



## CRYSTAL OSCILLATOR (SPXO)

OUTPUT : CMOS

For Automotive

## SG-210S\*BA

- Frequency range : 2 MHz to 60 MHz
- Supply voltage : 1.8 V Typ. / 2.5 V Typ. / 3.3 V Typ.
- Current consumption : 0.9 mA Typ.  
(SEB: 1.8 V No load condition 48 MHz)
- Function : Standby ( $\overline{ST}$ )
- External dimensions : 2.5 × 2.0 × 0.8 mm
- Operation temperature : +105 °C / +125 °C
- Applications : Car audio, Vehicle camera system,  
Car navigation system, ECU clock,  
Clock, Meter, Remote keyless entry
- Conforms to AEC-Q200



Product Number  
 SG-210SEBA : X1G004611Axxx00  
 SG-210SDBA : X1G004601Axxx00  
 SG-210SCBA : X1G004591Axxx00



## Specifications (characteristics)

| Item                         | Symbol                  | Specifications  |                              |                              | Conditions / Remarks   |
|------------------------------|-------------------------|---|------------------------------|------------------------------|--|
|                              |                         | SG-210SEBA  | SG-210SDBA                   | SG-210SCBA                   |  |
| Output frequency range       | f <sub>o</sub>          | 2 MHz to 60 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 |  |
| Storage temperature          | T <sub>stg</sub>        | -40 °C to +125 °C                                       |                              |                              | Storage as single product.   |
| Operating temperature        | T <sub>use</sub>        | -40 °C to +125 °C                                       |                              |                              |  |
| Frequency tolerance          | f <sub>tol</sub>        | B: ±50 × 10 <sup>-6</sup> , C: ±100 × 10 <sup>-6</sup>  |                              |                              | -20 °C to +70 °C   |
|                              |                         | L: ±50 × 10 <sup>-6</sup> , M: ±100 × 10 <sup>-6</sup>  |                              |                              | -40 °C to +85 °C   |
|                              |                         | Y: ±50 × 10 <sup>-6</sup> , W: ±100 × 10 <sup>-6</sup>  |                              |                              | -40 °C to +105 °C  |
|                              |                         | Z: ±100 × 10 <sup>-6</sup> , X: ±150 × 10 <sup>-6</sup> |                              |                              | -40 °C to +125 °C  |
| Current consumption          | I <sub>cc</sub>         | 1.6 mA Max.   | 2.4 mA Max.                  | 3.0 mA Max.                  | No load condition, -40 °C to +85 °C  |
|                              |                         | 2.0 mA Max.   | 3.0 mA Max.                  | 4.0 mA Max.                  | No load condition, +105 °C, +125 °C  |
| Stand-by current             | I <sub>std</sub>        | 0.5 µA Max.   | 1.0 µA Max.                  | 1.0 µA Max.                  | $\overline{ST}$ = GND, -40 °C to +85 °C  |
|                              |                         | 1.6 µA Max.   | 2.4 µA Max.                  | 3.0 µA Max.                  | $\overline{ST}$ = GND, +105 °C, +125 °C  |
| Symmetry                     | SYM                     | 45 % to 55 %  | 45 % to 55 %                 | 45 % to 55 %                 | 2 MHz ≤ f <sub>o</sub> ≤ 32 MHz<br>32 MHz < f <sub>o</sub> ≤ 60 MHz<br>50 % V <sub>cc</sub> level<br>L <sub>CMOS</sub> ≤ 15 pF |
|                              |                         | 40 % to 60 %  | 40 % to 60 %                 |                              |  |
| Output voltage               | V <sub>OH</sub>         | 90 % V <sub>cc</sub> Min.                               |                              |                              | I <sub>OH</sub> = -1 mA  |
|                              | V <sub>OL</sub>         | 10 % V <sub>cc</sub> Max.                               |                              |                              | I <sub>OL</sub> = 1 mA   |
| Output load condition (CMOS) | L <sub>CMOS</sub>       | 15 pF Max.  |                              |                              |  |
|                              |                         | V <sub>H</sub>  | 80 % V <sub>cc</sub> Min.    |                              |  |
| Input voltage                | V <sub>IL</sub>         | 20 % V <sub>cc</sub> Max.                               |                              |                              |  |
|                              | Rise time and Fall time | tr / tf   | 4 ns Max.                    | 3 ns Max.                    | +85 °C   |
| 7 ns Max.                    |                         |   | +105 °C, +125 °C             |                              |  |
| Start-up time                | t <sub>str</sub>        | 3 ms Max.   |                              |                              | t = 0 at 90 % V <sub>cc</sub> (+105 °C, +125 °C : 5 ms Max.)   |
| Frequency aging              | f <sub>aging</sub>      | ±3 × 10 <sup>-6</sup> / year Max.                       |                              |                              | +25 °C, First year, V <sub>cc</sub> = 1.8 V, 2.5 V, 3.3 V  |

Product Name SG-210 S E BA 27.000000MHz L  
 (Standard form) ① ②③ ④ ⑤  
 ① Model ② Function (S: Standby)  
 ③ Supply voltage ④ Frequency  
 ⑤ Frequency tolerance

## ③ Supply voltage

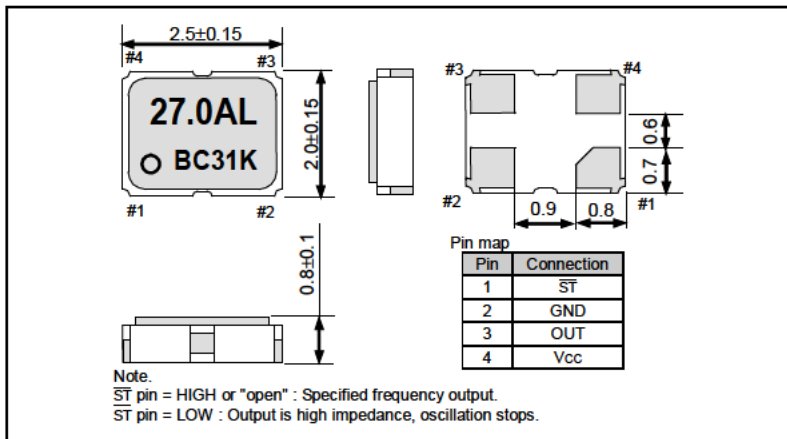
|   |            |
|---|------------|
| E | 1.8 V Typ. |
| D | 2.5 V Typ. |
| C | 3.3 V Typ. |

## ⑤ Frequency tolerance

|   |   |
|---|---|
| B | ±50 × 10 <sup>-6</sup> / -20 °C to +70 °C   |
| C | ±100 × 10 <sup>-6</sup> / -20 °C to +70 °C  |
| L | ±50 × 10 <sup>-6</sup> / -40 °C to +85 °C   |
| M | ±100 × 10 <sup>-6</sup> / -40 °C to +85 °C  |
| Y | ±50 × 10 <sup>-6</sup> / -40 °C to +105 °C  |
| W | ±100 × 10 <sup>-6</sup> / -40 °C to +105 °C |
| Z | ±100 × 10 <sup>-6</sup> / -40 °C to +125 °C |
| X | ±150 × 10 <sup>-6</sup> / -40 °C to +125 °C |

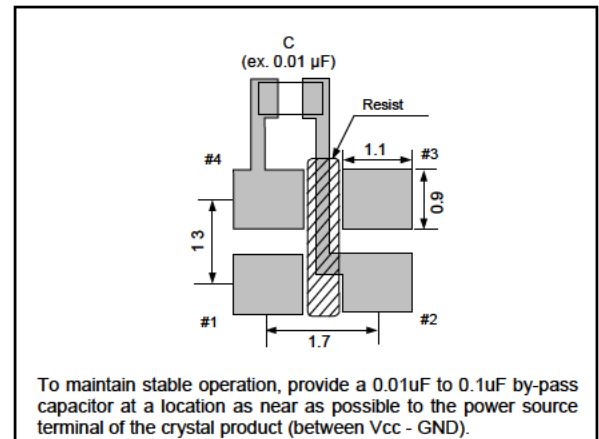
## External dimensions

(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 IATF 16949 certification that is requested strongly by major automotive manufacturers as standard.

IATF 16949 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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