

# Coaxial Frequency Mixer

# NON-CATALOG

## ZLW-1SH+

### Level 17 (LO Power +17 dBm) 2 to 500 MHz

#### Maximum Ratings

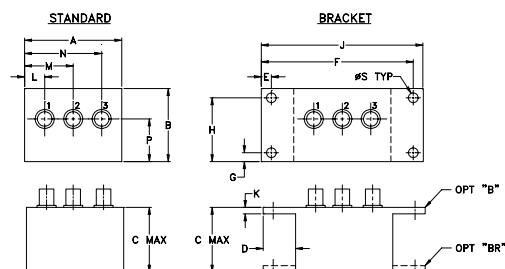
|                       |                |
|-----------------------|----------------|
| Operating Temperature | -55°C to 100°C |
| Storage Temperature   | -55°C to 100°C |
| RF Power              | 200mW          |
| IF Current            | 40mA           |

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

#### Coaxial Connections

|    |   |
|----|---|
| LO | 1 |
| RF | 3 |
| IF | 2 |

#### Outline Drawing



#### Outline Dimensions (inch/mm)

| A     | B     | C     | D     | E    | F     | G    | H     |
|-------|-------|-------|-------|------|-------|------|-------|
| 1.50  | 1.13  | 1.00  | .50   | .155 | 2.345 | .138 | .987  |
| 38.10 | 28.70 | 25.40 | 12.70 | 3.94 | 59.56 | 3.51 | 25.07 |

| J     | K    | L    | M     | N     | P     | S    | wt    |
|-------|------|------|-------|-------|-------|------|-------|
| 2.50  | .10  | .31  | .75   | 1.19  | .66   | .150 | grams |
| 63.50 | 2.54 | 7.87 | 19.05 | 30.23 | 16.76 | 3.81 | 40.0  |

#### Features

- low conversion loss, 5.93 dB typ.
- high L-R isolation, 40 dB typ., L-I, 35 dB typ.
- rugged shielded case

#### Applications

- VHF/UHF
- instrumentations



CASE STYLE: M21

Connectors Model  
SMA ZLW-1SH+  
BRACKET (OPTION "B")  
BRACKET (OPTION "BR")

+RoHS Compliant

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

#### Electrical Specifications

| FREQUENCY (MHz) |        | CONVERSION LOSS (dB) |          |      |             | LO-RF ISOLATION (dB) |      |      |      |      |      | LO-IF ISOLATION (dB) |      |      |      |      |      |
|-----------------|--------|----------------------|----------|------|-------------|----------------------|------|------|------|------|------|----------------------|------|------|------|------|------|
| LO/RF           | IF     | Mid-Band             |          | Max. | Total Range | L                    |      | M    |      | U    |      | L                    |      | M    |      | U    |      |
|                 |        | $\bar{X}$            | $\sigma$ |      |             | Typ.                 | Min. | Typ. | Min. | Typ. | Min. | Typ.                 | Min. | Typ. | Min. | Typ. | Min. |
| 2-500           | DC-500 | 5.93                 | 0.08     | 7.5  | 8.5         | 50                   | 40   | 40   | 30   | 30   | 25   | 45                   | 35   | 35   | 25   | 25   | 20   |

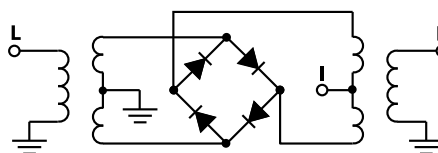
1 dB COMP.: +14 dBm typ.

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 +17dBm            | LO +17dBm          | LO +17dBm          | LO +17dBm         | LO +17dBm         |
| 2.00            | 32.00  | 6.30                 | 62.98              | 52.28              | 1.22              | 1.67              |
| 5.00            | 35.00  | 5.95                 | 62.06              | 52.79              | 1.10              | 1.60              |
| 10.00           | 40.00  | 5.92                 | 60.47              | 52.35              | 1.03              | 1.63              |
| 20.00           | 50.00  | 5.91                 | 57.14              | 51.13              | 1.02              | 1.61              |
| 34.13           | 64.13  | 5.81                 | 53.27              | 49.30              | 1.04              | 1.58              |
| 50.00           | 80.00  | 5.72                 | 50.24              | 47.27              | 1.06              | 1.57              |
| 66.26           | 96.26  | 5.66                 | 48.03              | 45.61              | 1.07              | 1.55              |
| 82.33           | 112.33 | 5.71                 | 46.33              | 44.27              | 1.08              | 1.54              |
| 100.00          | 130.00 | 5.63                 | 44.99              | 43.26              | 1.09              | 1.57              |
| 130.52          | 164.52 | 5.61                 | 43.18              | 41.91              | 1.10              | 1.55              |
| 162.65          | 208.65 | 5.61                 | 41.46              | 40.45              | 1.10              | 1.55              |
| 200.00          | 260.00 | 5.60                 | 40.12              | 39.22              | 1.08              | 1.60              |
| 259.04          | 329.04 | 5.42                 | 38.10              | 37.51              | 1.07              | 1.67              |
| 307.24          | 387.24 | 5.62                 | 37.54              | 36.13              | 1.06              | 1.70              |
| 355.43          | 443.43 | 5.86                 | 37.41              | 36.94              | 1.05              | 1.76              |
| 387.56          | 475.56 | 5.92                 | 36.35              | 35.99              | 1.04              | 1.82              |
| 435.76          | 523.76 | 5.81                 | 35.35              | 33.91              | 1.05              | 1.84              |
| 467.89          | 555.89 | 5.90                 | 36.34              | 33.81              | 1.06              | 1.85              |
| 483.95          | 571.95 | 6.08                 | 36.44              | 33.54              | 1.08              | 1.87              |
| 500.00          | 600.00 | 6.27                 | 36.27              | 33.21              | 1.09              | 1.90              |

#### Electrical Schematic



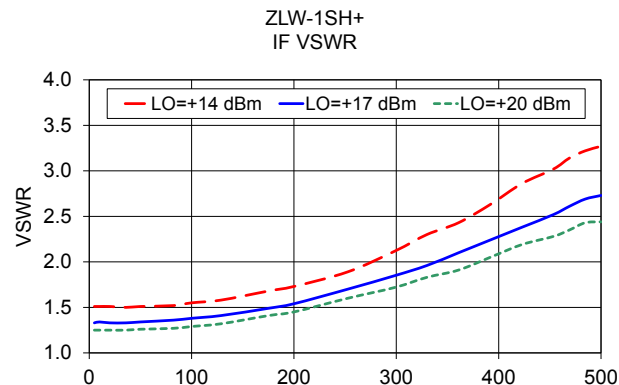
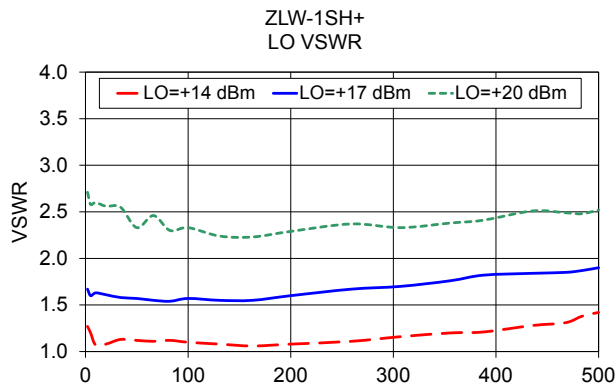
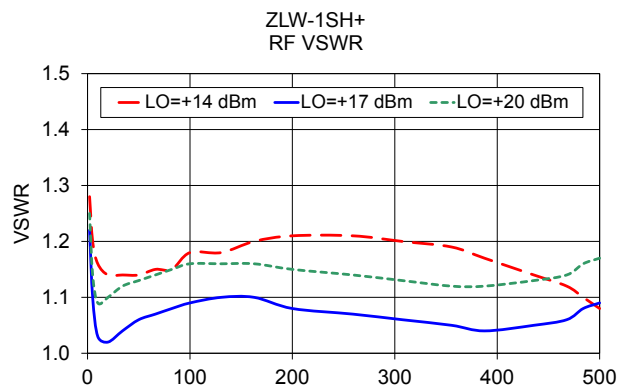
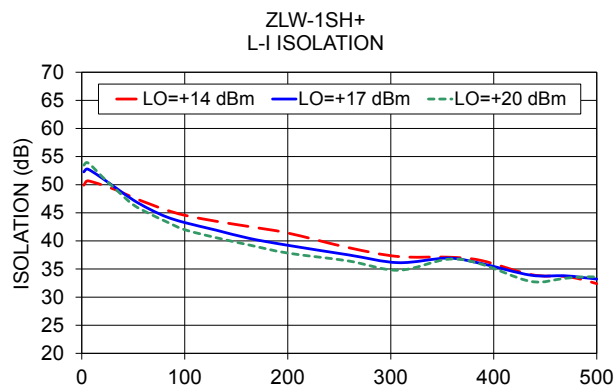
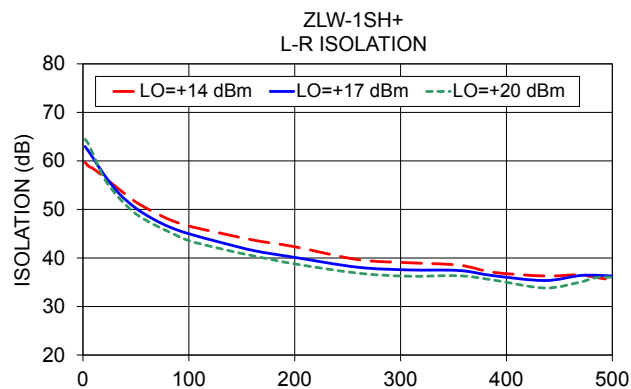
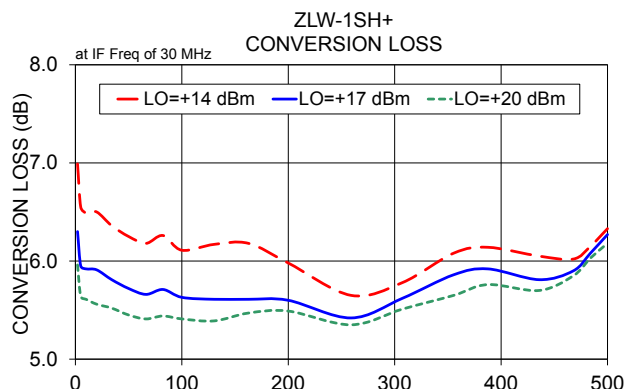
#### Notes

- 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.
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ZLW-1SH+  
DJ/TD/CP/AM  
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# Frequency Mixer

# ZLW-1SH+

## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>IF FIXED<br>@IF(OUT)=30MHz<br>(dB) |       |       |
|---------------------|-------------|-------------------------------------------------------|-------|-------|
|                     |             | @LO (dBm)                                             |       |       |
|                     |             | +14                                                   | +17   | +20   |
| 10.1                | 40.1        | 6.89                                                  | 6.14  | 5.85  |
| 30.1                | 60.1        | 7.23                                                  | 6.47  | 6.08  |
| 50.1                | 80.1        | 7.39                                                  | 6.61  | 6.19  |
| 70.1                | 100.1       | 7.18                                                  | 6.45  | 6.11  |
| 90.1                | 120.1       | 7.12                                                  | 6.43  | 6.16  |
| 110.1               | 140.1       | 7.31                                                  | 6.48  | 6.21  |
| 130.1               | 160.1       | 7.17                                                  | 6.42  | 6.17  |
| 150.1               | 180.1       | 7.07                                                  | 6.44  | 6.21  |
| 170.1               | 200.1       | 6.85                                                  | 6.36  | 6.20  |
| 190.1               | 220.1       | 6.88                                                  | 6.43  | 6.25  |
| 210.1               | 240.1       | 6.91                                                  | 6.41  | 6.22  |
| 230.1               | 260.1       | 6.80                                                  | 6.38  | 6.22  |
| 250.1               | 280.1       | 6.85                                                  | 6.43  | 6.23  |
| 270.1               | 300.1       | 6.75                                                  | 6.42  | 6.26  |
| 290.1               | 320.1       | 6.83                                                  | 6.48  | 6.33  |
| 310.1               | 340.1       | 6.89                                                  | 6.49  | 6.33  |
| 330.1               | 360.1       | 7.07                                                  | 6.60  | 6.36  |
| 350.1               | 380.1       | 7.17                                                  | 6.69  | 6.35  |
| 370.1               | 400.1       | 7.09                                                  | 6.79  | 6.49  |
| 390.1               | 420.1       | 7.18                                                  | 6.87  | 6.65  |
| 410.1               | 440.1       | 7.11                                                  | 6.82  | 6.65  |
| 430.1               | 460.1       | 7.13                                                  | 6.85  | 6.68  |
| 450.1               | 480.1       | 7.16                                                  | 6.87  | 6.71  |
| 470.1               | 500.1       | 7.23                                                  | 6.92  | 6.74  |
| 490.1               | 520.1       | 7.29                                                  | 6.90  | 6.67  |
| 510.1               | 540.1       | 7.47                                                  | 6.94  | 6.73  |
| 530.1               | 560.1       | 7.78                                                  | 7.07  | 6.84  |
| 550.1               | 580.1       | 7.93                                                  | 7.21  | 6.87  |
| 570.1               | 600.1       | 8.34                                                  | 7.63  | 7.04  |
| 590.1               | 620.1       | 8.48                                                  | 7.93  | 7.15  |
| 610.1               | 640.1       | 8.84                                                  | 8.37  | 7.57  |
| 630.1               | 660.1       | 9.09                                                  | 8.65  | 7.98  |
| 650.1               | 680.1       | 9.38                                                  | 8.93  | 8.33  |
| 670.1               | 700.1       | 9.85                                                  | 9.35  | 8.79  |
| 690.1               | 720.1       | 10.22                                                 | 9.68  | 9.12  |
| 710.1               | 740.1       | 10.80                                                 | 10.22 | 9.60  |
| 730.1               | 760.1       | 11.09                                                 | 10.44 | 9.75  |
| 740.1               | 770.1       | 11.15                                                 | 10.50 | 9.80  |
| 760.1               | 790.1       | 11.53                                                 | 10.80 | 10.00 |
| 770.1               | 800.1       | 11.62                                                 | 10.82 | 9.98  |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | IP3 INPUT<br>(dBm) |       |       |
|---------------------|-------------|--------------------|-------|-------|
|                     |             | @LO (dBm)          |       |       |
|                     |             | +14                | +17   | +20   |
| 10.1                | 40.1        | 28.15              | 30.20 | 30.22 |
| 30.1                | 60.1        | 25.07              | 29.21 | 28.82 |
| 50.1                | 80.1        | 24.95              | 27.21 | 27.56 |
| 70.1                | 100.1       | 31.14              | 28.85 | 29.71 |
| 90.1                | 120.1       | 25.50              | 28.33 | 30.65 |
| 110.1               | 140.1       | 26.61              | 31.20 | 33.94 |
| 130.1               | 160.1       | 27.89              | 28.42 | 29.82 |
| 150.1               | 180.1       | 26.59              | 27.91 | 30.09 |
| 170.1               | 200.1       | 24.48              | 27.54 | 27.26 |
| 190.1               | 220.1       | 26.45              | 34.87 | 30.99 |
| 210.1               | 240.1       | 25.62              | 26.24 | 25.13 |
| 230.1               | 260.1       | 24.43              | 31.16 | 27.41 |
| 250.1               | 280.1       | 25.13              | 29.62 | 28.36 |
| 270.1               | 300.1       | 23.68              | 22.92 | 22.94 |
| 290.1               | 320.1       | 25.89              | 22.35 | 20.87 |
| 310.1               | 340.1       | 23.19              | 21.80 | 20.95 |
| 330.1               | 360.1       | 27.87              | 26.21 | 23.42 |
| 350.1               | 380.1       | 24.73              | 27.72 | 27.24 |
| 370.1               | 400.1       | 25.46              | 23.59 | 26.94 |
| 390.1               | 420.1       | 26.59              | 22.89 | 22.31 |
| 410.1               | 440.1       | 23.13              | 21.68 | 21.11 |
| 430.1               | 460.1       | 26.18              | 21.71 | 20.61 |
| 450.1               | 480.1       | 22.86              | 21.17 | 20.79 |
| 470.1               | 500.1       | 25.37              | 21.67 | 21.17 |
| 490.1               | 520.1       | 23.03              | 21.68 | 21.53 |
| 510.1               | 540.1       | 20.87              | 21.65 | 23.37 |
| 530.1               | 560.1       | 19.20              | 23.34 | 25.04 |
| 550.1               | 580.1       | 15.90              | 20.46 | 24.90 |
| 570.1               | 600.1       | 14.71              | 17.73 | 24.56 |
| 590.1               | 620.1       | 13.22              | 14.74 | 20.07 |
| 610.1               | 640.1       | 12.73              | 13.39 | 16.91 |
| 630.1               | 660.1       | 12.20              | 12.47 | 14.54 |
| 650.1               | 680.1       | 11.59              | 11.67 | 12.98 |
| 670.1               | 700.1       | 11.36              | 11.28 | 12.07 |
| 690.1               | 720.1       | 10.96              | 10.94 | 11.44 |
| 710.1               | 740.1       | 10.77              | 10.85 | 11.31 |
| 730.1               | 760.1       | 10.80              | 11.23 | 11.96 |
| 740.1               | 770.1       | 10.93              | 11.50 | 12.36 |
| 760.1               | 790.1       | 11.37              | 12.27 | 13.56 |
| 770.1               | 800.1       | 11.41              | 12.42 | 13.68 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | COMPRESSION<br>@RF IN=+14dBm<br>(dB) |       |       |
|---------------------|-------------|--------------------------------------|-------|-------|
|                     |             | @LO (dBm)                            |       |       |
|                     |             | +14                                  | +17   | +20   |
| 10.1                | 40.1        | 0.62                                 | 0.24  | 0.17  |
| 30.1                | 60.1        | 0.32                                 | 0.16  | 0.08  |
| 50.1                | 80.1        | 0.45                                 | 0.15  | 0.09  |
| 70.1                | 100.1       | 0.54                                 | 0.25  | 0.14  |
| 90.1                | 120.1       | 0.69                                 | 0.34  | 0.18  |
| 110.1               | 140.1       | 0.50                                 | 0.25  | 0.10  |
| 130.1               | 160.1       | 0.53                                 | 0.28  | 0.13  |
| 150.1               | 180.1       | 0.65                                 | 0.23  | 0.08  |
| 170.1               | 200.1       | 0.77                                 | 0.30  | 0.14  |
| 190.1               | 220.1       | 0.84                                 | 0.29  | 0.13  |
| 210.1               | 240.1       | 0.69                                 | 0.21  | 0.10  |
| 230.1               | 260.1       | 0.80                                 | 0.26  | 0.10  |
| 250.1               | 280.1       | 0.75                                 | 0.21  | 0.12  |
| 270.1               | 300.1       | 0.83                                 | 0.29  | 0.19  |
| 290.1               | 320.1       | 0.79                                 | 0.27  | 0.17  |
| 310.1               | 340.1       | 0.71                                 | 0.24  | 0.13  |
| 330.1               | 360.1       | 0.63                                 | 0.20  | 0.10  |
| 350.1               | 380.1       | 0.61                                 | 0.24  | 0.20  |
| 370.1               | 400.1       | 0.74                                 | 0.24  | 0.21  |
| 390.1               | 420.1       | 0.73                                 | 0.21  | 0.14  |
| 410.1               | 440.1       | 0.81                                 | 0.28  | 0.16  |
| 430.1               | 460.1       | 0.90                                 | 0.34  | 0.19  |
| 450.1               | 480.1       | 0.94                                 | 0.43  | 0.26  |
| 470.1               | 500.1       | 0.90                                 | 0.44  | 0.26  |
| 490.1               | 520.1       | 1.00                                 | 0.54  | 0.28  |
| 510.1               | 540.1       | 1.35                                 | 0.93  | 0.48  |
| 530.1               | 560.1       | 1.32                                 | 0.99  | 0.50  |
| 550.1               | 580.1       | 1.43                                 | 1.13  | 0.67  |
| 570.1               | 600.1       | 1.27                                 | 0.96  | 0.72  |
| 590.1               | 620.1       | 1.47                                 | 1.04  | 0.95  |
| 610.1               | 640.1       | 1.29                                 | 0.91  | 0.87  |
| 630.1               | 660.1       | 1.23                                 | 0.84  | 0.71  |
| 650.1               | 680.1       | 1.15                                 | 0.77  | 0.56  |
| 670.1               | 700.1       | 0.86                                 | 0.45  | 0.23  |
| 690.1               | 720.1       | 0.50                                 | 0.16  | -0.02 |
| 710.1               | 740.1       | -0.02                                | -0.28 | -0.39 |
| 730.1               | 760.1       | -0.28                                | -0.48 | -0.52 |
| 740.1               | 770.1       | -0.35                                | -0.54 | -0.56 |
| 760.1               | 790.1       | -0.66                                | -0.79 | -0.73 |
| 770.1               | 800.1       | -0.71                                | -0.83 | -0.73 |

# Frequency Mixer

ZLW-1SH+

## 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)                                                       |
|                      |             | +17                                                             |                      |             | +17                                                            |                      |             | +17                                                             |
| 240.0                | 10.1        | 6.59                                                            | 10.0                 | 20.1        | 6.63                                                           | 490.0                | 10.1        | 6.94                                                            |
| 234.9                | 15.2        | 6.70                                                            | 50.0                 | 60.1        | 6.18                                                           | 479.8                | 20.3        | 6.83                                                            |
| 229.8                | 20.3        | 6.66                                                            | 90.0                 | 100.1       | 5.97                                                           | 469.6                | 30.5        | 6.80                                                            |
| 224.7                | 25.4        | 6.53                                                            | 130.0                | 140.1       | 6.17                                                           | 459.4                | 40.7        | 6.63                                                            |
| 219.6                | 30.5        | 6.56                                                            | 170.0                | 180.1       | 6.14                                                           | 449.1                | 51.0        | 6.75                                                            |
| 214.4                | 35.7        | 6.49                                                            | 210.0                | 220.1       | 6.18                                                           | 438.9                | 61.2        | 6.63                                                            |
| 209.3                | 40.8        | 6.46                                                            | 250.0                | 260.1       | 6.20                                                           | 428.7                | 71.4        | 6.53                                                            |
| 204.2                | 45.9        | 6.50                                                            | 290.0                | 300.1       | 6.52                                                           | 418.5                | 81.6        | 6.51                                                            |
| 199.1                | 51.0        | 6.40                                                            | 330.0                | 340.1       | 6.45                                                           | 408.3                | 91.8        | 6.34                                                            |
| 194.0                | 56.1        | 6.35                                                            | 370.0                | 380.1       | 6.46                                                           | 398.1                | 102.0       | 6.28                                                            |
| 188.9                | 61.2        | 6.42                                                            | 410.0                | 420.1       | 6.88                                                           | 387.9                | 112.2       | 6.26                                                            |
| 183.8                | 66.3        | 6.48                                                            | 450.0                | 460.1       | 7.15                                                           | 377.7                | 122.4       | 6.22                                                            |
| 178.7                | 71.4        | 6.36                                                            | 490.0                | 500.1       | 6.90                                                           | 367.4                | 132.7       | 6.06                                                            |
| 173.6                | 76.5        | 6.37                                                            | 510.0                | 520.1       | 6.80                                                           | 357.2                | 142.9       | 6.15                                                            |
| 168.4                | 81.7        | 6.38                                                            | 550.0                | 560.1       | 6.42                                                           | 347.0                | 153.1       | 6.05                                                            |
| 163.3                | 86.8        | 6.35                                                            | 570.0                | 580.1       | 6.53                                                           | 336.8                | 163.3       | 6.08                                                            |
| 158.2                | 91.9        | 6.31                                                            | 610.0                | 620.1       | 6.78                                                           | 326.6                | 173.5       | 6.06                                                            |
| 153.1                | 97.0        | 6.28                                                            | 630.0                | 640.1       | 6.85                                                           | 316.4                | 183.7       | 6.04                                                            |
| 148.0                | 102.1       | 6.15                                                            | 670.0                | 680.1       | 6.81                                                           | 306.2                | 193.9       | 6.10                                                            |
| 142.9                | 107.2       | 6.22                                                            | 690.0                | 700.1       | 6.73                                                           | 296.0                | 204.1       | 6.05                                                            |
| 137.8                | 112.3       | 6.31                                                            | 730.0                | 740.1       | 6.74                                                           | 285.7                | 214.4       | 6.15                                                            |
| 132.7                | 117.4       | 6.22                                                            | 750.0                | 760.1       | 6.67                                                           | 275.5                | 224.6       | 6.09                                                            |
| 127.6                | 122.5       | 6.09                                                            | 790.0                | 800.1       | 6.69                                                           | 265.3                | 234.8       | 6.19                                                            |
| 122.4                | 127.7       | 6.09                                                            | 810.0                | 820.1       | 6.73                                                           | 255.1                | 245.0       | 6.21                                                            |
| 117.3                | 132.8       | 6.08                                                            | 850.0                | 860.1       | 6.61                                                           | 234.7                | 265.4       | 6.17                                                            |
| 112.2                | 137.9       | 6.08                                                            | 870.0                | 880.1       | 6.47                                                           | 224.5                | 275.6       | 6.14                                                            |
| 107.1                | 143.0       | 6.09                                                            | 910.0                | 920.1       | 6.13                                                           | 204.0                | 296.1       | 6.38                                                            |
| 102.0                | 148.1       | 6.00                                                            | 930.0                | 940.1       | 5.94                                                           | 193.8                | 306.3       | 6.49                                                            |
| 91.8                 | 158.3       | 6.10                                                            | 970.0                | 980.1       | 5.81                                                           | 173.4                | 326.7       | 6.54                                                            |
| 86.7                 | 163.4       | 6.11                                                            | 990.0                | 1000.1      | 5.79                                                           | 163.2                | 336.9       | 6.50                                                            |
| 76.4                 | 173.7       | 6.09                                                            | 1030.0               | 1040.1      | 6.02                                                           | 142.8                | 357.3       | 6.62                                                            |
| 71.3                 | 178.8       | 6.13                                                            | 1050.0               | 1060.1      | 6.10                                                           | 132.6                | 367.5       | 6.52                                                            |
| 61.1                 | 189.0       | 6.09                                                            | 1090.0               | 1100.1      | 6.40                                                           | 112.1                | 388.0       | 6.57                                                            |
| 56.0                 | 194.1       | 6.06                                                            | 1110.0               | 1120.1      | 6.73                                                           | 101.9                | 398.2       | 6.63                                                            |
| 45.8                 | 204.3       | 6.16                                                            | 1150.0               | 1160.1      | 7.58                                                           | 81.5                 | 418.6       | 6.67                                                            |
| 40.7                 | 209.4       | 6.20                                                            | 1170.0               | 1180.1      | 8.09                                                           | 71.3                 | 428.8       | 6.72                                                            |
| 30.4                 | 219.7       | 6.19                                                            | 1210.0               | 1220.1      | 9.33                                                           | 50.9                 | 449.2       | 6.85                                                            |
| 25.3                 | 224.8       | 6.22                                                            | 1230.0               | 1240.1      | 9.76                                                           | 40.6                 | 459.5       | 6.81                                                            |
| 15.1                 | 235.0       | 6.33                                                            | 1270.0               | 1280.1      | 10.51                                                          | 20.2                 | 479.9       | 6.90                                                            |
| 10.0                 | 240.1       | 6.55                                                            | 1290.0               | 1300.1      | 10.76                                                          | 10.0                 | 490.1       | 7.24                                                            |

# Frequency Mixer

ZLW-1SH+

## Typical Performance Data

| LO<br>(MHz) | LO-RF ISOLATION<br>(dB) |       |       | LO-IF ISOLATION<br>(dB) |       |       |
|-------------|-------------------------|-------|-------|-------------------------|-------|-------|
|             | @LO (dBm)               |       |       | @LO (dBm)               |       |       |
|             | +14                     | +17   | +20   | +14                     | +17   | +20   |
| 40.1        | 73.26                   | 72.32 | 71.94 | 74.54                   | 64.09 | 60.01 |
| 60.1        | 70.24                   | 70.71 | 70.06 | 70.82                   | 61.74 | 57.53 |
| 80.1        | 67.74                   | 67.78 | 68.73 | 68.16                   | 59.92 | 55.86 |
| 100.1       | 65.81                   | 66.65 | 67.26 | 66.05                   | 58.17 | 54.16 |
| 120.1       | 65.09                   | 65.85 | 66.06 | 62.10                   | 56.81 | 52.72 |
| 140.1       | 64.70                   | 65.14 | 65.86 | 58.72                   | 54.63 | 50.97 |
| 160.1       | 63.85                   | 64.64 | 65.05 | 56.33                   | 53.85 | 50.59 |
| 180.1       | 63.32                   | 64.21 | 65.03 | 54.27                   | 52.68 | 49.81 |
| 200.1       | 62.47                   | 63.08 | 64.23 | 51.47                   | 50.82 | 48.94 |
| 220.1       | 62.76                   | 62.82 | 62.83 | 49.83                   | 49.75 | 48.08 |
| 240.1       | 61.94                   | 63.46 | 64.05 | 47.87                   | 48.91 | 47.73 |
| 260.1       | 61.92                   | 63.66 | 65.04 | 46.50                   | 46.95 | 46.63 |
| 280.1       | 61.19                   | 62.65 | 63.48 | 45.61                   | 45.40 | 44.85 |
| 300.1       | 59.61                   | 60.93 | 61.43 | 43.97                   | 44.64 | 43.89 |
| 320.1       | 58.23                   | 58.85 | 59.47 | 42.96                   | 43.68 | 43.80 |
| 340.1       | 58.88                   | 59.52 | 60.29 | 42.75                   | 43.34 | 43.63 |
| 360.1       | 60.52                   | 59.45 | 59.45 | 42.55                   | 42.31 | 42.56 |
| 380.1       | 62.38                   | 60.19 | 59.05 | 42.24                   | 41.69 | 41.28 |
| 400.1       | 63.34                   | 62.54 | 61.37 | 41.13                   | 42.01 | 41.29 |
| 420.1       | 62.13                   | 60.30 | 59.19 | 40.36                   | 41.92 | 41.82 |
| 440.1       | 58.43                   | 56.86 | 56.83 | 39.43                   | 40.86 | 41.14 |
| 460.1       | 55.56                   | 54.55 | 54.48 | 38.82                   | 40.21 | 40.82 |
| 480.1       | 53.24                   | 53.19 | 53.81 | 38.14                   | 39.73 | 40.45 |
| 500.1       | 50.69                   | 51.22 | 52.16 | 37.76                   | 39.51 | 40.18 |
| 520.1       | 48.81                   | 50.24 | 52.76 | 36.91                   | 38.09 | 38.22 |
| 540.1       | 49.31                   | 51.09 | 52.95 | 36.14                   | 36.17 | 36.53 |
| 560.1       | 49.50                   | 51.27 | 51.96 | 36.19                   | 34.90 | 35.54 |
| 580.1       | 50.64                   | 51.42 | 52.85 | 37.46                   | 34.41 | 34.94 |
| 600.1       | 51.45                   | 49.46 | 50.23 | 38.01                   | 34.36 | 34.56 |
| 620.1       | 55.04                   | 51.23 | 50.90 | 37.35                   | 35.54 | 34.37 |
| 640.1       | 56.59                   | 53.59 | 51.31 | 36.70                   | 36.83 | 35.15 |
| 660.1       | 55.00                   | 54.19 | 51.21 | 36.45                   | 37.37 | 36.39 |
| 680.1       | 53.63                   | 53.77 | 52.85 | 36.18                   | 37.54 | 37.53 |
| 700.1       | 50.64                   | 50.19 | 48.52 | 35.96                   | 37.27 | 38.04 |
| 720.1       | 52.08                   | 53.23 | 53.95 | 35.74                   | 36.79 | 37.62 |
| 740.1       | 50.49                   | 49.94 | 48.97 | 35.98                   | 36.98 | 37.58 |
| 760.1       | 52.81                   | 53.74 | 53.05 | 36.35                   | 37.44 | 38.12 |
| 770.1       | 52.17                   | 53.00 | 53.35 | 36.23                   | 37.17 | 37.77 |
| 790.1       | 49.47                   | 48.44 | 46.50 | 36.06                   | 37.00 | 37.51 |
| 800.1       | 49.69                   | 48.88 | 46.81 | 35.68                   | 36.42 | 37.06 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | +14                     | +17   | +20   |
| 10.1                | 40.1        | 49.43                   | 49.05 | 48.76 |
| 30.1                | 60.1        | 40.86                   | 40.67 | 40.65 |
| 50.1                | 80.1        | 36.73                   | 36.75 | 36.62 |
| 70.1                | 100.1       | 34.10                   | 34.29 | 34.22 |
| 90.1                | 120.1       | 32.29                   | 32.37 | 32.38 |
| 110.1               | 140.1       | 31.16                   | 31.33 | 31.47 |
| 130.1               | 160.1       | 30.21                   | 30.32 | 30.24 |
| 150.1               | 180.1       | 29.18                   | 29.41 | 29.49 |
| 170.1               | 200.1       | 28.60                   | 28.68 | 28.79 |
| 190.1               | 220.1       | 28.28                   | 28.28 | 28.27 |
| 210.1               | 240.1       | 28.05                   | 28.14 | 28.14 |
| 230.1               | 260.1       | 27.84                   | 28.16 | 28.13 |
| 250.1               | 280.1       | 27.71                   | 28.25 | 28.51 |
| 270.1               | 300.1       | 27.49                   | 28.06 | 28.52 |
| 290.1               | 320.1       | 27.51                   | 28.08 | 28.49 |
| 310.1               | 340.1       | 27.56                   | 27.93 | 28.16 |
| 330.1               | 360.1       | 27.90                   | 27.72 | 27.64 |
| 350.1               | 380.1       | 28.07                   | 27.57 | 27.09 |
| 370.1               | 400.1       | 28.00                   | 27.83 | 27.47 |
| 390.1               | 420.1       | 27.84                   | 27.82 | 27.76 |
| 410.1               | 440.1       | 27.68                   | 27.84 | 28.14 |
| 430.1               | 460.1       | 27.29                   | 27.51 | 27.75 |
| 450.1               | 480.1       | 26.55                   | 26.76 | 27.09 |
| 470.1               | 500.1       | 25.39                   | 25.63 | 26.18 |
| 490.1               | 520.1       | 24.46                   | 24.64 | 24.96 |
| 510.1               | 540.1       | 23.72                   | 23.57 | 23.52 |
| 530.1               | 560.1       | 23.21                   | 22.65 | 22.37 |
| 550.1               | 580.1       | 22.59                   | 21.78 | 21.28 |
| 570.1               | 600.1       | 22.13                   | 21.41 | 20.63 |
| 590.1               | 620.1       | 21.38                   | 20.85 | 19.94 |
| 610.1               | 640.1       | 20.61                   | 20.20 | 19.52 |
| 630.1               | 660.1       | 20.05                   | 19.56 | 18.94 |
| 650.1               | 680.1       | 19.45                   | 19.06 | 18.64 |
| 670.1               | 700.1       | 18.92                   | 18.48 | 18.03 |
| 690.1               | 720.1       | 18.57                   | 18.25 | 17.97 |
| 710.1               | 740.1       | 18.40                   | 18.09 | 17.83 |
| 730.1               | 760.1       | 18.21                   | 17.92 | 17.70 |
| 740.1               | 770.1       | 18.20                   | 17.95 | 17.71 |
| 760.1               | 790.1       | 18.16                   | 17.94 | 17.75 |
| 770.1               | 800.1       | 18.18                   | 17.96 | 17.79 |

# Frequency Mixer

# ZLW-1SH+

## 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)                       |      |      |
|                     |             | +14             | +17  | +20  |             | +14             | +17  | +20  |                      | +14                             | +17  | +20  |
| 10.1                | 40.1        | 1.27            | 1.14 | 1.18 | 40.1        | 1.18            | 1.43 | 2.25 | 10.1                 | 2.29                            | 2.04 | 1.82 |
| 30.1                | 60.1        | 1.17            | 1.04 | 1.06 | 60.1        | 1.15            | 1.39 | 2.12 | 20.1                 | 2.29                            | 2.03 | 1.81 |
| 50.1                | 80.1        | 1.18            | 1.04 | 1.06 | 80.1        | 1.12            | 1.37 | 2.02 | 30.1                 | 2.29                            | 2.04 | 1.82 |
| 70.1                | 100.1       | 1.15            | 1.01 | 1.10 | 100.1       | 1.15            | 1.40 | 2.11 | 40.1                 | 2.33                            | 2.07 | 1.85 |
| 90.1                | 120.1       | 1.13            | 1.02 | 1.10 | 120.1       | 1.13            | 1.34 | 1.96 | 50.1                 | 2.35                            | 2.09 | 1.87 |
| 110.1               | 140.1       | 1.14            | 1.02 | 1.12 | 140.1       | 1.15            | 1.41 | 2.13 | 60.1                 | 2.31                            | 2.05 | 1.83 |
| 130.1               | 160.1       | 1.11            | 1.04 | 1.13 | 160.1       | 1.13            | 1.37 | 2.02 | 70.1                 | 2.28                            | 2.03 | 1.81 |
| 150.1               | 180.1       | 1.11            | 1.07 | 1.14 | 180.1       | 1.14            | 1.37 | 2.02 | 80.1                 | 2.33                            | 2.07 | 1.85 |
| 170.1               | 200.1       | 1.10            | 1.06 | 1.14 | 200.1       | 1.14            | 1.39 | 2.05 | 90.1                 | 2.38                            | 2.11 | 1.88 |
| 190.1               | 220.1       | 1.09            | 1.05 | 1.14 | 220.1       | 1.15            | 1.36 | 1.95 | 100.1                | 2.38                            | 2.12 | 1.89 |
| 210.1               | 240.1       | 1.08            | 1.08 | 1.16 | 240.1       | 1.15            | 1.42 | 2.11 | 110.1                | 2.34                            | 2.08 | 1.86 |
| 230.1               | 260.1       | 1.05            | 1.11 | 1.18 | 260.1       | 1.13            | 1.38 | 1.97 | 120.1                | 2.33                            | 2.07 | 1.85 |
| 250.1               | 280.1       | 1.06            | 1.11 | 1.21 | 280.1       | 1.15            | 1.42 | 2.03 | 130.1                | 2.36                            | 2.10 | 1.87 |
| 270.1               | 300.1       | 1.06            | 1.08 | 1.17 | 300.1       | 1.14            | 1.43 | 2.03 | 140.1                | 2.38                            | 2.12 | 1.89 |
| 290.1               | 320.1       | 1.04            | 1.09 | 1.16 | 320.1       | 1.15            | 1.42 | 2.01 | 150.1                | 2.39                            | 2.12 | 1.89 |
| 310.1               | 340.1       | 1.03            | 1.12 | 1.18 | 340.1       | 1.16            | 1.47 | 2.09 | 160.1                | 2.37                            | 2.11 | 1.88 |
| 330.1               | 360.1       | 1.06            | 1.13 | 1.20 | 360.1       | 1.17            | 1.45 | 2.00 | 170.1                | 2.39                            | 2.11 | 1.88 |
| 350.1               | 380.1       | 1.07            | 1.13 | 1.23 | 380.1       | 1.16            | 1.50 | 2.06 | 180.1                | 2.44                            | 2.16 | 1.93 |
| 370.1               | 400.1       | 1.06            | 1.12 | 1.22 | 400.1       | 1.15            | 1.50 | 2.06 | 190.1                | 2.49                            | 2.21 | 1.97 |
| 390.1               | 420.1       | 1.05            | 1.13 | 1.22 | 420.1       | 1.15            | 1.51 | 2.09 | 200.1                | 2.46                            | 2.19 | 1.96 |
| 410.1               | 440.1       | 1.08            | 1.17 | 1.25 | 440.1       | 1.16            | 1.58 | 2.19 | 210.1                | 2.43                            | 2.15 | 1.93 |
| 430.1               | 460.1       | 1.08            | 1.17 | 1.23 | 460.1       | 1.18            | 1.52 | 2.05 | 220.1                | 2.44                            | 2.16 | 1.93 |
| 450.1               | 480.1       | 1.09            | 1.20 | 1.26 | 480.1       | 1.20            | 1.59 | 2.17 | 240.1                | 2.53                            | 2.24 | 2.01 |
| 470.1               | 500.1       | 1.12            | 1.23 | 1.31 | 500.1       | 1.24            | 1.68 | 2.28 | 250.1                | 2.51                            | 2.23 | 1.99 |
| 490.1               | 520.1       | 1.14            | 1.29 | 1.38 | 520.1       | 1.28            | 1.69 | 2.27 | 270.1                | 2.55                            | 2.25 | 2.01 |
| 510.1               | 540.1       | 1.14            | 1.32 | 1.38 | 540.1       | 1.32            | 1.71 | 2.29 | 280.1                | 2.61                            | 2.31 | 2.07 |
| 530.1               | 560.1       | 1.08            | 1.28 | 1.32 | 560.1       | 1.36            | 1.78 | 2.35 | 300.1                | 2.59                            | 2.30 | 2.06 |
| 550.1               | 580.1       | 1.04            | 1.22 | 1.27 | 580.1       | 1.39            | 1.87 | 2.44 | 310.1                | 2.59                            | 2.29 | 2.05 |
| 570.1               | 600.1       | 1.04            | 1.15 | 1.21 | 600.1       | 1.42            | 1.96 | 2.53 | 330.1                | 2.69                            | 2.38 | 2.14 |
| 590.1               | 620.1       | 1.05            | 1.11 | 1.17 | 620.1       | 1.45            | 2.00 | 2.59 | 340.1                | 2.71                            | 2.40 | 2.15 |
| 610.1               | 640.1       | 1.07            | 1.06 | 1.10 | 640.1       | 1.48            | 2.03 | 2.64 | 360.1                | 2.72                            | 2.41 | 2.16 |
| 630.1               | 660.1       | 1.12            | 1.07 | 1.04 | 660.1       | 1.52            | 2.08 | 2.71 | 370.1                | 2.76                            | 2.44 | 2.20 |
| 650.1               | 680.1       | 1.16            | 1.11 | 1.05 | 680.1       | 1.57            | 2.14 | 2.78 | 390.1                | 2.76                            | 2.45 | 2.20 |
| 670.1               | 700.1       | 1.22            | 1.17 | 1.11 | 700.1       | 1.62            | 2.19 | 2.84 | 400.1                | 2.76                            | 2.44 | 2.19 |
| 690.1               | 720.1       | 1.29            | 1.23 | 1.18 | 720.1       | 1.67            | 2.23 | 2.87 | 420.1                | 2.85                            | 2.53 | 2.27 |
| 710.1               | 740.1       | 1.42            | 1.36 | 1.31 | 740.1       | 1.71            | 2.27 | 2.91 | 430.1                | 2.88                            | 2.56 | 2.30 |
| 730.1               | 760.1       | 1.55            | 1.49 | 1.44 | 760.1       | 1.77            | 2.33 | 2.98 | 450.1                | 2.85                            | 2.52 | 2.26 |
| 740.1               | 770.1       | 1.60            | 1.53 | 1.48 | 770.1       | 1.81            | 2.37 | 3.02 | 460.1                | 2.86                            | 2.53 | 2.27 |
| 760.1               | 790.1       | 1.75            | 1.68 | 1.63 | 790.1       | 1.87            | 2.43 | 3.08 | 480.1                | 2.93                            | 2.59 | 2.32 |
| 770.1               | 800.1       | 1.81            | 1.74 | 1.69 | 800.1       | 1.90            | 2.45 | 3.10 | 490.1                | 2.92                            | 2.58 | 2.31 |

## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -     | 22  | 45  | 27  | 49  | 21  | 48  | 23  | 38  | 35  | 45  |
| 1  | -      | 21    | +0  | 33  | 16  | 36  | 24  | 44  | 32  | 41  | 25  | 45  |
| 2  | 56     | 66    | 57  | 78  | 58  | 80  | 58  | 74  | 47  | 71  | 51  | 61  |
| 3  | 89     | 68    | 53  | 72  | 52  | 65  | 45  | 71  | 43  | 66  | 56  | 71  |
| 4  | >90    | >82   | 78  | >82 | >82 | >82 | 75  | >82 | 74  | >82 | 75  | >82 |
| 5  | >90    | >82   | 79  | >82 | >82 | >82 | 69  | >82 | 67  | >82 | 64  | >82 |
| 6  | >90    | >82   | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 7  | >90    | >82   | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 8  | >90    | >82   | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 9  | >90    | >82   | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 10 | >90    | >82   | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
|    | RF CAL | 0     | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

## LO HARMONICS ORDER

Test conditions:

RF IN: 250.1 MHz; -1.00 dBm.

LO IN: 280.1 MHz; +17.00 dBm

IF OUT: 30 MHz; -7.43 dBm

RF HARMONICS ORDER

|    | (-dBm) | (dBc) |    |     |     |     |    |     |    |     |     |     |
|----|--------|-------|----|-----|-----|-----|----|-----|----|-----|-----|-----|
| 0  | -      | -     | 31 | 56  | 38  | 60  | 36 | 63  | 42 | 55  | 54  | 80  |
| 1  | -      | 21    | +0 | 32  | 15  | 37  | 22 | 42  | 40 | 49  | 35  | 50  |
| 2  | 37     | 57    | 46 | 68  | 58  | 70  | 60 | 74  | 46 | 64  | 45  | 59  |
| 3  | 59     | 52    | 42 | 62  | 51  | 61  | 39 | 61  | 42 | 69  | 49  | 56  |
| 4  | 89     | 81    | 80 | 81  | 74  | 84  | 75 | 81  | 71 | 82  | 61  | 75  |
| 5  | >90    | 71    | 57 | 76  | 59  | 66  | 50 | 61  | 47 | 74  | 45  | 65  |
| 6  | >90    | 85    | 86 | 85  | 86  | 89  | 80 | 89  | 76 | >91 | 76  | 86  |
| 7  | >90    | 81    | 75 | 76  | 62  | 86  | 65 | 73  | 59 | 72  | 58  | 78  |
| 8  | >90    | >91   | 86 | 91  | 86  | >91 | 85 | >91 | 86 | >91 | 81  | >91 |
| 9  | >90    | >91   | 81 | >91 | 81  | 78  | 71 | 81  | 69 | 80  | 67  | 79  |
| 10 | >90    | >91   | 87 | >91 | >91 | >91 | 87 | >91 | 89 | >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; 9.00 dBm.

LO IN: 280.1 MHz; +17.00 dBm

IF OUT: 30 MHz; 2.3 dBm

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

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

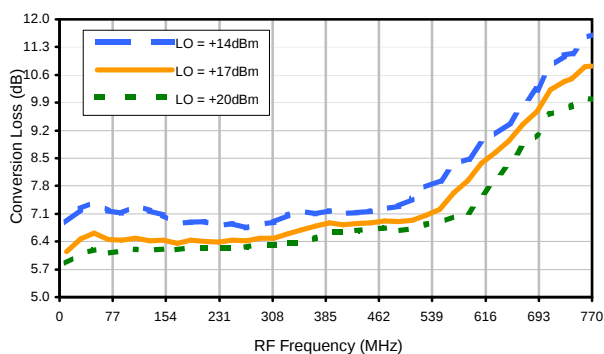
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

# Frequency Mixer

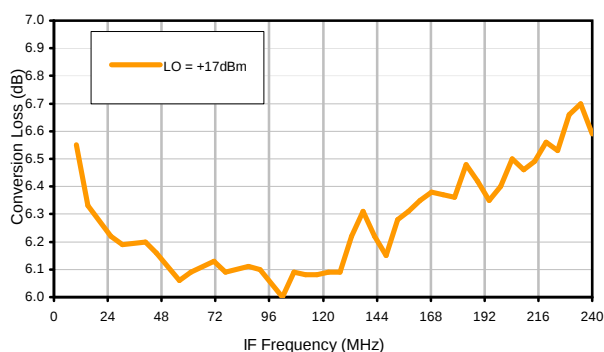
ZLW-1SH+

## Typical Performance Curves

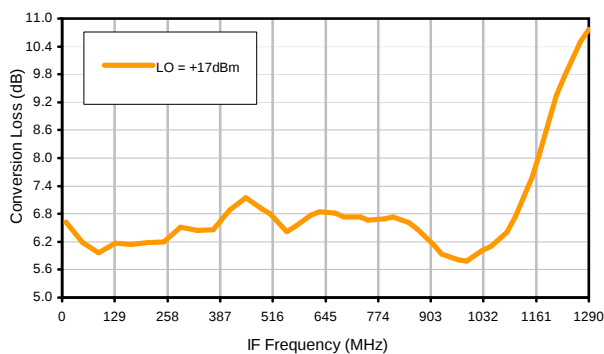
Conversion Loss @ IF=30MHz



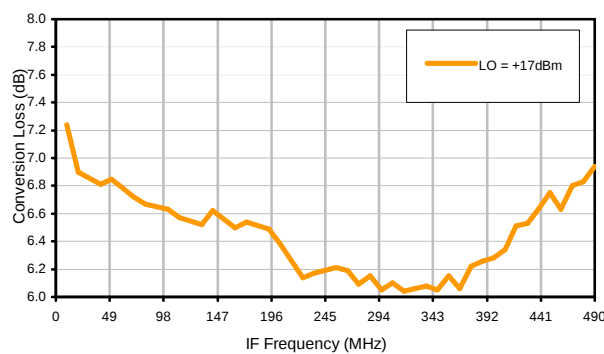
Conversion Loss vs. IF @ RF=250.1MHz



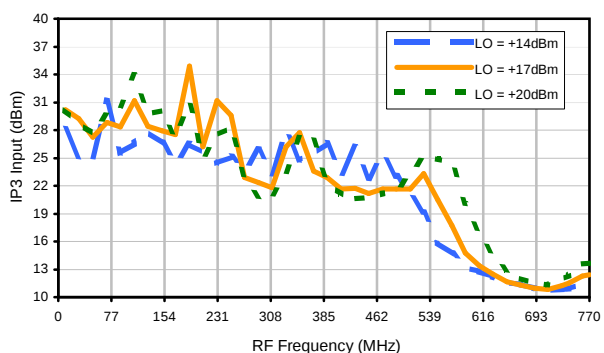
Conversion Loss vs. IF @ RF=10.1MHz



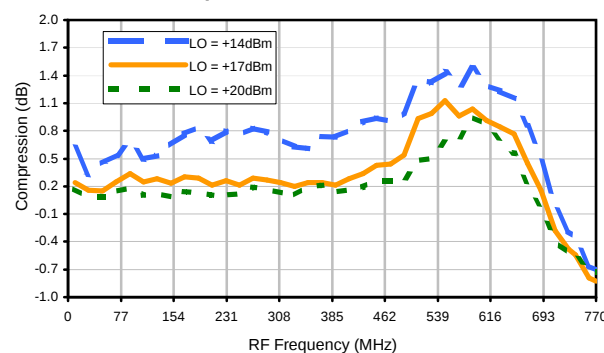
Conversion Loss vs. IF @ RF=500.1MHz



IP3 Input

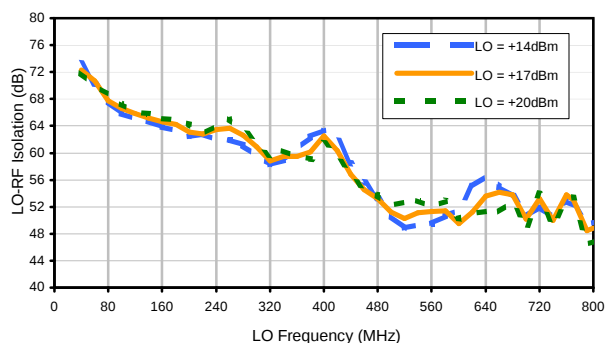


Compression @ RF IN=+14dBm

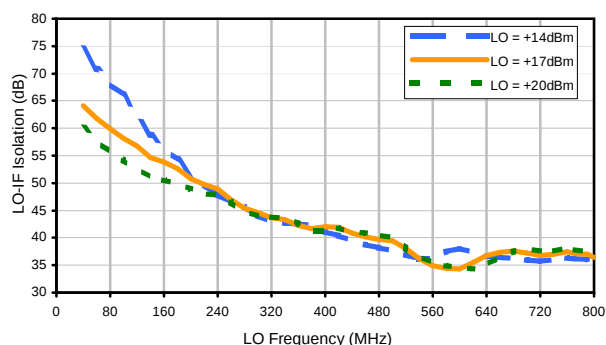


## Typical Performance Curves

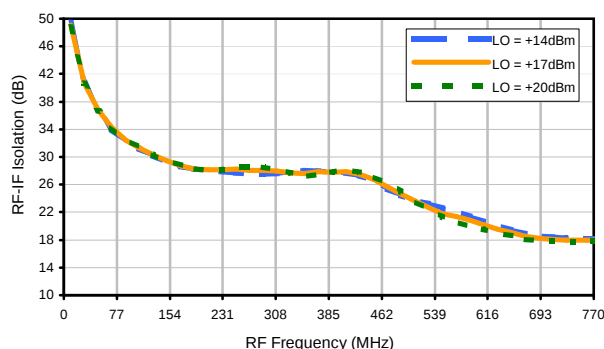
LO-RF Isolation



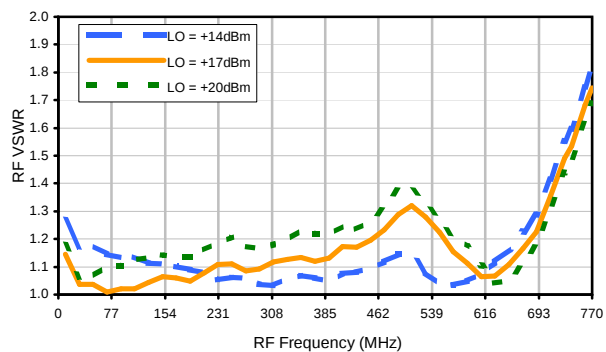
LO-IF Isolation



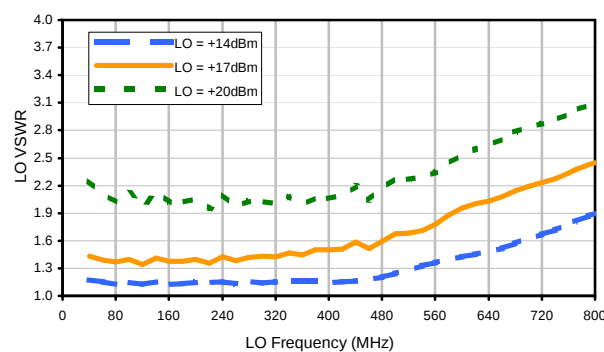
RF-IF Isolation



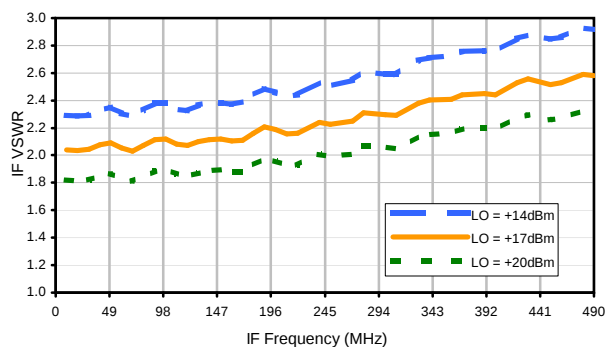
RF VSWR



LO VSWR



IF VSWR



## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -     | 22  | 45  | 27  | 49  | 21  | 48  | 23  | 38  | 35  | 45  |
| 1  | -      | 21    | +0  | 33  | 16  | 36  | 24  | 44  | 32  | 41  | 25  | 45  |
| 2  | 56     | 66    | 57  | 78  | 58  | 80  | 58  | 74  | 47  | 71  | 51  | 61  |
| 3  | 89     | 68    | 53  | 72  | 52  | 65  | 45  | 71  | 43  | 66  | 56  | 71  |
| 4  | >90    | >82   | 78  | >82 | >82 | >82 | 75  | >82 | 74  | >82 | 75  | >82 |
| 5  | >90    | >82   | 79  | >82 | >82 | >82 | 69  | >82 | 67  | >82 | 64  | >82 |
| 6  | >90    | >82   | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 7  | >90    | >82   | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 8  | >90    | >82   | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 9  | >90    | >82   | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 10 | >90    | >82   | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
|    | RF CAL | 0     | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions: RF IN: 250.1 MHz; -1.00 dBm.  
LO IN: 280.1 MHz; +17.00 dBm  
IF OUT: 30 MHz; -7.43 dBm

RF HARMONICS ORDER

|    | (-dBm) | (dBc) |    |     |     |     |    |     |    |     |     |     |
|----|--------|-------|----|-----|-----|-----|----|-----|----|-----|-----|-----|
| 0  | -      | -     | 31 | 56  | 38  | 60  | 36 | 63  | 42 | 55  | 54  | 80  |
| 1  | -      | 21    | +0 | 32  | 15  | 37  | 22 | 42  | 40 | 49  | 35  | 50  |
| 2  | 37     | 57    | 46 | 68  | 58  | 70  | 60 | 74  | 46 | 64  | 45  | 59  |
| 3  | 59     | 52    | 42 | 62  | 51  | 61  | 39 | 61  | 42 | 69  | 49  | 56  |
| 4  | 89     | 81    | 80 | 81  | 74  | 84  | 75 | 81  | 71 | 82  | 61  | 75  |
| 5  | >90    | 71    | 57 | 76  | 59  | 66  | 50 | 61  | 47 | 74  | 45  | 65  |
| 6  | >90    | 85    | 86 | 85  | 86  | 89  | 80 | 89  | 76 | >91 | 76  | 86  |
| 7  | >90    | 81    | 75 | 76  | 62  | 86  | 65 | 73  | 59 | 72  | 58  | 78  |
| 8  | >90    | >91   | 86 | 91  | 86  | >91 | 85 | >91 | 86 | >91 | 81  | >91 |
| 9  | >90    | >91   | 81 | >91 | 81  | 78  | 71 | 81  | 69 | 80  | 67  | 79  |
| 10 | >90    | >91   | 87 | >91 | >91 | >91 | 87 | >91 | 89 | >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; 9.00 dBm.  
LO IN: 280.1 MHz; +17.00 dBm  
IF OUT: 30 MHz; 2.3 dBm

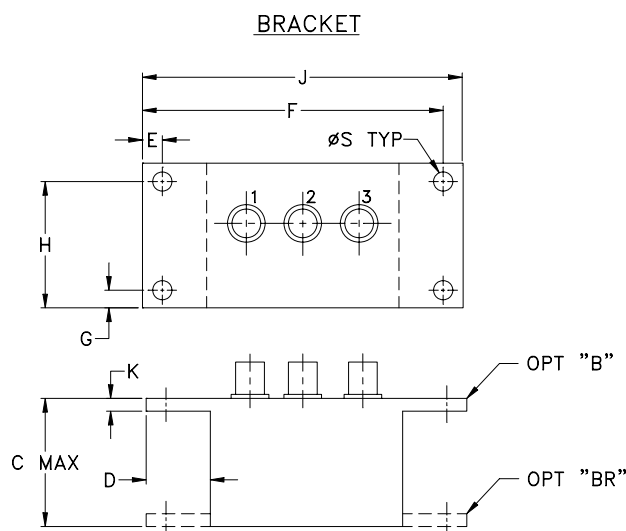
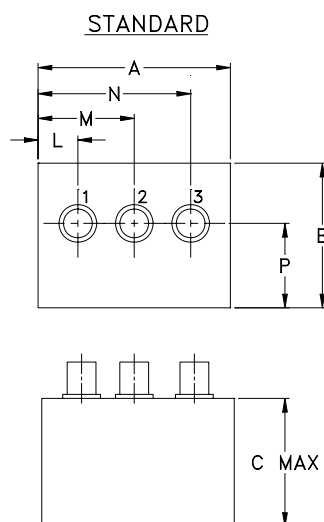
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.  
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.  
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

## Outline Dimensions

M21

M22

M23



| CASE# | A               | B               | C               | D              | E              | F                | G              | H                | J               | K             | L              | M               | N               |
|-------|-----------------|-----------------|-----------------|----------------|----------------|------------------|----------------|------------------|-----------------|---------------|----------------|-----------------|-----------------|
| M21   | 1.50<br>(38.10) | 1.13<br>(28.70) | 1.00<br>(25.40) | .50<br>(12.70) | .155<br>(3.94) | 2.345<br>(59.56) | .138<br>(3.51) | .987<br>(25.07)  | 2.50<br>(63.50) | .10<br>(2.54) | .31<br>(7.87)  | .75<br>(19.05)  | 1.19<br>(30.23) |
| M22   | 2.25<br>(57.15) | 1.38<br>(35.05) | 1.24<br>(31.50) |                | .150<br>(3.81) | 3.100<br>(78.74) |                | 1.238<br>(31.45) | 3.25<br>(82.55) |               | .40<br>(10.16) | 1.15<br>(29.21) | 1.86<br>(47.24) |
| M23   | 2.25<br>(57.15) | 1.38<br>(35.05) | 1.24<br>(31.50) |                | .150<br>(3.81) | 3.100<br>(78.74) |                | 1.238<br>(31.45) | 3.25<br>(82.55) |               | .63<br>(16.00) | 1.06<br>(26.92) | 1.63<br>(41.40) |

| CASE# | P              | Q  | R  | S              | WT. GRAMS |
|-------|----------------|----|----|----------------|-----------|
| M21   | .66<br>(16.76) | -- | -- | .150<br>(3.81) | 40.0      |
| M22   | .64<br>(16.26) | -- | -- |                | 74.0      |
| M23   | .69<br>(17.53) | -- | -- |                | 70.0      |

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

### Notes:

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

Due to transition from non-RoHS to RoHS, models will be supplied with either case style finish until the non-RoHS case inventory is depleted.
- Mounting bracket available on request. For bracket mounted on connector end add suffix B to part number and add \$5.00 to unit cost. For bracket mounted on the rear, add suffix BR to part number and add \$1.50 to unit cost.



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 |