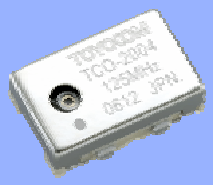
VOLTAGE -CONTROLLED CRYSTAL OSCILLATOR (VCXO)

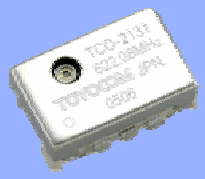
TCO - 2000 / 2100 series

- Frequency range : 1 MHz to 800 MHz
- Supply voltage : 3.3 V or 5.0 V
- Frequency control range : $\pm 100 \times 10^{-6}$ Min.
- Features : High reliability(20 years aging)
  : Wide frequency control range
  : Low phase noise, low jitter
  : With HFF-XTAL technology
  Fundamental oscillation (60 MHz to 230 MHz)
  Multiplier oscillation (fo≥230 MHz)

RoHS Compliant

Product Number (please contact us)
X1G00Xxxxxxxx00





Actual size

TCO-2000 Series

TCO-2100 Series

Specifications (characteristics)

Item	Symbol	Specifications				Remarks
		TCO-2001	TCO-2003	TCO-2002	TCO-2004	4 pin
		TCO-2101	TCO-2103	TCO-2102	TCO-2104	6 pin
Output frequency range	fo	8.000 MHz to 78.000 MHz		8.000 MHz to 125.000 MHz		
Supply voltage	Vcc	5.0 V ±0.25 V		3.3 V ±0.165 V		
Storage temperature range	T_stg	-45 °C to +90 °C				Store as bare product after unpacking
Operating temperature range	T_use	-40 °C to +85 °C				
Frequency tolerance	f_tol	As per table 1				-40 °C to +85 °C
Current consumption	Icc	50 mA Max.				
Frequency control range	f_cont	As per table 1. (Vc=2.5 V ±2 V)		As per table 1. (Vc=1.65 V ±1.65 V)		
Absolute pull range	APR	As per table 1				
Input resistance	Rin	100 kΩ Min.				DC level
Frequency change polarity	—	Positive slope				Vc = 0 V to 3.3 V or Vc =0.5 V to 4.5 V
Output load condition (TTL)	L_TTL	2 TTL Max.	—	2 TTL Max.		
Output load condition (CMOS)	L_CMOS	—	15 pF Max.	—	15 pF Max.	
Start-up time	t_str	10 ms Max. *1				
Frequency aging	f_aging	As per table 1				+25 °C

Specifications (characteristics)

Item	Symbol	Specifications		Remarks
		TCO-2106	TCO-2107	6pin, OE function
Output frequency range	fo	1.000 MHz to 80.000 MHz		
Supply voltage	Vcc	3.3 V ±0.165 V		
Storage temperature range	T_stg	-45 °C to +90 °C		Store as bare product after unpacking
Operating temperature range	T_use	-40 °C to +85 °C		
Frequency tolerance	f_tol	As per table 1		-40 °C to +85 °C
Current consumption	Icc	30 mA Max.		
Frequency control range	f_cont	As per table 1		Vc= 1.65 V ±1.65 V
Absolute pull range	APR	As per table 1		
Input resistance	Rin	100 kΩ Min.		DC level
Frequency change polarity	—	Positive slope		Vc= 0 V to 3.3 V
Output load condition (TTL)	L_TTL	2 TTL Max.	—	
Output load condition (CMOS)	L_CMOS	—	15 pF Max.	
Start-up time	t_str	10 ms Max. *1		
Frequency aging	f_aging	As per table 1		+25 °C

Specifications (characteristics)

Item	Symbol	Specifications			Remarks
		TCO-2111	TCO-2112	TCO-2114	6 pin
Output frequency range	fo	60.000 MHz to 800.000 MHz		60.000 MHz to 230.000 MHz	
Supply voltage	Vcc	3.3 V ±0.165 V	5.0 V ±0.25 V	3.3 V ±0.165 V	
Storage temperature range	T_stg	-45 °C to +90 °C			Store as bare product after unpacking
Operating temperature range	T_use	-40 °C to +85 °C			
Frequency tolerance	f_tol	As per table 1			-40 °C to +85 °C
Current consumption	Icc	65 mA Max.		40 mA Max.	
Frequency control range	f_cont	As per table 1 (Vc= 1.65 V ±1.65 V)	As per table 1 (Vc= 2.5 V ±2 V)	As per table 1 (Vc= 1.65 V ±1.65 V)	
Absolute pull range	APR	As per table 1			
Input resistance	Rin	100 kΩ Min.			DC level
Frequency change polarity	—	Positive slope			Vc = 0 V to 3.3 V or Vc =0.5 V to 4.5 V
Output level	—	LV-PECL	PECL	LVDS	
Start-up time	t_str	10 ms Max. *1			
Frequency aging	f_aging	As per table 1			+25 °C

Specifications (characteristics)

Item	Symbol	Specifications	Remarks
		TCO-2131	6pin, OE function
Output frequency range	fo	60.000 MHz to 700.000 MHz	
Supply voltage	Vcc	3.3 V ±0.165 V	
Storage temperature range	T_stg	-45 °C to +90 °C	Store as bare product after unpacking
Operating temperature range	T_use	-40 °C to +85 °C	
Frequency tolerance	f_tol	As per table 1	-40 °C to +85 °C
Current consumption	Icc	75 mA Max.	
Frequency control range	f_cont	As per table 1	Vc= 1.65 V ±1.65 V
Absolute pull range	APR	As per table 1	
Input resistance	Rin	100 kΩ Min.	DC level
Frequency change polarity	—	Positive slope	Vc= 0 V to 3.3 V
Output load condition	—	LV-PECL	
Start-up time	t_str	10 ms Max. *1.	
Frequency aging	f_aging	As per table 1	+25 °C

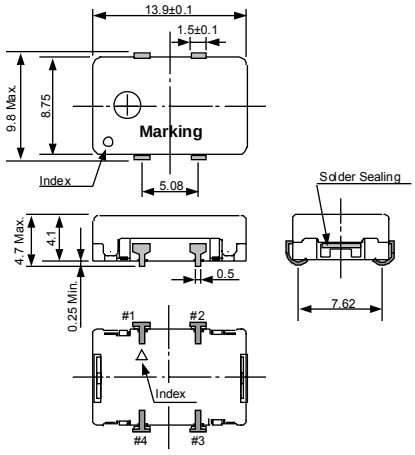
Table 1. Frequency tolerance, Absolute pull range and aging (TCO-2100-xx)

xx	Frequency tolerance	Absolute pull range *4	(Frequency control range)	Aging
AA	±50 × 10^{-6} Max. *2	±50 × 10^{-6} Min.	±100 × 10^{-6} Min.	1year (First year)
AB		±100 × 10^{-6} Min.	±150 × 10^{-6} Min.	
BA	±60 × 10^{-6} Max. *3	±50 × 10^{-6} Min.	±110 × 10^{-6} Min.	20 years
BB		±100 × 10^{-6} Min.	±160 × 10^{-6} Min.	

*1 Time at minimum supply voltage to be 0 s.
*2 This includes initial frequency tolerance, temperature variation, supply voltage variation and aging (+25℃, 1 year).
*3 This includes initial frequency tolerance, temperature variation, supply voltage variation and aging (+25℃, 20 years).
*4 Absolute pull range = Frequency control range - Frequency tolerance

External dimensions (Unit:mm)

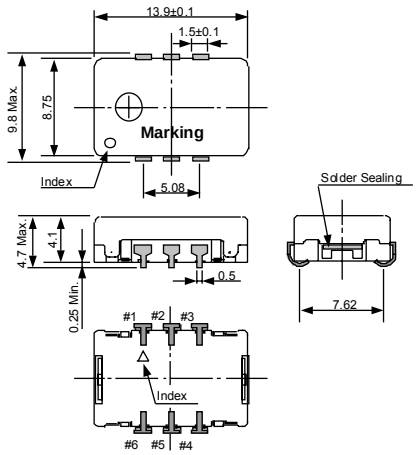
●TCO-2000 series



Pin map

Pin	CONNECTION
1	VC
2	GND/case
3	OUT
4	VCC

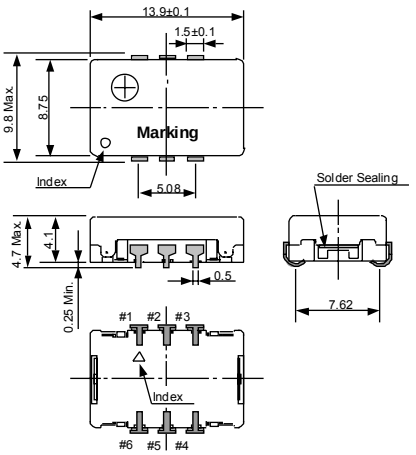
●TCO-2101/2102/2103/2104



Pin map

Pin	CONNECTION
1	VC
2	N.C.
3	GND/case
4	OUT
5	N.C.
6	VCC

●TCO-2106/2107/2111/2112/2113/2114/2131

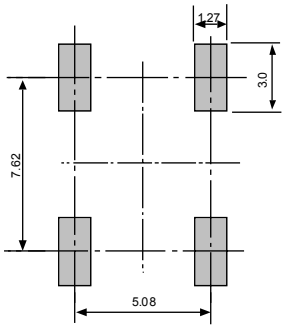


Pin map

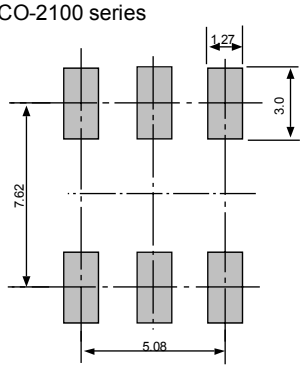
Pin	CONNECTION		
	TCO-2106/2107	TCO-2110 series	TCO-2131
1	VC		
2	OE	N.C.	OE
3	GND/case		
4	OUT	OUT1(Positive)	
5	N.C.	OUT2(Negative)	
6	VCC		

External dimensions (Unit:mm)

●TCO-2000 series



●TCO-2100 series



OE terminal

●TCO-2106 / 2107

OE pin = "H" or "open" : Specified frequency output.
OE pin = "L" : Output is high impedance, oscillation stops.

●TCO-2131

OE pin = "L" or "open" : Specified frequency output.
OE pin = "H" : Output is high impedance, oscillation stops.

“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.

QMEMS

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.

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.

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.

WORKING FOR HIGH QUALITY

In order 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.

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

Pb Free	**►Pb free.** **►Complies with EU RoHS directive.**
RoHS Compliant	**►Pb free terminal designed. Contains Pb in products exempted by RoHS directive.** **(Contains Pb in sealing glass, high melting temperature type solder or other.)** **►Complies with EU RoHS directive.**
For Automotive	**►The products have been designed for high reliability applications such as Automotive.**

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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.