

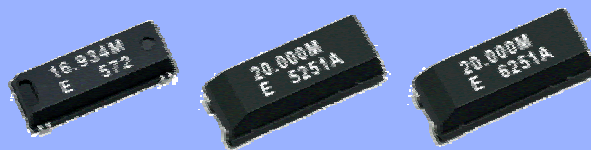
**MHz RANGE CRYSTAL UNIT**  
**SMD**

**MA-406**  
**MA-505/MA-506**

- Frequency range : 4 MHz to 64 MHz
- Thickness : 11.7 × 4.8 × 3.7 t (mm) ...MA-406  
13.46 × 5.08 × 4.6 t (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 : Q22MA4061xxxx00  
 MA-505 : Q22MA5051xxxx00  
 MA-506 : Q22MA5061xxxx00



Actual size



**Specifications (characteristics)**

| Item  | Symbol         | Specifications                                 | Remarks  |
|---|----------------|--|--|
| Nominal frequency range                                 | f_nom          | 4.000 MHz to 29.999 MHz                        | Fundamental *1   |
|   |                | 30.000 MHz to 64.000 MHz                       | 3rd overtone *2  |
| Temperature range                                       | T_stg          | -55 °C to +125 °C                              | Store as bare product after unpacking                                  |
|   | T_use          | -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_tol          | ±50 × 10 <sup>-6</sup>                         | +25 °C   |
| Frequency versus temperature characteristics (standard) | f_tem          | Under 5.5 MHz : ±50 × 10 <sup>-6</sup>         | -20 °C to +70 °C   |
|   |                | Over 5.5 MHz : ±30 × 10 <sup>-6</sup>          | For the out of standard specifications, please contact us for inquires |
| Load capacitance  | CL             | Fundamental: 10 pF to ∞<br>Overtone: 5 pF to ∞ | Please specify   |
| Motional resistance (ESR)                               | R <sub>1</sub> | As per below table                             | -20 °C to +70 °C, DL=100 μW  |
| Shunt capacitance                                       | C <sub>0</sub> | 5 pF Max.                                      |  |
| Frequency aging   | f_age          | ±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)**

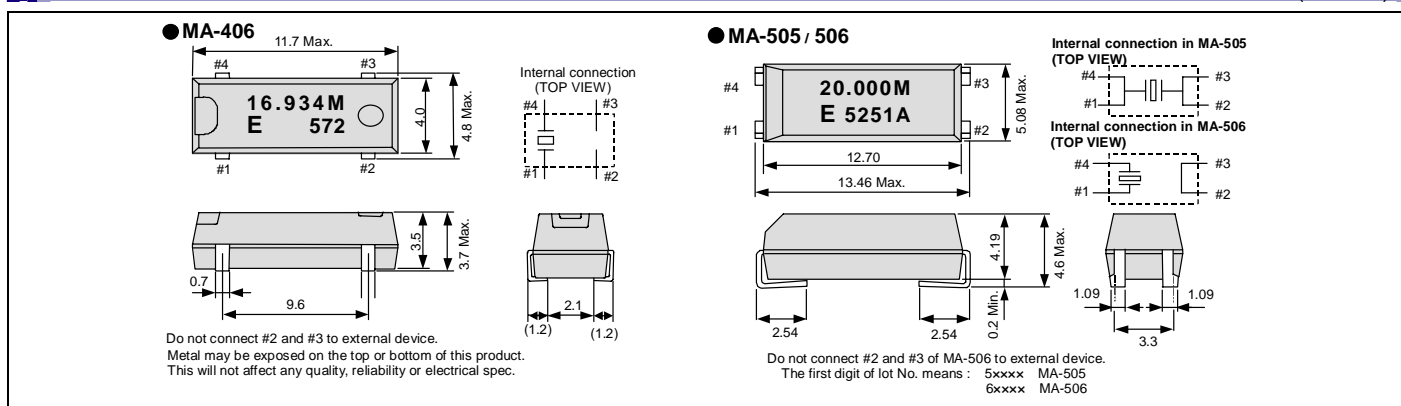
|       |       |       |       |          |          |       |       |        |
|-------|-------|-------|-------|----------|----------|-------|-------|--------|
| 4.000 | 4.032 | 4.096 | 4.190 | 4.194304 | 4.433619 | 4.500 | 4.800 | 4.9152 |
|-------|-------|-------|-------|----------|----------|-------|-------|--------|

**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               |                            |

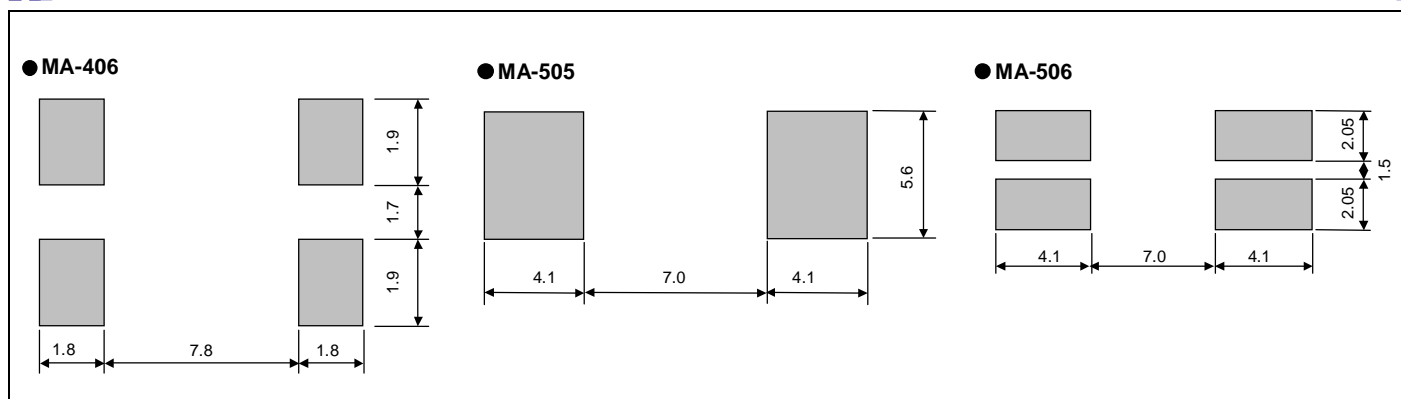
**External dimensions**

(Unit:mm)



**Footprint (Recommended)**

(Unit:mm)



# “QMEMS” EPSON TOYOCOM

In order to meet customer needs in a rapidly advancing digital, broadband and ubiquitous society, we are committed to offering products that are one step ahead of the market and a rank above the rest in quality. To achieve our goals, we follow a “3D (three device) strategy” designed to drive both horizontal and vertical growth. We will to grow our three device categories of “Timing Devices”, “Sensing Devices” and “Optical Devices”, and expand vertical growth through a combination of products from these categories.

A Quartz MEMS is any high added value quartz device that exploits the characteristics of quartz crystal material but that is produced using MEMS (micro-electro-mechanical system) processing technology.

Market needs are advancing faster than previously imagined toward smaller, more stable crystal products, but we will stay ahead of the curve by rolling out products that exceed market speed and quality requirements. We want to further accelerate the 3D strategy by QMEMS.

Quartz devices have become crucial in the network environment where products are increasingly intended for broadband, ubiquitous applications and where various types of terminals can transfer information almost immediately via LAN and WAN on a global scale. Epson Toyocom Corporation addresses every single aspect within a network environment. The new corporation offers “Digital Convergence” solutions to problems arising with products for consumer use, such as, core network systems and automotive systems.



## PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

At Epson Toyocom, 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 to provide high quality and reliable products and services that meet customer needs, Epson Toyocom 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/TS 16949 is a global standard based on QS-9001, a severe standard corresponding to the requirements from the automobile industry.

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

|  |   |
|--|---|
|  | ► <b>Pb free.</b>   |
|  | ► <b>Complies with EU RoHS directive.</b><br>*About the products without the Pb-free mark.<br><b>Contains Pb in products exempted by EU RoHS directive.</b><br>(Contains Pb in sealing glass, high melting temperature type solder or other.) |
|  | ► <b>The products have been designed for high reliability applications such as Automotive.</b>  |

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/ Medical instruments to sustain life / Submarine transmitters / Power stations and related / Fire work equipment and security equipment  
/ traffic control equipment / and others requiring equivalent reliability.
- In this new crystal master for Epson Toyocom, product codes and markings will remain as previously identified prior to the merger.  
Due to the on-going strategy of gradual unification of part numbers, please review product codes and markings, as they will change during the course of the coming months.

We apologize for the inconvenience, but we will eventually have a unified part numbering system for Epson Toyocom that will be user friendly.