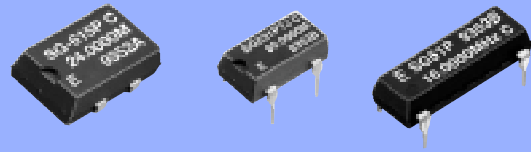




## CRYSTAL OSCILLATOR SPXO

# SG-615 series SG-531 / SG-51 series

- Frequency range : 1.025 MHz to 135 MHz
- Supply voltage : 3.3 V / 5.0 V
- Function : Output enable(OE) Standby( $\overline{ST}$ )
- Pin compatible with full-size metal can. (SG-51 series)
- Pin compatible with half-size metal can. (SG-531 series)



Actual size



### Specifications (characteristics)

| Item                                  | Symbol                | Specifications   |                                    |                                 | Remarks   |
|---------------------------------------|-----------------------|--|------------------------------------|---------------------------------|---|
|                                       |                       | SG-615P<br>SG-531P<br>SG-51P                             | SG-615PTJ<br>SG-531PTJ<br>SG-51PTJ | SG-615PH<br>SG-531PH<br>SG-51PH |   |
| Output frequency range                | $f_0$                 | 1.025 MHz to 26 MHz                                      | 26.001 MHz to 66.667 MHz           |                                 |   |
| Supply voltage                        | $V_{CC}$              | 5.0 V $\pm$ 0.5 V  |                                    |                                 |   |
| Temperature range                     | Storage temperature   | $T_{stg}$ -55 °C to +125 °C                              |                                    |                                 | Store as bare product after unpacking   |
|                                       | Operating temperature | $T_{use}$ -20 °C to +70 °C                               |                                    |                                 |   |
| Frequency tolerance                   | $f_{tol}(osc)$        | B: $\pm 50 \times 10^{-6}$ , C: $\pm 100 \times 10^{-6}$ |                                    |                                 | -20 °C to +70 °C *1   |
| Current consumption                   | $I_{CC}$              | 23 mA Max.   | 35 mA Max.                         |                                 | No load condition   |
| Output disable current                | $I_{dis}$             | 12 mA Max.   | 28 mA Max.                         | 20 mA Max.                      | OE=GND  |
| Symmetry                              | SYM                   | 40 % to 60 %   | —                                  | 40 % to 60 %                    | CMOS load:50 % $V_{CC}$ level<br>TTL load: 1.4 V level                              |
|                                       |                       | 40 % to 60 %   | 45 % to 55 %                       | —                               |   |
| High output voltage                   | $V_{OH}$              | $V_{CC}$ -0.4 V Min.                                     | 2.4 V Min.                         | $V_{CC}$ -0.4 V Min.            | $I_{OH}$ =-400 $\mu$ A(P,PTJ)/-4 mA(PH)   |
| Low output voltage                    | $V_{OL}$              | 0.4 V Max.   |                                    |                                 | $I_{OL}$ =16 mA(P)/ 8 mA(PTJ)/ 4 mA(PH)   |
| Output load condition (TTL)           | $L_{TTL}$             | 10 TTL Max.  | 5 TTL Max.                         | —                               | $L_{CMOS} \leq 15$ pF   |
| Output load condition (CMOS)          | $L_{CMOS}$            | 50 pF Max.   | —                                  | 50 pF Max.                      |   |
| Output enable / disable input voltage | $V_{IH}$              | 2.0 V Min.   | 3.5 V Min.                         | 2.0 V Min.                      | $I_{IH}$ = 1 $\mu$ A Max. (OE= $V_{CC}$ )   |
|                                       | $V_{IL}$              | 0.8 V Max.   | 1.5 V Max.                         | 0.8 V Max.                      | $I_{IL}$ = -100 $\mu$ A Min. (OE=GND),<br>PTJ: $I_{IL}$ = -500 $\mu$ A Min.(OE=GND) |
| Output rise and fall time             | $t_r / t_f$           | 8 ns Max.  | —                                  | 7 ns Max.                       | CMOS load:20 % $V_{CC}$ to 80 % $V_{CC}$ level<br>TTL load:0.4 V to 2.4 V level     |
|                                       |                       | 8 ns Max.  | 5 ns Max.                          | —                               |   |
| Oscillation start up time             | $t_{osc}$             | 4 ms Max.  | 10 ms Max.                         |                                 | Time at minimum supply voltage to be 0 s  |
| Frequency aging                       | $f_{aging}$           | $\pm 5 \times 10^{-6}$ / year Max.                       |                                    |                                 | +25 °C, $V_{CC}$ =5.0 V, First year   |

\*1 "B" tolerance will be available up to 55 MHz.

### Specifications (characteristics)

| Item                                  | Symbol                | Specifications  |                        |                          | Remarks  |
|---------------------------------------|-----------------------|---|------------------------|--------------------------|--|
|                                       |                       | SG-615PCG<br>SG-531PCG  | SG-615SCG<br>SG-531SCG | SG-615PCN                |  |
| Output frequency range                | $f_0$                 | 1.500 MHz to 26.000 MHz   |                        | 26.001 MHz to 66.667 MHz |  |
| Supply voltage                        | $V_{CC}$              | 2.7 V to 3.6 V  |                        | 3.0 V to 3.6 V           |  |
| 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  |                        |                          |  |
| Frequency tolerance                   | $f_{tol}(osc)$        | B: $\pm 50 \times 10^{-6}$ C: $\pm 100 \times 10^{-6}$<br>M: $\pm 100 \times 10^{-6}$ |                        |                          | -20 °C to +70 °C<br>-40 °C to +85 °C                       |
| Current consumption                   | $I_{CC}$              | 12 mA Max.  |                        | 20 mA Max.               | No load condition  |
| Output disable current                | $I_{dis}$             | 10 mA Max.  | —                      | 10 mA Max.               | OE=GND (PCG,PCN)   |
| Stand-by current                      | $I_{std}$             | —   | 50 $\mu$ A Max.        | —                        | $\overline{ST}$ =GND (SCG)                                 |
| Symmetry                              | SYM                   | 45 % to 55 %  |                        |                          | 50 % $V_{CC}$ level, $L_{CMOS}$ =Max.                      |
| High output voltage                   | $V_{OH}$              | $V_{CC}$ -0.4 V Min.  |                        | $V_{CC}$ -0.4 V Min.     | $I_{OH}$ =-8 mA  |
| Low output voltage                    | $V_{OL}$              | 0.4 V Max.  |                        | 0.4 V Max.               | $I_{OL}$ = 8 mA  |
| Output load condition                 | $L_{CMOS}$            | 25 pF Max.  |                        | 15 pF Max.               |  |
| Output enable / disable input voltage | $V_{IH}$              | 70 % $V_{CC}$ Min.  |                        | 70 % $V_{CC}$ Min.       | OE Terminal , $\overline{ST}$ Terminal                     |
|                                       | $V_{IL}$              | 20 % $V_{CC}$ Max.  |                        | 30 % $V_{CC}$ Max.       |  |
| Output rise and fall time             | $t_r / t_f$           | 4 ns Max.   |                        | —                        | 20 % $V_{CC}$ to 80 % $V_{CC}$ level, $L_{CMOS} \leq$ Max. |
| Oscillation start up time             | $t_{osc}$             | 12 ms Max.  |                        | 10 ms Max.               | $t=0$ at 90% $V_{CC}$                                      |
| Frequency aging                       | $f_{aging}$           | $\pm 5 \times 10^{-6}$ / year Max.  |                        |                          | +25 °C, $V_{CC}$ =3.3 V, First year                        |



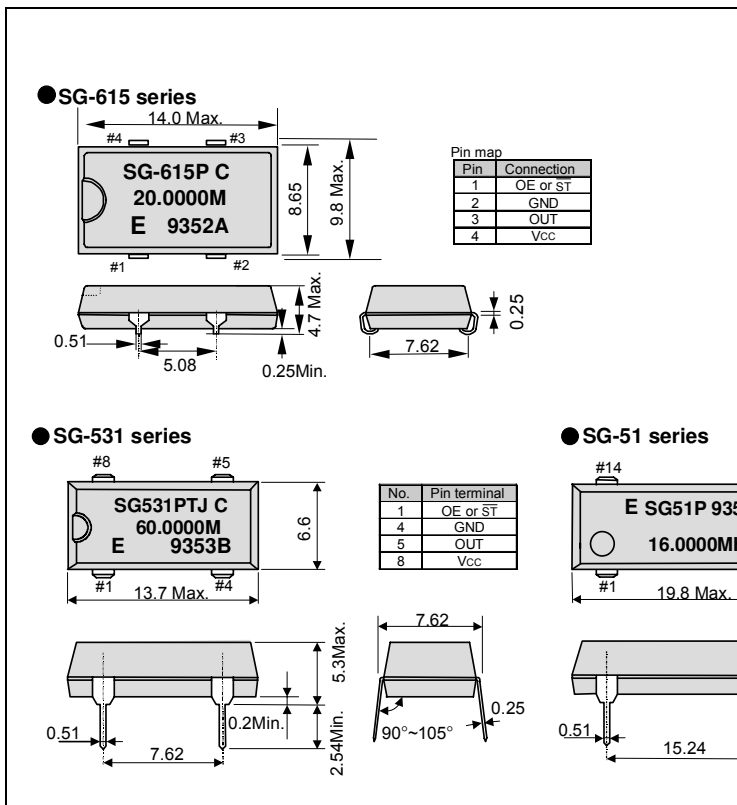
## Specifications (characteristics)

| Item                                  | Symbol                | Specifications   |                                    |                                    | Remarks  |
|---------------------------------------|-----------------------|--|------------------------------------|------------------------------------|--|
|                                       |                       | SG-615PTW / STW<br>SG-531PTW / STW                       | SG-615PHW / SHW<br>SG-531PHW / SHW | SG-615PCW / SCW<br>SG-531PCW / SCW |  |
| Output frequency range                | $f_0$                 | 55.001 MHz to 135.000 MHz                                |                                    | 26.001 MHz to 135.000 MHz          |  |
| Supply voltage                        | $V_{CC}$              | 5.0 V $\pm$ 0.5 V  |                                    | 3.3 V $\pm$ 0.3 V                  |  |
| Temperature range                     | Storage temperature   | -55 °C to +125 °C  |                                    |                                    | Store as bare product after unpacking                      |
|                                       | Operating temperature | -20 °C to +70 °C   |                                    | -40 °C to +85 °C                   |  |
| Frequency tolerance                   | $f_{tol(osc)}$        | B: $\pm 50 \times 10^{-6}$ , C: $\pm 100 \times 10^{-6}$ |                                    | M: $\pm 100 \times 10^{-6}$        | -20 °C to +70 °C *1<br>-40 °C to +85 °C                    |
| Current consumption                   | $I_{CC}$              | 45 mA Max.   |                                    | 28 mA Max.                         | No load condition( Max. frequency range )                  |
| Output disable current                | $I_{dis}$             | 30 mA Max.   |                                    | 16 mA Max.                         | OE=GND (PTW,PHW,PCW)                                       |
| Stand-by current                      | $I_{std}$             | 50 $\mu$ A Max.  |                                    |                                    | $\overline{ST}$ =GND (STW,SHW,SCW)                         |
| Symmetry                              | SYM                   | —  |                                    | 40 % to 60 %                       | 50 % $V_{CC}$ level, $L_{CMOS}$ =Max.                      |
|                                       |                       | 40 % to 60 %   |                                    | —                                  | 1.4 V level, $L_{CMOS}$ =Max.                              |
| High output voltage                   | $V_{OH}$              | $V_{CC}$ -0.4 V Min.                                     |                                    |                                    | $I_{OH}$ =-16 mA(PTW,STW,PHW,SHW), -8 mA(PCW,SCW)          |
| Low output voltage                    | $V_{OL}$              | 0.4 V Max.   |                                    |                                    | $I_{OL}$ = 16 mA(PTW,STW,PHW,SHW), 8 mA(PCW,SCW)           |
| Output load condition (TTL)           | $L_{TTL}$             | 5 TTL Max.   | —                                  | —                                  | $f_0 \leq 90$ MHz , Max.supply voltage                     |
| Output load condition (CMOS)          | $L_{CMOS}$            | 15 pF Max.   |                                    |                                    | Max.frequency , Max.supply voltage                         |
| Output enable / disable input voltage | $V_{IH}$              | 2.0 V Min.   |                                    | 70 % $V_{CC}$ Min.                 | OE Terminal , $\overline{ST}$ Terminal                     |
|                                       | $V_{IL}$              | 0.8 V Max.   |                                    | 20 % $V_{CC}$ Max.                 |  |
| Output rise and fall time             | $t_r / t_f$           | —  |                                    | 4 ns Max.                          | 20 % $V_{CC}$ to 80 % $V_{CC}$ level, $L_{CMOS} \leq$ Max. |
|                                       |                       | 4 ns Max.  |                                    | —                                  |  |
| Oscillation start up time             | $t_{osc}$             | 10 ms Max..  |                                    |                                    | Time at minimum supply voltage to be 0 s                   |
| Frequency aging                       | $f_{aging}$           | $\pm 5 \times 10^{-6}$ / year Max.                       |                                    |                                    | +25 °C, $V_{CC}$ =5.0 V / 3.3 V, First year                |

\*1 "C" tolerance :  $f_0 \geq 66.667$  MHz(PTW,STW,PHW,SHW )

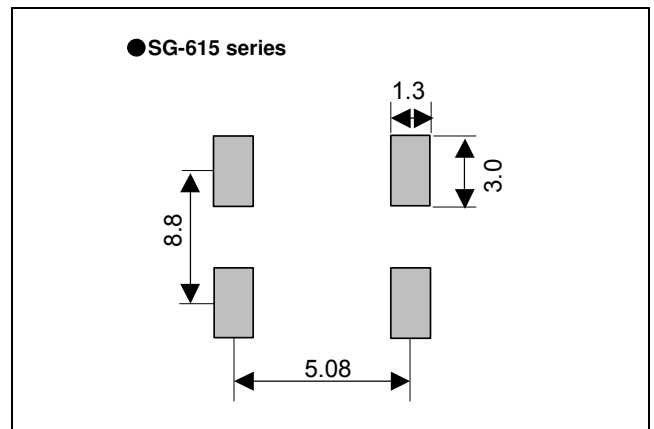
## External dimensions

(Unit:mm)



## Footprint (Recommended)

(Unit:mm)



Note.  
 OE pin (P,PTJ,PH,PTW,PHW,PCW,PCN,PCG)  
 OE pin = "H" or "open" : Specified frequency output.  
 OE pin = "L" : Output is high impedance.

$\overline{ST}$  pin (STW, SHW, SCW,SCG)  
 $\overline{ST}$  pin = "H" or "open" : Specified frequency output.  
 $\overline{ST}$  pin = "L" : Output is low level  
 (weak pull - down), oscillation stops.

# “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 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.

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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/ traffic control equipment / and others requiring equivalent reliability.
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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.