



## 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

MA-406



MA-505 / 506



### 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	T_stg T_use	-55 °C to +125 °C -20 °C to +70 °C	Store as bare product after unpacking 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	$\pm 50 \times 10^{-6}$	+25 °C
Frequency versus temperature characteristics (standard)	f_tem	Under 5.5 MHz : $\pm 50 \times 10^{-6}$ Over 5.5 MHz : $\pm 30 \times 10^{-6}$	-20 °C to +70 °C 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	$\pm 5 \times 10^{-6}$ / 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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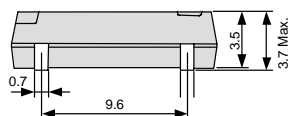
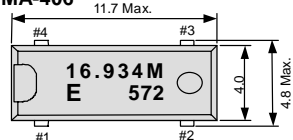
### Motional resistance (ESR)

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	

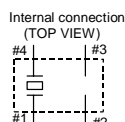
### External dimensions

(Unit:mm)

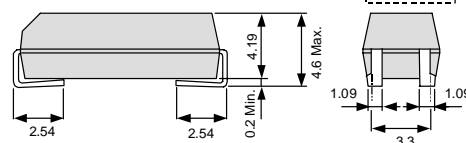
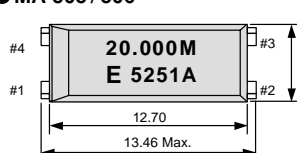
#### MA-406



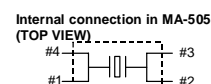
Do not connect #2 and #3 to external device.  
Metal may be exposed on the top or bottom of this product.  
This will not affect any quality, reliability or electrical spec.



#### MA-505 / 506



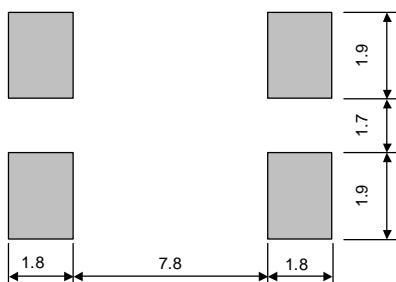
Do not connect #2 and #3 of MA-506 to external device.  
The first digit of lot No. means : 5xxxx MA-505  
6xxxx MA-506



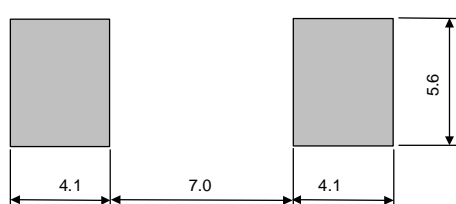
### Footprint (Recommended)

(Unit:mm)

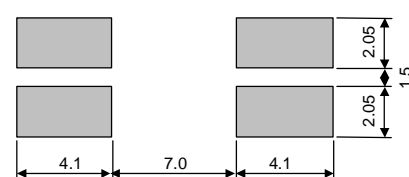
#### MA-406



#### MA-505



#### MA-506



# “Quartz + MEMS” 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.

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

In order to provide high quality and reliable products and services than 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.

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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  - / 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.