



## CRYSTAL OSCILLATOR (SPXO)

OUTPUT : CMOS

## SG-310 series

- Frequency range : 2 MHz to 80 MHz
- Supply voltage : 1.8 V Typ. / 2.5 V Typ. / 3.3 V Typ.
- Current consumption : 1.5 mA Typ.  
(SEF: 1.8 V No load condition 48 MHz)
- Function : Standby( $\overline{ST}$ )
- External dimensions :  $3.2 \times 2.5 \times 1.05$  mm



Product Number (please contact us)  
Q33310xx0xxxx00



Actual size

Actual size

## Specifications (characteristics)

| Item                         | Symbol                             | SG-310 SEF                                                                                                       | SG-310 SDF                   | SG-310 SCF                   | SG-310 SDN                                             | SG-310 SCN                                                                   | Conditions / Remarks                                           |                                                         |
|------------------------------|------------------------------------|------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------|--------------------------------------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------|
| Output frequency range       | f <sub>0</sub>                     | 2.000 MHz to 48.000 MHz                                                                                          |                              |                              | 3.000 MHz to 80.000 MHz                                |                                                                              | Please contact us about available frequencies.                 |                                                         |
| Supply voltage               | V <sub>CC</sub>                    | 1.8 V Typ.<br>1.6 V to 2.2 V                                                                                     | 2.5 V Typ.<br>2.2 V to 3.0 V | 3.3 V Typ.<br>2.7 V to 3.6 V | 2.5 V Typ.<br>2.2 V to 2.7 V                           | 3.3 V Typ.<br>2.7 V to 3.6 V                                                 |                                                                |                                                         |
| Storage temperature          | T <sub>stg</sub>                   | -40 °C to +125 °C                                                                                                |                              |                              |                                                        | Storage as single product.                                                   |                                                                |                                                         |
| Operating temperature        | T <sub>use</sub>                   | -40 °C to +85 °C                                                                                                 |                              |                              | -40 °C to +85 °C (+105 °C)                             |                                                                              | Please contact us about +85 °C < T <sub>use</sub>              |                                                         |
| Frequency tolerance          | f <sub>tol</sub>                   | B: ±50 × 10 <sup>-6</sup> , C: ±100 × 10 <sup>-6</sup><br>L: ±50 × 10 <sup>-6</sup> , M: ±100 × 10 <sup>-6</sup> |                              |                              |                                                        | -20 °C to +70 °C                                                             |                                                                |                                                         |
|                              |                                    |                                                                                                                  |                              |                              |                                                        | -40 °C to +85 °C                                                             |                                                                |                                                         |
|                              |                                    | —                                                                                                                |                              |                              |                                                        | D:±20 × 10 <sup>-6</sup> ,S:±25 × 10 <sup>-6</sup>                           |                                                                | -20 °C to +70 °C                                        |
|                              |                                    | —                                                                                                                |                              |                              |                                                        | R:±25 × 10 <sup>-6</sup> ,P:±20 × 10 <sup>-6</sup>                           |                                                                | -30 °C to +85 °C                                        |
|                              |                                    | —                                                                                                                |                              |                              |                                                        | J:±25 × 10 <sup>-6</sup>                                                     |                                                                | -40 °C to +85 °C                                        |
| Current consumption          | I <sub>CC</sub>                    | 1.5 mA Max.                                                                                                      | 1.5 mA Max.                  | 1.5 mA Max.                  | 4.0 mA Max.                                            | 5.0 mA Max.                                                                  | No load condition, 2 MHz≤f <sub>0</sub> ≤ 4 MHz                |                                                         |
|                              |                                    | 1.5 mA Max.                                                                                                      | 1.5 mA Max.                  | 2.0 mA Max.                  |                                                        |                                                                              | No load condition, 4 MHz<f <sub>0</sub> ≤ 8 MHz                |                                                         |
|                              |                                    | 1.5 mA Max.                                                                                                      | 2.0 mA Max.                  | 2.5 mA Max.                  |                                                        |                                                                              | No load condition, 8 MHz<f <sub>0</sub> ≤16 MHz                |                                                         |
|                              |                                    | 2.0 mA Max.                                                                                                      | 2.0 mA Max.                  | 2.5 mA Max.                  |                                                        |                                                                              | No load condition, 16 MHz<f <sub>0</sub> ≤25 MHz               |                                                         |
|                              |                                    | 2.0 mA Max.                                                                                                      | 2.5 mA Max.                  | 3.5 mA Max.                  |                                                        |                                                                              | No load condition, 25 MHz<f <sub>0</sub> ≤33 MHz               |                                                         |
|                              |                                    | 3.0 mA Max.                                                                                                      | 3.5 mA Max.                  | 4.5 mA Max.                  |                                                        |                                                                              | No load condition, 33 MHz<f <sub>0</sub> ≤48 MHz               |                                                         |
|                              |                                    | —                                                                                                                |                              |                              |                                                        | 6.0 mA Max.                                                                  | 7.0 mA Max.                                                    | No load condition, 48 MHz<f <sub>0</sub> ≤80 MHz        |
| Stand-by current             | I <sub>std</sub>                   | 0.7 µA Max.<br>(0.2 µA Typ.)                                                                                     | 1.5 µA Max.<br>(0.5 µA Typ.) | 2.0 µA Max.<br>(1.0 µA Typ.) | 10 µA Max.                                             |                                                                              | ST =GND                                                        |                                                         |
| Symmetry                     | SYM                                | 45 % to 55 %                                                                                                     | 45 % to 55 %                 | 45 % to 55 %                 | 45 % to 55 %                                           |                                                                              | 2 MHz≤f <sub>0</sub> ≤16 MHz                                   | 50 % V <sub>CC</sub> level<br>L <sub>CMOS</sub> ≤ 15 pF |
|                              |                                    | 40 % to 60 %                                                                                                     |                              |                              |                                                        |                                                                              | 16 MHz<f <sub>0</sub> ≤40 MHz<br>40 MHz<f <sub>0</sub> ≤80 MHz |                                                         |
| Output voltage               | V <sub>OH</sub>                    | 90 % V <sub>CC</sub> Min.                                                                                        |                              |                              |                                                        | I <sub>OH</sub> =-3 mA                                                       |                                                                |                                                         |
|                              | V <sub>OL</sub>                    | 10 % V <sub>CC</sub> Max.                                                                                        |                              |                              |                                                        | I <sub>OL</sub> = 3 mA                                                       |                                                                |                                                         |
| Output load condition (CMOS) | L <sub>CMOS</sub>                  | 15 pF Max.                                                                                                       |                              |                              |                                                        |                                                                              |                                                                |                                                         |
| Input voltage                | V <sub>IH</sub><br>V <sub>IL</sub> | 80 % V <sub>CC</sub> Min.<br>20 % V <sub>CC</sub> Max.                                                           |                              |                              | 70 % V <sub>CC</sub> Min.<br>30 % V <sub>CC</sub> Max. |                                                                              | ST terminal                                                    |                                                         |
| Rise time / Fall time        | t <sub>r</sub> / t <sub>f</sub>    | 4 ns Max.                                                                                                        |                              |                              |                                                        | 20 % V <sub>CC</sub> to 80 % V <sub>CC</sub> level, L <sub>CMOS</sub> =15 pF |                                                                |                                                         |
| Start-up time                | t <sub>str</sub>                   | 10 ms Max.                                                                                                       |                              |                              | 2 ms Max.                                              |                                                                              | t=0 at 90 % V <sub>CC</sub>                                    |                                                         |
| Frequency aging              | f <sub>aging</sub>                 | ±5 × 10 <sup>-6</sup> / year Max.                                                                                |                              |                              | ±3 × 10 <sup>-6</sup> / year Max.                      |                                                                              | +25 °C, First year, V <sub>CC</sub> =1.8 V, 2.5 V, 3.3 V       |                                                         |
|                              |                                    | —                                                                                                                |                              |                              | ±10 × 10 <sup>-6</sup> Max.                            |                                                                              | +25 °C, 10 years                                               |                                                         |

Product Name  
(Standard form)

SG-310 S E F 25.000000MHz L

- ① ② ③ ④ ⑤  
 ① Model ② Function (S: Standby)  
 ③ Supply voltage ④ Frequency  
 ⑤ Frequency tolerance

③ Supply voltage

|   |            |
|---|------------|
| E | 1.8 V Typ. |
| D | 2.5 V Typ. |
| C | 3.3 V Typ. |

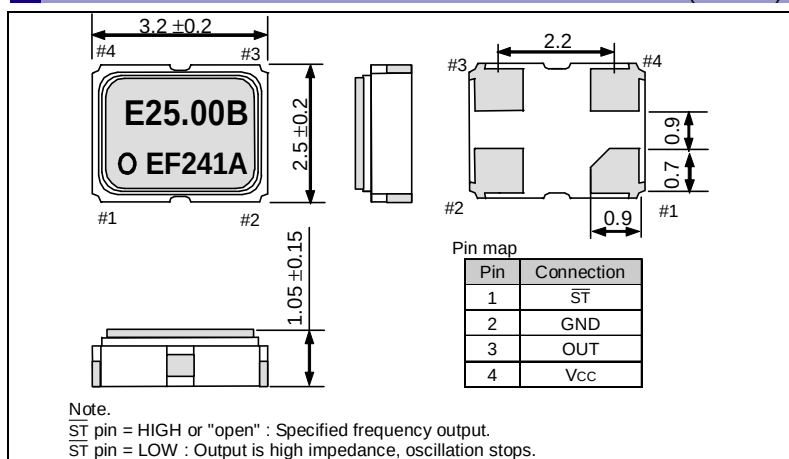
⑤ Frequency tolerance

\*Only SDN, SCN are available

|   |                                          |    |                                         |
|---|------------------------------------------|----|-----------------------------------------|
| B | $\pm 50 \times 10^{-6}$ / -20 to +70 °C  | D* | $\pm 20 \times 10^{-6}$ / -20 to +70 °C |
| C | $\pm 100 \times 10^{-6}$ / -20 to +70 °C | S* | $\pm 25 \times 10^{-6}$ / -20 to +70 °C |
| L | $\pm 50 \times 10^{-6}$ / -40 to +85 °C  | R* | $\pm 25 \times 10^{-6}$ / -30 to +85 °C |
| M | $\pm 100 \times 10^{-6}$ / -40 to +85 °C | P* | $\pm 20 \times 10^{-6}$ / -30 to +85 °C |
|   |                                          | J* | $\pm 25 \times 10^{-6}$ / -40 to +85 °C |

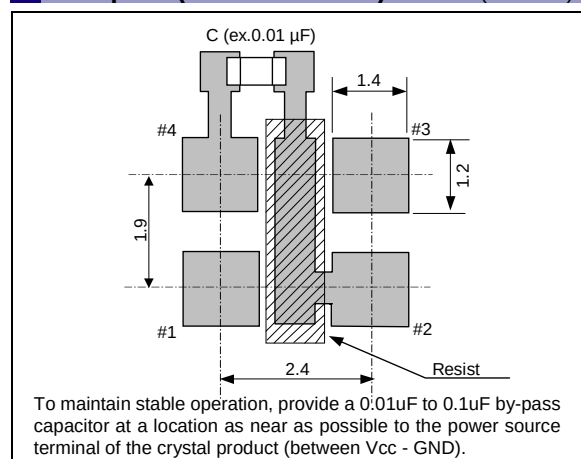
## External dimensions

(Unit:mm)



## Footprint (Recommended)

(Unit:mm)



## PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

At Seiko Epson, 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.

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 provide high quality and reliable products and services than meet customer needs,

Seiko Epson 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.

ISO/TS16949 is the international standard that added the sector-specific supplemental requirements for automotive industry based on ISO9001.

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

|                                                                                     |                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | ► Pb free.                                                                                                                                                                                                                      |
|  | ► Complies with EU RoHS directive.<br>*About the products without the Pb-free mark.<br>Contains Pb in products exempted by EU RoHS directive.<br>(Contains Pb in sealing glass, high melting temperature type solder or other.) |
|  | ► Designed for automotive applications such as Car Multimedia, Body Electronics, Remote Keyless Entry etc.                                                                                                                      |
|  | ► Designed for automotive applications related to driving safety (Engine Control Unit, Air Bag, ESC etc ).                                                                                                                      |

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