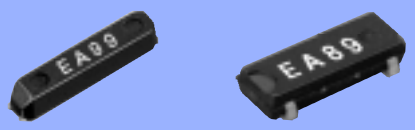
kHz RANGE CRYSTAL UNIT
LOW PROFILE SMD

MC - 146 / MC - 156

- Frequency range : 32.768 kHz (32 kHz to 100 kHz)
- Thickness : 1.4 mm Max. (MC-146)
  1.5 mm Max. (MC-156)
- Overtone order : Fundamental
- Applications : Small communications devices



Actual size

MC-146

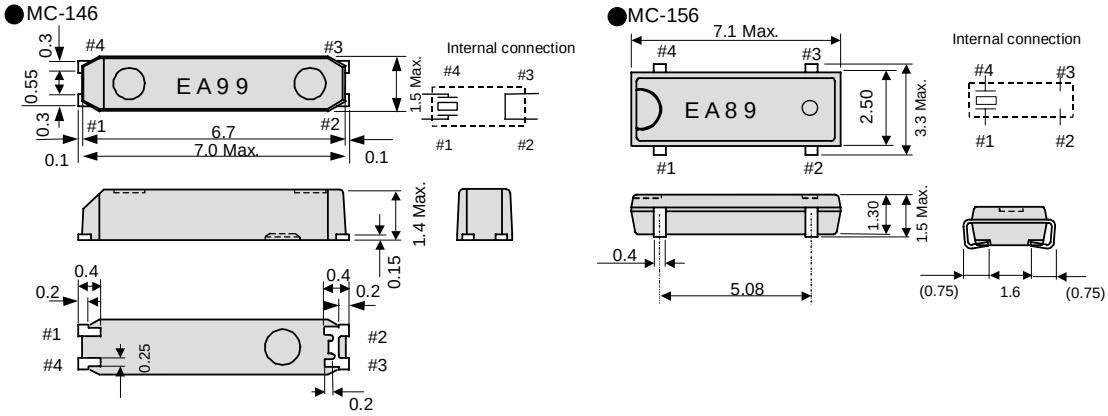
MC-156

Specifications (characteristics)

Item		Symbol	Specifications		Remarks
Nominal frequency range		f	32.768 kHz	32 kHz to 100 kHz	Please contact us for inquiries regarding available frequencies
Temperature range	Storage temperature	T_stg	-55 °C to +125 °C		Store as bare product after unpacking
	Operating temperature	T_use	-40 °C to +85 °C		
Level of drive		DL	1.0 µW Max.		Operating Drive level 0.5 µW Max.
Frequency tolerance (standard)		f_tol	$\pm 20 \times 10^{-6}$, $\pm 50 \times 10^{-6}$	$\pm 50 \times 10^{-6}$, $\pm 100 \times 10^{-6}$	+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	7 pF, 12.5 pF		Please specify
Motional resistance (ESR)		R_1	65 kΩ Max.	65 kΩ to 25 kΩ	
Motional capacitance		C_1	1.9 fF Typ.	2.5 fF to 0.6 fF	
Shunt capacitance		C_0	0.8 pF Typ.	1.2 pF to 0.5 pF	
Frequency aging		f_age	$\pm 3 \times 10^{-6}$ / year Max.	$\pm 5 \times 10^{-6}$ / year Max.	+25 °C, First year

External dimensions

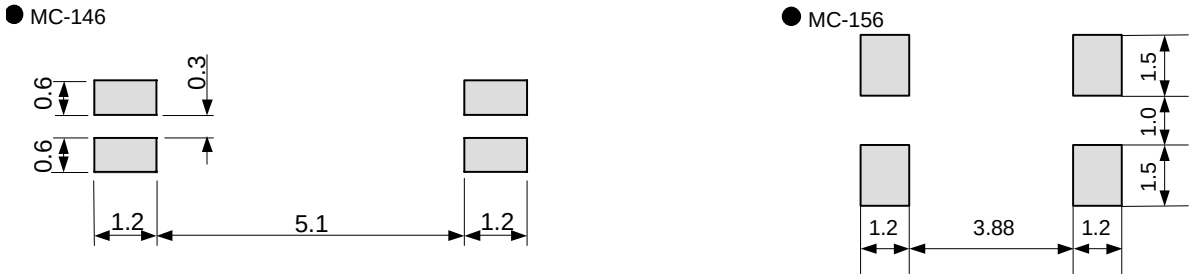
(Unit:mm)



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.

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.

Notice

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- Any part of this material may not be reproduced or duplicated in any form or any means without the written permission of Epson Toyocom.
- The information, applied circuitry, programming, usage, etc., written in this material is intended for reference only. Epson Toyocom does not assume any liability for the occurrence of infringing on any patent or copyright of a third party. This material does not authorize the licensing on for any patent or intellectual copyrights.
- Any product described in this material may contain technology or the subject relating to strategic products under the control of the Foreign Exchange and Foreign Trade Law of Japan and may require an export license from the Ministry of International Trade and Industry or other approval from another government agency.
- You are requested not to use the products (and any technical information furnished, if any) for the development and/or manufacture of weapon of mass destruction or for other military purposes. You are also requested that you would not make the products available to any third party who may use the products for such prohibited purposes.
- 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.
  / Space equipment (artificial satellites, rockets, etc.) / Transportation vehicles and related (automobiles, aircraft, trains, vessels, etc.)
  / 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.

OCEAN CHIPS
Океан Электроники
Поставка электронных компонентов

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения **«JONHON»**, а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов **«FORSTAR»**.

AVIC JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).

FORSTAR®

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