*Coaxial*

# Frequency Mixer

## ZLW-1-1+

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

*Generic photo used for illustration purposes only*

CASE STYLE: M21

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

***+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 | 1 |
| RF | 3 |
| IF | 2 |

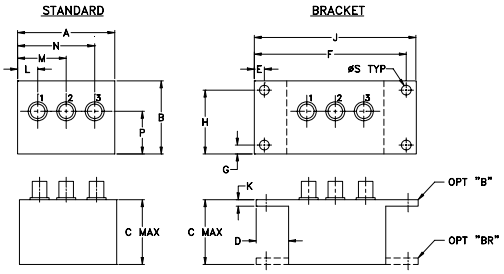
### Features

- low conversion loss, 4.82 dB typ.
- high L-R isolation, 45 dB typ., L-I, 40 dB typ.
- rugged shielded case

### Applications

- VHF/UHF
- defense & federal communications
- instrumentations

### 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 |

### Electrical Specifications

| FREQUENCY (MHz) | | CONVERSION LOSS (dB) | | | | LO-RF ISOLATION (dB) | | | | | | LO-IF ISOLATION (dB) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LO/RF | IF | Mid-Band m | | | Total Range | L | | M | | U | | L | | M | | U | |
| $f_L$-$f_U$ | | $\overline{X}$ | σ | Max. | Max. | Typ. | Min. | Typ. | Min. | Typ. | Min. | Typ. | Min. | Typ. | Min. | Typ. | Min. |
| 0.1-500 | DC-500 | 4.82 | 0.07 | 7.5 | 8.5 | 50 | 45 | 45 | 30 | 35 | 25 | 45 | 30 | 40 | 25 | 30 | 20 |

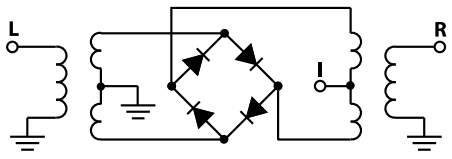
1 dB COMP.: +1 dBm typ.

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

### Typical Performance Data

| Frequency (MHz) | | Conversion Loss (dB) | Isolation L-R (dB) | Isolation L-I (dB) | VSWR RF Port (:1) | VSWR LO Port (:1) |
|---|---|---|---|---|---|---|
| RF | LO | LO +7dBm | LO +7dBm | LO +7dBm | LO +7dBm | LO +7dBm |
| 0.10 | 30.10 | 5.97 | >67.00 | >67.00 | 1.27 | 2.30 |
| 0.50 | 30.50 | 5.10 | >67.00 | >67.00 | 1.27 | 2.24 |
| 1.00 | 31.00 | 5.03 | >67.00 | 60.45 | 1.27 | 2.26 |
| 2.00 | 32.00 | 4.95 | >67.00 | 60.33 | 1.25 | 2.20 |
| 5.00 | 35.00 | 4.94 | >67.00 | 60.77 | 1.23 | 2.16 |
| 10.00 | 40.00 | 4.92 | >67.00 | 61.39 | 1.18 | 2.11 |
| 20.00 | 50.00 | 5.01 | >67.00 | 61.65 | 1.15 | 2.08 |
| 50.00 | 80.00 | 4.95 | >67.00 | 61.63 | 1.12 | 2.09 |
| 69.83 | 99.83 | 4.92 | 57.89 | 55.93 | 1.09 | 2.12 |
| 100.00 | 70.00 | 4.82 | 51.38 | 49.30 | 1.10 | 2.18 |
| 173.07 | 143.07 | 4.99 | 42.54 | 40.81 | 1.11 | 2.22 |
| 200.00 | 170.00 | 5.08 | 43.50 | 41.01 | 1.15 | 2.23 |
| 224.69 | 194.69 | 5.23 | 41.57 | 39.41 | 1.22 | 2.38 |
| 259.11 | 229.11 | 5.21 | 38.74 | 36.85 | 1.27 | 2.43 |
| 293.52 | 263.52 | 5.32 | 37.88 | 36.40 | 1.31 | 2.44 |
| 345.14 | 315.14 | 5.71 | 36.54 | 33.55 | 1.34 | 2.56 |
| 396.76 | 366.76 | 5.68 | 37.59 | 34.68 | 1.36 | 2.75 |
| 431.18 | 401.18 | 5.98 | 37.76 | 36.68 | 1.35 | 2.85 |
| 465.59 | 435.59 | 7.01 | 37.18 | 36.08 | 1.31 | 2.95 |
| 500.00 | 470.00 | 7.80 | 38.33 | 34.17 | 1.23 | 3.00 |

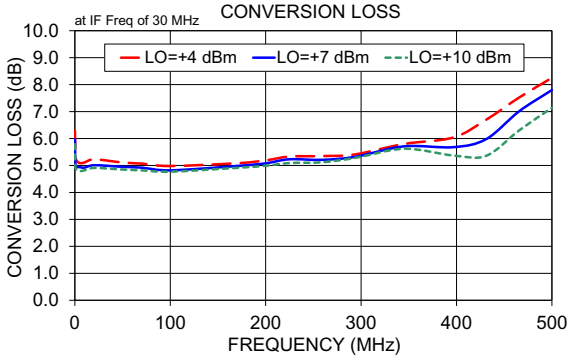
### Electrical Schematic



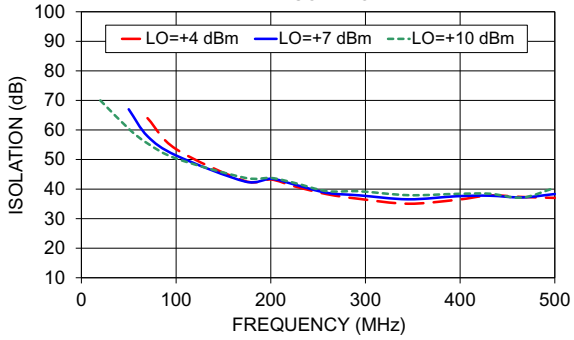

Notes

**A.** Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
**B.** Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
**C.** The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp

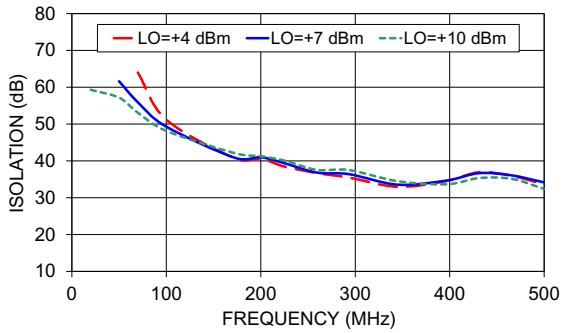
ZLW-1-1+
CONVERSION LOSS
at IF Freq of 30 MHz



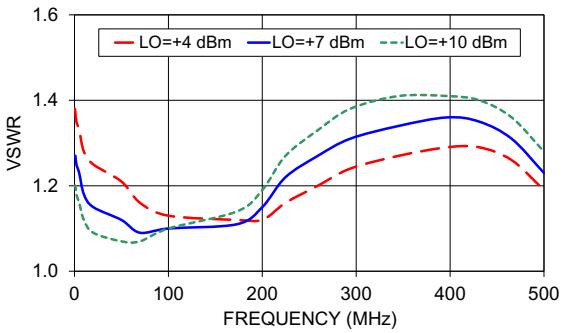

ZLW-1-1+
L-R ISOLATION



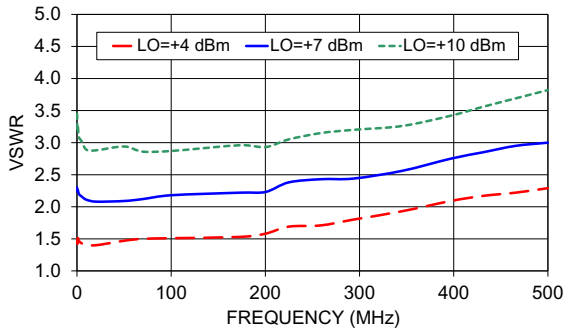

ZLW-1-1+
L-I ISOLATION



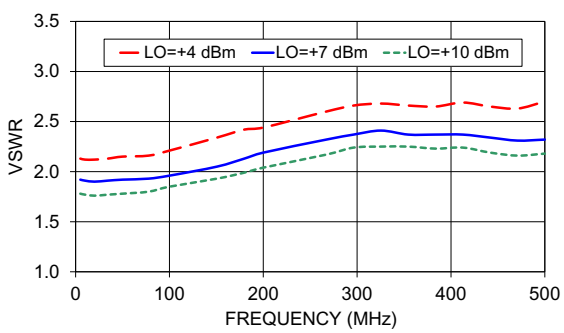

ZLW-1-1+
RF VSWR




ZLW-1-1+
LO VSWR




ZLW-1-1+
IF VSWR





Notes
**A.** Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
**B.** Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
**C.** The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp

# Frequency Mixer ZLW-1-1+

## *Typical Performance Data*

| RF (IN) (MHz) | LO (MHz) | CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB) @LO (dBm) | | |
|---|---|---|---|---|
| | | +4 | +7 | +10 |
| 10.1 | 40.1 | 4.98 | 4.68 | 4.35 |
| 30.1 | 60.1 | 5.05 | 4.92 | 4.83 |
| 50.1 | 80.1 | 5.24 | 5.01 | 4.78 |
| 70.1 | 100.1 | 5.04 | 4.86 | 4.78 |
| 90.1 | 120.1 | 5.10 | 4.94 | 4.84 |
| 110.1 | 140.1 | 5.19 | 5.02 | 4.91 |
| 130.1 | 160.1 | 5.21 | 5.00 | 4.89 |
| 150.1 | 180.1 | 5.23 | 5.05 | 4.94 |
| 170.1 | 200.1 | 5.15 | 5.02 | 4.96 |
| 190.1 | 220.1 | 5.23 | 5.07 | 4.97 |
| 210.1 | 240.1 | 5.22 | 5.06 | 4.97 |
| 230.1 | 260.1 | 5.34 | 5.10 | 4.95 |
| 250.1 | 280.1 | 5.41 | 5.15 | 5.00 |
| 270.1 | 300.1 | 5.50 | 5.33 | 5.19 |
| 290.1 | 320.1 | 5.50 | 5.35 | 5.26 |
| 310.1 | 340.1 | 5.48 | 5.34 | 5.23 |
| 330.1 | 360.1 | 5.62 | 5.46 | 5.36 |
| 350.1 | 380.1 | 5.68 | 5.53 | 5.46 |
| 370.1 | 400.1 | 5.82 | 5.61 | 5.52 |
| 390.1 | 420.1 | 5.96 | 5.62 | 5.46 |
| 410.1 | 440.1 | 6.27 | 5.74 | 5.44 |
| 430.1 | 460.1 | 6.51 | 5.95 | 5.48 |
| 450.1 | 480.1 | 6.56 | 6.07 | 5.64 |
| 470.1 | 500.1 | 6.94 | 6.49 | 6.00 |
| 490.1 | 520.1 | 7.16 | 6.69 | 6.21 |
| 510.1 | 540.1 | 7.54 | 7.08 | 6.58 |
| 530.1 | 560.1 | 7.66 | 7.19 | 6.68 |
| 550.1 | 580.1 | 7.84 | 7.29 | 6.78 |
| 570.1 | 600.1 | 7.91 | 7.30 | 6.84 |
| 590.1 | 620.1 | 7.65 | 7.05 | 6.66 |
| 610.1 | 640.1 | 7.53 | 7.06 | 6.75 |
| 630.1 | 660.1 | 7.50 | 7.17 | 6.97 |
| 650.1 | 680.1 | 7.73 | 7.46 | 7.34 |
| 680.1 | 710.1 | 7.65 | 7.46 | 7.42 |
| 700.1 | 730.1 | 7.88 | 7.69 | 7.69 |
| 730.1 | 760.1 | 8.33 | 8.14 | 8.15 |
| 750.1 | 780.1 | 8.80 | 8.59 | 8.58 |
| 780.1 | 810.1 | 9.56 | 9.18 | 9.06 |
| 800.1 | 830.1 | 10.13 | 9.71 | 9.55 |
| 830.1 | 860.1 | 11.13 | 10.66 | 10.47 |

| RF (IN) (MHz) | LO (MHz) | IP3 INPUT (dBm) @LO (dBm) | | |
|---|---|---|---|---|
| | | +4 | +7 | +10 |
| 10.1 | 40.1 | 14.30 | 16.19 | 21.82 |
| 30.1 | 60.1 | 14.62 | 18.28 | 21.58 |
| 50.1 | 80.1 | 16.33 | 21.50 | 21.61 |
| 70.1 | 100.1 | 14.03 | 18.20 | 20.27 |
| 90.1 | 120.1 | 16.29 | 20.23 | 21.06 |
| 110.1 | 140.1 | 15.35 | 18.22 | 21.00 |
| 130.1 | 160.1 | 15.27 | 17.93 | 14.65 |
| 150.1 | 180.1 | 19.48 | 18.14 | 15.74 |
| 170.1 | 200.1 | 14.43 | 17.40 | 16.23 |
| 190.1 | 220.1 | 14.15 | 13.47 | 14.68 |
| 210.1 | 240.1 | 9.75 | 9.00 | 9.12 |
| 230.1 | 260.1 | 14.02 | 10.51 | 10.49 |
| 250.1 | 280.1 | 16.02 | 18.02 | 21.50 |
| 270.1 | 300.1 | 15.42 | 20.78 | 16.22 |
| 290.1 | 320.1 | 11.05 | 10.63 | 11.53 |
| 310.1 | 340.1 | 7.87 | 7.39 | 7.54 |
| 330.1 | 360.1 | 8.07 | 7.44 | 8.22 |
| 350.1 | 380.1 | 9.27 | 11.07 | 13.98 |
| 370.1 | 400.1 | 12.80 | 21.19 | 19.61 |
| 390.1 | 420.1 | 11.64 | 15.59 | 14.86 |
| 410.1 | 440.1 | 8.03 | 18.14 | 18.60 |
| 430.1 | 460.1 | 4.08 | 6.44 | 8.19 |
| 450.1 | 480.1 | 3.05 | 4.84 | 7.23 |
| 470.1 | 500.1 | 3.01 | 4.57 | 7.85 |
| 490.1 | 520.1 | 2.51 | 3.71 | 5.85 |
| 510.1 | 540.1 | 1.81 | 2.77 | 4.95 |
| 530.1 | 560.1 | 2.45 | 3.99 | 7.24 |
| 550.1 | 580.1 | 3.68 | 5.39 | 8.69 |
| 570.1 | 600.1 | 5.37 | 6.82 | 7.96 |
| 590.1 | 620.1 | 6.61 | 7.12 | 7.74 |
| 610.1 | 640.1 | 6.64 | 7.72 | 8.51 |
| 630.1 | 660.1 | 6.38 | 8.08 | 8.78 |
| 650.1 | 680.1 | 6.85 | 8.70 | 9.49 |
| 680.1 | 710.1 | 5.97 | 7.51 | 8.55 |
| 700.1 | 730.1 | 5.84 | 7.04 | 8.44 |
| 730.1 | 760.1 | 5.67 | 6.76 | 8.24 |
| 750.1 | 780.1 | 6.12 | 7.31 | 8.71 |
| 780.1 | 810.1 | 6.80 | 7.84 | 8.71 |
| 800.1 | 830.1 | 7.29 | 8.52 | 9.21 |
| 830.1 | 860.1 | 8.30 | 9.92 | 10.70 |

| RF (IN) (MHz) | LO (MHz) | COMPRESSION @RF IN=+1dBm (dB) @LO (dBm) | | |
|---|---|---|---|---|
| | | +4 | +7 | +10 |
| 10.1 | 40.1 | 1.39 | 1.21 | 1.02 |
| 30.1 | 60.1 | 1.40 | 1.04 | 0.93 |
| 50.1 | 80.1 | 1.39 | 1.08 | 0.89 |
| 70.1 | 100.1 | 1.41 | 1.11 | 0.92 |
| 90.1 | 120.1 | 1.54 | 1.20 | 1.02 |
| 110.1 | 140.1 | 1.29 | 1.02 | 0.83 |
| 130.1 | 160.1 | 1.26 | 1.02 | 0.86 |
| 150.1 | 180.1 | 1.21 | 0.96 | 0.81 |
| 170.1 | 200.1 | 1.32 | 1.04 | 0.86 |
| 190.1 | 220.1 | 1.32 | 1.06 | 0.90 |
| 210.1 | 240.1 | 1.14 | 0.90 | 0.77 |
| 230.1 | 260.1 | 1.20 | 0.98 | 0.83 |
| 250.1 | 280.1 | 1.22 | 0.98 | 0.80 |
| 270.1 | 300.1 | 1.40 | 1.14 | 0.96 |
| 290.1 | 320.1 | 1.44 | 1.17 | 0.99 |
| 310.1 | 340.1 | 1.53 | 1.27 | 1.11 |
| 330.1 | 360.1 | 1.77 | 1.44 | 1.26 |
| 350.1 | 380.1 | 1.91 | 1.47 | 1.26 |
| 370.1 | 400.1 | 2.18 | 1.66 | 1.43 |
| 390.1 | 420.1 | 2.18 | 1.74 | 1.54 |
| 410.1 | 440.1 | 2.46 | 2.10 | 1.89 |
| 430.1 | 460.1 | 2.71 | 2.46 | 2.19 |
| 450.1 | 480.1 | 2.80 | 2.49 | 2.21 |
| 470.1 | 500.1 | 2.76 | 2.47 | 2.23 |
| 490.1 | 520.1 | 2.56 | 2.33 | 2.19 |
| 510.1 | 540.1 | 2.36 | 2.16 | 2.06 |
| 530.1 | 560.1 | 2.32 | 2.10 | 1.99 |
| 550.1 | 580.1 | 2.14 | 1.97 | 1.85 |
| 570.1 | 600.1 | 2.04 | 1.91 | 1.72 |
| 590.1 | 620.1 | 2.18 | 1.99 | 1.73 |
| 610.1 | 640.1 | 2.13 | 1.82 | 1.53 |
| 630.1 | 660.1 | 2.05 | 1.62 | 1.32 |
| 650.1 | 680.1 | 1.77 | 1.32 | 1.08 |
| 680.1 | 710.1 | 1.79 | 1.35 | 1.07 |
| 700.1 | 730.1 | 1.80 | 1.35 | 1.09 |
| 730.1 | 760.1 | 1.91 | 1.52 | 1.29 |
| 750.1 | 780.1 | 1.87 | 1.50 | 1.29 |
| 780.1 | 810.1 | 1.98 | 1.63 | 1.46 |
| 800.1 | 830.1 | 1.93 | 1.52 | 1.36 |
| 830.1 | 860.1 | 1.73 | 1.31 | 1.13 |



Mini-Circuits®
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see minicircuits.com

## *Typical Performance Data*

| IF (OUT) (MHz) | LO (MHz) | CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=250.1MHz (dB) |
|---|---|---|
| | | @LO (dBm) |
| | | +7 |
| 240.0 | 10.1 | 5.21 |
| 235.0 | 15.1 | 5.24 |
| 230.0 | 20.1 | 5.23 |
| 225.0 | 25.1 | 5.14 |
| 220.0 | 30.1 | 5.09 |
| 215.0 | 35.1 | 5.06 |
| 210.0 | 40.1 | 5.03 |
| 205.0 | 45.1 | 5.02 |
| 200.0 | 50.1 | 4.95 |
| 195.0 | 55.1 | 4.94 |
| 190.0 | 60.1 | 4.96 |
| 185.0 | 65.1 | 4.98 |
| 180.0 | 70.1 | 4.98 |
| 175.0 | 75.1 | 4.93 |
| 170.0 | 80.1 | 4.94 |
| 165.0 | 85.1 | 4.97 |
| 160.0 | 90.1 | 4.98 |
| 155.0 | 95.1 | 4.92 |
| 150.0 | 100.1 | 4.91 |
| 145.0 | 105.1 | 4.93 |
| 140.0 | 110.1 | 4.98 |
| 135.0 | 115.1 | 4.99 |
| 130.0 | 120.1 | 4.94 |
| 125.0 | 125.1 | 4.92 |
| 120.0 | 130.1 | 4.96 |
| 115.0 | 135.1 | 4.98 |
| 105.0 | 145.1 | 4.92 |
| 100.0 | 150.1 | 4.96 |
| 90.0 | 160.1 | 5.00 |
| 85.0 | 165.1 | 4.97 |
| 75.0 | 175.1 | 4.98 |
| 70.0 | 180.1 | 4.98 |
| 60.0 | 190.1 | 4.93 |
| 55.0 | 195.1 | 4.95 |
| 45.0 | 205.1 | 5.02 |
| 40.0 | 210.1 | 5.02 |
| 30.0 | 220.1 | 5.07 |
| 25.0 | 225.1 | 5.05 |
| 15.0 | 235.1 | 5.10 |
| 10.0 | 240.1 | 5.32 |

| IF (OUT) (MHz) | LO (MHz) | CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=10.1MHz (dB) |
|---|---|---|
| | | @LO (dBm) |
| | | +7 |
| 10.0 | 20.1 | 4.88 |
| 30.0 | 40.1 | 4.56 |
| 50.0 | 60.1 | 4.75 |
| 70.0 | 80.1 | 4.31 |
| 90.0 | 100.1 | 4.60 |
| 110.0 | 120.1 | 4.66 |
| 130.0 | 140.1 | 4.65 |
| 150.0 | 160.1 | 4.63 |
| 170.0 | 180.1 | 4.62 |
| 190.0 | 200.1 | 4.54 |
| 210.0 | 220.1 | 4.57 |
| 230.0 | 240.1 | 4.55 |
| 250.0 | 260.1 | 4.64 |
| 270.0 | 280.1 | 4.79 |
| 290.0 | 300.1 | 5.24 |
| 310.0 | 320.1 | 5.12 |
| 330.0 | 340.1 | 5.18 |
| 350.0 | 360.1 | 5.05 |
| 370.0 | 380.1 | 5.01 |
| 390.0 | 400.1 | 4.88 |
| 410.0 | 420.1 | 4.90 |
| 430.0 | 440.1 | 4.82 |
| 450.0 | 460.1 | 4.75 |
| 470.0 | 480.1 | 4.83 |
| 490.0 | 500.1 | 4.81 |
| 510.0 | 520.1 | 4.73 |
| 530.0 | 540.1 | 4.70 |
| 550.0 | 560.1 | 5.00 |
| 590.0 | 600.1 | 5.26 |
| 610.0 | 620.1 | 5.00 |
| 650.0 | 660.1 | 4.92 |
| 670.0 | 680.1 | 4.81 |
| 710.0 | 720.1 | 5.07 |
| 730.0 | 740.1 | 5.34 |
| 770.0 | 780.1 | 6.01 |
| 790.0 | 800.1 | 6.48 |
| 830.0 | 840.1 | 7.73 |
| 850.0 | 860.1 | 8.59 |
| 890.0 | 900.1 | 10.01 |
| 910.0 | 920.1 | 11.02 |

| IF (OUT) (MHz) | LO (MHz) | CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=500.1MHz (dB) |
|---|---|---|
| | | @LO (dBm) |
| | | +7 |
| 490.0 | 10.1 | 6.66 |
| 480.0 | 20.1 | 6.57 |
| 470.0 | 30.1 | 6.55 |
| 460.0 | 40.1 | 6.46 |
| 450.0 | 50.1 | 6.52 |
| 440.0 | 60.1 | 6.48 |
| 430.0 | 70.1 | 6.47 |
| 420.0 | 80.1 | 6.44 |
| 410.0 | 90.1 | 6.38 |
| 400.0 | 100.1 | 6.42 |
| 390.0 | 110.1 | 6.34 |
| 380.0 | 120.1 | 6.41 |
| 370.0 | 130.1 | 6.32 |
| 360.0 | 140.1 | 6.36 |
| 350.0 | 150.1 | 6.34 |
| 340.0 | 160.1 | 6.33 |
| 330.0 | 170.1 | 6.37 |
| 320.0 | 180.1 | 6.35 |
| 310.0 | 190.1 | 6.45 |
| 300.0 | 200.1 | 6.35 |
| 290.0 | 210.1 | 6.38 |
| 280.0 | 220.1 | 6.33 |
| 260.0 | 240.1 | 6.39 |
| 250.0 | 250.1 | 6.47 |
| 230.0 | 270.1 | 6.13 |
| 220.0 | 280.1 | 6.12 |
| 200.0 | 300.1 | 6.22 |
| 190.0 | 310.1 | 6.22 |
| 170.0 | 330.1 | 6.22 |
| 160.0 | 340.1 | 6.07 |
| 140.0 | 360.1 | 6.04 |
| 130.0 | 370.1 | 5.91 |
| 110.0 | 390.1 | 5.51 |
| 100.0 | 400.1 | 5.50 |
| 80.0 | 420.1 | 5.34 |
| 70.0 | 430.1 | 5.34 |
| 50.0 | 450.1 | 6.01 |
| 40.0 | 460.1 | 6.15 |
| 20.0 | 480.1 | 6.30 |
| 10.0 | 490.1 | 6.89 |




Mini-Circuits®
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see minicircuits.com

## *Typical Performance Data*

| LO (MHz) | LO-RF ISOLATION (dB) @LO (dBm) | | | LO-IF ISOLATION (dB) @LO (dBm) | | |
|---|---|---|---|---|---|---|
| | +4 | +7 | +10 | +4 | +7 | +10 |
| 40.1 | 70.69 | 69.87 | 74.32 | 61.02 | 59.01 | 57.93 |
| 60.1 | 63.53 | 67.76 | 71.24 | 57.16 | 55.65 | 55.04 |
| 80.1 | 61.99 | 65.55 | 70.48 | 54.08 | 53.26 | 52.94 |
| 100.1 | 60.97 | 64.66 | 69.55 | 52.08 | 51.63 | 51.24 |
| 120.1 | 59.27 | 63.03 | 67.69 | 50.41 | 50.02 | 49.61 |
| 140.1 | 59.78 | 65.03 | 72.22 | 48.78 | 48.48 | 47.89 |
| 160.1 | 58.42 | 64.23 | 72.93 | 47.61 | 47.25 | 46.70 |
| 180.1 | 56.45 | 60.88 | 66.56 | 47.70 | 46.77 | 45.87 |
| 200.1 | 56.45 | 61.21 | 68.45 | 47.42 | 45.92 | 44.56 |
| 220.1 | 57.79 | 64.22 | 74.75 | 46.39 | 45.33 | 43.97 |
| 240.1 | 58.96 | 66.73 | 74.90 | 45.20 | 43.96 | 42.98 |
| 260.1 | 54.64 | 60.32 | 68.07 | 43.95 | 42.27 | 40.91 |
| 280.1 | 53.96 | 62.05 | 65.34 | 41.90 | 40.15 | 38.98 |
| 300.1 | 51.14 | 55.55 | 60.72 | 39.87 | 38.41 | 37.21 |
| 320.1 | 50.18 | 55.02 | 61.83 | 38.69 | 37.46 | 36.49 |
| 340.1 | 48.79 | 53.07 | 57.81 | 38.61 | 36.97 | 35.93 |
| 360.1 | 49.23 | 54.85 | 60.63 | 37.94 | 35.64 | 33.97 |
| 380.1 | 52.39 | 57.24 | 53.50 | 36.05 | 33.53 | 32.11 |
| 400.1 | 52.55 | 56.65 | 54.88 | 35.31 | 32.73 | 31.40 |
| 420.1 | 55.78 | 55.03 | 51.77 | 33.79 | 31.11 | 29.81 |
| 440.1 | 51.86 | 52.61 | 50.98 | 32.71 | 29.91 | 28.36 |
| 460.1 | 49.49 | 53.09 | 52.47 | 32.25 | 29.75 | 27.66 |
| 480.1 | 47.49 | 50.10 | 50.27 | 30.75 | 28.45 | 26.21 |
| 500.1 | 49.05 | 54.20 | 62.69 | 30.16 | 28.59 | 26.28 |
| 520.1 | 47.79 | 52.27 | 57.77 | 29.28 | 28.11 | 26.41 |
| 540.1 | 47.16 | 52.56 | 64.61 | 28.72 | 27.94 | 26.48 |
| 560.1 | 49.13 | 60.52 | 53.08 | 28.08 | 27.75 | 26.54 |
| 580.1 | 48.53 | 59.89 | 50.36 | 27.25 | 27.22 | 25.84 |
| 600.1 | 50.08 | 50.90 | 43.28 | 26.23 | 26.23 | 24.37 |
| 620.1 | 47.60 | 48.70 | 41.52 | 25.03 | 24.83 | 22.32 |
| 640.1 | 45.36 | 42.54 | 37.62 | 23.80 | 23.07 | 20.62 |
| 660.1 | 44.86 | 40.61 | 36.50 | 22.30 | 21.24 | 19.36 |
| 680.1 | 40.64 | 37.53 | 34.62 | 20.86 | 19.81 | 18.29 |
| 710.1 | 36.53 | 34.72 | 32.39 | 18.93 | 18.40 | 17.25 |
| 730.1 | 33.85 | 32.67 | 30.92 | 17.89 | 17.49 | 16.62 |
| 760.1 | 31.14 | 30.56 | 29.26 | 16.71 | 16.54 | 15.78 |
| 780.1 | 29.53 | 29.15 | 27.99 | 16.22 | 16.14 | 15.39 |
| 810.1 | 28.04 | 27.97 | 27.03 | 15.86 | 15.85 | 15.13 |
| 830.1 | 26.85 | 26.73 | 25.87 | 15.62 | 15.73 | 14.98 |
| 860.1 | 25.77 | 25.83 | 25.14 | 15.34 | 15.47 | 14.80 |

| RF (IN) (MHz) | LO (MHz) | RF-IF ISOLATION (dB) @LO (dBm) | | |
|---|---|---|---|---|
| | | +4 | +7 | +10 |
| 10.1 | 40.1 | 42.77 | 42.63 | 42.14 |
| 30.1 | 60.1 | 34.77 | 34.59 | 34.73 |
| 50.1 | 80.1 | 30.92 | 30.99 | 30.91 |
| 70.1 | 100.1 | 28.66 | 28.77 | 28.79 |
| 90.1 | 120.1 | 26.90 | 27.01 | 27.04 |
| 110.1 | 140.1 | 26.17 | 26.46 | 26.67 |
| 130.1 | 160.1 | 25.46 | 25.60 | 25.72 |
| 150.1 | 180.1 | 25.48 | 25.63 | 25.68 |
| 170.1 | 200.1 | 25.47 | 26.07 | 26.46 |
| 190.1 | 220.1 | 24.79 | 25.44 | 26.14 |
| 210.1 | 240.1 | 24.52 | 24.92 | 25.26 |
| 230.1 | 260.1 | 24.59 | 24.77 | 25.05 |
| 250.1 | 280.1 | 25.93 | 26.25 | 26.51 |
| 270.1 | 300.1 | 27.23 | 27.88 | 28.42 |
| 290.1 | 320.1 | 28.25 | 29.34 | 30.39 |
| 310.1 | 340.1 | 26.76 | 27.59 | 28.42 |
| 330.1 | 360.1 | 24.26 | 24.74 | 25.22 |
| 350.1 | 380.1 | 22.00 | 22.02 | 21.99 |
| 370.1 | 400.1 | 20.24 | 20.00 | 19.82 |
| 390.1 | 420.1 | 19.07 | 18.70 | 18.51 |
| 410.1 | 440.1 | 18.57 | 18.25 | 18.11 |
| 430.1 | 460.1 | 18.07 | 17.88 | 17.70 |
| 450.1 | 480.1 | 17.72 | 17.67 | 17.49 |
| 470.1 | 500.1 | 17.57 | 17.56 | 17.45 |
| 490.1 | 520.1 | 17.56 | 17.55 | 17.54 |
| 510.1 | 540.1 | 18.07 | 18.02 | 17.97 |
| 530.1 | 560.1 | 18.18 | 18.11 | 17.84 |
| 550.1 | 580.1 | 18.22 | 18.12 | 17.84 |
| 570.1 | 600.1 | 17.48 | 17.28 | 16.83 |
| 590.1 | 620.1 | 16.98 | 16.51 | 16.04 |
| 610.1 | 640.1 | 15.96 | 15.55 | 15.02 |
| 630.1 | 660.1 | 15.16 | 14.71 | 14.28 |
| 650.1 | 680.1 | 14.37 | 14.02 | 13.63 |
| 680.1 | 710.1 | 13.41 | 13.01 | 12.58 |
| 700.1 | 730.1 | 12.75 | 12.30 | 11.88 |
| 730.1 | 760.1 | 11.69 | 11.29 | 10.75 |
| 750.1 | 780.1 | 11.01 | 10.63 | 10.33 |
| 780.1 | 810.1 | 10.34 | 10.03 | 9.73 |
| 800.1 | 830.1 | 9.81 | 9.44 | 9.11 |
| 830.1 | 860.1 | 9.00 | 8.68 | 8.38 |




Mini-Circuits®
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see minicircuits.com

## *Typical Performance Data*

| RF (IN) (MHz) | LO (MHz) | RF VSWR (:1) @LO (dBm) | | |
|---|---|---|---|---|
| | | +4 | +7 | +10 |
| 10.1 | 40.1 | 1.22 | 1.05 | 1.12 |
| 30.1 | 60.1 | 1.21 | 1.12 | 1.02 |
| 50.1 | 80.1 | 1.20 | 1.09 | 1.04 |
| 70.1 | 100.1 | 1.15 | 1.07 | 1.03 |
| 90.1 | 120.1 | 1.15 | 1.07 | 1.04 |
| 110.1 | 140.1 | 1.11 | 1.03 | 1.05 |
| 130.1 | 160.1 | 1.10 | 1.04 | 1.05 |
| 150.1 | 180.1 | 1.09 | 1.06 | 1.08 |
| 170.1 | 200.1 | 1.07 | 1.05 | 1.10 |
| 190.1 | 220.1 | 1.06 | 1.02 | 1.08 |
| 210.1 | 240.1 | 1.03 | 1.03 | 1.08 |
| 230.1 | 260.1 | 1.03 | 1.07 | 1.12 |
| 250.1 | 280.1 | 1.05 | 1.13 | 1.19 |
| 270.1 | 300.1 | 1.05 | 1.12 | 1.20 |
| 290.1 | 320.1 | 1.07 | 1.15 | 1.21 |
| 310.1 | 340.1 | 1.12 | 1.19 | 1.25 |
| 330.1 | 360.1 | 1.16 | 1.25 | 1.32 |
| 350.1 | 380.1 | 1.20 | 1.28 | 1.33 |
| 370.1 | 400.1 | 1.18 | 1.25 | 1.28 |
| 390.1 | 420.1 | 1.14 | 1.19 | 1.22 |
| 410.1 | 440.1 | 1.12 | 1.13 | 1.15 |
| 430.1 | 460.1 | 1.16 | 1.11 | 1.10 |
| 450.1 | 480.1 | 1.20 | 1.13 | 1.08 |
| 470.1 | 500.1 | 1.27 | 1.20 | 1.13 |
| 490.1 | 520.1 | 1.37 | 1.29 | 1.21 |
| 510.1 | 540.1 | 1.54 | 1.46 | 1.39 |
| 530.1 | 560.1 | 1.70 | 1.62 | 1.55 |
| 550.1 | 580.1 | 1.84 | 1.76 | 1.70 |
| 570.1 | 600.1 | 1.90 | 1.85 | 1.82 |
| 590.1 | 620.1 | 2.01 | 1.98 | 1.97 |
| 610.1 | 640.1 | 2.12 | 2.13 | 2.12 |
| 630.1 | 660.1 | 2.24 | 2.25 | 2.25 |
| 650.1 | 680.1 | 2.38 | 2.39 | 2.39 |
| 680.1 | 710.1 | 2.48 | 2.48 | 2.48 |
| 700.1 | 730.1 | 2.62 | 2.62 | 2.62 |
| 730.1 | 760.1 | 2.70 | 2.67 | 2.63 |
| 750.1 | 780.1 | 2.78 | 2.73 | 2.69 |
| 780.1 | 810.1 | 3.03 | 2.94 | 2.89 |
| 800.1 | 830.1 | 3.20 | 3.10 | 3.05 |
| 830.1 | 860.1 | 3.43 | 3.32 | 3.26 |

| LO (MHz) | LO VSWR (:1) @LO (dBm) | | |
|---|---|---|---|
| | +4 | +7 | +10 |
| 40.1 | 1.89 | 2.95 | 4.41 |
| 60.1 | 1.80 | 2.71 | 3.89 |
| 80.1 | 1.74 | 2.56 | 3.59 |
| 100.1 | 1.81 | 2.69 | 3.80 |
| 120.1 | 1.71 | 2.47 | 3.40 |
| 140.1 | 1.86 | 2.76 | 3.86 |
| 160.1 | 1.76 | 2.53 | 3.46 |
| 180.1 | 1.80 | 2.59 | 3.56 |
| 200.1 | 1.83 | 2.60 | 3.53 |
| 220.1 | 1.79 | 2.52 | 3.40 |
| 240.1 | 1.93 | 2.76 | 3.74 |
| 260.1 | 1.82 | 2.52 | 3.35 |
| 280.1 | 1.95 | 2.72 | 3.62 |
| 300.1 | 1.92 | 2.66 | 3.50 |
| 320.1 | 1.98 | 2.74 | 3.62 |
| 340.1 | 2.06 | 2.84 | 3.75 |
| 360.1 | 1.99 | 2.70 | 3.52 |
| 380.1 | 2.09 | 2.82 | 3.68 |
| 400.1 | 2.08 | 2.77 | 3.56 |
| 420.1 | 2.27 | 3.02 | 3.89 |
| 440.1 | 2.38 | 3.11 | 3.93 |
| 460.1 | 2.34 | 3.05 | 3.84 |
| 480.1 | 2.57 | 3.37 | 4.22 |
| 500.1 | 2.58 | 3.39 | 4.29 |
| 520.1 | 2.63 | 3.43 | 4.33 |
| 540.1 | 2.69 | 3.49 | 4.40 |
| 560.1 | 2.79 | 3.61 | 4.53 |
| 580.1 | 2.91 | 3.74 | 4.67 |
| 600.1 | 2.97 | 3.79 | 4.69 |
| 620.1 | 3.00 | 3.79 | 4.64 |
| 640.1 | 3.06 | 3.82 | 4.64 |
| 660.1 | 3.15 | 3.89 | 4.74 |
| 680.1 | 3.23 | 3.96 | 4.82 |
| 710.1 | 3.39 | 4.10 | 4.95 |
| 730.1 | 3.57 | 4.26 | 5.06 |
| 760.1 | 3.92 | 4.55 | 5.31 |
| 780.1 | 4.15 | 4.74 | 5.46 |
| 810.1 | 4.45 | 4.99 | 5.65 |
| 830.1 | 4.62 | 5.13 | 5.77 |
| 860.1 | 4.79 | 5.31 | 5.93 |

| IF (OUT) (MHz) | IF VSWR @LO=500.1MHz (:1) @LO (dBm) | | |
|---|---|---|---|
| | +4 | +7 | +10 |
| 10.1 | 2.18 | 1.91 | 1.66 |
| 20.1 | 2.26 | 1.97 | 1.71 |
| 30.1 | 2.28 | 1.99 | 1.73 |
| 40.1 | 2.26 | 1.98 | 1.72 |
| 50.1 | 2.27 | 1.99 | 1.73 |
| 60.1 | 2.30 | 2.01 | 1.75 |
| 70.1 | 2.31 | 2.03 | 1.77 |
| 80.1 | 2.30 | 2.03 | 1.78 |
| 90.1 | 2.25 | 1.98 | 1.75 |
| 100.1 | 2.29 | 2.02 | 1.78 |
| 110.1 | 2.37 | 2.10 | 1.85 |
| 120.1 | 2.43 | 2.15 | 1.91 |
| 130.1 | 2.42 | 2.16 | 1.92 |
| 140.1 | 2.39 | 2.13 | 1.91 |
| 150.1 | 2.42 | 2.16 | 1.93 |
| 160.1 | 2.47 | 2.21 | 1.98 |
| 170.1 | 2.45 | 2.20 | 1.99 |
| 180.1 | 2.42 | 2.17 | 1.97 |
| 190.1 | 2.46 | 2.22 | 2.01 |
| 200.1 | 2.55 | 2.29 | 2.08 |
| 210.1 | 2.59 | 2.34 | 2.14 |
| 220.1 | 2.56 | 2.32 | 2.12 |
| 240.1 | 2.61 | 2.36 | 2.16 |
| 250.1 | 2.67 | 2.43 | 2.23 |
| 270.1 | 2.56 | 2.33 | 2.15 |
| 280.1 | 2.57 | 2.34 | 2.14 |
| 300.1 | 2.69 | 2.46 | 2.27 |
| 310.1 | 2.66 | 2.43 | 2.24 |
| 330.1 | 2.65 | 2.42 | 2.21 |
| 340.1 | 2.70 | 2.48 | 2.27 |
| 360.1 | 2.56 | 2.35 | 2.16 |
| 370.1 | 2.53 | 2.31 | 2.10 |
| 390.1 | 2.61 | 2.39 | 2.18 |
| 400.1 | 2.57 | 2.35 | 2.16 |
| 420.1 | 2.50 | 2.28 | 2.07 |
| 430.1 | 2.54 | 2.31 | 2.10 |
| 450.1 | 2.42 | 2.19 | 1.99 |
| 460.1 | 2.36 | 2.11 | 1.89 |
| 480.1 | 2.44 | 2.17 | 1.94 |
| 490.1 | 2.40 | 2.14 | 1.91 |




Mini-Circuits®
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see minicircuits.com

*Harmonics Tables*

| RF HARMONICS ORDER | (-dBm) | (-dBc) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | - | - | 14 | 41 | 15 | 37 | 21 | 29 | 40 | 38 | 45 | 63 |
| 1 | - | 21 | +0 | 26 | 10 | 38 | 24 | 40 | 34 | 40 | 51 | 68 |
| 2 | 83 | >69 | 55 | 66 | 57 | 66 | 52 | >69 | 66 | >69 | >69 | >69 |
| 3 | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 4 | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 5 | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 6 | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 7 | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 8 | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 9 | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 10 | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| | RF CAL | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

**LO HARMONICS ORDER**

**Test conditions:** **RF IN: 250.1 MHz; -14.00 dBm.**
**LO IN: 280.1 MHz; +7.00 dBm**
**IF OUT: 30 MHz; -19.95 dBm**

| RF HARMONICS ORDER | (-dBm) | (-dBc) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | - | - | 24 | 69 | 28 | 48 | 33 | 42 | 51 | 52 | 60 | >80 |
| 1 | - | 21 | +0 | 27 | 11 | 37 | 26 | 44 | 36 | 47 | 57 | 71 |
| 2 | 62 | 59 | 45 | 57 | 48 | 56 | 47 | 64 | 76 | 62 | 64 | 66 |
| 3 | >90 | 51 | 42 | 49 | 44 | 54 | 38 | 65 | 48 | 53 | 53 | 53 |
| 4 | >90 | >80 | 73 | >80 | 66 | >80 | 65 | 75 | 59 | 75 | 74 | >80 |
| 5 | >90 | >80 | 60 | 60 | 52 | 67 | 54 | 67 | 57 | 68 | 69 | 72 |
| 6 | >90 | >80 | >80 | >80 | 80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
| 7 | >90 | >80 | >80 | >80 | 73 | 72 | 69 | 75 | 70 | 77 | 67 | >80 |
| 8 | >90 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
| 9 | >90 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
| 10 | >90 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | 79 |
| | RF CAL | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

**LO HARMONICS ORDER**

**Test conditions:** **RF IN: 250.1 MHz; -4.00 dBm.**
**LO IN: 280.1 MHz; +7.00 dBm**
**IF OUT: 30 MHz; -9.23 dBm**

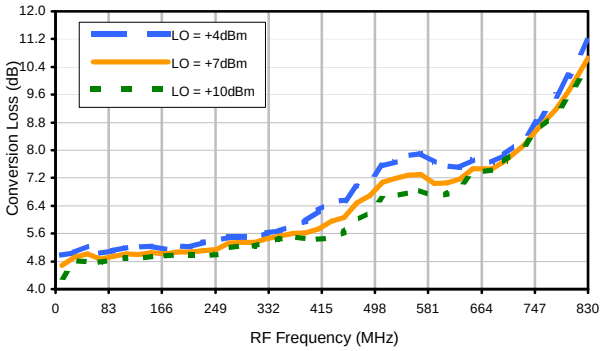
**Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.**
**2. + entry denotes harmonics are in (dBc) above IF OUTPUT.**
**3. RF Cal represent the Harmonics level of the RF input signal to the mixer.**



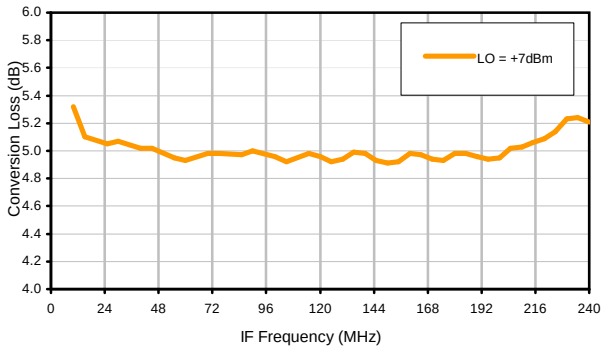

Mini-Circuits®
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see minicircuits.com

## *Typical Performance Curves*

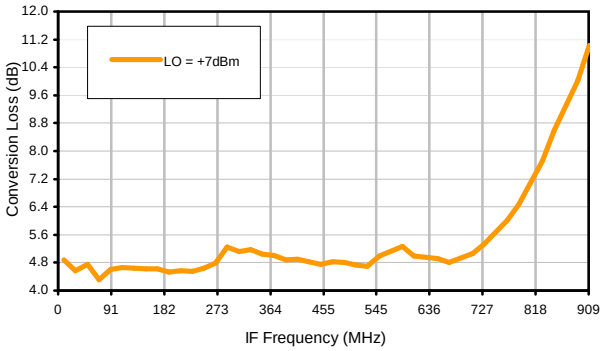
**Conversion Loss @ IF=30MHz**



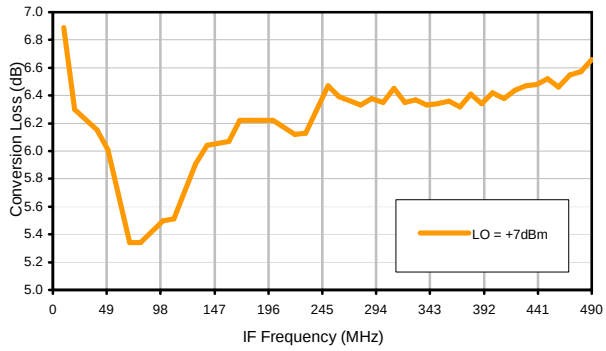

**Conversion Loss vs. IF @ RF=250.1MHz**



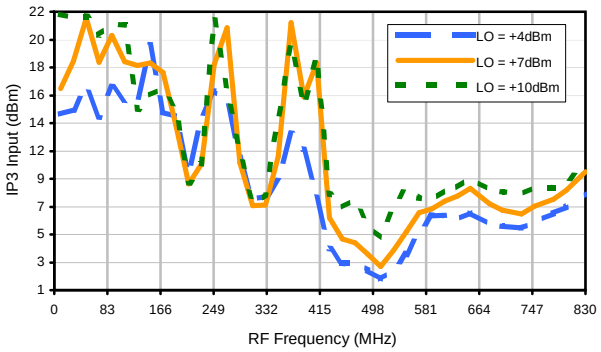

**Conversion Loss vs. IF @ RF=10.1MHz**



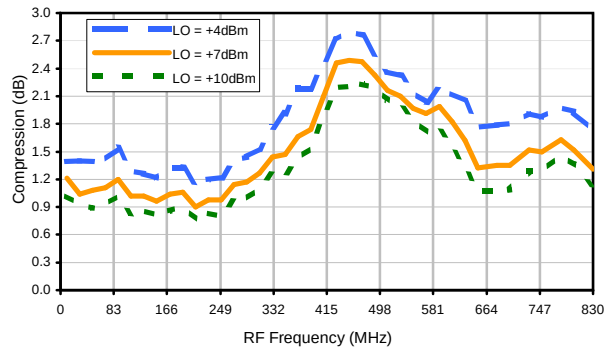

**Conversion Loss vs. IF @ RF=500.1MHz**




**IP3 Input**




**Compression @ RF IN=+1dBm**



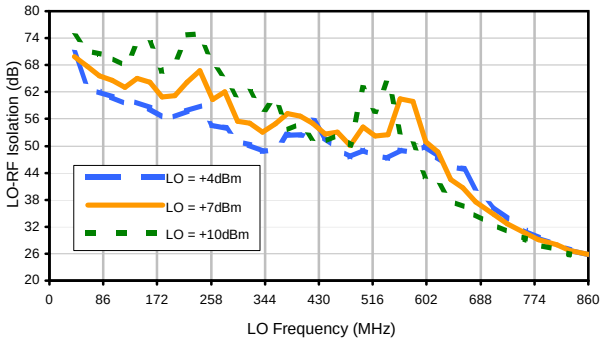




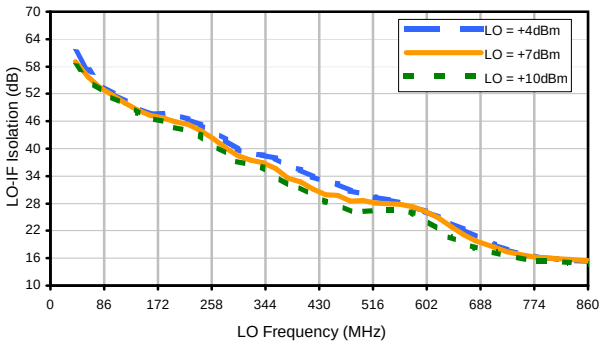
Mini-Circuits®
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see minicircuits.com

## *Typical Performance Curves*

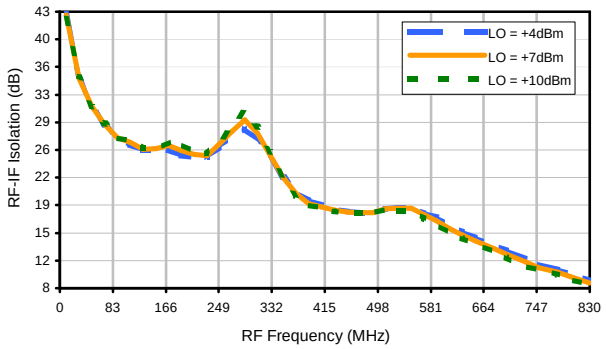
**LO-RF Isolation**



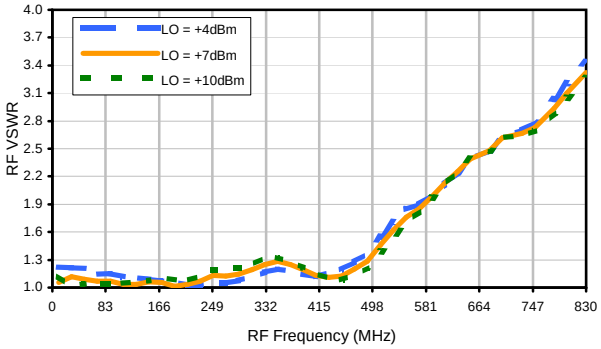

**LO-IF Isolation**



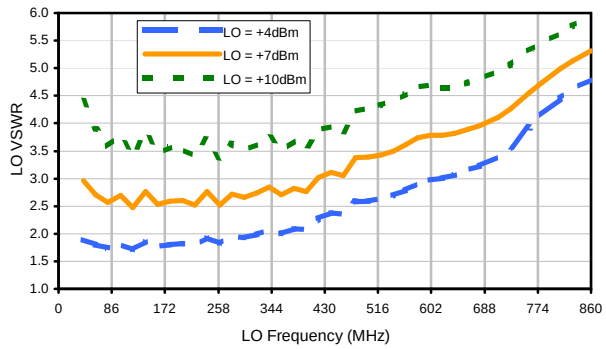

**RF-IF Isolation**



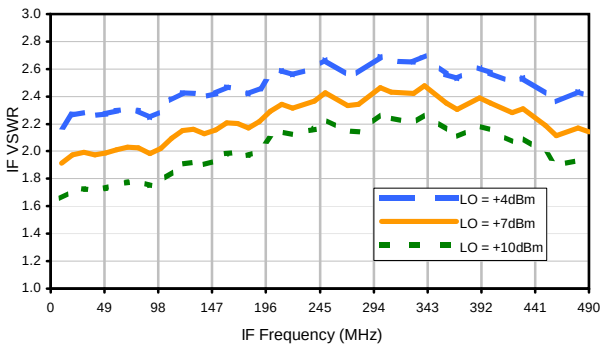

**RF VSWR**




**LO VSWR**




**IF VSWR**







Mini-Circuits®
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see minicircuits.com

*Harmonics Tables*

| RF HARMONICS ORDER | (-dBm) | (-dBc) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | - | - | 14 | 41 | 15 | 37 | 21 | 29 | 40 | 38 | 45 | 63 |
| 1 | - | 21 | +0 | 26 | 10 | 38 | 24 | 40 | 34 | 40 | 51 | 68 |
| 2 | 83 | >69 | 55 | 66 | 57 | 66 | 52 | >69 | 66 | >69 | >69 | >69 |
| 3 | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 4 | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 5 | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 6 | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 7 | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 8 | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 9 | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| 10 | >90 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 | >69 |
| | RF CAL | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

**LO HARMONICS ORDER**

**Test conditions:** **RF IN: 250.1 MHz; -14.00 dBm.**
**LO IN: 280.1 MHz; +7.00 dBm**
**IF OUT: 30 MHz; -19.95 dBm**

| RF HARMONICS ORDER | (-dBm) | (-dBc) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | - | - | 24 | 69 | 28 | 48 | 33 | 42 | 51 | 52 | 60 | >80 |
| 1 | - | 21 | +0 | 27 | 11 | 37 | 26 | 44 | 36 | 47 | 57 | 71 |
| 2 | 62 | 59 | 45 | 57 | 48 | 56 | 47 | 64 | 76 | 62 | 64 | 66 |
| 3 | >90 | 51 | 42 | 49 | 44 | 54 | 38 | 65 | 48 | 53 | 53 | 53 |
| 4 | >90 | >80 | 73 | >80 | 66 | >80 | 65 | 75 | 59 | 75 | 74 | >80 |
| 5 | >90 | >80 | 60 | 60 | 52 | 67 | 54 | 67 | 57 | 68 | 69 | 72 |
| 6 | >90 | >80 | >80 | >80 | 80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
| 7 | >90 | >80 | >80 | >80 | 73 | 72 | 69 | 75 | 70 | 77 | 67 | >80 |
| 8 | >90 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
| 9 | >90 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 |
| 10 | >90 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | >80 | 79 |
| | RF CAL | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

**LO HARMONICS ORDER**

**Test conditions:** **RF IN: 250.1 MHz; -4.00 dBm.**
**LO IN: 280.1 MHz; +7.00 dBm**
**IF OUT: 30 MHz; -9.23 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.**

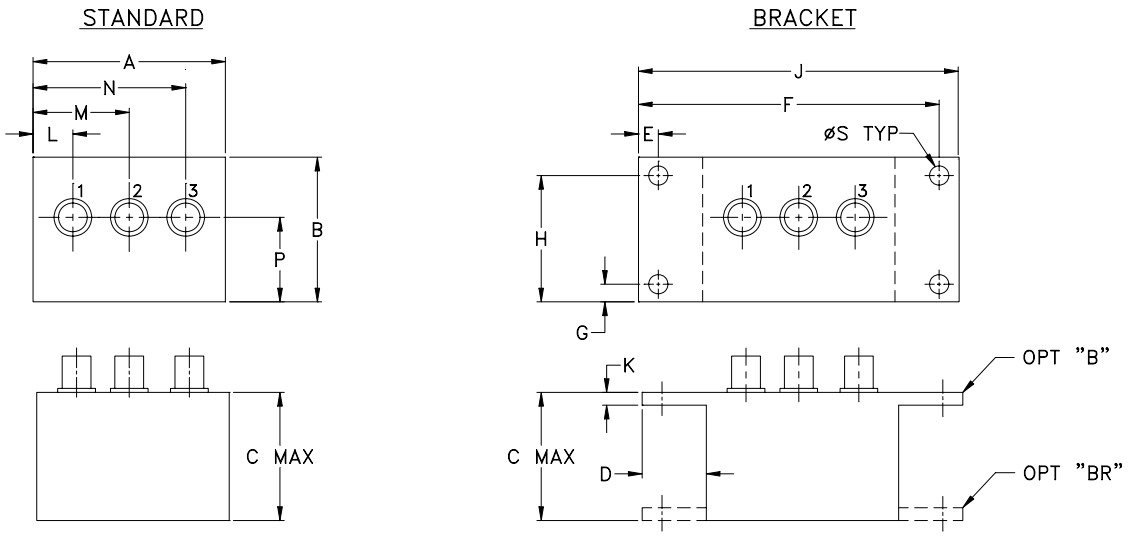



Mini-Circuits®
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see minicircuits.com

# Case Style M

## Outline Dimensions

**M21**
**M22**
**M23**




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

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

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

### Notes:

1. Case material: Aluminum alloy.
2. 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.
3. 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.


Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified




This document and its contents are the property of Mini-Circuits

Mini-Circuits

# Environmental Specifications ENV28

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 |


This document and its contents are the property of Mini-Circuits.