

# X3 Frequency Multiplier

50Ω Output 6000 to 8100 MHz

## ZX90-3-812+



Generic photo used for illustration purposes only

CASE STYLE: JA1242

Connectors Model  
SMA ZX90-3-812-S+

**+RoHS Compliant**

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

### Maximum Ratings

|                       |                |
|-----------------------|----------------|
| Operating Temperature | -40°C to 85°C  |
| Storage Temperature   | -55°C to 100°C |
| RF Input Power        | 17 dBm         |

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

### Coaxial Connections

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

### Features

- broadband
- high rejection F1, 30 dBc typ.; F2, 48 dBc typ., F4, 55 dBc typ.
- rugged construction
- protected by US Patent 6,790,049

### Applications

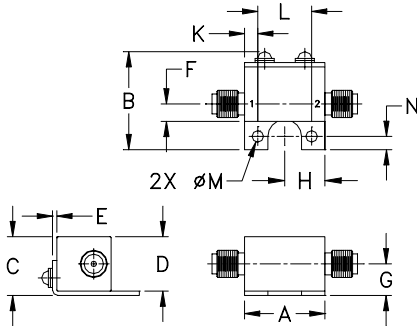
- synthesizers
- local oscillators
- satellite up and down converters

### Electrical Specifications

| MULTIPLICATION FACTOR | FREQUENCY (MHz) |           | INPUT POWER (dBm) |      | CONVERSION LOSS (dB) |      | *HARMONIC OUTPUT (dBc) |      |      |      |      |      |      |
|-----------------------|-----------------|-----------|-------------------|------|----------------------|------|------------------------|------|------|------|------|------|------|
|                       | F1 Input        | F3 Output | Min.              | Max. | Typ.                 | Max. | F1                     |      | F2   |      | F4   |      |      |
|                       |                 |           |                   |      |                      |      |                        | Typ. | Min. | Typ. | Min. | Typ. | Min. |
| 3                     | 2000-2700       | 6000-8100 | 0                 | 5    | 15                   | 22   | 30                     | 21   | 48   | 30   | 48   | 27   |      |

\* Harmonics of input frequency below the power level of F3

### 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 |

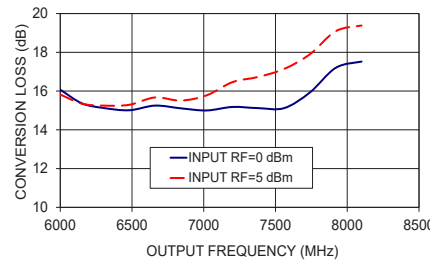
  

| H    | J  | K    | L     | M    | N    | wt    |
|------|----|------|-------|------|------|-------|
| .37  | -- | .122 | .496  | .106 | .122 | grams |
| 9.40 | -- | 3.10 | 12.60 | 2.69 | 3.10 | 19.0  |

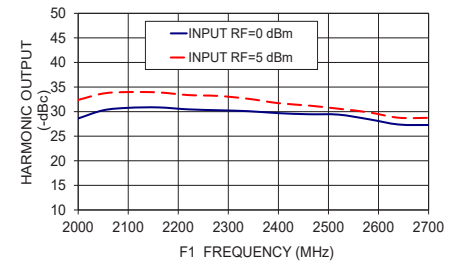
### Typical Performance Data

| Input Frequency (MHz) | INPUT RF= 0 dBm      |                                 |       |       | INPUT RF= 5 dBm      |                                 |       |       |
|-----------------------|----------------------|---------------------------------|-------|-------|----------------------|---------------------------------|-------|-------|
|                       | Conversion Loss (dB) | Harmonic Output Below F3 (-dBc) |       |       | Conversion Loss (dB) | Harmonic Output Below F3 (-dBc) |       |       |
|                       |                      | F3                              | F1    | F2    |                      | F4                              | F3    | F1    |
| 2000.00               | 16.07                | 28.61                           | 39.71 | 32.76 | 15.82                | 32.38                           | 40.92 | 47.75 |
| 2050.00               | 15.37                | 30.27                           | 43.04 | 36.29 | 15.35                | 33.69                           | 42.23 | 44.35 |
| 2100.00               | 15.13                | 30.77                           | 52.29 | 38.99 | 15.25                | 33.98                           | 55.15 | 40.09 |
| 2160.00               | 15.01                | 30.86                           | 54.04 | 44.45 | 15.29                | 33.91                           | 64.18 | 43.05 |
| 2220.00               | 15.25                | 30.46                           | 54.81 | 46.76 | 15.67                | 33.37                           | 58.33 | 47.65 |
| 2280.00               | 15.11                | 30.28                           | 57.32 | 48.63 | 15.51                | 33.19                           | 53.77 | 53.41 |
| 2340.00               | 15.00                | 30.09                           | 55.94 | 49.94 | 15.78                | 32.61                           | 49.10 | 55.01 |
| 2400.00               | 15.18                | 29.69                           | 50.59 | 52.35 | 16.46                | 31.72                           | 45.50 | 55.73 |
| 2460.00               | 15.12                | 29.47                           | 46.97 | 51.62 | 16.73                | 31.24                           | 43.44 | 51.87 |
| 2520.00               | 15.12                | 29.39                           | 44.21 | 49.41 | 17.14                | 30.59                           | 41.38 | 47.42 |
| 2580.00               | 15.93                | 28.46                           | 43.39 | 47.25 | 17.90                | 29.86                           | 39.40 | 44.54 |
| 2640.00               | 17.20                | 27.38                           | 42.79 | 44.54 | 19.09                | 28.76                           | 37.26 | 41.18 |
| 2700.00               | 17.52                | 27.28                           | 42.93 | 43.92 | 19.38                | 28.74                           | 36.75 | 39.96 |

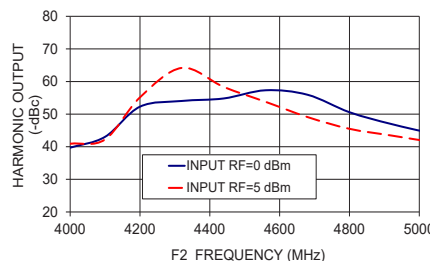
ZX90-3-812-S+  
CONVERSION LOSS



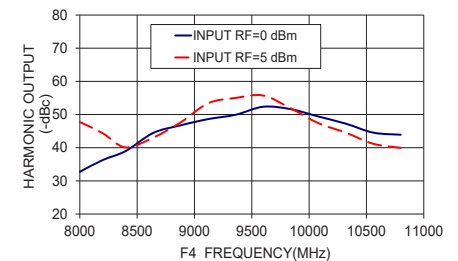
ZX90-3-812-S+  
HARMONIC OUTPUT F1



ZX90-3-812-S+  
HARMONIC OUTPUT F2



ZX90-3-812-S+  
HARMONIC OUTPUT F4



### Notes

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

# ZX90-3-812+

## Typical Performance Data

| FREQUENCY<br>(MHz) |            |            |            | RF IN=0 dBm                |                  |            |            |
|--------------------|------------|------------|------------|----------------------------|------------------|------------|------------|
|                    |            |            |            | CONVERSION<br>LOSS<br>(dB) | HARMONIC OUTPUT* |            |            |
|                    |            |            |            |                            | X 3 OUTPUT       | X 1 OUTPUT | X 2 OUTPUT |
| X 1 OUTPUT         | X 2 OUTPUT | X 3 OUTPUT | X 4 OUTPUT |                            |                  |            |            |
| 1700               | 3400       | 5100       | 6800       | 19.29                      | 36.60            | 53.52      | 38.60      |
| 1750               | 3500       | 5250       | 7000       | 19.09                      | 37.05            | 49.33      | 39.47      |
| 1800               | 3600       | 5400       | 7200       | 18.66                      | 38.55            | 46.43      | 37.94      |
| 1840               | 3680       | 5520       | 7360       | 18.56                      | 41.97            | 43.47      | 36.31      |
| 1880               | 3760       | 5640       | 7520       | 18.06                      | 47.02            | 41.86      | 31.32      |
| 1920               | 3840       | 5760       | 7680       | 19.33                      | 25.14            | 39.70      | 26.36      |
| 1960               | 3920       | 5880       | 7840       | 16.86                      | 25.52            | 48.03      | 30.69      |
| 2000               | 4000       | 6000       | 8000       | 16.07                      | 28.61            | 39.71      | 32.76      |
| 2050               | 4100       | 6150       | 8200       | 15.37                      | 30.27            | 43.04      | 36.29      |
| 2100               | 4200       | 6300       | 8400       | 15.13                      | 30.77            | 52.29      | 38.99      |
| 2160               | 4320       | 6480       | 8640       | 15.01                      | 30.86            | 54.04      | 44.45      |
| 2220               | 4440       | 6660       | 8880       | 15.25                      | 30.46            | 54.81      | 46.76      |
| 2280               | 4560       | 6840       | 9120       | 15.11                      | 30.28            | 57.32      | 48.63      |
| 2340               | 4680       | 7020       | 9360       | 15.00                      | 30.09            | 55.94      | 49.94      |
| 2400               | 4800       | 7200       | 9600       | 15.18                      | 29.69            | 50.59      | 52.35      |
| 2460               | 4920       | 7380       | 9840       | 15.12                      | 29.47            | 46.97      | 51.62      |
| 2520               | 5040       | 7560       | 10080      | 15.12                      | 29.39            | 44.21      | 49.41      |
| 2580               | 5160       | 7740       | 10320      | 15.93                      | 28.46            | 43.39      | 47.25      |
| 2640               | 5280       | 7920       | 10560      | 17.20                      | 27.38            | 42.79      | 44.54      |
| 2700               | 5400       | 8100       | 10800      | 17.52                      | 27.28            | 42.93      | 43.92      |
| 2750               | 5500       | 8250       | 11000      | 18.52                      | 26.71            | 41.28      | 42.69      |
| 2800               | 5600       | 8400       | 11200      | 19.64                      | 26.14            | 39.04      | 41.57      |
| 2840               | 5680       | 8520       | 11360      | 20.07                      | 26.47            | 36.83      | 41.17      |
| 2886               | 5772       | 8658       | 11544      | 20.37                      | 27.41            | 35.32      | 41.56      |
| 2932               | 5864       | 8796       | 11728      | 20.64                      | 29.07            | 34.47      | 40.56      |
| 2978               | 5956       | 8934       | 11912      | 21.55                      | 31.52            | 32.68      | 39.17      |
| 3024               | 6048       | 9072       | 12096      | 22.22                      | 36.43            | 30.83      | 38.12      |
| 3070               | 6140       | 9210       | 12280      | 22.11                      | 33.80            | 29.85      | 36.95      |
| 3116               | 6232       | 9348       | 12464      | 22.04                      | 26.50            | 28.99      | 35.71      |
| 3162               | 6324       | 9486       | 12648      | 22.75                      | 20.99            | 27.53      | 33.83      |
| 3208               | 6416       | 9624       | 12832      | 23.73                      | 16.08            | 25.70      | 32.78      |
| 3254               | 6508       | 9762       | 13016      | 23.33                      | 13.17            | 25.06      | 33.39      |
| 3300               | 6600       | 9900       | 13200      | 22.74                      | 10.92            | 25.13      | 35.32      |

\*Harmonic Output below power level of X 3 Output .



# Frequency Multiplier (Tripler)

# ZX90-3-812+

## Typical Performance Data

| FREQUENCY<br>(MHz) |            |            |            | RF IN=+5 dBm               |                  |            |            |
|--------------------|------------|------------|------------|----------------------------|------------------|------------|------------|
|                    |            |            |            | CONVERSION<br>LOSS<br>(dB) | HARMONIC OUTPUT* |            |            |
|                    |            |            |            |                            | X 3 OUTPUT       | X 1 OUTPUT | X 2 OUTPUT |
| X 1 OUTPUT         | X 2 OUTPUT | X 3 OUTPUT | X 4 OUTPUT |                            |                  |            |            |
| 1700               | 3400       | 5100       | 6800       | 19.04                      | 36.96            | 62.95      | 30.39      |
| 1750               | 3500       | 5250       | 7000       | 18.49                      | 37.72            | 57.42      | 32.68      |
| 1800               | 3600       | 5400       | 7200       | 17.83                      | 38.97            | 52.47      | 33.65      |
| 1840               | 3680       | 5520       | 7360       | 17.54                      | 41.69            | 46.94      | 35.25      |
| 1880               | 3760       | 5640       | 7520       | 16.92                      | 56.69            | 46.51      | 34.82      |
| 1920               | 3840       | 5760       | 7680       | 17.06                      | 31.56            | 47.98      | 34.76      |
| 1960               | 3920       | 5880       | 7840       | 16.31                      | 29.83            | 55.19      | 36.24      |
| 2000               | 4000       | 6000       | 8000       | 15.82                      | 32.38            | 40.92      | 47.75      |
| 2050               | 4100       | 6150       | 8200       | 15.35                      | 33.69            | 42.23      | 44.35      |
| 2100               | 4200       | 6300       | 8400       | 15.25                      | 33.98            | 55.15      | 40.09      |
| 2160               | 4320       | 6480       | 8640       | 15.29                      | 33.91            | 64.18      | 43.05      |
| 2220               | 4440       | 6660       | 8880       | 15.67                      | 33.37            | 58.33      | 47.65      |
| 2280               | 4560       | 6840       | 9120       | 15.51                      | 33.19            | 53.77      | 53.41      |
| 2340               | 4680       | 7020       | 9360       | 15.78                      | 32.61            | 49.10      | 55.01      |
| 2400               | 4800       | 7200       | 9600       | 16.46                      | 31.72            | 45.50      | 55.73      |
| 2460               | 4920       | 7380       | 9840       | 16.73                      | 31.24            | 43.44      | 51.87      |
| 2520               | 5040       | 7560       | 10080      | 17.14                      | 30.59            | 41.38      | 47.42      |
| 2580               | 5160       | 7740       | 10320      | 17.90                      | 29.86            | 39.40      | 44.54      |
| 2640               | 5280       | 7920       | 10560      | 19.09                      | 28.76            | 37.26      | 41.18      |
| 2700               | 5400       | 8100       | 10800      | 19.38                      | 28.74            | 36.75      | 39.96      |
| 2750               | 5500       | 8250       | 11000      | 20.20                      | 28.34            | 35.67      | 38.65      |
| 2800               | 5600       | 8400       | 11200      | 21.09                      | 28.03            | 34.44      | 37.17      |
| 2840               | 5680       | 8520       | 11360      | 21.39                      | 28.62            | 33.41      | 36.95      |
| 2886               | 5772       | 8658       | 11544      | 21.33                      | 30.06            | 32.56      | 37.24      |
| 2932               | 5864       | 8796       | 11728      | 21.29                      | 32.16            | 31.75      | 36.63      |
| 2978               | 5956       | 8934       | 11912      | 21.86                      | 35.55            | 30.53      | 35.74      |
| 3024               | 6048       | 9072       | 12096      | 22.44                      | 44.64            | 29.33      | 35.29      |
| 3070               | 6140       | 9210       | 12280      | 22.14                      | 38.06            | 28.98      | 34.47      |
| 3116               | 6232       | 9348       | 12464      | 21.92                      | 29.73            | 29.27      | 33.64      |
| 3162               | 6324       | 9486       | 12648      | 22.56                      | 24.25            | 28.73      | 32.46      |
| 3208               | 6416       | 9624       | 12832      | 23.25                      | 19.59            | 28.47      | 32.21      |
| 3254               | 6508       | 9762       | 13016      | 22.60                      | 16.97            | 28.93      | 33.46      |
| 3300               | 6600       | 9900       | 13200      | 21.75                      | 14.90            | 29.34      | 35.89      |

\*Harmonic Output below power level of X 3 Output .

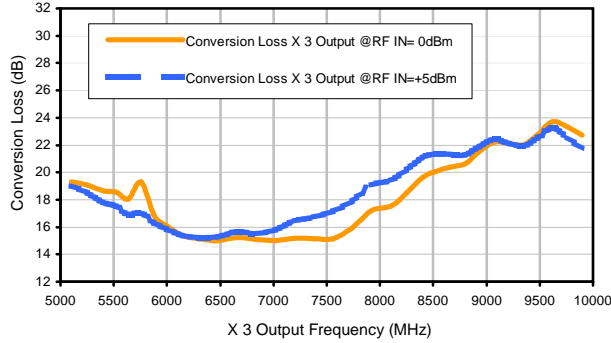


# Frequency Multiplier (Tripler)

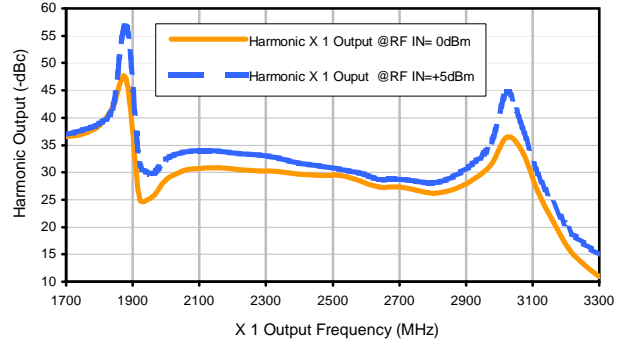
# ZX90-3-812+

## Typical Performance Curves

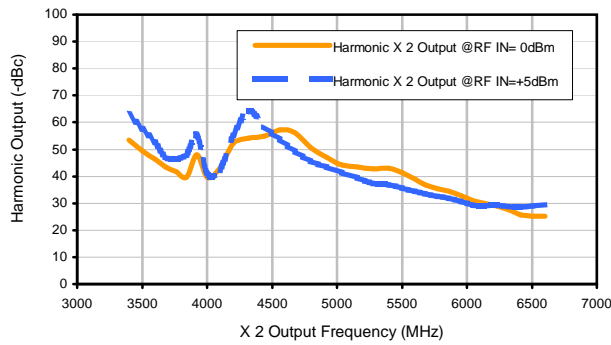
### Conversion Loss X 3 Output



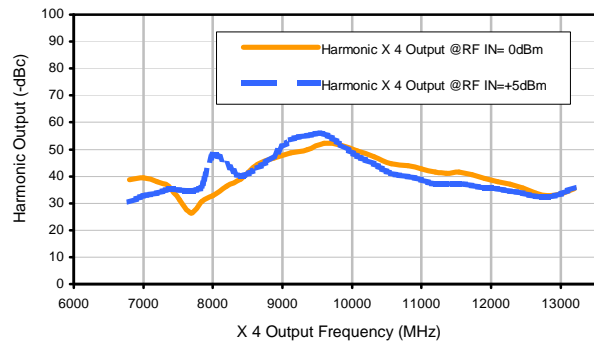
### Harmonic X 1 Output



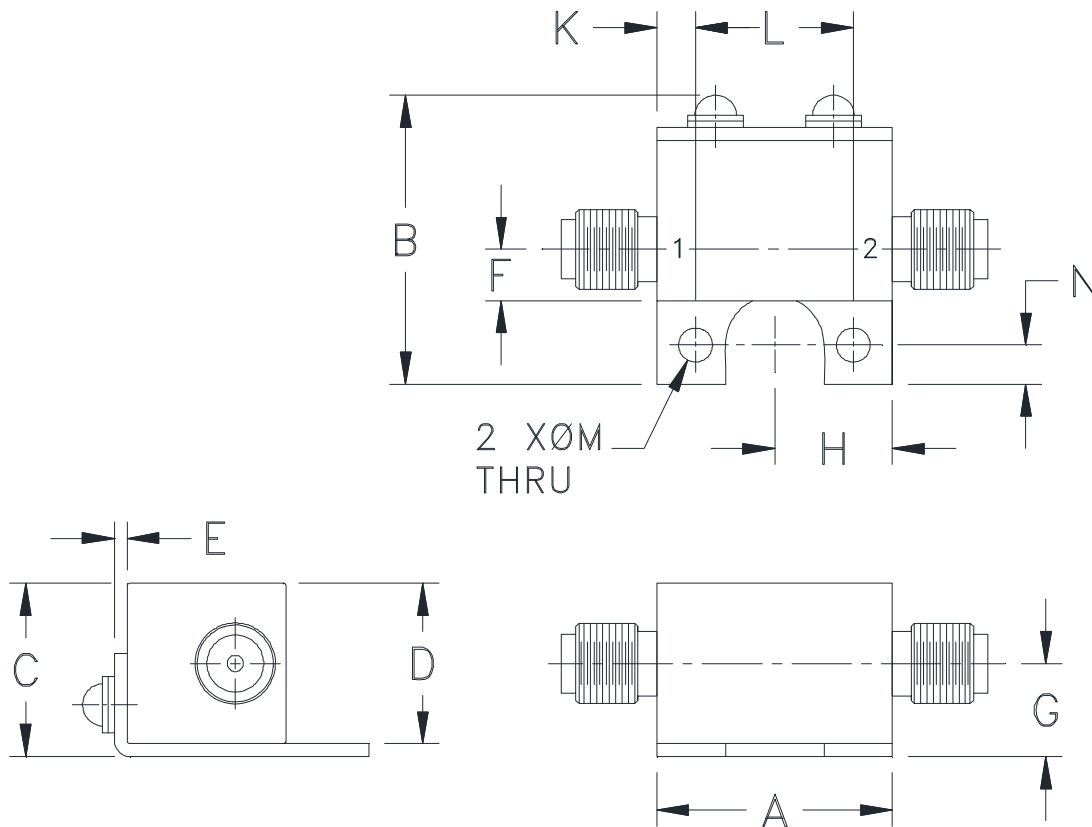
### Harmonic X 2 Output



### Harmonic X 4 Output



### Outline Dimensions



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

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

**Tolerance on hole size and interaxes dimensions to be  $\pm .005$ .**

#### Notes:

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



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| Specification              | Test/Inspection Condition  | Reference/Spec                       |
|----------------------------|--|--------------------------------------|
| Operating Temperature      | -40° to 85°C   | 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 |