## kHz RANGE CRYSTAL UNIT

# MC - 306
# MC - 405 / MC - 406

- Frequency range : 32.768 kHz (20 kHz to 120 kHz)
- Thickness : 8.0 × 3.8 × 2.54 mm ⋯MC-306
  10.41 × 4.06 × 3.6 mm ⋯MC-405 / 406
- Overtone order : Fundamental
- Applications : Clock and Microcomputer

RoHS Compliant

Product Number (please contact us)
MC-306 : Q1xMC3062xxxx00
MC-405 : Q1xMC4052xxxx00
MC-406 : Q1xMC4062xxxx00


Actual size

| MC-306 | MC-405 / 406 |
|---|---|
|  |  |

## Specifications (characteristics)

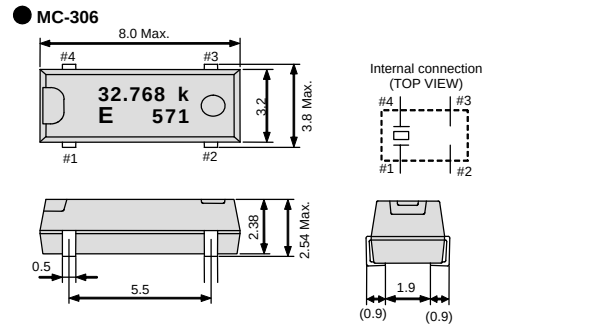
| Item | Symbol | Specifications | | Conditions / Remarks |
|---|---|---|---|---|
| Nominal frequency range | f_nom | 32.768 kHz | 20 kHz to 120 kHz | Please contact us about available frequencies. |
| Storage temperature | T_stg | -55 °C to +125 °C | | Storage as single product. |
| Operating temperature | T_use | -40 °C to +85 °C | | |
| Level of drive | DL | 1.0 μW Max. | | |
| Frequency tolerance (standard) | f_tol | ±20 × $10^{-6}$, ±50 × $10^{-6}$ | ±50 × $10^{-6}$, ±100 × $10^{-6}$ | +25 °C, DL=0.1 μW |
| Turnover temperature | Ti | +25 °C ±5 °C | | |
| Parabolic coefficient | B | -0.04 × $10^{-6}$ / °$C^2$ Max. | | |
| Load capacitance | CL | 6 pF to ∞ (standard :12.5 pF) | | Please specify |
| Motional resistance (ESR) | $R_1$ | 50 kΩ Max. | As per table below | |
| Motional capacitance | $C_1$ | 1.8 fF Typ. | 4.0 fF to 0.6 fF | MC-306 |
| | | 2.0 fF Typ. | | MC-405 / 406 |
| Shunt capacitance | $C_0$ | 0.9 pF Typ. | 2.0 pF to 0.6 pF | MC-306 |
| | | 0.85 pF Typ. | | MC-405 / 406 |
| Frequency aging | f_age | ±3 × $10^{-6}$ / year Max. | ±5 × $10^{-6}$ / year Max. | +25 °C, First year |

## Motional resistance (ESR)

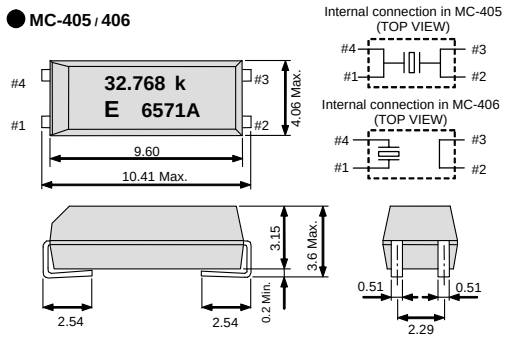
| Frequency | 20 kHz≤f_nom< 31.2 kHz | 31.2 kHz≤f_nom< 40 kHz | 40 kHz≤f_nom< 90 kHz | 90 kHz≤f_nom≤120 kHz |
|---|---|---|---|---|
| Motional resistance | 55 kΩ Max. | 35 kΩ Max. | 20 kΩ Max. | 12 kΩ Max. |

Product name (Standard form) MC-306 32.768000kHz 12.5 +20.0-20.0
① ② ③ ④
①Model ②Frequency ③Load capacitance(pF) ④Frequency tolerance(× $10^{-6}$, +25 °C)

## External dimensions (Unit:mm)



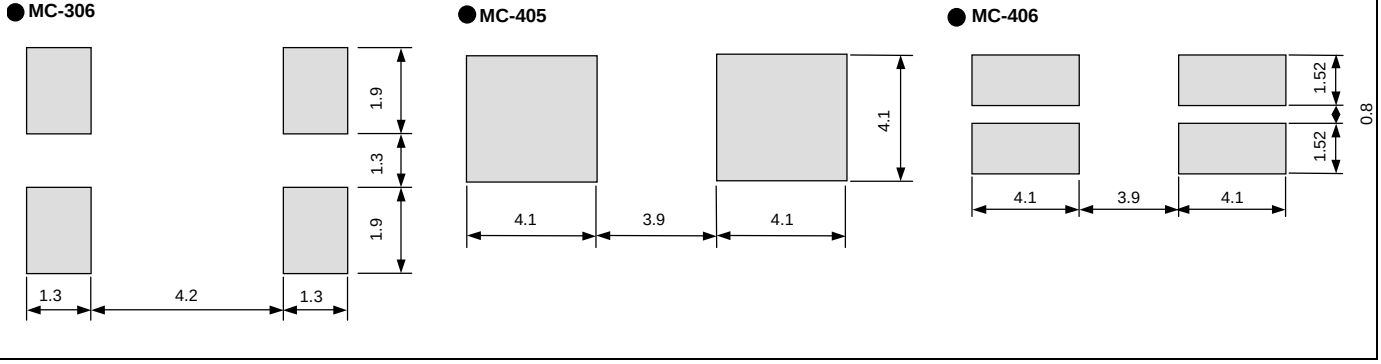

Do not connect #2 and #3 to external device.
The metal case inside of the molding compound may be exposed on the top or bottom of this product.
This purely cosmetic and does not have any effect on quality, reliability or electrical specs.




Do not connect #2 and #3 of MC-406 to external device.

The first digit of No. means: 5×××× MC-405
6×××× MC-406

## Footprint (Recommended) (Unit:mm)



## PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

At Seiko Epson, all environmental initiatives operate under the Plan-Do-Check-Action (PDCA) cycle designed to achieve continuous improvements. The environmental management system (EMS) operates under the ISO 14001 environmental management standard.

All of our major manufacturing and non-manufacturing sites, in Japan and overseas, completed the acquisition of ISO 14001 certification.

ISO 14000 is an international standard for environmental management that was established by the International Standards Organization in 1996 against the background of growing concern regarding global warming, destruction of the ozone layer, and global deforestation.

## WORKING FOR HIGH QUALITY

In order provide high quality and reliable products and services than meet customer needs,

Seiko Epson made early efforts towards obtaining ISO9000 series certification and has acquired ISO9001 for all business establishments in Japan and abroad. We have also acquired ISO/TS 16949 certification that is requested strongly by major automotive manufacturers as standard.

ISO/TS16949 is the international standard that added the sector-specific supplemental requirements for automotive industry based on ISO9001.

**►Explanation of the mark that are using it for the catalog**

| | |
|---|---|
| Pb Free | ►Pb free. |
| RoHS Compliant | ►Complies with EU RoHS directive.<br>*About the products without the Pb-free mark.<br>Contains Pb in products exempted by EU RoHS directive.<br>(Contains Pb in sealing glass, high melting temperature type solder or other.) |
| For Automotive | ►Designed for automotive applications such as Car Multimedia, Body Electronics, Remote Keyless Entry etc. |
| Automotive Safety | ►Designed for automotive applications related to driving safety (Engine Control Unit, Air Bag, ESC etc ). |

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