



## MHz RANGE CRYSTAL UNIT

MA-406  
MA-505, MA-506

- Frequency range : 4 MHz to 64 MHz
- Thickness : 11.7 × 4.8 × 3.7 mm ...MA-406  
13.46 × 5.08 × 4.6 mm ...MA-505/506
- Overtone order : Fundamental  
3rd overtone (30 MHz to 64 MHz)
- Applications : For Clock of integrated circuit



Product Number (please contact us)

MA-406 : Q22MA4062xxxx00

MA-505 : Q22MA5052xxxx00

MA-506 : Q22MA5062xxxx00



Actual size

MA-406



MA-505 / 506



## Specifications (characteristics)

| Item                                                    | Symbol           | Specifications                                                                  | Conditions / Remarks                                                  |
|---------------------------------------------------------|------------------|---------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Nominal frequency range                                 | f <sub>nom</sub> | 4.000 MHz to 29.999 MHz                                                         | Fundamental *1                                                        |
|                                                         |                  | 30.000 MHz to 64.000 MHz                                                        | 3rd overtone *2                                                       |
| Storage temperature                                     | T <sub>stg</sub> | -55 °C to +125 °C                                                               | Storage as single product.                                            |
| Operating temperature                                   | T <sub>use</sub> | -20 °C to +70 °C                                                                | Please contact us on availability of -40 °C to +85 °C                 |
| Level of drive                                          | DL               | 10 µW to 100 µW                                                                 |                                                                       |
| Frequency tolerance (standard)                          | f <sub>tol</sub> | ±50 × 10 <sup>-6</sup>                                                          | +25 °C                                                                |
| Frequency versus temperature characteristics (standard) | f <sub>tem</sub> | Under 5.5 MHz : ±50 × 10 <sup>-6</sup><br>Over 5.5 MHz : ±30 × 10 <sup>-6</sup> | -20 °C to +70 °C                                                      |
|                                                         |                  | Fundamental: 10 pF to ∞                                                         | Please contact us for requirements not listed in this specifications. |
| Load capacitance                                        | CL               | Overtone: 5 pF to ∞                                                             | Please specify                                                        |
| Motional resistance (ESR)                               | R <sub>1</sub>   | As per table below                                                              | -20 °C to +70 °C, DL=100 µW                                           |
| Shunt capacitance                                       | C <sub>0</sub>   | 5 pF Max.                                                                       |                                                                       |
| Frequency aging                                         | f <sub>age</sub> | ±5 × 10 <sup>-6</sup> / year Max.                                               | +25 °C, First year                                                    |

\*1 4.0 MHz ≤ f<sub>nom</sub> < 5.5 MHz : See "Available frequencies from 4.0 MHz to less than 5.5 MHz". 8.0 MHz < f<sub>nom</sub> < 8.2 MHz: Unavailable.\*2 26.000 MHz ≤ f<sub>nom</sub> < 30.000 MHz : please contact us for inquiries for 3rd overtone mode.

## Available frequencies from 4.0 MHz to less than 5.5 MHz (MHz)

|       |       |       |       |          |          |       |       |        |
|-------|-------|-------|-------|----------|----------|-------|-------|--------|
| 4.000 | 4.032 | 4.096 | 4.190 | 4.194304 | 4.433619 | 4.500 | 4.800 | 4.9152 |
|-------|-------|-------|-------|----------|----------|-------|-------|--------|

## Motional resistance (ESR)

| Frequency (MHz)     | 4 ≤ f <sub>nom</sub> < 5.5 | 5.5 ≤ f <sub>nom</sub> < 6 | 6 ≤ f <sub>nom</sub> < 10 | 10 ≤ f <sub>nom</sub> < 12 | 12 ≤ f <sub>nom</sub> < 16 | 16 ≤ f <sub>nom</sub> < 30 | 30 ≤ f <sub>nom</sub> ≤ 36 | 36 < f <sub>nom</sub> ≤ 64 |
|---------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Motional resistance | 150 Ω Max.                 | 100 Ω Max.                 | 80 Ω Max.                 | 60 Ω Max.                  | 50 Ω Max.                  | 40 Ω Max.                  | 100 Ω Max.                 | 80 Ω Max.                  |
| Overtone order      | Fundamental                |                            |                           |                            |                            |                            | 3rd overtone               |                            |

Product name MA-406 24.000000MHz 12.0 +10.0-10.0

(Standard form)

① ② ③ ④

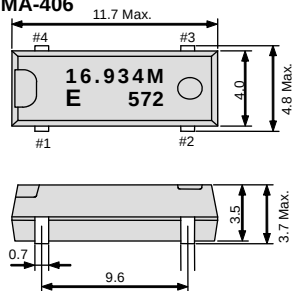
①Model ②Frequency ③Load capacitance(pF) ④Frequency tolerance(× 10<sup>-6</sup>, +25 °C)

In addition to the above mentioned specification item, please specify frequency temperature characteristics and operating temperature range in case of inquiry.

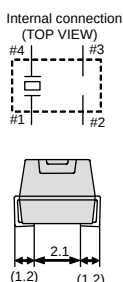
## External dimensions

(Unit:mm)

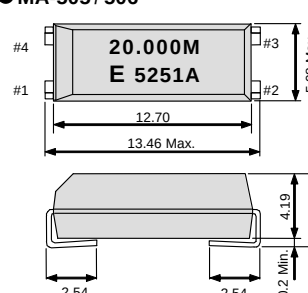
## ● MA-406



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.

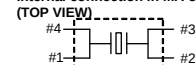


## ● MA-505 / 506

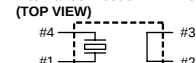


Do not connect #2 and #3 of MA-506 to external device.  
The first digit of lot No. means : 5xxxx MA-505  
6xxxx MA-506

Internal connection in MA-505



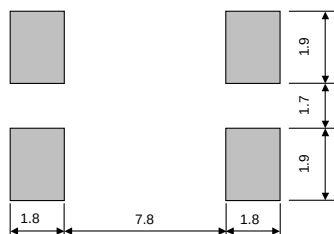
Internal connection in MA-506



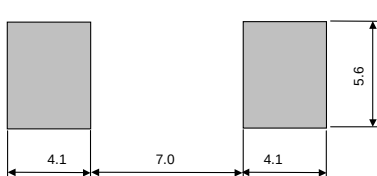
## Footprint (Recommended)

(Unit:mm)

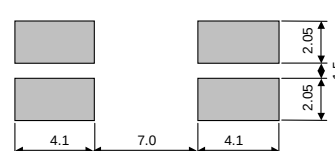
## ● MA-406



## ● MA-505



## ● MA-506



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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.

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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.                                                                                                                                                                                                                      |
|  | ► 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.) |
|  | ► Designed for automotive applications such as Car Multimedia, Body Electronics, Remote Keyless Entry etc.                                                                                                                      |
|  | ► Designed for automotive applications related to driving safety (Engine Control Unit, Air Bag, ESC etc ).                                                                                                                      |

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Тел: +7 (812) 336 43 04 (многоканальный)

Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)

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