

CRYSTAL OSCILLATOR (SPXO)

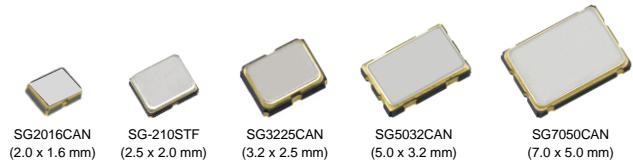
OUTPUT : CMOS



Product Number (please contact us)  
 SG2016CAN: X1G004801xxxx00  
 SG-210STF: X1G004171xxxx00  
 SG3225CAN: X1G005961xxxx15  
 SG5032CAN: X1G004451xxxx00  
 SG7050CAN: X1G004481xxxx00

SG2016 / 3225 / 5032 / 7050CAN  
 SG-210STF

- Frequency : 20 standard frequencies
- Supply voltage : 1.8 V to 3.3 V Typ.
- Function : Standby( $\overline{ST}$ )
- Operating temperature : -40 °C to +105 °C



Specifications (characteristics)

| Item                         | Symbol   | Specifications   | Conditions / Remarks   |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
|------------------------------|--|--|--|--|-------------------|-------------------|-------------------|----------|---------|-------|-------|----------|--------|------|------|--|-------------------|-------------------|-------------------|----------|-------|-------|-------|----------|------|------|------|
| Output frequency             | $f_o$  | 4 MHz 8 MHz 10 MHz 12 MHz 12.288 MHz<br>14.7456 MHz 16 MHz 20 MHz 24 MHz 24.576 MHz<br>25 MHz 26 MHz 27 MHz 32 MHz 33.33 MHz<br>33.3333 MHz 40 MHz 48 MHz 50 MHz 72 MHz  |  |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
| Supply voltage               | $V_{CC}$   | 1.60 V to 3.63 V<br>1.71 V to 3.63 V<br>2.25 V to 3.63 V   | 4 MHz $\leq f_o \leq$ 50 MHz, $T_{use} = +105$ °C Max.<br>fo = 72 MHz, $T_{use} = +85$ °C Max.<br>fo = 72 MHz, $T_{use} = +105$ °C Max.  |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
| Storage temperature          | $T_{stg}$  | -55 °C to +125 °C<br>-40 °C to +125 °C   | SG2016CAN<br>All others  |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
| Operating temperature        | $T_{use}$  | -20 °C to +70 °C, -40 °C to +85 °C, -40 °C to +105 °C  | See of figure *1   |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
| Frequency tolerance          | $f_{tol}$  | $\pm 25 \times 10^{-6}$<br>$\pm 50 \times 10^{-6}$   | -20 °C to +70 °C<br>-40 °C to +85 °C, -40 °C to +105 °C  |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
| Current consumption          | $I_{CC}$   | $V_{CC} = 1.8 V \pm 10 \%$ $V_{CC} = 2.5 V \pm 10 \%$ $V_{CC} = 3.3 V \pm 10 \%$<br>1.5 mA Max. 1.6 mA Max. 1.8 mA Max.<br>1.8 mA Max. 2.0 mA Max. 2.2 mA Max.<br>2.1 mA Max. 2.4 mA Max. 2.6 mA Max.<br>2.4 mA Max. 2.8 mA Max. 3.0 mA Max. | No load condition, 4 MHz $\leq f_o \leq$ 20 MHz<br>No load condition, 20 MHz $< f_o \leq$ 40 MHz<br>No load condition, 40 MHz $< f_o \leq$ 50 MHz<br>No load condition, fo = 72 MHz  |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
| Stand-by current             | $I_{std}$  | 2.1 $\mu$ A Max. 2.5 $\mu$ A Max. 2.7 $\mu$ A Max.   | $\overline{ST} = GND$  |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
| Symmetry                     | SYM  | 45 % to 55 %   | 50 % $V_{CC}$ level, $L_{CMOS} \leq 15$ pF   |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
| Output voltage               | $V_{OH}$<br>$V_{OL}$<br>$V_{OH-2}$<br>$V_{OL-2}$ | 90 % $V_{CC}$ Min.<br>10 % $V_{CC}$ Max.<br>$V_{CC} - 0.4$ V Min.<br>0.4 V Max.  | <table border="1"> <tr> <td></td> <td>1.8 V <math>\pm 10 \%</math></td> <td>2.5 V <math>\pm 10 \%</math></td> <td>3.3 V <math>\pm 10 \%</math></td> </tr> <tr> <td><math>I_{OH}</math></td> <td>-1.5 mA</td> <td>-3 mA</td> <td>-4 mA</td> </tr> <tr> <td><math>I_{OL}</math></td> <td>1.5 mA</td> <td>3 mA</td> <td>4 mA</td> </tr> </table><br><table border="1"> <tr> <td></td> <td>1.8 V <math>\pm 10 \%</math></td> <td>2.5 V <math>\pm 10 \%</math></td> <td>3.3 V <math>\pm 10 \%</math></td> </tr> <tr> <td><math>I_{OH}</math></td> <td>-3 mA</td> <td>-4 mA</td> <td>-6 mA</td> </tr> <tr> <td><math>I_{OL}</math></td> <td>3 mA</td> <td>4 mA</td> <td>6 mA</td> </tr> </table> |  | 1.8 V $\pm 10 \%$ | 2.5 V $\pm 10 \%$ | 3.3 V $\pm 10 \%$ | $I_{OH}$ | -1.5 mA | -3 mA | -4 mA | $I_{OL}$ | 1.5 mA | 3 mA | 4 mA |  | 1.8 V $\pm 10 \%$ | 2.5 V $\pm 10 \%$ | 3.3 V $\pm 10 \%$ | $I_{OH}$ | -3 mA | -4 mA | -6 mA | $I_{OL}$ | 3 mA | 4 mA | 6 mA |
|                              | 1.8 V $\pm 10 \%$                                | 2.5 V $\pm 10 \%$  | 3.3 V $\pm 10 \%$  |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
| $I_{OH}$                     | -1.5 mA  | -3 mA  | -4 mA  |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
| $I_{OL}$                     | 1.5 mA   | 3 mA   | 4 mA   |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
|                              | 1.8 V $\pm 10 \%$                                | 2.5 V $\pm 10 \%$  | 3.3 V $\pm 10 \%$  |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
| $I_{OH}$                     | -3 mA  | -4 mA  | -6 mA  |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
| $I_{OL}$                     | 3 mA   | 4 mA   | 6 mA   |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
| Output load condition (CMOS) | $L_{CMOS}$                                       | 15 pF Max.   |  |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
| Input voltage                | $V_{IH}$<br>$V_{IL}$                             | 80 % $V_{CC}$ Min.<br>20 % $V_{CC}$ Max.   | $\overline{ST}$ terminal   |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
| Rise time and Fall time      | $t_r / t_f$                                      | 3 ns Max.<br>3.5 ns Max. (@1.8 V $\pm 10 \%$ )   | 20 % $V_{CC}$ to 80 % $V_{CC}$ level, $L_{CMOS} = 15$ pF   |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
| Start-up time                | $t_{str}$  | 3 ms Max.  | $T = 0$ at 90 % $V_{CC}$   |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |
| Frequency aging              | $f_{age}$  | $\pm 3 \times 10^{-6}$ / year Max.   | +25 °C, First year   |  |                   |                   |                   |          |         |       |       |          |        |      |      |  |                   |                   |                   |          |       |       |       |          |      |      |      |

[Model : SG2016 / 3225 / 5032 / 7050CAN]

Product name SG2016CAN25.000000MHzTJHA

(Standard form) ① ② ③ ④⑤⑥⑦

- ①Model ②Output(C: CMOS) ③Frequency ④Supply voltage  
 ⑤Frequency tolerance ⑥Operating temperature range  
 ⑦Internal identification code("A" is default)

|                               |                     |   |   |
|-------------------------------|---------------------|---|---|
| ④Supply voltage *See Figure 1 |                     | ⑤Frequency tolerance / ⑥Operating temperature range |   |
| T                             | 1.8 V to 3.3 V Typ. | DB*   | $\pm 25 \times 10^{-6}$ / -20 °C to +70 °C  |
| K                             | 2.5 V to 3.3 V Typ. | JG  | $\pm 50 \times 10^{-6}$ / -40 °C to +85 °C  |
|                               |                     | JH  | $\pm 50 \times 10^{-6}$ / -40 °C to +105 °C |

\* Please refer to Product number list on Full Data Sheet for available frequencies

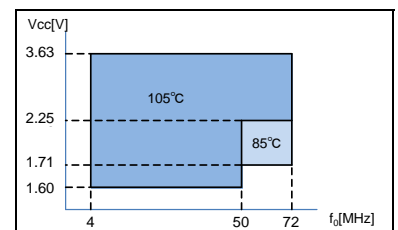


Figure 1 : The upper limit of Operating temperature and the related conditions

Please note that Supply voltage range ( $V_{CC}$ ) depends on Output frequency ( $f_o$ ) and upper limit of Operating temperature ( $T_{use}$  Max.).

[Model : SG-210STF]

Product name SG-210STF25.000000MHzY

(Standard form) ① ②③ ④ ⑤

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

|                               |                     |                      |   |
|-------------------------------|---------------------|----------------------|---|
| ③Supply voltage *See Figure 1 |                     | ⑤Frequency tolerance |   |
| T                             | 1.8 V to 3.3 V Typ. | S*                   | $\pm 25 \times 10^{-6}$ / -20 °C to +70 °C  |
|                               |                     | L                    | $\pm 50 \times 10^{-6}$ / -40 °C to +85 °C  |
|                               |                     | Y                    | $\pm 50 \times 10^{-6}$ / -40 °C to +105 °C |

\* Please refer to Product number list on Full Data Sheet for available frequencies

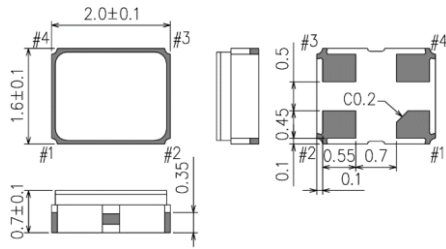
External dimensions

(Unit:mm)

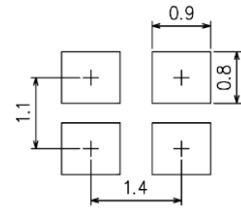
Footprint (Recommended)

(Unit:mm)

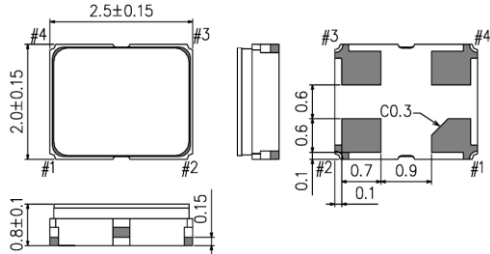
SG2016CAN



SG2016CAN



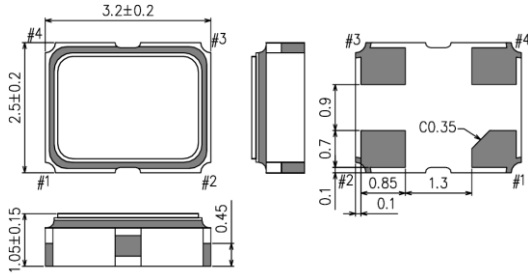
SG-210STF



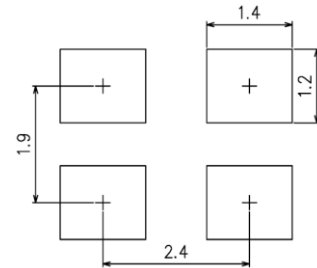
SG-210STF



SG3225CAN



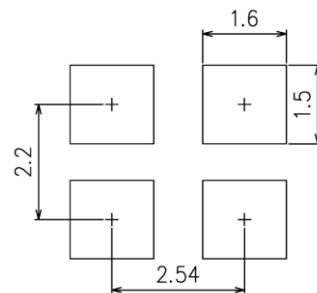
SG3225CAN



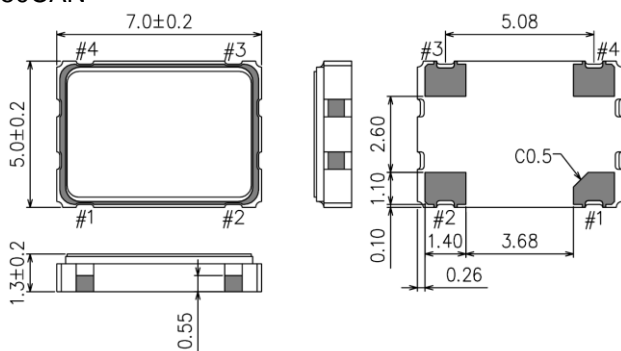
SG5032CAN



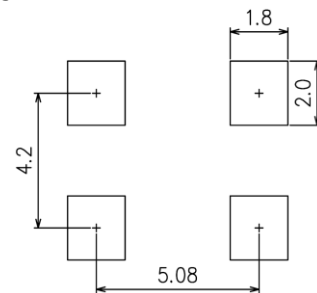
SG5032CAN



SG7050CAN



SG7050CAN



Pin Map

| Pin | Connection      | Function       |                    |                             |
|-----|-----------------|----------------|--------------------|-----------------------------|
|     |                 | ST terminal    | Oscillator circuit | Output                      |
| 1   | ST              | ST function    | Oscillation        | Specified frequency: Enable |
|     |                 | HIGH or "open" | Oscillation stop   | High impedance: Disable     |
|     |                 | LOW            |                    |                             |
| 2   | GND             | Ground         |                    |                             |
| 3   | OUT             | Clock output   |                    |                             |
| 4   | V <sub>CC</sub> | Power supply   |                    |                             |

■Notes: To maintain stable operation, provide a 0.01μF to 0.1μF by-pass capacitor at a location as near as possible to the power source terminal of the crystal product (between V<sub>CC</sub> - GND).

## 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.

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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.  |
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