



**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 × 2.5 × 1.05 mm



Product Number (please contact us)  
Q33310xx0xxx00



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   |                              |                              |   |   |  |
| 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> |                              |                              | D: ±20 × 10 <sup>-6</sup> , S: ±25 × 10 <sup>-6</sup><br>R: ±25 × 10 <sup>-6</sup> , P: ±20 × 10 <sup>-6</sup><br>J: ±25 × 10 <sup>-6</sup> |   | -20 °C to +70 °C<br>-40 °C to +85 °C<br>-20 °C to +70 °C<br>-30 °C to +85 °C<br>-40 °C to +85 °C |
|                              |                                 | 1.5 mA Max.  |                              |                              | 4.0 mA Max.   |   | No load condition, 2 MHz < f <sub>0</sub> ≤ 4 MHz  |
|                              |                                 | 1.5 mA Max.  |                              |                              | 4.0 mA Max.   |   | No load condition, 4 MHz < f <sub>0</sub> ≤ 8 MHz  |
|                              |                                 | 1.5 mA Max.  |                              |                              | 4.0 mA Max.   |   | No load condition, 8 MHz < f <sub>0</sub> ≤ 16 MHz   |
| Current consumption          | I <sub>cc</sub>                 | 1.5 mA Max.  | 2.0 mA Max.                  | 2.5 mA Max.                  | 4.0 mA Max.   | 5.0 mA Max.   | No load condition, 16 MHz < f <sub>0</sub> ≤ 25 MHz  |
|                              |                                 | 2.0 mA Max.  | 2.0 mA Max.                  | 2.5 mA Max.                  |   |   | No load condition, 25 MHz < f <sub>0</sub> ≤ 33 MHz  |
|                              |                                 | 2.0 mA Max.  | 2.5 mA Max.                  | 3.5 mA Max.                  |   |   | No load condition, 33 MHz < f <sub>0</sub> ≤ 48 MHz  |
|                              |                                 | 3.0 mA Max.  | 3.5 mA Max.                  | 4.5 mA Max.                  |   |   | No load condition, 48 MHz < f <sub>0</sub> ≤ 80 MHz  |
|                              |                                 | -  |                              |                              |   |   | 6.0 mA Max.  |
| 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.  |   | $\overline{ST}$ = GND  |
| Symmetry                     | SYM                             | 45 % to 55 %   | 45 % to 55 %                 | 45 % to 55 %                 | 45 % to 55 %  |   | 2 MHz < f <sub>0</sub> ≤ 16 MHz  |
|                              |                                 | 40 % to 60 %   |                              |                              |   |   | 40 % to 60 %   |
| 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>                 | 80 % V <sub>cc</sub> Min.  |                              |                              | 70 % V <sub>cc</sub> Min.   |   | $\overline{ST}$ terminal   |
|                              | V <sub>IL</sub>                 | 20 % V <sub>cc</sub> Max.  |                              |                              | 30 % V <sub>cc</sub> Max.   |   |  |
| 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   |

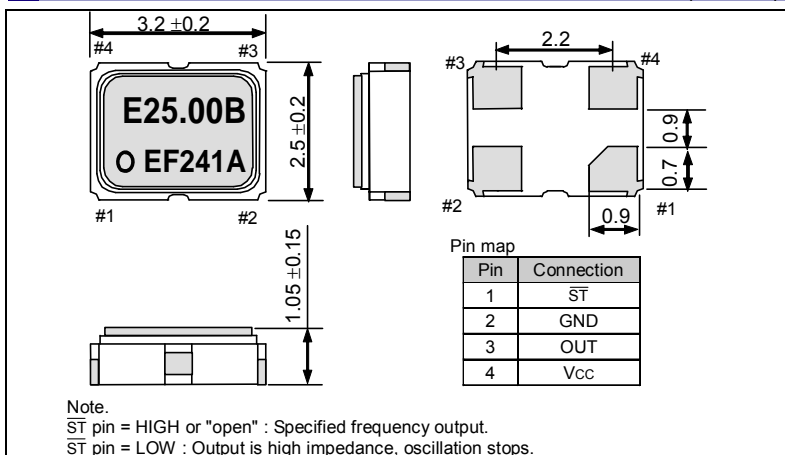
Product Name (Standard form) **SG-310 S E F 25.000000MHz L**  
 ① Model ② Function (S: Standby)  
 ③ Supply voltage ④ Frequency ⑤ Frequency tolerance

| ③ Supply voltage | ④ Frequency                               |
|------------------|---|
| E 1.8 V Typ.     | B ±50 × 10 <sup>-6</sup> / -20 to +70 °C  |
| D 2.5 V Typ.     | C ±100 × 10 <sup>-6</sup> / -20 to +70 °C |
| C 3.3 V Typ.     | L ±50 × 10 <sup>-6</sup> / -40 to +85 °C  |
|                  | M ±100 × 10 <sup>-6</sup> / -40 to +85 °C |

| ⑤ Frequency tolerance                     | *Only SDN, SCN are available              |
|---|---|
| D* ±20 × 10 <sup>-6</sup> / -20 to +70 °C | S* ±25 × 10 <sup>-6</sup> / -20 to +70 °C |
| R* ±25 × 10 <sup>-6</sup> / -30 to +85 °C | P* ±20 × 10 <sup>-6</sup> / -30 to +85 °C |
| J* ±25 × 10 <sup>-6</sup> / -40 to +85 °C |   |

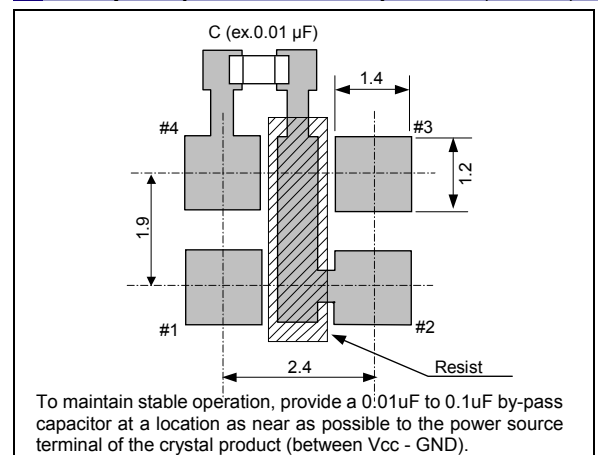
**External dimensions**

(Unit:mm)



**Footprint (Recommended)**

(Unit:mm)



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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.

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|---|---|
|  | ► 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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