

**MHz RANGE CRYSTAL UNIT  
SMD**



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

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



Actual size



**Specifications (characteristics)**

Item	Symbol	Specifications	Remarks
Nominal frequency range	f	4.000 MHz to 29.999 MHz 30.000 MHz to 64.000 MHz	Fundamental *1 3rd overtone *2
Temperature range	Storage temperature	T_stg	-55 °C to +125 °C
	Operating temperature	T_use	-20 °C to +70 °C
Level of drive	DL	10 μW to 100 μW	Please contact us on availability of -40 °C to +85 °C
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 inquiries
Load capacitance	CL	Fundamental: 10 pF to ∞ 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 < 5.5 MHz : See "Available frequencies from 4.0 MHz to less than 5.5 MHz". 8.0 MHz < f < 8.2 MHz: Unavailable.

\*2 26.000 MHz ≤ f < 30.000 MHz : please contact us for inquiries for 3rd overtone mode.

**Available frequency from 4.0 MHz to less than 5.5 MHz (MHz)**

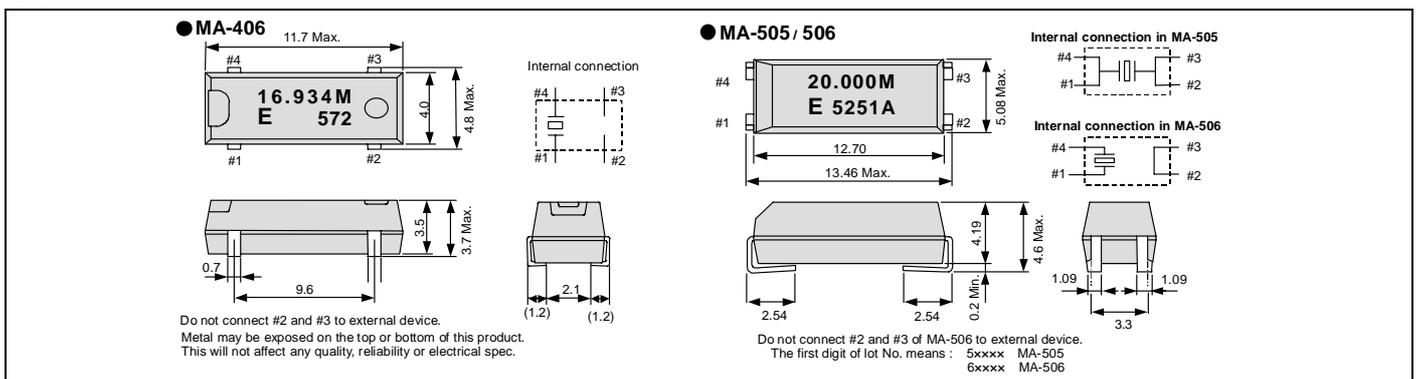
4.000	4.032	4.096	4.190	4.194304	4.433619	4.500	4.800	4.9152
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**Motional resistance (ESR)**

Frequency (MHz)	4.0 ≤ f < 5.5	5.5 ≤ f < 6.0	6.0 ≤ f < 10.0	10.0 ≤ f < 12.0	12.0 ≤ f < 16.0	16.0 ≤ f < 30.0	30.0 ≤ f < 36.0	36.0 < f ≤ 64.0
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

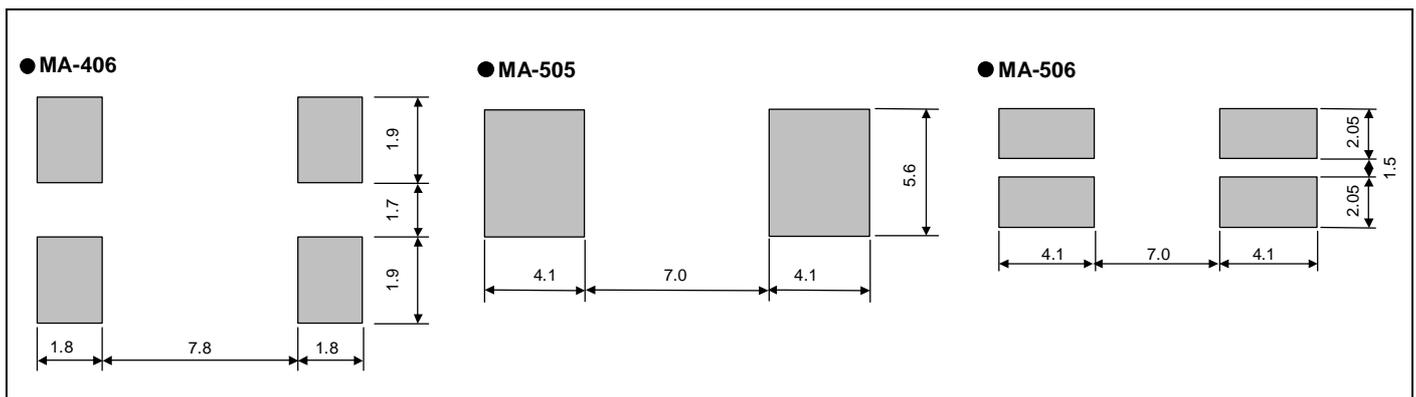
**External dimensions**

(Unit:mm)



**Footprint (Recommended)**

(Unit:mm)



# “3D STRATEGY” 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.

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. In the future, new group companies will be expected to acquire the certification around the third year of operations.

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

Epson Toyocom quickly began working to acquire company-wide ISO 9000 series certification, and has acquired ISO 9001 or ISO 9002 certification for all targeted products manufactured in Japanese and overseas plants.

Epson Toyocom has acquired QS-9000 certification, which is of a higher level. Also, TS 16949 certification, which is also of a higher level, has been acquired.

QS-9000 is an enhanced standard for quality assurance systems formulated by leading U.S. automobile manufacturers based on the international ISO 9000 series.

ISO/TS 16949 is a global standard based on QS-9000, a severe standard corresponding to the requirements from the automobile industry.

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- These products are intended for general use in electronic equipment. When using them in specific applications that require extremely high reliability, such as the applications stated below, you must obtain permission from Epson Toyocom in advance.
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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.