# X2 Frequency Multiplier

## 50Ω Output 2200 to 3800 MHz

# ZX90-2-19-S+

*Generic photo used for illustration purposes only*

CASE STYLE: JA1242

| Connectors | Model |
|---|---|
| **SMA** | ZX90-2-19-S+ |

***+RoHS Compliant***

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

### Maximum Ratings

| | |
|---|---|
| Operating Temperature | -55°C to 100°C |
| Storage Temperature | -55°C to 100°C |
| RF Input Power, 25°C | 23 dBm |

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

### Coaxial Connections

| | |
|---|---|
| INPUT | 2 |
| OUTPUT | 1 |

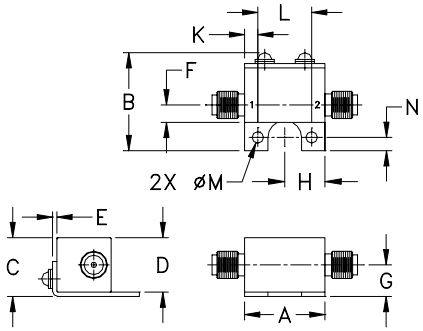
### Features

- broadband
- low conversion loss, 10.5 dB typ.
- rugged construction
- protected by US Patent 6,790,049

### Applications

- synthesizers
- local oscillators

### Outline Drawing




### Outline Dimensions (inch / mm)

| A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|
| .74 | .90 | .54 | .50 | .04 | .16 | .29 |
| 18.80 | 22.86 | 13.72 | 12.70 | 1.02 | 4.06 | 7.37 |

| H | J | K | L | M | N | wt |
|---|---|---|---|---|---|---|
| .37 | -- | .122 | .496 | .106 | .122 | grams |
| 9.40 | -- | 3.10 | 12.60 | 2.69 | 3.10 | 19.0 |

### Electrical Specifications

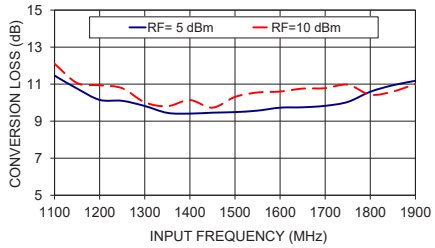
| MULTIPLICATION FACTOR | FREQUENCY (MHz) | | INPUT POWER (dBm) | | CONVERSION LOSS (dB) | | *HARMONIC OUTPUT (dBc) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | F1 | F2 | | | | | F1 | | F3 | | F4 | |
| | Input | Output | Min. | Max. | Typ. | Max. | Typ. | Min. | Typ. | Min. | Typ. | Min. |
| 2 | 1100-1900 | 2200-3800 | 5 | 10 | 10.5 | 14.5 | 27 | 20 | 30 | 23 | 17 | 11 |

* Harmonics of input frequency below the power level of F2

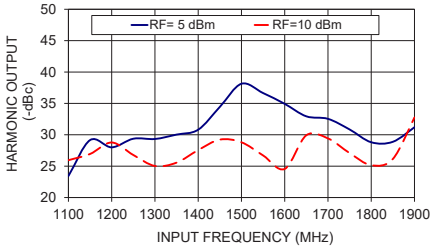
### Typical Performance Data

| | INPUT RF= 5 dBm | | | | INPUT RF= 10 dBm | | | |
|---|---|---|---|---|---|---|---|---|
| Input Frequency (MHz) | Conversion Loss (dB) | Harmonic Output Below F2 (-dBc) | | | Conversion Loss (dB) | Harmonic Output Below F2 (-dBc) | | |
| | | F1 | F3 | F4 | | F1 | F3 | F4 |
| 1100.00 | 11.46 | 23.43 | 28.77 | 31.18 | 12.10 | 25.95 | 27.81 | 16.56 |
| 1150.00 | 10.76 | 29.15 | 29.59 | 30.82 | 11.06 | 26.94 | 29.25 | 18.64 |
| 1200.00 | 10.15 | 28.00 | 33.16 | 28.41 | 10.94 | 28.77 | 31.44 | 17.83 |
| 1250.00 | 10.10 | 29.37 | 38.22 | 23.66 | 10.78 | 26.78 | 33.74 | 16.46 |
| 1300.00 | 9.82 | 29.33 | 34.73 | 22.27 | 10.02 | 25.03 | 41.56 | 18.39 |
| 1350.00 | 9.45 | 30.03 | 33.13 | 24.97 | 9.81 | 25.56 | 33.58 | 18.82 |
| 1400.00 | 9.41 | 30.81 | 33.72 | 23.31 | 10.14 | 27.56 | 32.27 | 16.29 |
| 1450.00 | 9.46 | 34.44 | 33.65 | 22.87 | 9.73 | 29.23 | 33.94 | 18.28 |
| 1500.00 | 9.49 | 38.13 | 34.21 | 22.14 | 10.31 | 28.80 | 31.51 | 16.64 |
| 1550.00 | 9.57 | 36.65 | 32.46 | 22.53 | 10.55 | 26.71 | 31.65 | 14.95 |
| 1600.00 | 9.73 | 34.93 | 31.55 | 21.08 | 10.60 | 24.56 | 32.26 | 13.62 |
| 1650.00 | 9.75 | 32.94 | 31.83 | 21.46 | 10.76 | 29.92 | 36.99 | 14.61 |
| 1700.00 | 9.83 | 32.54 | 30.91 | 20.96 | 10.78 | 29.42 | 42.75 | 17.52 |
| 1750.00 | 10.04 | 30.85 | 30.19 | 21.65 | 10.97 | 27.09 | 44.22 | 18.17 |
| 1800.00 | 10.59 | 28.81 | 28.76 | 24.46 | 10.43 | 25.15 | 50.65 | 22.83 |
| 1850.00 | 10.94 | 28.88 | 28.49 | 25.71 | 10.60 | 26.14 | 39.20 | 25.09 |
| 1900.00 | 11.18 | 31.20 | 30.07 | 29.26 | 11.01 | 32.76 | 38.51 | 31.67 |

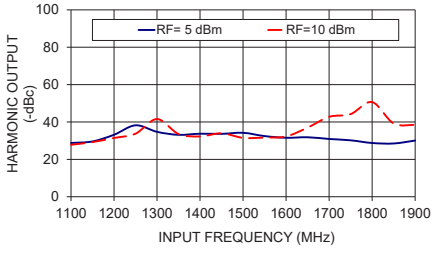
ZX90-2-19-S+
CONVERSION LOSS



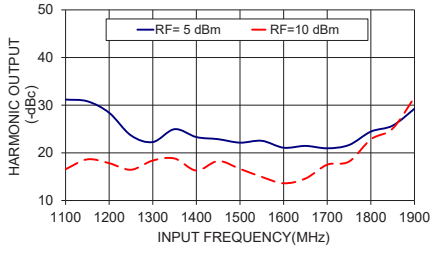

ZX90-2-19-S+
HARMONIC OUTPUT F1




ZX90-2-19-S+
HARMONIC OUTPUT F3




ZX90-2-19-S+
HARMONIC OUTPUT F4




**Notes**

**A.** Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
**B.** Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
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M171494
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# Frequency Multiplier (Doubler) ZX90-2-19+

*Typical Performance Data*

| FREQUENCY (MHz) | | | | RF IN=+5dBm | | | |
|---|---|---|---|---|---|---|---|
| | | | | CONVERSION LOSS (dB) | HARMONIC OUTPUT* (-dBc) | | |
| X 1 OUTPUT | X 2 OUTPUT | X 3 OUTPUT | X 4 OUTPUT | X 2 OUTPUT | X 1 OUTPUT | X 3 OUTPUT | X 4 OUTPUT |
| 1050 | 2100 | 3150 | 4200 | 12.30 | 24.01 | 37.27 | 22.28 |
| 1100 | 2200 | 3300 | 4400 | 11.46 | 23.43 | 28.77 | 31.18 |
| 1150 | 2300 | 3450 | 4600 | 10.76 | 29.15 | 29.59 | 30.82 |
| 1200 | 2400 | 3600 | 4800 | 10.15 | 28.00 | 33.16 | 28.41 |
| 1250 | 2500 | 3750 | 5000 | 10.10 | 29.37 | 38.22 | 23.66 |
| 1300 | 2600 | 3900 | 5200 | 9.82 | 29.33 | 34.73 | 22.27 |
| 1350 | 2700 | 4050 | 5400 | 9.45 | 30.03 | 33.13 | 24.97 |
| 1400 | 2800 | 4200 | 5600 | 9.41 | 30.81 | 33.72 | 23.31 |
| 1450 | 2900 | 4350 | 5800 | 9.46 | 34.44 | 33.65 | 22.87 |
| 1500 | 3000 | 4500 | 6000 | 9.49 | 38.13 | 34.21 | 22.14 |
| 1550 | 3100 | 4650 | 6200 | 9.57 | 36.65 | 32.46 | 22.53 |
| 1600 | 3200 | 4800 | 6400 | 9.73 | 34.93 | 31.55 | 21.08 |
| 1650 | 3300 | 4950 | 6600 | 9.75 | 32.94 | 31.83 | 21.46 |
| 1700 | 3400 | 5100 | 6800 | 9.83 | 32.54 | 30.91 | 20.96 |
| 1750 | 3500 | 5250 | 7000 | 10.04 | 30.85 | 30.19 | 21.65 |
| 1800 | 3600 | 5400 | 7200 | 10.59 | 28.81 | 28.76 | 24.46 |
| 1850 | 3700 | 5550 | 7400 | 10.94 | 28.88 | 28.49 | 25.71 |
| 1900 | 3800 | 5700 | 7600 | 11.18 | 31.20 | 30.07 | 29.26 |
| 1950 | 3900 | 5850 | 7800 | 9.92 | 33.99 | 29.64 | 22.69 |

*Harmonic Output below power level of X 2 Output .

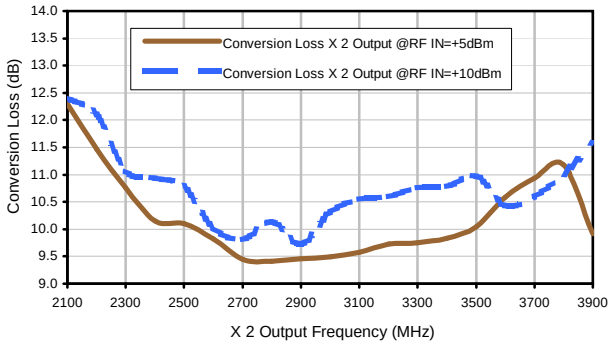
| FREQUENCY (MHz) | | | | RF IN=+10dBm | | | |
|---|---|---|---|---|---|---|---|
| | | | | CONVERSION LOSS (dB) | HARMONIC OUTPUT* (-dBc) | | |
| X 1 OUTPUT | X 2 OUTPUT | X 3 OUTPUT | X 4 OUTPUT | X 2 OUTPUT | X 1 OUTPUT | X 3 OUTPUT | X 4 OUTPUT |
| 1050 | 2100 | 3150 | 4200 | 12.40 | 28.59 | 33.72 | 21.13 |
| 1100 | 2200 | 3300 | 4400 | 12.10 | 25.95 | 27.81 | 16.56 |
| 1150 | 2300 | 3450 | 4600 | 11.06 | 26.94 | 29.25 | 18.64 |
| 1200 | 2400 | 3600 | 4800 | 10.94 | 28.77 | 31.44 | 17.83 |
| 1250 | 2500 | 3750 | 5000 | 10.78 | 26.78 | 33.74 | 16.46 |
| 1300 | 2600 | 3900 | 5200 | 10.02 | 25.03 | 41.56 | 18.39 |
| 1350 | 2700 | 4050 | 5400 | 9.81 | 25.56 | 33.58 | 18.82 |
| 1400 | 2800 | 4200 | 5600 | 10.14 | 27.56 | 32.27 | 16.29 |
| 1450 | 2900 | 4350 | 5800 | 9.73 | 29.23 | 33.94 | 18.28 |
| 1500 | 3000 | 4500 | 6000 | 10.31 | 28.80 | 31.51 | 16.64 |
| 1550 | 3100 | 4650 | 6200 | 10.55 | 26.71 | 31.65 | 14.95 |
| 1600 | 3200 | 4800 | 6400 | 10.60 | 24.56 | 32.26 | 13.62 |
| 1650 | 3300 | 4950 | 6600 | 10.76 | 29.92 | 36.99 | 14.61 |
| 1700 | 3400 | 5100 | 6800 | 10.78 | 29.42 | 42.75 | 17.52 |
| 1750 | 3500 | 5250 | 7000 | 10.97 | 27.09 | 44.22 | 18.17 |
| 1800 | 3600 | 5400 | 7200 | 10.43 | 25.15 | 50.65 | 22.83 |
| 1850 | 3700 | 5550 | 7400 | 10.60 | 26.14 | 39.20 | 25.09 |
| 1900 | 3800 | 5700 | 7600 | 11.01 | 32.76 | 38.51 | 31.67 |
| 1950 | 3900 | 5850 | 7800 | 11.57 | 30.38 | 35.06 | 29.33 |

*Harmonic Output below power level of X 2 Output .

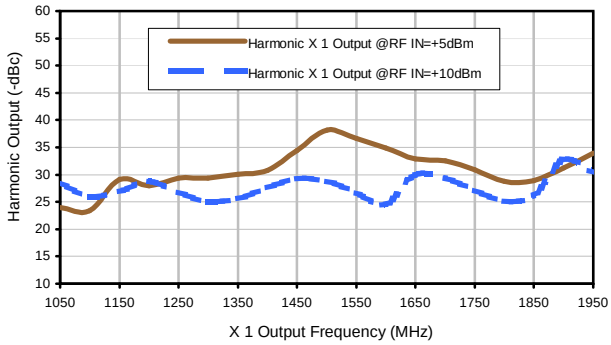
# Frequency Multiplier (Doubler) ZX90-2-19+

*Typical Performance Curves*

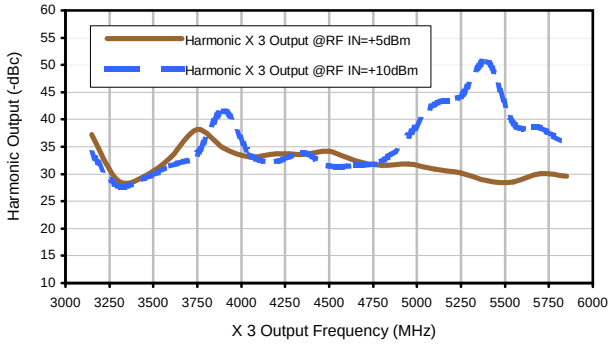
**Conversion Loss X 2 Output**



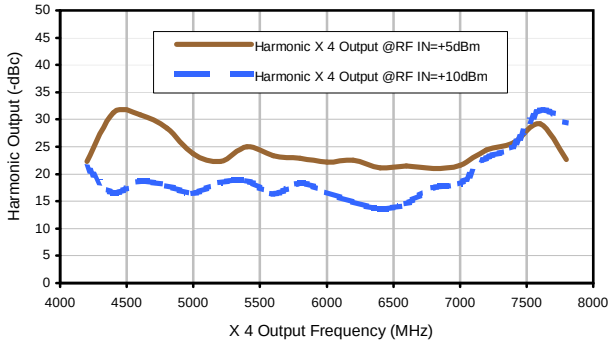

**Harmonic X 1 Output**




**Harmonic X 3 Output**



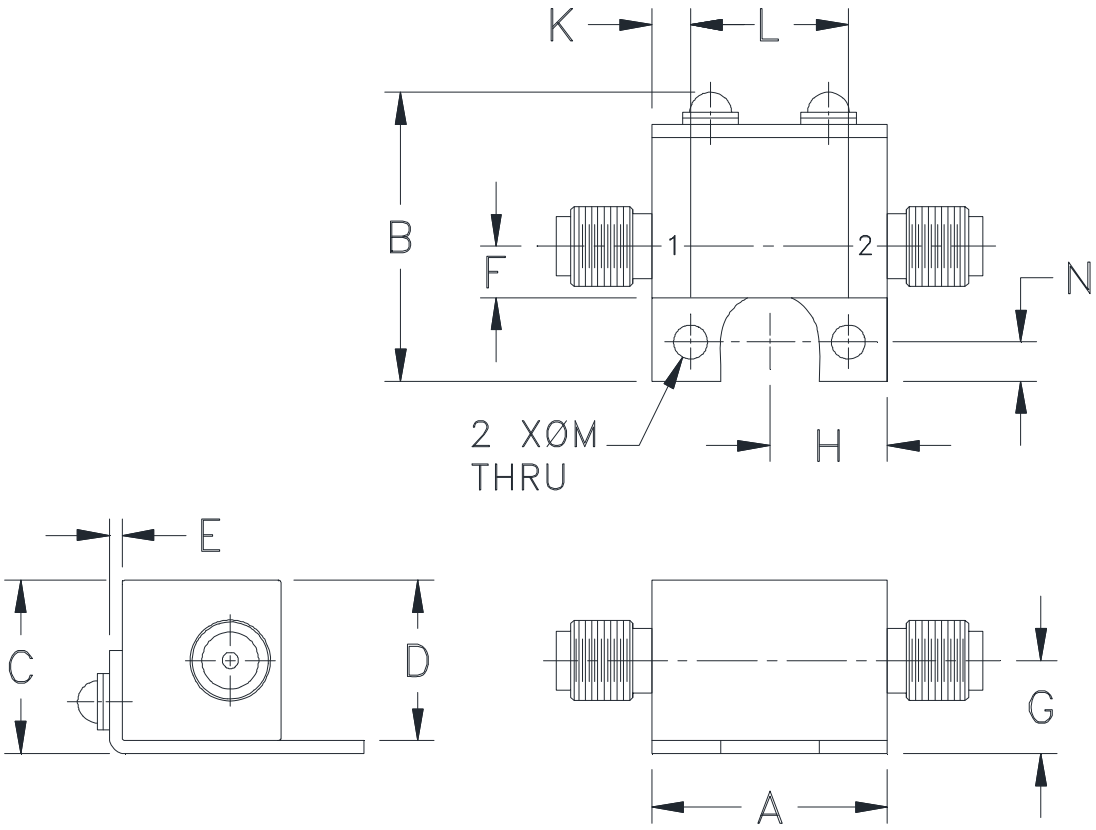

**Harmonic X 4 Output**



# Case Style JA

**JA1242**

## Outline Dimensions




| CASE #. | A | B | C | D | E | F | G | H | J | K | L | M | N | WT, GRAM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JA1242 | .74 (18.80) | .90 (22.86) | .54 (13.72) | .50 (12.70) | .04 (1.02) | .16 (4.06) | .29 (7.37) | .37 (9.40) | - - | .122 (3.10) | .496 (12.60) | .106 (2.69) | .122 (3.10) | 19.0 |

**Dimensions are in inches (mm). Tolerances: 2Pl. ± .03; 3Pl. ± .015.**
**Tolerance on hole size and interaxes dimensions to be ±.005.**

### Notes:

1. Case material: Brass.
2. Case finish: Nickel plate.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# 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 |