     | +0  | 25  | 11  | 34  | 32  | 48  | 38  | 48  | 45 | 57  |
| 2  | >100   | 54     | 50  | 52  | 52  | 50  | 46  | 64  | 53  | 58  | 52 | 66  |
| 3  | >100   | 51     | 41  | 49  | 45  | 53  | 39  | 65  | 55  | 55  | 53 | 56  |
| 4  | >100   | 68     | 68  | 66  | 64  | 64  | 64  | 66  | 62  | 83  | 67 | 76  |
| 5  | >100   | 70     | 60  | 56  | 51  | 62  | 51  | 63  | 53  | 65  | 68 | 68  |
| 6  | >100   | 89     | 86  | 84  | 79  | 81  | 78  | 84  | >91 | 79  | 87 | 90  |
| 7  | >100   | 89     | 90  | 83  | 75  | 69  | 71  | 72  | 67  | 75  | 67 | 82  |
| 8  | >100   | >91    | >91 | >91 | >91 | >91 | 86  | 87  | 70  | 89  | 81 | 86  |
| 9  | >100   | >91    | 88  | >91 | 90  | >91 | 76  | 78  | 76  | 79  | 79 | 90  |
| 10 | >100   | >91    | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 | 89 | >91 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9  | 10  |

### LO HARMONICS ORDER

Test conditions: RF IN: 200.1 MHz; -4.00 dBm.  
LO IN: 230.01 MHz; +7.00 dBm  
IF OUT: 29.91 MHz; -9.22 dBm

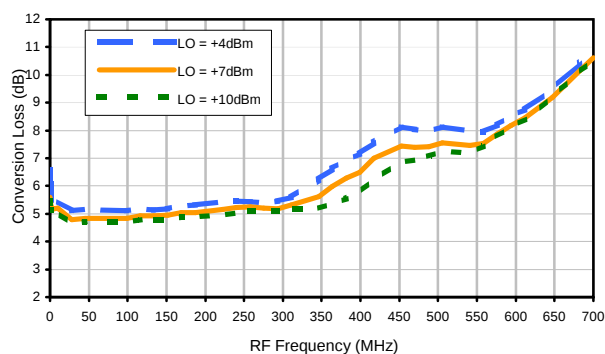
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.  
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.  
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

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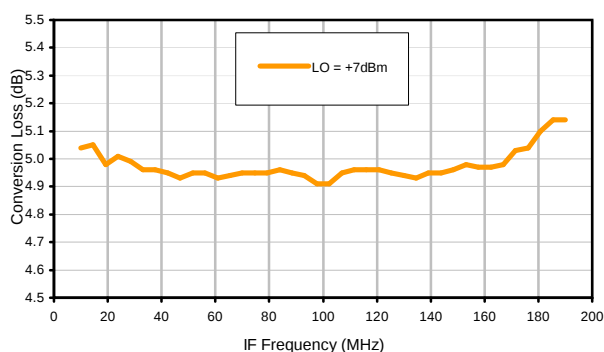


## Typical Performance Curves

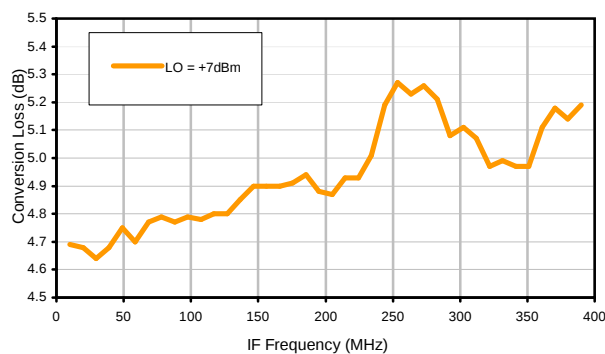
Conversion Loss @ IF=30MHz



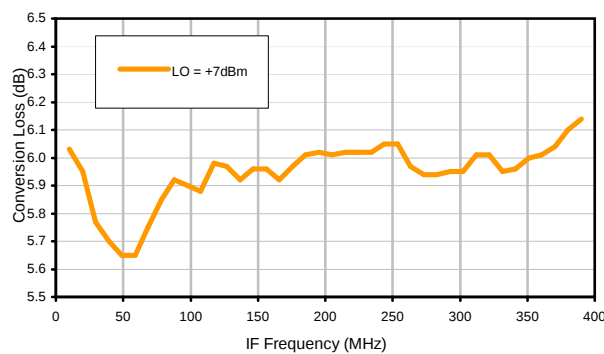
Conversion Loss vs. IF @ RF=200.1MHz



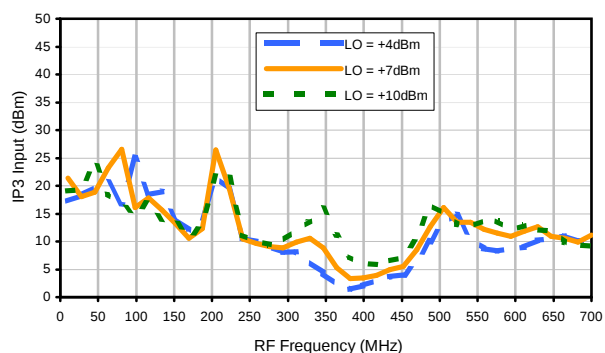
Conversion Loss vs. IF @ RF=10.1MHz



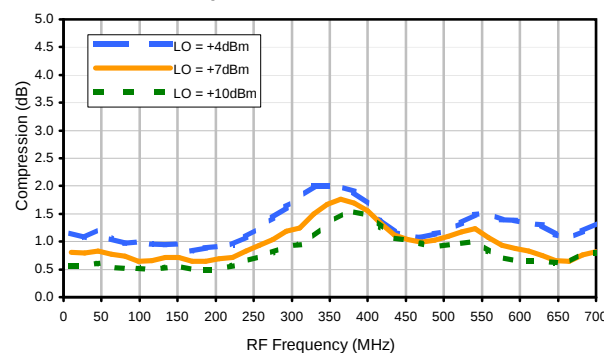
Conversion Loss vs. IF @ RF=400.1MHz



IP3 Input

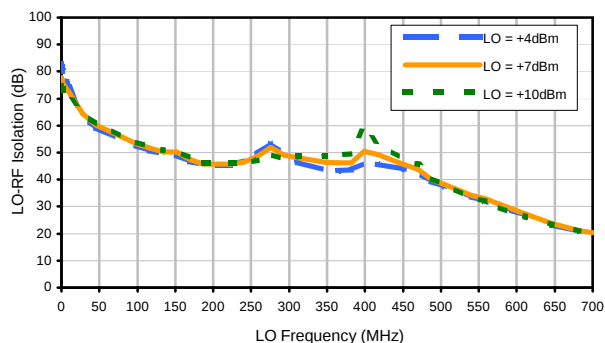


Compression @ RF IN=+1dBm

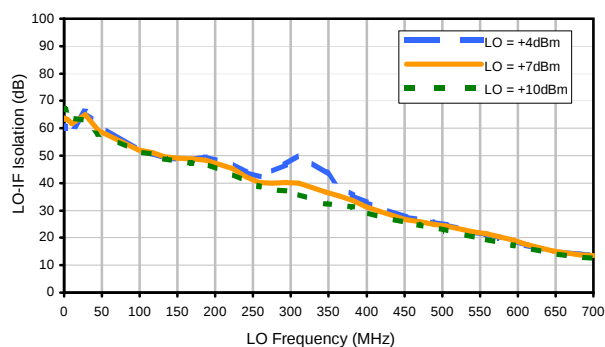


## Typical Performance Curves

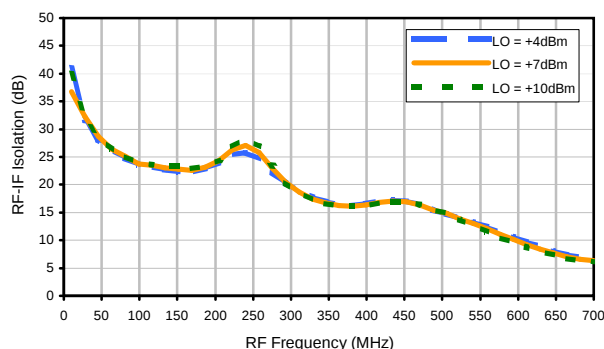
LO-RF Isolation



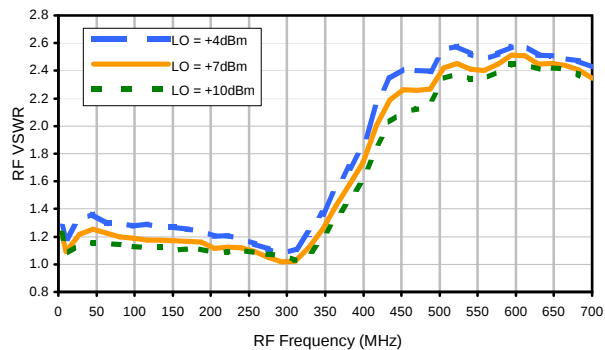
LO-IF Isolation



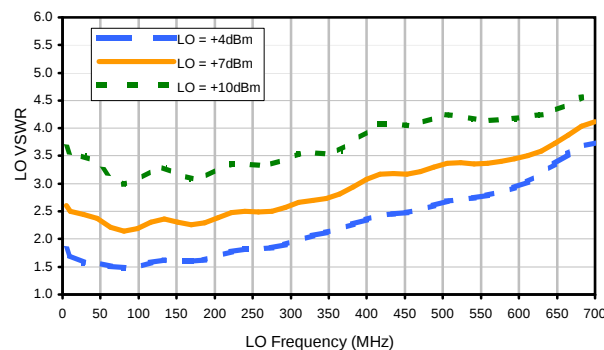
RF-IF Isolation



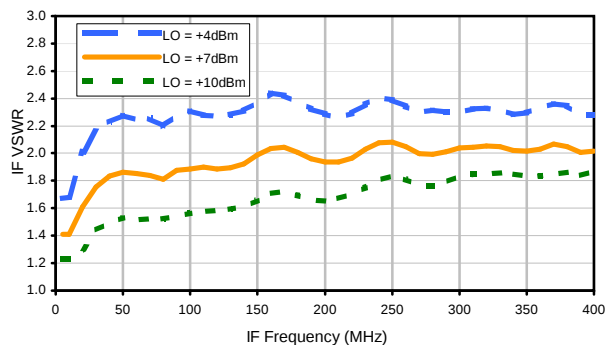
RF VSWR



LO VSWR



IF VSWR



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## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 16  | 31  | 11  | 52  | 19  | 43  | 24  | 39  | 37  | 47  |
| 1  | -      | 19     | +0  | 24  | 11  | 35  | 30  | 42  | 38  | 43  | 39  | 48  |
| 2  | >100   | 57     | 56  | 55  | 57  | 56  | 51  | 72  | 59  | 67  | 59  | >81 |
| 3  | >100   | 76     | 71  | 74  | 65  | 72  | 65  | 77  | 73  | 72  | 66  | 75  |
| 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 | 78  | >81 | >81 | >81 | >81 | >81 |
| 7  | >100   | >81    | >81 | >81 | >81 | >81 | >81 | 72  | >81 | >81 | >81 | >81 |
| 8  | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | 62  | >81 | >81 | >81 |
| 9  | >100   | >81    | >81 | >81 | >81 | >81 | >81 | >81 | >81 | 75  | >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: 200.1 MHz; -14.00 dBm.  
LO IN: 230.01 MHz; +7.00 dBm  
IF OUT: 29.91 MHz; -19.24 dBm

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |    |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|
| 0  | -      | -      | 26  | 39  | 21  | 55  | 30  | 61  | 39  | 50  | 50 | 60  |
| 1  | -      | 19     | +0  | 25  | 11  | 34  | 32  | 48  | 38  | 48  | 45 | 57  |
| 2  | >100   | 54     | 50  | 52  | 52  | 50  | 46  | 64  | 53  | 58  | 52 | 66  |
| 3  | >100   | 51     | 41  | 49  | 45  | 53  | 39  | 65  | 55  | 55  | 53 | 56  |
| 4  | >100   | 68     | 68  | 66  | 64  | 64  | 64  | 66  | 62  | 83  | 67 | 76  |
| 5  | >100   | 70     | 60  | 56  | 51  | 62  | 51  | 63  | 53  | 65  | 68 | 68  |
| 6  | >100   | 89     | 86  | 84  | 79  | 81  | 78  | 84  | >91 | 79  | 87 | 90  |
| 7  | >100   | 89     | 90  | 83  | 75  | 69  | 71  | 72  | 67  | 75  | 67 | 82  |
| 8  | >100   | >91    | >91 | >91 | >91 | >91 | 86  | 87  | 70  | 89  | 81 | 86  |
| 9  | >100   | >91    | 88  | >91 | 90  | >91 | 76  | 78  | 76  | 79  | 79 | 90  |
| 10 | >100   | >91    | >91 | >91 | >91 | >91 | >91 | >91 | >91 | >91 | 89 | >91 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9  | 10  |

### LO HARMONICS ORDER

Test conditions: RF IN: 200.1 MHz; -4.00 dBm.  
LO IN: 230.01 MHz; +7.00 dBm  
IF OUT: 29.91 MHz; -9.22 dBm

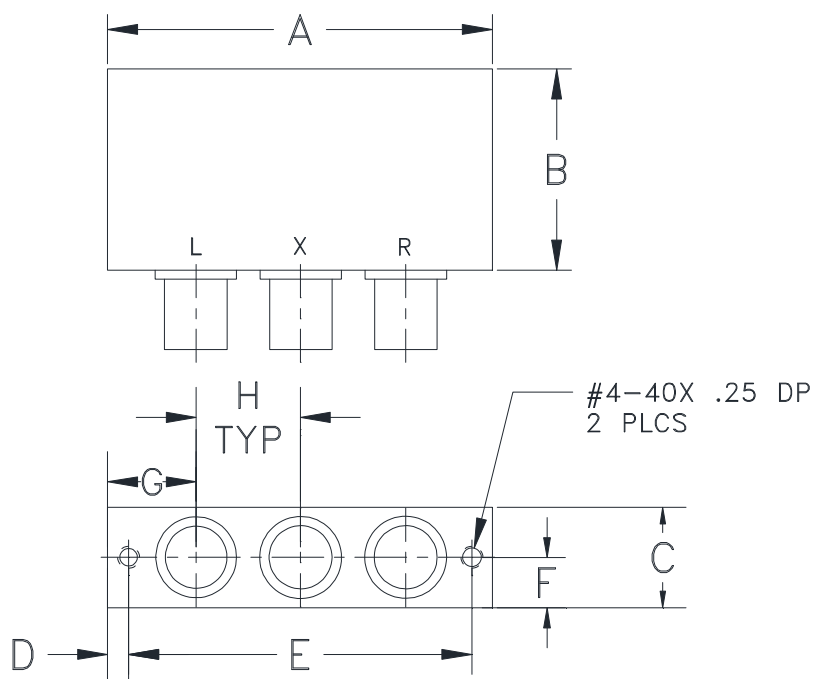
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.  
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.  
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

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## Outline Dimensions

**GG60**



| CASE #. | A               | B               | C              | D              | E                | F             | G              | H              | WT.<br>GRAM |
|---------|-----------------|-----------------|----------------|----------------|------------------|---------------|----------------|----------------|-------------|
| GG60    | 2.31<br>(58.67) | 1.20<br>(30.48) | .60<br>(15.24) | .125<br>(3.18) | 2.062<br>(52.37) | .30<br>(7.62) | .53<br>(13.46) | .63<br>(16.00) | 75.0        |

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

### Notes:

- Case material: Aluminum alloy.
- Case finish:  
For RoHS Case Styles: Clear chemical conversion coating, non-chrome or trivalent chrome based.



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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          |
| Barometric Pressure        | 100,000 Feet                                                                           | MIL-STD-202, Method 105, Condition D |
| Humidity                   | 90% RH, 65°C<br>Units may require bake-out after humidity to restore full performance. | MIL-STD-202, Method 103              |
| Thermal Shock              | -65° to 125°C, 5 cycles                                                                | MIL-STD-202, Method 107, Condition B |
| 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           | 100g, 6ms sawtooth, 3 shocks each direction 3 axes (total 18)                          | MIL-STD-202, Method 213, Condition I |