

X2

Frequency Multiplier

50Ω Output 2 to 1000 MHz

AK-2+



Generic photo used for illustration purposes only

CASE STYLE: A03

+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 | 200mW |

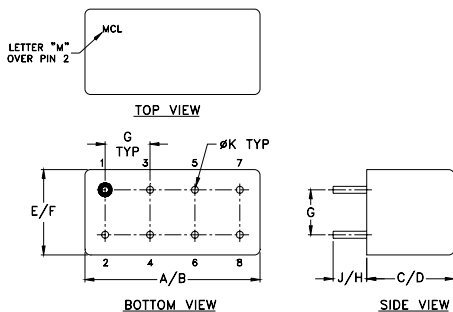
Permanent damage may occur if any of these limits are exceeded.

Pin Connections

| | |
|-------------|--------------------|
| INPUT | 1,3,4 [^] |
| OUTPUT | 8 |
| GROUND | 2,5,6,7 |
| CASE GROUND | 2,5,6,7 |

[^] pins must be connected together externally

Outline Drawing



Outline Dimensions (inch/mm)

| | | | | | |
|-------|-------|------|-------|-------|------|
| A | B | C | D | E | F |
| .480 | .500 | .390 | .405 | .210 | .230 |
| 12.19 | 12.70 | 9.91 | 10.29 | 5.33 | 5.84 |
| G | H | J | K | wt | |
| .100 | .20 | .14 | .020 | grams | |
| 2.54 | 5.08 | 3.56 | 0.51 | 2.3 | |

Features

- wideband, 2 to 1000 MHz
- low conversion loss, 13.5 dB typ.
- hermetic case

Applications

- synthesizers
- local oscillators
- military, hi-rel applications

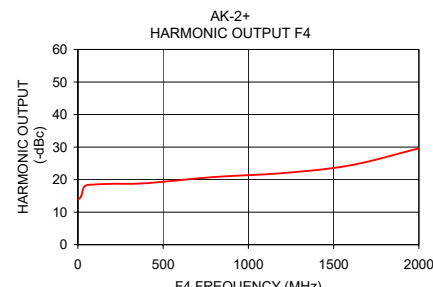
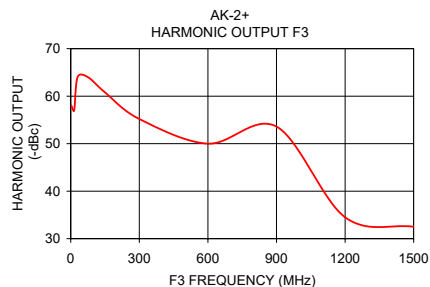
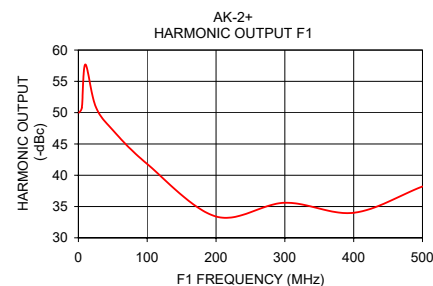
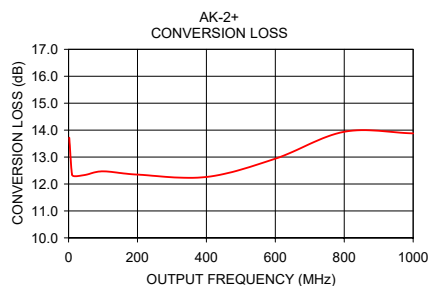
Electrical Specifications

| MULTIPLICATION FACTOR | FREQUENCY (MHz) | | INPUT POWER (dBm) | | CONVERSION LOSS (dB) | | *HARMONIC OUTPUT (dBc) | | | | | |
|-----------------------|-----------------|----------|-------------------|------|----------------------|------|------------------------|------|------|------|------|------|
| | F1 | F2 | Min. | Max. | Typ. | Max. | F1 | | F3 | | F4 | |
| | Input | Output | | | | | Typ. | Min. | Typ. | Min. | Typ. | Min. |
| 2 | 1-100 | 2-200 | 1 | 10 | 13.0 | 15.0 | 40 | 30 | 50 | 40 | 16 | 12 |
| | 100-300 | 200-600 | 1 | 10 | 13.5 | 15.5 | 25 | 20 | 40 | 30 | 16 | 12 |
| | 300-500 | 600-1000 | 1 | 10 | 14.0 | 17.5 | 20 | 15 | 30 | 25 | 16 | 12 |

* Harmonics of input frequency below the power level of F2

Typical Performance Data

| Input Frequency (MHz) | Conversion Loss (dB) F2 | F1 | F3 | F4 |
|-----------------------|-------------------------|-------|-------|-------|
| 1.00 | 13.72 | 50.00 | 58.00 | 13.90 |
| 5.00 | 12.35 | 50.80 | 57.00 | 15.00 |
| 10.00 | 12.29 | 57.70 | 64.00 | 18.00 |
| 25.00 | 12.34 | 51.00 | 64.00 | 18.50 |
| 50.00 | 12.47 | 47.20 | 60.80 | 18.70 |
| 100.00 | 12.35 | 41.80 | 55.20 | 18.90 |
| 200.00 | 12.26 | 33.40 | 50.00 | 20.80 |
| 300.00 | 12.94 | 35.60 | 53.60 | 22.00 |
| 400.00 | 13.94 | 34.00 | 34.50 | 24.40 |
| 500.00 | 13.88 | 38.20 | 32.50 | 29.60 |



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.
- 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 Multiplier (Doublers)

AK-2+

Typical Performance Data

| FREQUENCY (MHz) | | | | CONVERSION LOSS (dB) | HARMONIC OUTPUT* | | |
|--------------------|------------|------------|------------|----------------------------|------------------|------------|------------|
| X 1 OUTPUT | X 2 OUTPUT | X 3 OUTPUT | X 4 OUTPUT | X 2 OUTPUT | X 1 OUTPUT | X 3 OUTPUT | X 4 OUTPUT |
| 1 | 2 | 3 | 4 | 13.72 | 50.00 | 58.00 | 13.90 |
| 5 | 10 | 15 | 20 | 12.35 | 50.80 | 57.00 | 15.00 |
| 10 | 20 | 30 | 40 | 12.29 | 57.70 | 64.00 | 18.00 |
| 25 | 50 | 75 | 100 | 12.34 | 51.00 | 64.00 | 18.50 |
| 50 | 100 | 150 | 200 | 12.47 | 47.20 | 60.80 | 18.70 |
| 100 | 200 | 300 | 400 | 12.35 | 41.80 | 55.20 | 18.90 |
| 200 | 400 | 600 | 800 | 12.26 | 33.40 | 50.00 | 20.80 |
| 300 | 600 | 900 | 1200 | 12.94 | 35.60 | 53.60 | 22.00 |
| 400 | 800 | 1200 | 1600 | 13.94 | 34.00 | 34.50 | 24.40 |
| 500 | 1000 | 1500 | 2000 | 13.88 | 38.20 | 32.50 | 29.60 |

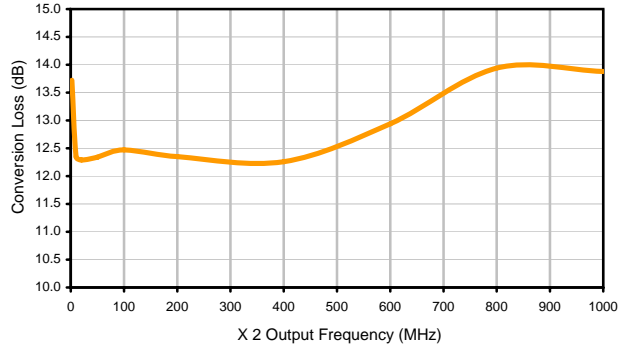
*Harmonic Output below power level of X 2 Output .

Frequency Multiplier (Doubler)

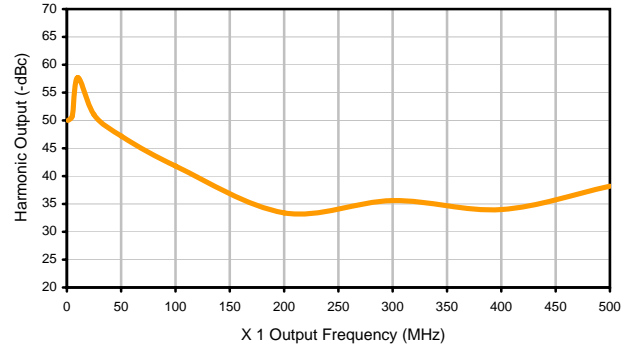
AK-2+

Typical Performance Curves

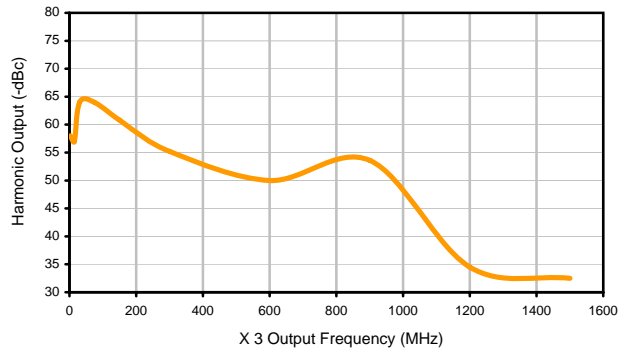
Conversion Loss X 2 Output



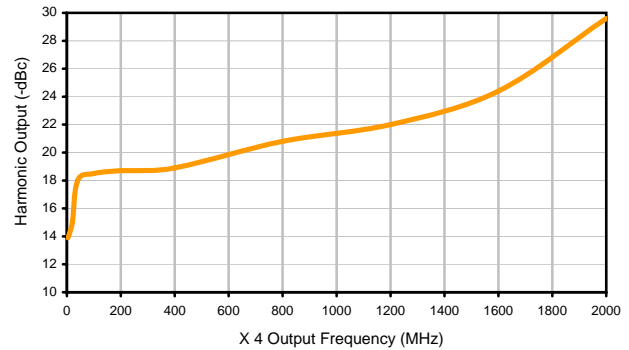
Harmonic X 1 Output



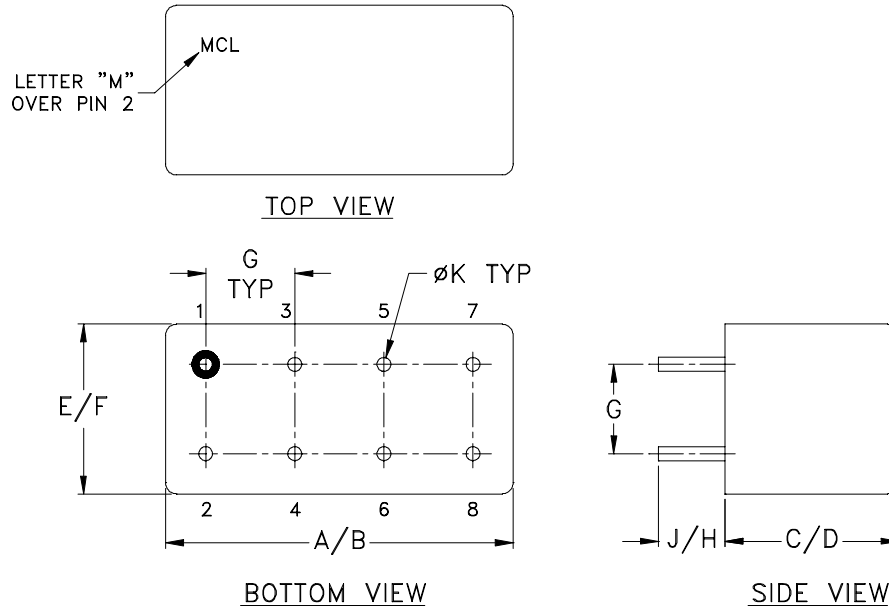
Harmonic X 3 Output



Harmonic X 4 Output



Outline Dimensions



| CASE# | A | B | C | D | E | F | G | H | J | K | WT, GRAM |
|-------|---------|---------|----------------|-----------------|----------------|----------------|----------------|---------------|---------------|---------------|-------------|
| A03 | .480 | .500 | .390 (9.91) | .405 (10.29) | .210 (5.33) | .230 (5.84) | .100 (2.54) | .20 (5.08) | .14 (3.56) | .020 (.51) | 2.3 |
| A11 | (12.19) | (12.70) | .240 (6.10) | .255 (6.48) | | | | | | | 1.9 |

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

Notes:

- Header material: C.R.S.
Pin material: #52 alloy.
Cover material: Cupro-Nickel.
- Pin finish: Electro Tin-Silver.
- Insulated spacer available. Request P/N B14-047-01.
- Tolerance on pin diameter $\pm .005$ inch.
- Glass meniscus 0.015 inch max.
- Blue bead indicates Pin 1. Pin numbers do not appear on unit, for reference only.

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 Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -55° to 100° C Ambient Environment | Individual Model Data Sheet |
| Thermal Shock | -55° to 100°C, 100 cycles | MIL-STD-202, Method 107, Condition A-3, except +100°C |
| 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 | 50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes | MIL-STD-202, Method 213, Condition A |
| Moisture Resistance | 10 cycles, 24 hours per cycle | MIL-STD-202, Method 106, Condition A, except 50°C and end point electrical test done within 12 hours |
| Solderability | 10X Magnification | J-STD-002, 95% Coverage |
| Resistance to Solder Heat | 260°C for 10 seconds | MIL-STD-202, Method 210, Condition B |
| Marking Resistance to Solvents | Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C | MIL-STD-202, Method 215 |
| Terminal Strength | 4 1/2 Pound Pull | MIL-STD-202, Method 211, Condition A |



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| Specification | Test/Inspection Condition | Reference/Spec |
|---------------------|---------------------------|--------------------------------------|
| Gross Leak | 125°C Bubble Test | MIL-STD-202, Method 112, Condition D |
| Barometric Pressure | 100,000 Feet | MIL-STD-202, Method 105, Condition D |